

**INFLUENCE OF INSTITUTIONAL FACTORS ON STUDENT SKILLS
DEVELOPMENT IN PUBLIC TECHNICAL TRAINING INSTITUTIONS IN KENYA**

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THE DEGREE OF DOCTOR OF PHILOSOPHY IN EDUCATIONAL LEADERSHIP
AND MANAGEMENT OF THE KENYA METHODIST UNIVERSITY**

OCTOBER 2022

DECLARATION AND RECOMMENDATION

Declaration

The thesis is my own original work and has not been presented for a degree or any other award in any other university.

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Recommendation

We confirm that the work reported in this thesis was carried out by the candidate under our supervision.

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DEDICATION

This work is dedicated to my parents who inspired me to the teaching profession and entrepreneurship.

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ABSTRACT

Technical Training Institutions (TTIS) play a significant role in providing skills that are required in the various sectors of the economy. Knowledge and skills gap in any sector calls for empirical studies aimed at suggesting solutions to the problem. The study was guided by three objectives: to examine the influence of academic admission qualifications, to assess the influence of instructional methods and to explore the influence of instructional equipment on student skills development in public technical training institutions in Kenya and an intervening variable of instructional leadership styles. The purpose of this study was to establish the influence of institutional factors that include academic admission qualifications, instructional methods and instructional equipment while considering the influence of leadership styles on student skills development in Public TTIs in Kenya. The study was anchored on the Pragmatic philosophy. The convergence parallel mixed design methods was applied. Target population included 49 public TTIs, 348 lecturers, 4,199 students and 49 principals making a total of 4, 596 from which a sample of 11 TTIs, 11 principals, 100 lecturers and 100 students was determined making a total of 211 participants using Fisher (1998) and Berttlett et al (2001) formulae. Contacted participants included 8 principals, 80 lecturers and 80 students. Probability and non-probability sampling methods were used in sample selection. This included simple random for lecturers and students and census for principals. Research tools included: questionnaires for lecturers and students, interview schedule for principles, document analysis guide and observation guides. Delphi method was used in the selection and development the tools. Pilot study was conducted in Sikri and Keroka TTIs. Chronbach alpha was used to test reliability of the questionnaires and yielded test re-test results of 0.799 and 0.892 for lecturers and 0.848 and 0.853 for students. Reliability and validity test for qualitative instruments was conducted using a Likert scale. Response rate was at 86.25% for lecturers, 87.5% for student and 100% for principals. Convergence approach was used in data analysis. Quantitative data was analyzed using descriptive and inferential statistics. The study was anchored the Systems theory in education and the Decision making theory. Conceptual framework depicting relationship amongst the study variables. Hypotheses were tested using Chi Square, Kruskall Wallis, Man Whitney and Multiple Regression tests. Kolmoglov- Smirnov test was used for normality test. Variance inflation factor was used to test for multicolineality fitness for the data. Cronbach Alpha was used in managing Likert scale data. Qualitative data was arranged in themes and presented in narrative forms and direct quotes. Quantitative and qualitative results were compared, contrasted and interpreted. The null hypotheses were rejected and the alternatives were retained. A multiple regression test results showed that academic admission qualifications had the highest influence on skills development where p -value=0.035 followed by instructional methods, p =0.061, intervening variable, p =0.295 and instructional equipment variable with the least significance, p =0.554. Null hypothesis was retained: there is no significant statistical relationship between leadership styles and instructional methods and instructional equipment. The study thus concluded that TTIs are highly theoretical. Several recommendations were made among them admission qualifications need to be at par with other middle level colleges, the Technical institutions should offer specialized courses in the psychomotor domain and that TTIs should not be allowed to replicate university courses. To address issues of skills-gap the study suggested a curriculum perceptual implementation model. For further research, the study recommended among others a research on whether it is necessary to abolish the open policy for TTIs.

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ABBREVIATIONS

CBT	Competence Based Training
CBTA	Competence Based Training Authority
CBTC	Competence Based Training Curriculum
EFA	Education for all Conference
GIRNQF	Global Inventory of Regional and National Qualifications Framework
GOK	Government of Kenya
KCPE	Kenya Certificate of Primary Education
KCSE	Kenya Certificate of Secondary Education
KNEC	Kenya National Examination Council
KNQA	Kenya National Qualifications Authority
KNQF	Kenya National Qualification
KTTC	Kenya Technical Teachers Training College
MoE	Ministry of Education
NACOSTI	National Council for Science Technology and Innovation
NQF	National Qualification Framework
NSDC	National Skills Development Authority
SSAC	Sector Skill Advisory Committee
SPSS	Statistical Packages for Social Sciences
TTIS	Technical Training Institutes
TTTC	Technical Teacher Training College
TVET	Technical Vocational Education and Training

TVETA	Technical Vocational Education and Training Authority
UNESCO	United Nations Education Science and Cultural Organization
UNEVOC	United Nations Education and Vocation
WEFER	World Economic Forum Education Report

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The escalating unavailability of quality skills globally has left governments with no choice of reviewing policies and educational systems with regard to technical education skills development (United Nations Education Science and Cultural Organization [UNESCO], 2015). Globally, the World Bank (2020) observed that nations lack quality technical skills that meet global standards as most of the skills are not trained in formal institutions and if they were, they are not certified. This shows that nations are likely not to survive in the rapidly changing technological world with skills trained and certified by formal technical institutions and universities.

The term institutional factors refer to internal dynamics set for Technical Institutions as standards for students to participate in and meet the conditions established for graduation (Dortch, 2014). This thus study focused on academic admission qualifications, instructional methods, instructional equipment and instructional leadership styles as institutional factors believed to influence skills development most (Lucas, et al., 2012). Skills development is defined as a process which enables students to gain knowledge, practical skills, career ethics and attitudes required by industries (UNESCO, 2015). The terms, skills development, acquisition, learning and formation are used synonymously world-wide to describe the development of work-related skills or competencies. UNESCO (2015) defines skills development as the acquisition of practical competencies, knowhow

and attitudes necessary to perform a trade or occupation in the labour market. According to DeKeyser (1998), Fitts and Posner (2019), skills development takes place in three stages: cognitive stage in which the task is new to the learner, the associative stage in which a learner practices a skill repeatedly alongside a tool and the automation stage in which the learner masters a skill comprehensively.

studied.

Globally, technical education suffers low opinion when compared with other forms of education. Okware and Ngako (2017) established that the cause of the low rank of technical education has its origin on great scholars globally such as Plato and Aristotle in the year 427 BC. The scholars asserted that thinking, politics and philosophizing are the highest human activities while physical work was viewed as an activity for the province of slaves. This thinking perspective opines that the only way of solving problems in the world is through cognitive approach. Globally, this perspective seems to influence ministries of education, governments and citizens. The world seems to forget that the cognitive, psychomotor and affective domains belong to the same person whose body, mind and spirit function as a unity the invisible fortunes that associated with these form of education notwithstanding.

Despite the low opinion on technical skills, United States of America (USA) has exemplified itself as best in technical education skills development. This is in regard to the presence of well-organized secondary schools and an education system in which technical education curriculum is integrated at all levels of learning using the dual system

(Dortch, 2014; Pavlona, 2014). As a result, secondary school students are well prepared for tertiary education in regard to skills learning. Europe ranks best in tertiary technical education institutions using the dual system in which theoretical and practical learning are conducted concurrently (Dortch, 2014). This classical skills training model, dual, was developed by European Union of nations among them: Italy, Germany and the Netherlands (UNESCO, 2002; 2015). Dominancy of the model in the two continents alludes to the fact that success of skills development lies on the use of the model.

In Asia, skills development by technical institutions is sporadic. For instance, technical schools and institutes in Central Asia have similar curriculum to the European Union's (Organization for Economic Cooperation and Development, [OECD], 2011). Despite the disparity of skills development among nations in Asia, Malaysia leads in well-organized technical institutions and skills development. The skills development success of Malaysia is backed up with open admission policy, adequately trained lecturers, adequate training equipment, adequate supervision and current skill teaching models such as the Analyze, Design, Develop, Implement and Evaluate (ADDIE) model (UNESCO, 2017a).

Australia was observed as a strongly upcoming continent in skills training with consistent research and reforms, sourcing for training equipment for the world of work, close monitoring of skills training and application of transformational leadership style since 1980s (UNESCO, 2017a). As a result, Australia has a well-defined technical education structure on training programs and a well-established quality training framework to underpin quality assurance of its training system hence leading in the implementation of industry driven qualification in the world (UNESCO, 2017a). Oceania applies the

Australian TVET system hence similar TVET standards. The Antarctic records no technical education and training activity as it does not have permanent residents (UNESCO, 2019). While the other regions in the world developed technical education in diverse ways, most African countries were recovering from colonial hangovers and others were still under colonial rule.

Open admission policy is observed as a major factor that accounts for the existing problem of skills gap (Brewer & Comyn,2015) in countries such as Jamaica, Chile, Malawi, Philipines, India and Australia. Mack and white, (2019) observed a similar situation in Trinidad and Tobago in South America, Eicker et al., (2017) in sub-Saharan Africa, Oviawe, (2018) in Nigeria, Munishi, (2015) in Tanzania and Anindo, (2016) in Kenya. It is therefore very important that a scientific study that focuses on academic admission qualifications as an institutional factor on skills development.

Pertaining pedagogy for technical institutions in Africa, there is an agreement among technical education stakeholders and scholars that lecture method is mostly utilized in skills development especially in developing nations (Brewer & Comyn, 2015;Eicker, et al, 2017; Technical Vocational Education and Training Authority [TVETA], 2018). Globally, the higher the Gross Domestic Product (GDP) of a nation, the relevant pedagogical science knowledge (Almoaibed, 2019). The converse is true to developing nations since GDP for most nations in this category is as low as one dollar (UNESO, 2015). In attempt to respond to TTI pedagogical issues, global stakeholders are aware of this gap and seem to be working towards addressing the issues by developing pedagogical centers for technical education lecturers in both college and university levels. The

persistence of application of irrelevant instructional method calls for empirical studies to addresses the issue. It was therefore important that instructional methods applied in the TTIs be investigated by this study.

Instructional equipment was observed to be the main challenge in skills development as researchers described it as an expensive venture especially for developing nations worldwide (Demi, 2017, Eicker et al, 2017; International Labour Organization [ILO], 2015). For this regard, High Gross Domestic Product (GDP) nations in Asia such as Tajikistan and United Arab Emirates nations have less challenges in regard to instructional equipment (Alharbi, 2014; Safarmamad, 2019). Conversely, Africa nations are faced with inadequate instructional equipment in TTIs as observed by Mwila (2016) in Zambia where the student equipment ratio is incommensurable and instructional space of ten is used by over fifty students. Similar instances were observed in Kenya, Ghana and Nigeria among other nations (Amedorme & Fiagbe, 2013; Anindo, 2016; Oviawe, 2018). It was therefore important for this study to investigate the cause of these undesirable observation in the process of skills development and in regard to the issue of skills gap.

Globally, successful nations in skills development apply transformational leadership style (Ahmed & Ejaz, 2019; Joo, 2018; Temple, 2001). These include USA, European Union, Korea, and Malaysia among others. Moreover, there is an agreement among researchers that nations that apply transactional leadership style are struggling to meet the required international standards of skill development (Ahmed & Ejaz 2019; Burdenhost & Radile, 2018 2019; Eicker et al, 2017; Malachwenzi, 2018). In regard to this, lack of quality skills have manifested as lack of collaboration among stakeholders and failure to participate in

international meetings for skills development due to inferiority complex for substandard skills knowledge (Eicker et al., 2017; Malachwenzi, 2018; Ngati, 2015; Wambui, 2016). Globally stakeholders are in agreement that skills mismatch exists between training institutions and industries (Alshamsi, 2020; Brewer & Comyn, 2015; Mack & White 2019; Ngwato, 2020; Wanjohi et al., 2019). These is as a result of lack of systems thinking among stakeholders (Wamboi, 2016). Nevertheless, issues pertaining skills gap are being reported to date due to failure to address emerging issues as they arise (Eicker et al., 2017). It was thus imperative to carry out a scientific study to find out how instructional leadership styles influence skills development.

In regard to skills development there is a consensus among researchers that technical education sector experiences low levels of quantitative, communication, technical, leadership skills and knowledge globally (Eicker et al, 2017; UNESCO, 2015). These have been established as a result of open academic admission policy observed Yizengaw (2018) in Ethiopia, Ngoveni (2018) in South Africa and Muthoni (2015) in Kenya. The inadequate levels explicated include presence of highly qualified graduates with certificates of excellency but unable to deliver required services in their places of work (Anindo, 2016). It was thus necessary that issues in regard to skills development are

Kenya's technical education is assimilated from the British colonial government initiated in 1909. In regards to this, Kenyans observed that the colonial curriculum curtailed ambitions for educational emancipation and actualization hence resented the curriculum. Since then, technical education in Kenya has faced myriads of challenges. When there are problems raised about technical education, Lucas, Spencer and Claxton in 2012 points out

that the main problem is in the teaching of skills in classrooms, workshops and laboratories. Inspired by Lucas and others that the genesis of skills gap is institutional based, the study sought to understand how the studied institutional factors influenced skills development in public TTIs in Kenya.

In regard to skills gap in Kenya, the origin of the gaps can be traced from the basic education level. For instance, table 1.1 shows that there are more students qualifying for middle level colleges than universities. The students who did not qualify for university admissions are therefore supposed to join a middle level college in which technical institutions are categorized (TVETA, 2019). The students are not accounted for in regard to where they are and what they are doing hence one source of skills gap in Kenya.

Table 1.1

Analysis of KCSE Results from 2015 to 2021

Year	Number of candidates registered	Number of students with C+ & above	Number of students with C Plain & below
2021	1,218,892	145,145	1,073,745
2020	751,150	143,140	608,010
2019	699,745	125,746	573,999
2018	660,204	90,377	569,827
2017	615,772	70,073	545,699
2016	574,125	88,929	485,196
2015	577,253	169,492	407,761
Total	4,397,396	832,902	3,690,238

Source: Republic of Kenya (2018) KCSE – Examination Essential Statistics

The policy of the Kenyan government in Vision 2030 is to envision Kenya as middle level income economy like Malaysia where the Growth National Index Per Capita (GNI), in

2017, was US Dollars 9,650. In this concern, the system of education being faced out, the 8.4.4 system, whose one goal was to make the learner self-reliant, failed to achieve this vision. However, with respect to global qualification levels to university, (UNESCO 2017b) and the existence of technical institutes, many youths do not qualify to join university as shown in table 1.1.

Despite the concerted efforts made by the government of Kenya in tackling skills gap issues such as developing the TVET directorate, increasing annual budgetary allocations for TVET, establishing new TTIs in each county, equipping TTIs with modern equipment, deployment of more lecturers among other, issues pertaining to skills gap have persisted. It was therefore important that a scientific study based on the influence of institutional factors on student skills development in Kenya is conducted in order to generate evidence-based ideas aimed at tackling issues of skills gap in the country.

1.2 Statement of the Problem

Technical education is a major element in the economic and social growth of any nation globally. On this regard, Kenya envisions technical education as one strategies in the achievement of vision 2030 and as an enabler of development. Despite this, employers have raised concerns in regard to disparities between skills produced by TTIs and these required by industries. The 8.4.4 system of education whose one goal was to produce well skilled graduates failed to achieve this goal. Meanwhile the problem is hoped to be solved by the new system of education, 2,6,3,3,3, the question whether TTI have the capacity to adequately trained graduates is not answered. Despite the efforts the government had

made in addressing the issues as shown in the back ground of this study the issue of skills gap has persisted manifesting in presence graduates with impressive academic credentials but lacking employable skills and in physical structures collapsing and taking lives across the country notwithstanding the import of second hand textile products (Anindo et al, 2016; Maina, Kahando & Maina, 2016; Njoroge, 2019; Wambui, 2016). When such a phenomenon is observed (Lucas, et al (2012) assert that the main problem is in teaching of skills the classrooms, workshops and laboratories of the training institutions. Therefore, the urgent need to fill the gap that exists between skills produced by TTI and those required by the industry initiated this research.

1.3 Purpose of the Study

The purpose of the study was to investigate the influence of institutional factors on student skills development in public Technical Training Institutions in Kenya in order to produce evidence-based findings that are hoped to contribute to the mitigation of the problem of skills gap in Kenya.

1.4 Research Objectives

This study was guided by the following objectives:

- i. To examine the influence of academic admission qualifications on student skills development in public TTIs in Kenya.
- ii. To analyze the influence of instructional methods on student skills development in public TTIs in Kenya.

- iii. To assess the influence of instructional equipment on student skills development in public TTIs in Kenya.
- iv. To establish whether instructional leadership styles have influence on student skills development when combined with academic admission qualifications, instructional methods and instructional equipment variables, in public TTIs in Kenya

1.5 Hypotheses

The following hypotheses were developed based on the objectives of this study. The hypotheses were stated in their null forms.

- i. **Ho:** There is no statistical significant relationship between academic admission requirements and student skills development in public TTIs in Kenya.
- ii. **Ho:** There is no statistical significant relationship between instructional methods and student skills development in TTIs in Kenya.
- iii. **Ho:** There is no statistical significant relationship between available training equipment and student skills development in public TTIs in Kenya.
- iv. **Ho:** Leadership styles have no statistical significant relationship on student skills development when combined with academic admission qualifications, instructional methods and instructional equipment in public TTIs in Kenya.

1.6 Justification of the Study

Youth unemployment is a major problem affecting most young people globally. A functioning technical education curriculum will therefore benefit Kenya's technical skills development and the world at large. Currently, TVET in Kenya has a training policy, the TVET Act 2013. In this regard, the TTIs are placed in a position of providing quality skills but seem to have challenges in quality skills development manifested in the current skills gap raised by employers (TVETA, 2018). This study therefore was best placed in studying the institutional factors influencing student skills development in public TTIs in Kenya with the aim of contributing researched and evidence based knowledge suitable in tackling the issues of skills gap in Kenya.

Currently, the world has 1.2 billion youth and youth population by 2030 is projected at 1.3 billion as the population constitutes 16% of the total world population (United Nations [UN], 2018). In Africa, the youth population by 2030 is projected 42% of the 1.3 billion youth (UN, 2013) and over 80 million in East Africa, the year 2030 accounting for 35% of the total population. In Kenya the youth population, aged between 15- 34, is projected at 22.3 million by the year 2030 constituting 34.90 % of the total population (Government of Kenya [GoK], 2017). The challenge that will be faced globally, regionally and locally is how to match the growth of economically active youthful population with creation of quality jobs. Focusing on these predictions, the researched knowledge of this study is thus hoped to contribute ideas required in tackling the present and foreseen adverse youth unemployment crisis in Kenya through technical training institutions.

1.7 Delimitations of the Study

Geographically, this research was based in Kenya covering forty-nine (49) Technical Training Institutions registered and licensed by the Technical Vocational Education and Training Authority (TVETA), recognized by Kenya National Examination Council (KNEC) and High Education Loan Board (HELB) by the year 2018 as shown in appendix H. Other institutions recognized by the same authorities after the year 2018 were not part of this study. After a research visibility study, the study opted to include all the forty-nine TTIs in Kenya because there were few TTIs in each county and one had no TTI and the diploma student population could not constitute the sample desired. Moreover, the study was based in Kenya because there is a spatial distribution of this phenomenon of skills gap across the country.

The reason for the focus on third year students enrolled in Building and Construction and Clothing Technology courses is that they are believed to have acquired more knowledge, skills and experience in their various areas of specialization as they have been in the training for more than two years compared to Artisan and Craft students. The two courses were selected for the study because complaints raised by industries and employers across the country revolve around the two professions as shown at the background of the study and the statement of the problem. The study focused on lecturers, students and principals of public Technical Institutions of Kenya because they are main stakeholders in the process of skills development within TTIs. The study was delimited to the three objectives and intervening variable because the elements are the main inputs and through puts in the skill development process within TTIs. In this regard, academic admission qualifications,

instructional equipment and leadership styles are inputs while instructional methods are through puts.

1.8 Limitations of the Study

The study had three limitations that included respondent biases, Covid 19 pandemic and international language barriers. To curb these, participants were requested to be as honest as possible while responding to the questionnaires as the study was exclusively for academic purposes. The kobo tool box, an online data collection means, was used to collect data from student and lecturer participants during the actual data collection period. The strategy facilitated minimization of direct contact with the respondents and accelerated spread of covid 19 virus through use of print media as guided by the Ministry of Health. Zoom meeting were used in collecting data from the principals who could not be available for a face to face meeting. In regard to language barriers, the study focused on English speaking countries for available related literature to the study while ensuring a literature review balance of studies conducted globally.

1.9 Basic Assumptions of the Study

The study assumed that students, lectures and principals of public TTIs in Kenya were aware of the current phenomenon of skills gap and that they had firsthand knowledge and personal experience regarding institutional factors influencing student skills development in public TTIs in Kenya. The researcher also assumed that the principals and lecturers were implementing the institutional factors effectively, guiding students in developing right skills. The study further assumed that the respondents were sufficiently predisposed

in answering the questions appropriately and elicit right responses. Moreover, the study assumed that every student enrolled in TTIs was entitled to High Education Loan Board (HELB), hence enrollment, retention and completion of student training are enhanced. The study thus presupposed that a sufficient number of students and lecturers to participate in the study were available in the institutes of training in Kenya.

1.10 Operational Definition of Key Terms

Admission: Refers to the granting of opportunity for a qualified applicant to pursue education and training at a technical training institution in a given program (MoE, 2019) as per the (TVET ACT, 2013)

Academic qualifications: Refer to basic and tertiary education national examination results (Kenya National Examination Council [KNEC], 2018)

Cognitive domain: refers to mental skills and acquisition of knowledge by an individual encompassing knowledge, comprehension, application, analysis, synthesis and evaluation

Convergence approach: Refers to a mixed research model that combines qualitative and quantitative research designs and enables a discussion of both results by comparing and contrasting its results for better understanding of a phenomenon (Creswell, 2014).

Curriculum review: Refers to discussion of new technical education knowledge in the industry and integrating it with the formal curriculum by students and lecturers in the technical institutions

Leadership Knowledge: Quantitative and communication knowledge required by principals, lecturers and students for adequate skills learning

Leadership styles: Refer to type knowledge and skills required by principals in giving direction in regard to skills development

Lecturer: Means a person who imparts skills competencies, knowledge to students and has undertaken a recognized pedagogical accredited certification under TSC ACT (MoE, 2019; TVET Act, 2013). The title is used interchangeably with instructor, coach, teacher and tutor titles.

Industry: Refers to employers; company or individual hiring technical education graduates

Institutional Factors: Refer to admission requirements, training equipment, TVET curriculum and instructional methodology and all the relevant stakeholders in TVET education

Open admission: Refers to criteria used in enrolment to TTIs that is unselective in regard to admission grades and age though upward skills development mobility is by merit (EFA, 2010)

Phenomenon: refers to observed circumstances whose cause requires an investigation and for this study the issue of skills gap

Pragmatic philosophy: is a world view that combines postpositivism and constructivism philosophy principles in solving a problem (Ayiro, 2021)

Psychomotor domain: refers corporeal movement, harmonization and use of motor Skill areas that require learning by repetition and examined in terms of exactness, distance, steps followed and techniques in performance

Public TTI: Refers to an established training institution by the national government

maintained by the use of public funds, registered and accredited by TVETA
(TVET ACT, 2013)

Skill: Refers to the ability to perform a trade based task independently, effectively and efficiently (UNESCO, 2015)

Skills Development: is the process of acquiring knowledge, behaviors, practical competencies and attitudes necessary for performing a trade task (UNESCO, 2015)

Student: Refers to someone who attends a TTI for skills learning purposes (TVET Act, 2013).

Technical education: Refers to a more science-oriented course with emphasis on the application of scientific and mathematical principles (Kenya Institute of Education [KIE], 1990b)

Technical skills development: Refers to the process of acquiring basic, managerial, leadership, technical, quantitative and communication competencies with a goal of improving oneself in order to perform a certain occupation in the labour market (UNESCO, 2015)

Technical education: Refers to a more science-oriented course with emphasis on the application of scientific and mathematics principles as applied in fields such as engineering, electronics, motor-vehicle mechanics and automotive trade (KIE,1990b)

Technical skills: Refer to abilities and knowledge acquired by learning and used to perform practical tasks (KIE, 1990a)

Technical Training Institutions: Refers to institutions that offer Diplomas, certificates and artisan programs in a trade (TVET ACT, 2013).

Transformational leadership: Is a strategy leaders use to align followers with an organization's mission so as to optimize their performance by empowering them to bring the required change and results (Breevaart & Esperik, 2014; McCleskey, 2014)

Transactional leadership: Is a type of leadership in which the leader promotes compliance of his followers through both rewards and punishment (Odumeru & Ogbonna, 2013)

Triangulation: Refers to use of multiple methods data sources to develop a comprehensive understanding of phenomena (Creswell, 2014) and in this study the term refers to validating the study findings with the findings of literature reviewed.

TVET Principal: Refers to the top most leaders in the technical institute structure whose responsibility is to oversee the overall curriculum and policy implementation (TVET ACT, 2013)

Vocational skills: Are a less science-oriented course with more practical lessons usually 80% of the coursework and 20% of theoretical work, usually Artisan and craft levels, (KIE,1990a)

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter is a review of the related literature on the influence of institutional factors on student skills development in Public Technical Training Institutions in Kenya. The literature was reviewed based on the following topics: Global overview of technical education, global analysis of skills development, the influence of academic admission qualifications, instructional methods, instructional equipment, instructional leadership styles on student skills development in public Technical Training Institutions in Kenya, summary of the literature reviewed, theoretical framework and conceptual framework.

2.2 A Global Overview of Technical Education

According to Education for All (EFA ,2010), the purpose of technical education is to provide skills, knowledge and attitudes to trainees for effective employment in specific occupations. Globally, technical education thrives on international policies such as EFA policy number three advocates for life-long learning for self-reliance and sustainability and United Nations Education and Vocation (UNEVOC, 2015), which advocates for adequate preparations of trainees in skills domain for the world of work. Globally, there is lack of logical reason for the existence of technical institutions as failure to obtain a university entry grade seem to be an automatic qualification for Technical Education enrolment (Eicker, 2017) and in reference to table 1.1.

Nevertheless, institutional based technical education was first developed in the USA through the 1916 first Child Labour Law that aimed at giving a solution to child labour experience in industries (UNESCO, 2015). Through the 1917 Smith Hughes Act, high schools started offering vocational education programs by the support of the USA states leader President Roosevelt. The Act advocated for vocational education programs for future professionals who would not need a Bachelor's degree to their jobs. Courses offered entailed plumbing, mechanics, home economics and factory related skill courses. The curriculum comprised of technical, Business studies, science subjects, Mathematics, languages and support subjects such as communication and critical thinking skills. Diploma level of education ranked highest level of training. The state applied open academic admission policy in all TTIs. Kenya adopted this kind of curriculum, (KIE, 1990a), an indicator that the curriculum is not researched as established by Eicker in 2017.

This strategy limited upward mobility in the training as it was also set aside for migrants and poor children from rural areas (Defalco, 2016; UNESCO, 2015). John Dewey observed this kind of education that violated the main purpose of education as the curriculum implemented was undemocratic and dehumanizing. In this regard Negroes and marginalized youth were purposely trained to serve their masters (Defalco, 2016). Dewey thus advocated for both liberal and vocational education for all children emphasizing that better teaching and learning involved doing what you have learned and not mere book reading (Defalco, 2016). John Dewey's democracy and humane ideas on technical and vocational education were later reviewed and formalized by the University of Illinois (Simpson, 1966). The technical education review task force by the chairmanship of Dr

Simpson, a balanced technical and vocational curriculum based on the three objectives of learning according to Bloom's Taxonomy: the cognitive, psychomotor and normative domains was developed. The implementation of this curriculum led to the end of skills gap in the USA by the year 2000 (UNESCO, 2015).

Globally, technical education has grown due to the technological challenges that led to review of educational systems, research and continuous review of technical and vocational ACTS. In regard to this, Europe developed technical education through international convergence strategy of six nations among them: Italy, Germany and Poland in 1970s. This included development of similar institutions of training, curriculum, trainers, instructional methodology, funding strategies and similar training equipment. America developed technical education, currently known as Career Technical Education (CTE), through vocational education ACTS. The conglomeration was successful through the dual system of training in which theory and practical learning is conducted concurrently (European Centre for the Development of Vocational Training [CEDEFOP], 2015).

Globally, the success of technical education development and sustainability lies on research. This is demonstrated by the success made the European Union after calling for research paper presentation in a conference among them Professor Eleonora Guasani's on the Union and Launching of the European Social policy and Georges Saunier's on the Place of Vocational Education and Training on Françoise Mitterrand's idea of European Social Space in 1981 and 1986 (Wollschleger & Reuter-Kumpmann, 2004; CEDEFOP, 2002). Despite this progress in technical education development, technical education continues to be allotted a low profile in Europe. For instance, Pouliakas (2014) shows that

technical education is perceived as a laborious, inferior and manual labour -based type of education set apart for low school achievers. Despite this observation, technical education in Europe is associated with great fortunes compared to other forms of training. In regard to this, Pouliakas (2014) attested that students graduating from technical institutions have less trouble in getting jobs unlike their counterparts in liberal studies that enjoy high social standing in the society but with high trouble in getting jobs. This statement shows cognitive domain power is not the only way of solving problems in our world today but also psychomotor and normative-based powers.

Central Asia developed TVET by the help of the European Union in which the dual system was adopted (OECD, 2016). Admission to technical training in Asia is open just like other parts of the world. Open admission policy has pros and cons. In this concern, Habiby and Wenning (2018) observed that admission to technical institutes was open in terms of basic education grade obtained and age. This resulted to inferiority complex of the nation and individuals when competing in the world of business and industry. To curb this problem, continuous improvement of skills development in the country was ensured through conferences and workshops.

While little is studied on instructional methods and training equipment in technical training institutions in Asia, (Joo, 2018 ;OECD, 2016) show that most countries in this continent have quality technical skills. Some of these countries include: Malaysia, Japan, China, Israel, Dubai, Korea, and all Central Asia countries such as Kazakhstan, Kyrgyz republic and Tajikistan.

Australia is ranked best globally in consistent research and reforms, sourcing for training equipment for the world of work and close monitoring of skills training since 1980s (UNESCO, 2017a). As a result, Australia has a well-defined technical education structure on training courses and a well-established quality training framework to underpin quality assurance of its training system hence a leader in implementation of industry driven qualification in the world. Oceania continent applies the Australian technical education system hence similar training standards and outcomes. The Antarctic continent being a continent without countries and no permanent residents, records no technical education activity (UNESCO, 2017a).

While the other parts of the world developed Technical education, most African countries were recovering from colonial hangovers and others were still under colonial rule like South Africa. Focusing on the Education for All policy goal number three which advocates for life-long learning, (EFA, 2010), West Africa leads in Skills development and opportunities in Africa based on the number of researches conducted for which Nigeria is leading (Achieng, 2012). This is in exemption to African technological giants such as Algeria, Tunisia, Morocco, South Africa, Egypt, Mauritius and Madagascar (UNESCO, 2019).

In regard to institutional factors and skills development, Africa seems to have myriads of challenges facing training institutions that include low opinion on technical education hence low entry academic behavior to TTIs, obsolete and inadequate training equipment, inadequately trained instructors, overcrowded training facilities and meager annual budgetary allocation (1%) by governments (Eicker et al., 2017).

In East Africa, Tanzania embraced technical and vocational education earlier among the Eastern Africa nations guided by the “Ujamaa” Philosophy (Nyerere, 1967). However, Munishi (2016) opines that Tanzania exhibits low TE hence making the skills less relevant to the global skill standards. In regard to this, Habiby and Wenning (2018) asserts that low level of TE leads to inferiority complex in business and industrial competitions globally.

While other East African countries such as Rwanda, Burundi and Southern Sudan struggled with civil war, Kenya progressed in the development of the TE by constitution and through the devolution policy (UNESCO, 2019). Currently, Kenya leads in technical education skills development in East Africa with the presence of a well-defined policy, presence of a technical teacher training college in East Africa, a technical training institution for the deaf in East African region, a TTI in each constituency, the presence of ten national polytechnics, six technical universities (TVETA, 2018; UNESCO, 2019). Within Kenya, the Rift valley and Central regions take the largest share in skills development in the country as they host the largest and oldest TTIs in the country as shown in table 3.1 (TVETA, 2018).

The issue of skills gap seems to be a global issue raised by industries and un-addressed since the issues are being reported to date (Eicker et al, 2017; Handiso & Cal, 2021; Robertson & Frick, 2018; TVETA, 2018). In regard to this concern, the following questions can be raised: Are the employers part of the problem or part of the solution to the skills gap? What is their contribution towards skills gap? Based on the utilitarianism and consumerism ideologies on production and consumption, the employers seem to be

concerned of the end product of technical education, victimizing graduates, and not the rest of the process which includes inputs and through puts as the systems theory suggests.

Despite the challenges faced in skills development, the policy makers globally aware that skills development cannot be achieved without well-developed technical education training institutions (Eicker et al., 2017). As a result, all nations that had not developed TVET structures in Africa and other parts of the world such as Jamaica, Chile, Australia and Philippines have now embarked on developing the policies that include qualification frameworks and TE teacher training (Brewer & Comyn, 2015; ILO, 2015).

Global information in regard to skills development has revealed that skills gap is a global issue characterized by myriads of challenges that are not entirely institutional. The factors include; systemic, curriculum, leadership, political, social, student and economic factors. Therefore, continuous research on the issue of skill gap is inevitable. In this regard, the subsequent parts of the study explore sources of information in regard to the objectives and variables of this study globally in the quest of addressing issues of skills gap in Kenya.

2.3 Global Analysis of Skills Development

The terms skills development, acquisition, learning and formation are used synonymously globally to describe the development of work-related skills or competencies through Technical Education and Training. According DeKeyser (1998); Fitts and Posner (2019), skills development takes place in three stages: Cognitive stage in which the task is new to the learner, the associative stage in which a learner practices a skill repeatedly alongside a tool and the autonomous stage in which the learner masters a skill comprehensively. In

regard to this, Simpson's (1966) research presented to the Illinois University, asserts that effective TE in the USA is based on Blooms Taxonomy in which cognitive, psychomotor and the affective domains are considered when developing the curriculum. Simpson's work led to the development of the USA technical education curriculum which comprises of technical, business studies, science subjects, Mathematics, languages and support subjects such as communication and critical thinking skills. This gives an example of an effective technical education curriculum globally.

Various scholars have made different observations regarding skills development. In 2012, Lucas et al observed that when complaints in regard to technical education are raised, the main problem is based on instruction in classrooms, workshops and laboratories. Moreover, Okware and Ngako (2017) observed that over the years TE received low opinion as the genesis is traced back to great scholars such as Plato and Aristotle in the year 427 BC. In regard to this observation, Plato and Aristotle asserted that thinking, politics and philosophizing are the highest human activities and physical work as activities for the province of slaves. In 1999, Drucker asserted that it is the human resources with optimal mental strength and not human resources with physical skills that determine the economic strength of a country. These assertions have dominated Ministries of Education, great scholars, religions, hence an indicator of a significant relationship between institutional factors and skills development.

Globally, skills development is faced with myriads of challenges that included curriculum, leadership, management, technology and stakeholder based challenges (ILO, 2015). In regard to curriculum, Brewer and Comyn (2015) established issues of integrating core

work skills into TVET Systems in Jamaica, Chile, Philippines, India and Australia which lacked standard skills assessment tool, training colleges, adequately trained teachers with a capacity of balancing theory and practical lessons. Mack and White's (2019) observed skill deficiency among students in Trinidad and Tobago in South America due to poor skill knowledge foundation at secondary school level. In Asia, Safarmamad (2018) shows that in Tajikistan, technical education curriculum and training through Technical Institutions does not matter in obtaining an industrial job. This is because skills development and training is considered a waste of time by the youth.

Similar, observations were made in Tanzania by Munishi (2016) in which secondary school education was deemed inadequate in preparing learners for tertiary education in which TTIs are categorized. Moreover, instructional language in most developed countries was observed as a challenge to student skills development in Ghana, Rwanda and Tanzania among other nations (Adogpa, 2016; Munishi, 2015; Obura 2003). The study indicated that the students have difficulties in translating and applying the skills they learned to their own context. In this regard, the question as to why Bibles were translated into all indigenous languages of the world and not educational books arises. In this regard, students stagnate in the process of skills development due to policy issues that require students to pass instructional language examination before proceeding to the next levels of learning.

Globally, numeracy factor has been observed as the main challenge among students in skills development process. For instance, Ngoveni (2018) established quantitative deficiencies among students in South Africa that included inability to perform simple

mathematical calculations such as calculating distance and speed, simple algebra sums in which such a mistake was noted $(a+b)^2 = a^2+b^2$ and $x+y= 2xy$. Similar challenges were observed in Ethiopia by (Yizengaw, 2018), Botswana (Koobonye ,2020), Cameroon (Zauliatou 2017), Tanzania (Tambwe, 2017), Kenya (Karumba, 2014; Muthoni, 2015). These observation thus reveals that there is a relationship between academic admission qualifications and skills development.

The Permanent Working Group's (2017) conference sought to understand the future of technical education and training skills in Kenya. The members agreed that skills gap exists and it is manifested as a mismatch of industrial and TTI skills. The private sector raised issues of public TTIs producing unemployable skills. As a result, the private sector is reluctant in offering pubic TTI students internship and job opportunities. Moreover, failure of the private sector to offer internship opportunities to students was also raised as one of the causes of skills gap in Kenya. To address this gap, the study thus endeavored to find out the role of private and public sectors in student skills development.

Stakeholders in Kenya are in agreement that skills mismatch exists between TTIs and industries. For instance, the Toyota Company in 2018 showed that there is need for partnership between the government and the private sector in developing skills through TTIs which is not yet realized. Additionally, public and private partnership required to align education inputs such as funds, skill lectures, learners, and curriculum as well as the training outcomes as knowledge, attitudes, experience, creativity and innovation. Systems thinking in this regard seems to be lacking among stakeholders. For instance, Ngati (2015)

showed that in Botswana, industries and government lacked collaboration manifesting as lack of rationale and credibility.

Training facilities as part of skills development process includes classrooms, workshops, laboratories, libraries and assessment rooms. Developing nations seem to lack such essentials. In this regard, Mwila (2016) established that a classroom meant for a capacity of ten students is occupied by over fifty students in Zambia and students were not supposed to complain about this state of affairs in the institution (Alharbi, 2014; Amedorme & Fiagbe, 2013; Ayonmike et al, 2014; Musingwa & Andala; 2020; Mwila, 2016; Nyizeyimana, 2016)

Technical education in Kenya seems to be developed when compared to other nations in sub-Saharan Africa. Despite this, the education system is faced with a number of challenges such as over described curriculum in which important subjects such as “Life Skills” are offered but not examined by KNEC and as a result students do not take it seriously. Consequently, Mohammed (2017) observed that technical education graduates have workplace challenges. Moreover, Wanjohi et al. (2019) study established that practical lessons are taught theoretically in Kenya where lecture method was preferred most. In regard to inclusivity in skills learning, Chege and Kiiru (2013) observed that the curriculum was non inclusive of working students that wished to upgrade their studies. To address this issue, distance learning was initiated by the institution.

Sources of information reviewed in regard to skills development reveal that various ministries have concerted efforts towards the processes of skills development in their

various nations. Despite this, skills development seems to lack systems thinking in regard to consolidation of inputs, through puts and outputs of technical education skills development. Skills development is thus not a “stand alone activity” but a system which involves a combination of multiple and relevant elements for the realization of its goals and objectives. In this case, the elements include; academic admission qualifications, instructional methods, instruction equipment and the intervening variable of instructional leadership style. The subsequent sub sections thus present an in-depth review of these elements and their influence on skills development.

2.4 Influence of Academic Admission Qualifications on Student Skills Development

Kenya Certificate of Secondary Education (KCSE) constitutes basic education structure in the national education system of Kenya. Basic literacy and numeracy are key factors in skills development. A grade scored in KCSE can be an indicator of either high or low quality of skills. In most instances high grades are indicators of quality skills. Therefore, the output of Technical Education critically depends on academic admission qualifications. The outcomes, moreover, depend on other forms of inputs such as lecturer qualifications, infrastructure and finance factors.

In this study, academic admission qualifications are thus an important variable to be studied in relation to skills development. UNESCO (2019) shows that academic admission qualifications to TE globally are open in terms of academic qualifications, age and gender. The two major global policies, EFA, (2010) and United Nations Sustainable Development Goals (SDGs) support the open admission policy globally. While EFA goal number three

advocates for life-long learning for everyone, SDGs goal number eight advocates for decent work and economic growth which are part of TE curriculum (UNESCO, 2015). The two policies seem to be challenged at the implementation stage as literature reviewed show that not all students admitted to TTIs succeed. Moreover, the big four agenda that include: Affordable housing, Manufacturing, Universal health care and Food security according to Sessional paper no.1 of 2019 (GoK, 2019) seem to be faced with multiple challenges. The question whether the government will succeed in achieving the goals in the presence of multiple problems raised in regard to skills training in TTIs requires empirical studies.

Nevertheless, the four big agendas seem not to have adhered to Tylor's 1949 rationale which states that before an education system and policy is put in place, the following questions must be answered: What education goals or objectives should the training institutes seek to attain? How can the curriculum be developed to enable attainment of the goals? How can the knowledge or curriculum content be organized for effective instruction? How can the efficiency of learning skills be assessed? Therefore, the roadside declarations on education need to be accompanied with relevant curriculum, well spelled education goals, methods of instruction and right assessment approaches in order to aid in tackling the problems of skills gap in Kenya.

Globally, open access policy to technical education has given all youths an opportunity to pursue tertiary technical education. Despite the fact that there are no restrictions for entry to technical education world-wide, upward mobility in the training is by merit. In countries like Turkey, all students entering higher vocational education need to obtain a pass in

basic level of Turkey's English, Standard English Language and Mathematics (Sarıkaya & Yildirim, 2019). In this regard, progress from one level of training to another requires students to obtain at least a pass in all subject including mathematics and English language which have been observed most challenging to students in TTIs in Nigeria (Amedorme & Fiagbe, 2013). Sarıkaya and Yildirim (2019) made a similar observation in Turkey in which Mathematics and English Language was not only an entry requirement but also an upward skills development mobility requirement. This observation shows that globally skills development strategy in TTIs is similar.

Despite the presence of international policies governing Technical Education, Eicker et al. (2017) observes that TE in Sub-Saharan Africa cannot be explained at international levels due to multiple inconsistencies in regard to the training that include lack of clear training policy, funding and different in TE management strategies in the among the nations. In Kenya, the policy institution, Public Service Commission (PSC) for TVET graduates, has serious discrepancies between the TVET admission criteria and the employment policy. This observation contradicts international policies such as EFA that advocates for occupational equality in the society. The observation thus shows one cause of skills gap in Kenya. Additionally, the observation shows that causes of skills gap are not only institutional but ecological since the government TVET agencies are involved. Thus, the question as to why the government admits students to courses for which they will not be employed by the same government reveals another cause of skills gap in the country. This observation requires another study as the observation is beyond this study.

Al-Saaideh (2016) observed that in Tajikistan, a country in Central Asia, few youths enroll for technical education annually. The study thus endeavored to finding out the reasons for avoidance of Technical and Vocational Education in the country. Findings showed that TTIs were set aside for low grade academic achievers. University entry was embedded for those who did not obtain university entry grades unlike Kenya in which universities offer certificate and diploma courses. The study further established that students enrolled for technical courses do not master the skill they study because of low entry behavior other factors such as curricula and parental influence. The study also established that same students discouraged other students from enrolling for similar courses as the course work was a challenge. These findings can thus be used to show that success in TTIs depend on adequate basic education preparation. Thus, the adequate the initial level of education preparation is, the higher the quality better the skills developed.

Similar observations to Al-Saaideh's (2016) findings were established by Burdenhost and Radile, (2018) in South Africa. The findings showed that TE curriculum was set at a higher level comparing to the students' aptitudes. In this regard, the learner's ability to assimilate the content was not considered by the curriculum developers who were to even TE graduates. The study thus recommended a review of the curricula in order to align the level of curriculum content to the learners'.

While the study observed that students discouraged others from pursuing challenging technical education programs in Tajikistan, the findings showed that that the relationship between students and teachers need to be improved due to instances of student harassment. The relationship thus should create a platform on which teachers advise students on

matters related to their careers rather than students receiving guidance from their peers. Similar observations were made by Malechwani (2018) in Kenya in which deans of students failed to address harassment issues.

Daoudou (2018), observed that TE in Cameroon had multiple issues. The study thus endeavored to study the state of TVET in Cameroon in order to suggest solutions to the problems facing TVET in Cameroon. The study focused on several objectives among them influence of trainee admission qualifications on skills development. The study findings indicated that admission to technical courses was based on a competitive examination administered prior to admission. In addition to this, the students' academic credentials and education background were studied against courses applied for before admission. Most of the students admitted were satisfied by this approach but some not because they were not admitted to the rightful courses for lack of quorum and capacity to accommodate large number of students in the available classrooms.

As a result, the students opted for a different course which they were not prepared for. Similar situations could be one of the causes of skills gap in Kenya. The study also ascertained that most students were not aware of courses offered in technical institutions. This alludes to the fact that career guidance in basic education levels was not offered. One strength of this study is that it focuses on the social aspect of admission process which revealed that it is not only academic admission grades that influence skills development but also economic and social factors. To fill these gaps, another study will be required.

A study conducted by Munishi (2016) in Tanzania sought to establish factors contributing to lack of employable skills among technical graduates in Tanzania. Using the historical dialectical materialism approach, the study found out that poor training at primary and secondary school levels that manifested in incompetent teachers was the main cause of the problem. The study further established that students that are weak and poor in form four and form six continue to join technical teacher training institutions hence production of inadequately trained skill lecturers. The study thus recommended the improvement of primary and secondary education and collaboration of Tanzania National Council for Technical Education and the Technical Regulatory Authority in addressing challenges facing skills development in Tanzania. The results of this study has shown a significant relationship between academic admission grades and student skills development in Tanzania. This study will thus endeavor to establish whether it is the same case in Kenya.

A study carried out by Mosoti (2017) sought to establish the influence of TVET centers of excellence and non-excellence on students' performance at the national examination in Nairobi County Kenya. The study found out that the KCSE results influenced performance according to the principals and lecturers hence suggesting increase of academic entry grade. The weakness of the study is that the research did not comprehensively address the academic admission qualifications. The study applied qualitative research design in studying the phenomenon that requires a mixed research design given the fact that there are two major examination involved that require a co-relational study in order to decide whether or not the admission grade influence skills development. The study thus endeavored to address this gap using a mixed research design.

Ringera (2017) carried out a study in Meru County Kenya to establish the relationship between performance in secondary school Mathematics and Diploma in structured programming unit in technical institutes in Meru. The study's statement of the problem showed students that did not perform well in Diploma in Communication Information Technology (DCIT) had failed in Mathematics at KCSE. The lecturers opined that the reason for failure in the course is poor performance in Mathematics at KCSE and as a result the lecturers made no effort of teaching the students as they believed that they will still fail. These impeded students from progressing to the next level of study. The stagnation led to low enrolment in the programme. Hypothesis tested indicated is no statistical relationship between KCSE Mathematics results and poor performance in Diploma Communication Information Technology (DCIT) module one. The researcher thus recommended a study on the real causes of failure in the subject would be required. Similar findings were established by Yi et al. (2015) in China in which decline of student enrollment in computer science before the students completed their first year in China was observed. The study established the reason behind this as poor academic performance at preceding levels of learning. To fill this gap in Kenya, the study studied KCSE KNEC results against KNEC Technical results to find out if there was any statistical relationship between the variables.

Ngure's (2015) study on empirical evaluation of TVET processes in Kenya that focused on a media debate about the relationship between business centers and training practitioners to the perceived discrepancy of skills required by industries and those produced by the training institutions. Focusing on key stakeholders of technical education,

the study findings showed that the skill training institutes face myriads of challenges such a low-quality input among them low entry grades that make it difficult for the institutes to respond adequately to the industry's needs. The study recommended an analysis of all training inputs and judge whether training is worthwhile. The major strength of this study is that it focused on both employer and training students of whom are the main target populations in any skill-based research. One main weakness of the study is that there was no involvement of the training principals who are overall overseers of the process of skills development. To fill this gap, the study will employ an intervening variable of leadership styles focusing the role of instructional leadership styles in the process of skills development.

The literature reviewed in regard to academic admission requirement has addressed issues pertaining skills gap and suggested solutions. Issues related to skills development are systemic involving a wide range of elements among them instructional methods. Focusing on Lucas et al. (2012) assertion that problems raised in regard to skills development are associated with inadequate classroom teaching and training in workshops, it is therefore imperative to examine the influence of instructional methods on student skills development.

2.5 Influence of Instructional Methods on Student Skills Development

Simpson's (1966) defines technical education instructional methods as strategies used in transmitting skills and knowledge based on Bloom's Taxonomy objectives of education categorized as cognitive, psychomotor and normative. This definition shows that technical

education requires multiple methods of instruction. Simpson's (1966) approach seem to be inspired by (Tyler's, 1940) rationale which requires curriculum planners to define knowledge and skills transmission strategies before implementing any form of education. In regard to instructional strategies, UNESCO-UNEVOC, (2015) envisions technical education curriculum as psychomotor domain in which demonstration method is the main instructional method.

Cedefop (2015a) advises that every technical education lecturer needs to understand different types of instructional methods and various types of theories of learning for effective teaching of learners with diverse learning needs. For this concern, a TTI lecturer needs to be well trained in pedagogical sciences in which learning theories such as cognitive, behavioral, constructivism, and social theories are emphasized. Moreover, a skills lecturer needs to understand levels of learning by Bloom's (1956) Taxonomy that include recall, comprehension, application, analysis, synthesis and evaluation or creativity. While studying the influence of instructional methods on skills development, the study endeavored to understand how other researchers have addressed this gap.

A study conducted by McCrone et al. (2015) in the United Kingdom (UK) defines technical education from a constructivist point of view in which skills learning is a psychomotor based process where learners construct occupational knowledge rather than acquiring it passively. Based on this perspective, the study sought to understand how principals, students and lecturers understood teaching and learning of technical education at tertiary levels and how skills assessed was carried out. Using a qualitative approach of phenomenological design, the study established that effective skills learning was a

systemic process achieved by different elements in the system performing their duties as one. Findings showed that effective instructional method depended on the type of curriculum designed, teacher knowledge and understanding of the curriculum, learning environment, curriculum objectives, teacher traits and teacher role distribution.

The study opined that an effective teacher in technical education requires four types of knowledge for effective teaching. These included: coursework, instructional, technological and contextual knowledge. Additionally, the study asserted that effective teaching requires a teacher to reflect upon personal qualities such as interpersonal relation abilities with professional knowledge acquired. At the same time, the study opines that cognitive knowledge is important in technical education and therefore technical education students need to acquire the knowledge through research, extra practical work in the laboratories, workshops and individual part-time knowledge and skills search in relevant places. These recommendations are well stipulated in the Kenya Technical Education course syllabi by the Kenya Institute of Education and despite the fact that much of the syllabi content is analogue, it is not adequately implemented. The weakness of this study is that the study failed to address instructional method for generic skills such as communication skills that are essential in skills development process. It was therefore important that this study sought to understand how students participated in the process of skill development and how instructional methods influence skills development in Kenya.

Sarikaya and Yildirim (2019) sought to understand how technical education principals, lecturers and students understood teaching and learning at higher vocational schools in Turkey. Findings showed that all of them agreed that product-oriented process yielded

greater outcomes in skills development as compared to process-oriented learning approach. The product-oriented learning process involved teacher roles in skills development such as developing lesson plans and preparation of instructional materials, teacher knowledge, curriculum design, instructional methods and arrangement of learning environment. Findings based on product-oriented learning process created an environment for learners to acquire job competencies, job knowledge, skills code of conduct, and job search abilities such as writing of internship and permanent job seeking letters. The Turkey skills learning approach support the common saying of “the end justifies the means”. This approach of skills learning advocates to balanced learning as (Chandio et al., 2017) explained that both process and product learning orientations are important in skills learning and effective when monitored and supervised.

To achieve these, Mwangi (2015) opines that technical education pedagogy requires that the lecturer develops a course outline from the syllabus, prepares schemes of work, lesson plans, teaching notes, instructional materials and relevant training equipment. This preparation was deemed important for the selection of relevant instructional methods for effective content delivery. In regard to this, supervision of teaching in TTIs by TTI principals is important and without which instruction could pose a challenge considering the X and Y principles of Macgregor theory which opines that human being are lazy animals which dislike work but like money and not unless they are supervised no work can be done especially in regard to the X category of employees. To fill this gap the study endeavored to study training records such as records of work and inventories in order to discern the main cause of skills gap.

In other parts of Europe, CEDEFOP (2015b) established that technical education pedagogy is under researched. These findings contradicted other studies that showed that technical education in Europe met the global standards such as (Pavlon, 2015). To address the paradox, the CEDEFOP resolved to understand obstacles to teaching and learning technical and vocational subjects in Europe. Italy, Malta, Romania, Ireland, UK-England Sweden, Hungary, France and Slovenia were among the countries selected for the study. Findings showed that only Slovenia applied unique instructional methods that included inquiry learning, learning by doing and constructivist approaches in which teachers based their teaching on the creativity of students and how they applied the knowledge. The study also noted students who could not cope with the learner centered teaching method as some learners could only study what they were capable of doing and any challenging task was skipped. This could be the reason as to why lecturers are observed skipping study topics in Kenya by (TVETA, 2018). To tackle the problem, the study suggested use of coaching method to such learners, embedment of new technologies into the curriculum and use of multiple methods of teaching to enable accurate instruction and assessment of student skills. The study also recommended that skills learning should not be limited to classroom and advocates for the application of (Bloom's, 1956) Taxonomy levels of learning in which the learner should be able to recall, understand, apply, synthesize, analyze and create knowledge and skills.

As a remedy to such instructional challenges, Michael and Marino (2017) advised that skill learning should not be restricted to classroom teaching. This means that teaching can be done through observation in an apprenticing environment. And if this is the case, can

quality skills in developing countries be learned through observation? What do the countries have to create such an impact in a learner? Do institutions have adequate equipment and are industries well equipped to enable a learner learn adequately through observation? To fill this gap, another study will be required.

A study carried out in the Caribbean countries and specifically Jamaica by Roofe and Ferguson (2018) sought to explore ways in which Education for Sustainable Development (ESD) was infused in the TVET curriculum at lower secondary levels. The study established that the curriculum lacked alignment among components that included objectives of TVET education, learning experiences, assessment and methodologies that reflected Educational Sustainable Development of Jamaica. The study recommended adequate training of teachers to help them understand curriculum documents that include syllabus and lesson plans. This could enable easy integration of ESD principles and an integration of more ESD themes in the resources and technologies curriculum to ensure that technical education and ESD yields relevant benefits. Focusing on teaching strategies, the study reveals that instructional strategies were one of the main causes of skills gap in Jamaica since teachers lacked adequate training. The same findings were observed by TVETA (2018) in Kenya. To address the issues pointed out, this study sought to establish whether the skills issues pointed out are same causes of skills development in Kenya.

According to sessional paper number one of 2005, effective knowledge and skills acquisition requires media support. Saefudin and Sumardi's (2019) research underpins this statement by asserting that media is an important tool in the process of teaching a technical subject. This involves an enhancement and understanding of skills imparted

through simulation and promoting teacher-student active participation in learning. Simulation method of instruction on its own is believed important in creating understanding of knowledge and molding technical education students' attitudes and behavior. The study further asserts that simulation necessitated by media is cost effective as it can be offered online and offline thus replacing expensive machines and equipment. The use of media in technical education instruction thus utilizes observation method of instruction. The knowledge and skills acquired can further be reinforced through group discussion, question and answer by the involvement of lecturers and then developed further in the world of work. For instance, students can watch a video recorded on how to repair a mobile phone. In the process of learning the students will be required to take notes for group discussion. After which the students will be enabled to determine a concept, design the project, collect materials needed, manufacture the item and finally test their knowledge on the product produced.

In the process of skills learning, Saefudin and Sumardi (2019) asserts that behaviorism and creative thinking theories need to be adopted and applied in teaching skills. Behaviorism theories such as the classical conditioning theory by Pavlov requires effective stimuli to motivate students to learn such as current technological knowledge. Eicker et al. (2017) shows that Sub-Saharan African countries are still using the colonial government curriculum whose sole purpose was to create wealth for their empires. Similar to this observation is Ismael et al. (2018) study which shows that the technical syllabus in Malaysia requires learners to be taught how to repair a television, a machine that is technologically overhauled. Televisions existed during the colonial period. The

content is obsolete thus leading to students being ill trained hence obsolete skills for the current job markets.

Similarly, the study advocates for the application of creative thinking theories that include Albert Bandura's theory of learning which asserts that human beings learn better through observation. Through this, learners can practice and construct their own knowledge. This study therefore endeavored to understand how well lecturers and instructors in public TTIs in Kenya are prepared to teach the subject allocated and how well they are grounded in education psychology.

A study carried out by Ahmed et al (2015) in Malaysia sought to identify technical education students' preferences on conducting automotive courses teaching and learning sessions in a workshop in Malaysia. The study findings revealed that the students had peculiar characteristics that needed to be considered when selecting teaching methods. In most cases, the learners were observed to be visual oriented. They preferred learning from what they see like pictures, video demonstrations and films. The study also found out that students preferred demonstration, sketching and question techniques at the introduction. At the body level, the students preferred small group approach, module and problem-solving approaches. At the conclusion, the learners preferred re-explanation, question technique and report writing.

While Roofe and Ferguson (2018) also established that interactive and practical methods of teaching were preferred and yielded quality skills, it is unfortunate that this is not the case in public TTIs in Kenya as established by (Anindo, 2016; TVETA, 2019). The

researchers made an observation that a lecture method of instruction is used in teaching a psychomotor domain based subject due to overcrowded classrooms and lack of sufficient training equipment. A related observation made by Malechwani (2018) in Kenya, shows that absent mindedness of students in class as an aspect that affects learning processes. A similar observation was made by Burdenhost and Radile (2018) in South Africa. One weakness to these studies is that they failed to show how they measured absent mindedness. To fill this gap, another study is required.

Another study carried out by Ahmed et al. (2017) on the best ways of teaching a technical course in order to improve the quality of teaching sought to find out what the student and teachers' preferences were in learning automotive practical lesson at the introduction, body and conclusion. The study also endeavored to understand the relationship between teaching preferences and automotive practices research in the three parts of lesson delivery. This study was similar to Ahmed et al.'s (2015) study. The study delves deeper to establish instructional methods used at the introduction, body and conclusion of a lesson. Findings showed that at the introduction, the learners preferred lessons introduced using demonstration method, sketching diagrams with an explanation before they do the task. The teachers preferred the same with video clips used but finding showed that students did not prefer videos but demonstration. At the body section, the students preferred learning in small groups in the presence of the teacher to answer question though not all students preferred so. At the conclusion, students preferred question in which the answers will be compared with other students' in the group. The teachers preferred report writing at the end of the lesson.

Despite all these, the researchers' findings indicated that the students showed interest of learning when a practical lesson was introduced. In this study, demonstration method of learning scored highest thus ranked best method of instruction in technical education. The weakness to this study is that the study failed to show how the students who were not comfortable with group learning were addressed. CEDEFOP (2015) addresses this problem by recommending use of coaching method in a one on one basis.

Jailan et al. (2017) sought to establish factors that affect teaching and learning of skills in technical institutions in Malaysia through a conference. Focusing on teaching and learning strategies, pedagogical wheel and teaching decisions, the study established that technical education teachers were incompetent in applying teaching and learning methods effectively in the skills learning processes. The study asserts that such teachers will always have a negative impact on students' achievement.

In regard to the above concerns, the researchers assert that the teachers lacked effective teaching methods such as simulation and demonstration aided by new technology. Secondly, the teachers were observed to be lacking professional skills in the teaching process such as lesson planning, preparation of lesson notes, suitable instructional methods at the introduction, body and conclusion and lack of face to face teaching strategy. Thirdly, the study observed that the teachers lacked instructional wheel knowledge as explained by Bloom's (1959) that requires all teachers to ensure that learners are able to recall, understand, apply, analyze evaluate, and create knowledge and skills learned. A lack of Bloom's taxonomy knowledge among lecturers and instructors is an indicator of a lack of psychology of education skills in the Technical Teacher Training

Colleges (TTTCs) and universities. To address this gap, the study endeavored to gather information through observation, questionnaires and interviews thus generating evidence-based ideas effective in tackling the issues of instructional methods and student skills development in Kenya.

For the above reasons, this study will seek to find out how well the technical institute teachers are prepared to teach the subjects allocated. Using a questionnaire for teachers, observation, record analysis and an interview guide to principals, the study will endeavor to fill the gap by exploring the strategies used in class room instruction for skills development. An evaluation as to whether the lecturers are adequately prepared to teach in TTIs was important in the discernment of the main cause of skills gap in Kenya.

A study conducted in Malaysia by Ismail et al. (2018) shows that not all Malaysian technical institutes have best skills training strategies. The study thus asserts that like any other nation struggling with the quality of technical education lecturers, Malaysia is not exceptional. Focusing on public TVET institutions in Malaysia, the study established six major challenges that face lecturers in the process of teaching. These included: Teachers with no interest of teaching, lack of skill qualifications and industrial experience of lecturers from universities, low academic student achievement at basic education levels, difficulties in project writing and intricacy in use of English as instructional language.

In regard to lack of motivation, the study ascertained that the instructors are not able to teach effectively due to work overload brought about by a combination of emerging issues in technology and obsolete curriculum content such as topics on how to repair radios and

televisions. In addition, teachers are assigned subjects that they have not specialized in thus leading to academic mistrust of what lecturers teach. In the same study, graduate teachers were observed as not able to teach a technical subject effectively as they lacked industrial attachment experience however, they were first class graduates. At the same time, teaching student of low secondary school level achievement was a challenge for them. The findings thus show that TTIs have superfluous qualifications that cannot be used to address the issue of skills gap.

The question whether the lecturers were trained in educational pedagogy or not is not addressed in the study. The research further noted a lack of capacity in teaching and supervising project writing units by lecturers. Most lecturers allotted the task were Diploma holders who were observed as having low interest with academic tasks that required a lot of reading and critical thinking. The lecturers also disliked project writing unit since students had problems with English as an instructional language. The study hence concluded that an instructor that has no industrial experience always experiences difficulties in sharing and explaining any industrial knowledge, skills and experience to students.

A study conducted by Muthoni (2015) on the influence of pedagogical techniques on student performance in Mechanics in selected technical institutes in Kenya sought to compare performance in Mechanics when taught using steeplechase activities and when taught using traditional methods with an aim of contributing to knowledge on modeling

mechanics problems. The study diagnosed several problems in mechanical instruction such as inability to calculate initial velocity, use square roots, make additions and subtraction and find area of trapezium among others. Inability to solve simple mathematical problems is a sign of skills gap as technical education is about mathematics and sciences. The experiment showed that the application of the steeplechase method in teaching mathematics yielded positive results showing that causes of skills gap in Kenya can be attributed to instructional methods selected. These findings agree with Anindo's (2016) findings in Kenya and Ahmed et al (2015) in Malaysia.

Technical education is not only offered at TTIs but also in universities at Craft and Diploma levels of learning (Mwangi, 2015). Mwangi's (2015) study at Kirinyanga University College showed that lecturers and instructors are quite knowledgeable in skills development. The pedagogical strategies involved use of demonstration and discussion methods in teaching practical subjects. These methods enabled effective interaction of students with the course content and thus instruction made easier in the assimilation and acquisition of skills and knowledge. These findings show that to solve instructional problems in TTIs universities need to be involved.

Studies conducted in Tanzania and in the Philippines by Munishi (2016), and Brewer and Comyn (2015) respectively show that developing countries suffer inferiority complex when presenting technical skills at international level. Oyebolu and Lemu (2013) opines that such problems can be tackled using an integration of Information Communication Technology (ICT) into the traditional technical education instructional methods. This strategy is described as having multiple advantages over the traditional instructional

methods because it enables easy inclusion of emerging issues into the curriculum, create a forum for TVET teachers to update a given coursework of a global concern, unites students on the same class with those of other training institution.

ns globally in conducting study experiments and finding ways of tackling study problems and thus enable a radical acquisition of diverse technical skills available in different parts of the world. Oyebolu and Lemu's (2013) study alludes to the fact that instructional methods in isolation of ICT in the developing nations may not have the capacity to effectively facilitate effective training of students. To address these issues, another study that focuses on ICT and skills instruction will be required.

Ahmed et al. (2017) asserts that technical skills learning is about memorizing and explaining what has been memorized. This definition supports Simpson's (1966) assertion the cognitive domain is important in skills development, a fact ignored by many. Ahmed et al. (2017) opines that students learn with varied degrees of success. This can be through reading, memorizing, thinking, note making, note taking, creative writing, observation, listening to and talking to each other. These facts that are indispensable in regard to technical education skills development but a right method of transmitting the knowledge has to be employed. Therefore, the study advises that effective teaching of a technical course requires a teacher to be well versed with theories of learning such as behaviorism, humanistic, cognitive psychology and constructivism theories in addition to studies of student learning.

For this concern, the study advocates for use of demonstration method of instruction in a technical lesson as it utilizes several senses that enable students to hear and experience the actual event. This was deemed suitable for skills development as it enkindles learning interest, stimulates present ideas and concepts, provides direct experiences, reinforces learning and can be applied for both small and large groups of learning. This is unlike the lecture method that is effective in teaching communication, interpersonal, creative writing, problem solving skills and all other skills that make student better citizens (Ahmed et al., 2017). In the quest of addressing issues of skills gap, this study endeavored to understand how various instructional method are applied and how they can be integrated with the purpose of tackling issues of skills gap in Kenya.

The literature reviewed on instructional methods show that most developing countries globally prefer lecture method in teaching a psychomotor knowledge-based domain. This is due to lack of sufficient equipment which was revealed at an average ratio of 1:4, inadequately trained lecturers' and use of obsolete and irrelevant equipment to those of the industries. These findings reveal a significant relationship between instructional methods and skills development. None of the studies reviewed addresses the problem of instructional method from Benjamin Bloom's Taxonomy point of view and neither from the theories of learning point of view. To fill this gap, this study will use questionnaires and an interview schedule to explore knowledge on the causes of the undesired state of skills gap in Kenya.

Technical Education instruction methods alone cannot suffice quality skills development without relevant equipment. It was therefore important to examine how available training equipment influenced student skills development.

2.6 Influence of Training Equipment on Student Skills Development

The KIE (1990b) states that the technical education syllabus recommends that all TVET students in Kenya carry out fifty-seven (57) practical study hours per term comprising seven practical lessons within a period of twelve weeks. For effective training, each technical institute need to have inclusive equipment that are appropriate to the curriculum, syllabus, instructional language proficiency, learners' cognitive ability and multiple pre-social identities relevant to the industrial requirements (Brewer & Comyn, 2015). This means that the equipment used at the work place should be relevant to those prescribed in the technical education curriculum and syllabus. To fill the skills gap identified, this study endeavored to explore different sources of information in regard to the influence of instructional equipment and skills development globally in order to gather evidence-based ideas suitable for addressing the problem of skills gap as follows:

A study conducted by Ifeyinwa and Serumu (2016) sought to establish the constraints and solutions to effective vocational skills training among technical education students in Nigeria as understood by their lecturers. Focusing on the influence of instructional equipment on skills development, the study found out that technical institutions, the study found out that technical institutes lacked adequate instructional materials that included consumable and non-consumable materials and library sources for curriculum support.

The study also established that industries as well were not well equipped. When such an observation that even industries are inadequately equipped, the fact that TTU cannot rely of industries for student skills practice emerges. This thus reveals a serious cause of skills gap in Africa. As noted earlier in this study that the main group of stakeholders raising issues of skills gap are industries, a paradox is noted when industries are reported as not adequately equipped.

Ayonmike (2014) made a similar observation that industries and technical training institutes in Nigeria were either empty or stocked with obsolete equipment. Technical training institutes were observed as lacking textbooks. Industries and technical institutes alongside lacked effective linkages between them. While the study called upon relevant stakeholders to address the established issues, the recommendations for adequate training of trainers for effective training and in-cooperation of competence-based education into the main training were also made. While this observation is made in Nigeria, Sherry and Yesuenyegbe (2013) make similar observation in Ghana in which the country's few technical training institutes produced graduates with deficiencies in their areas of specialization due to inadequate training equipment and tools in the hands of inadequately trained trainers.

Recovering from a genocide hangover, Nizeyimana's (2016) study which focused on factors affecting the provision of quality training in Technical Vocational and Education Training Institutions in Rwanda makes a keen observation on the influence of training resources on skills development. The study findings show that Kigali city has modern infrastructure and in good condition. The study observes that TTIs in Rwanda enjoy

sufficient electricity, water supply, modern spacious classrooms, adequate workshops and adequately equipped libraries. The study noted the remarkable effort the government made towards provision of sufficient equipping in technical institutes in future. The study makes an observation that the missing training equipment is the major challenge to skills development by students in Kigali since not all will have access to the equipment. In addition to this, the institutions lack qualified principals in technical education as most of the principals were hired from public service sector. With this observation, the challenge of being an administrator of a profession for which one is not qualified for was noted. This thus revealed one likely cause of skills development. Nevertheless, the deficit in training equipment is likely to lead to distorted skills development process according to this study. Apart from the recommendation made that all technical institutes need to be well equipped, the study noted regular changes in the institutions that disrupted the skills development process thus making training equipment obsolete soon after procurement. For effective skills development the study recommended that the government need to be stable and thus avoid changes that interrupted the process of skills development.

Nizeyimana's (2016) study shows that Rwanda is likely to be the leading nation in technical skills development in East Africa soon. Besides this observation, when such findings are established in a restarting economy after a national crisis, the Abraham Maslow theory on needs' principles need to be reflected upon that a nation's economy will take time to grow and if grows in several stages as the theory suggests. Learning from this research that procurement of modern and relevant equipment in technical institutions is possible but effective with political stability of a nation, this study endeavored to fill

the skills gap phenomenon in Kenya by making suggestions for enacting laws that protect skills learning in TTIs from politics that include roadside declarations and political manifestations.

Kryriz (2016) asserts that emerging issues such as change of technology can make training equipment and the graduates' skills obsolete as quick as technological change takes place. Focusing on Uganda, Kryriz (2016) recommends that technical and vocational education graduates need to be untrained and retrained regularly and in regard to change of technology in attempt to solve the problem training equipment issue. The question whether it is possible to un-train and re-train students regularly in countries struggling with disease, illiteracy, hunger and poverty will need to be answered. This study thus endeavored to understand how emergent issues influence skills development in regard to training equipment and the rapidly changing technology using interviews and questionnaires.

A study carried out by Anindo et al. (2016) on training equipment and acquisition of skills by students in Nairobi County TTIs established that inadequacy and the obsolete state of training equipment led to poor training of skills. As a result, teachers used lecture method to teach a psychomotor based domain subject. The study finding showed that the same equipment were not relevant to those of the industries as the government lacked sufficient funds to equip the institutions. For this concern, the study suggested that students and teachers need regular experience of industries for quality skills development. Further, the study opined that new technology needs to be integrated in the TTI curriculum to help

modernize and make relevant skills offered. Adequate student equipment ratio as well as teacher student ratio was found lacking.

The study thus suggested a collaboration of parents and government in the provision of training equipment. Similar findings were established by Adjrah (2014) in Togo, Kemevor and Kassah (2015) in Ghana and Munishi (2016) in Tanzania just to name but a few. These studies observed a situation in which the number of students per class is higher than the training materials and equipment available and at times none. Training facilities and instructional materials were in an appalling state. As a result, lecturers preferred lecture method of training to others. When such an observation is made, it shows that skills are not developed as required. This thus can be an observed as another cause of skills gap in developing countries. To tackle this problem, the study suggested provision of training equipment by all stakeholders, support of skills development by industries, curriculum change and procuring modern equipment. In addition, the study suggested that the government needs to employ qualified and sufficient number of teachers.

The strength of this study is that it focuses on main stakeholders and main factor that affects skills development in tackling the issue of skills gap. This includes the student, teachers and training equipment. One major weakness of the study is based on its recommendations. The study failed to take into consideration the findings and recommendations of Sessional paper no 6 of 1988 in Kenya. The study recommended cost sharing policy in training equipment procurement yet that policy failed to tackle problems that faced the 8.4.4 vocational and technical education-based curriculum. This study therefore endeavored to fill the gaps identified through interviews, observation and

questionnaires that garnered current evidence based ideas suitable for addressing the problem of skills gap.

A study by Barasa and Kwasira (2019) sought to understand how the availability of learning resources in youth polytechnics impacted on youth economic empowerment in Kakamega County Kenya. The study found out that quality of vocational education and training graduates was declining at all levels due to use of outdated tools and equipment, poor inflexible curricular, ill-trained lecturers and lack of work experience and meaningful supervision. The study revealed a significant relationship between variables studied. Similar findings were established by Mulenga and Chileshe (2020) in Zambia, Onditi (2015) in Kwale, Bogonko (2018) in Nyamira, Mosoti (2017) in Nairobi counties in which the instructional equipment ratio were observed at an average of 1:4 thus revealing one major cause of skills gap across the country. For this observation Mulenga and Chileshe (2020) established that most industries in Zambia and business owners do not want to hire technical education graduates for fear of damage of equipment. Industries in this case wonder whether the graduates went through formal training or never. This study with thus endeavored to fill the gap by exploring the entire training process through interviews, observation and questionnaires that aided in capturing the relationship between industries and training institutions in regard to skills formation.

Malechwanzi (2018) conducted a study on the effect of college resources and student engagement on learning outcomes in Kenya's higher vocational colleges of the coastal region of Kenya. In this study college recourses referred to physical, human and fiscal resources. The findings showed that students in well-equipped vocational colleges

performed poorly in national examination with many referrals at subject levels. The study recommended that the effect of college resources need to be evaluated in terms of the degree to which they increased student engagement and lecturers should be at the forefront in promoting student engagement since they are at the center of knowledge transformation. To fill this gap, this study will use document analysis data collection tool in addition to other research tools selected for this study. This will aid in gathering data regarding the influence of training equipment of skills development for appropriate discernment of the causes of the phenomenon of skills gap.

Mosomi et al. (2014) identified a problem in skills development yet the government of Kenya had initiated performance contracts to facilitated effective utilization of teaching and learning materials among them libraries, computers and modern machines by the year 2010. The study thus sought to establish how instructors and lecturers in public technical institutes understood the impact of performance contracts on the utilization of the teaching and learning resources. Findings showed that the contracts were to a larger extent effective on the utilization of library resources, inventory management on teaching and learning materials and access to computers. In regard to skills development in class, the contracts had little impact. The study indicated that performance contract strategy was thus not effective in enhancing the utilization of teaching and learning equipment. This was so because the strategy was rolled out before lecturers were trained on the use of modern teaching and learning equipment such as projectors, new machines and digital teaching and learning machines.

Failure of the implementation of performance contracts in public technical institutes resulted in abridged teaching and instructional activities and increase of time spent in completing performance contracts. To address this problem, the study recommended an involvement of technical education instructors and lecturers in the development of the policy as it includes service charter comprised of mission, vision statement and quality policies. The study also emphasized that improved utilization of instructional equipment requires adequate financing to facilitate training on the use and maintenance of modern training materials and equipment. Mosomi et al. (2014) study is unique among literature reviewed in addressing skills gap in Kenya. Through observation and interviews, this study will endeavor to find out if performance contracts had an impact on skills development in Kenya.

According to Burdenhost and Radile (2018) technical education outcomes are largely influenced by the kind of leadership style used in a training institution. Focusing on principles of classical educational models by Tyler (1949) the fact that a technical institute leader must have expert knowledge and ability for effective outcomes emerges. The model requires that any education system developed needs to address four fundamental questions based on the goals of education system, learning experience and activities, organization of the learning experiences and evaluation. The following variable explores the influence of leadership style in regard to student skills development in Kenya.

2.7 Instructional Leadership Styles on Student Skills Development- Intervening Variable

The OECD (2016) defines instructional leadership as the practice of planning, coordinating and improving teaching and learning. On this regard, Burdenhost and Radile (2018) asserts that instructional leadership is unique when compared with other leaderships since it requires that the leader focuses on the influence of the leadership style on the outcomes rather than the original assertions of the style described and the source of the style. To be able to do this, a TTI leader needs to be well grounded in educational psychology and have sufficient experience in problem diagnosing and solving. Without this knowledge, Geleta (2017) asserts that the goals which are to prepare students for self-reliance will not be possible. The following section explores the global understanding of the influence of instructional leadership styles on student skills training.

A study carried out by Baglow (2016) sought to understand technical and vocational leadership development environment in New Zealand polytechnics. The study findings show that leaders in the institutions had no leadership skills but applied school and workplace experience in managing polytechnics and if they had, they were ill trained. To address this issue, the institutions organized in service trainings which the managers were not for because they had ninety percent teaching workloads and ten percent administrative time. Moreover, multitasking was a problem in which managers seemed to be having challenges of balancing the operational work and curriculum implementation. The managers recommended leadership training of management skills at an early stage before the leaders assume such demanding responsibilities. Throughout this research, it is

observed that the trade grade graduates appointed as administrators find it difficult to run polytechnics for lack of management skills.

Moreover, Baglow' (2016) study findings show that even if the managers succeed in achieving the institutional goals, they do so painfully and thus the question whether a student with technical skills alone can manage an administrative role is not answered in this research paper. The findings seem to agree with Drucker' (1999) assertions that it is people with cognitive knowledge that can drive the economy of a nation and not people with hand on skills. Nevertheless, the study ascertained that in some institutions, the managers are appointed to work at operational level, a strategy that cut off the manager from the required direct relationship with lecturers and students. This strategy denied the teaching staff an opportunity to acquire leadership skills hence showing a conspicuous genesis of skills gap globally. This research paper has demonstrated that not all countries in the first world economy have adequate technical education skills. This study thus endeavored to establish whether leadership styles have influence on student skills development in Kenya using interviews and questionnaires.

The United States of America seem not to have issues in regard to leadership of technical education and skills development. However, an early study conducted by Temple (2001) showed that both technical and vocational education institutions had issues in defining the best leadership style in technical institutions. The study thus sought to explore and evaluate the profile of deans of technical community colleges and their faculty and how the faculty perceived the influence of the deans' leadership styles on the outcomes of the institutes.

Using the structural equation model and focusing on the influence of the deans on the institutes' outcomes, the study findings showed that transformational leadership was prognostic of superior faculty outcomes characterized by clarity of job duties, responsibilities and motivation. The leadership style enabled the deans to come up with strategies of increasing their staff members' awareness of what is right and vital in attempt to raise the employees' motivational maturity and to enable them not to focus on own self-interest but on the interest of the training institution. The study concluded that the greater the transformational leadership style applied the greater the perceived leadership outcomes and the greater the amount of transactional leadership, the faculty outcomes were negatively impacted.

Similar studies were carried out in other parts of the world: Ahmed and Ejaz (2019) in Pakistan and Malechwani (2018) in Kenya. Ahmed and Ejaz (2019) observed that in a textile sector of Pakistan transformational leadership yielded quality returns as opposed to transactional style while Malechwani (2019) established that studying the impact of transformational leadership styles in higher compared to transactional style but practically transactional style was applied in technical institutions in Kenya. This study will thus endeavor to fill the gap as choice of irreverent leadership styles by exploring leadership styles used in public technical training institutions in Kenya, establishing their impact on skills development in order to discern the main cause of the problem of skills gap in the country.

A study conducted by Osman and Kamis (2019) sought to know the rudiments of innovation leadership skills for leaders of middle level technical institutions in Malaysia. The study defined innovative leadership as the ability to enhance collective thinking, generate ideas, take risks, make decisions, solve problems and implement decisions. These will thus build relationships among lecturers and other employees and create a fair environment for capacity building and effective skills development. Using document observation approach to collect data, the researchers noted that innovative leadership style applies a pragmatic approach which involves an amalgamation of several leadership styles in management of technical institutions. The study asserts that any technical institution that does not apply this kind of leadership approach will be forced to work harder in order to succeed in skills development

Osman and Kamis' (2019) study further established that innovative leadership style is effective in middle level technical institution management as the principal is required to influence lecturers among other employees to cope with any emerging issues and changes in industries, curriculum and government reforms. This observation is consistent with Joo's (2018) study that discovered a successful technical education high school principal in Korea applying Center-Focused Development System, Burdenhost and Radile (2018) advocating for Distributed leadership style in technical education institutions. These two later leadership styles seem to work in a similar way to innovative leadership style. Factually, all these styles are similar to transformative leadership style. The only difference is that innovative style does not ignore any leadership style that work well in maximizing training outcomes. Kenyan public technical training institutes seem to apply

transactional leadership style (Malechwani, 2019). To address this gap, the study endeavored to establish instructional leadership styles applied and how effective they were in the process of skills development.

Joo (2018) studied a series of empirical studies in Korea on excellence of technical and vocational institutions which investigated the association among four premise factors that included competent teachers, relevant curriculum, effective leadership, school industry linkages and school performance. The researcher then conducted a study on the same to provide recommendations to the problems faced by technical institution managers in Korea. To achieve this, the researcher sought to establish the reasons for the excellence in technical and vocational skills development through a case study of Busan National Mechanical Technical High School in Korea.

Through a Survey Research Design, the study established that the school leader had a direct effect on student skills development. The PhD holder principal, Dr. Lee, applied Center-Focused Development Management System in managing the entire technical school. The study established that the success of the principal lay in the bi-weekly curriculum implementation meetings aimed at tackling curriculum related issues. Moreover, the study established that the principal was keen to emerging issues, studied them, developed a new curriculum then identified emerging issues and in-cooperated it with government's curriculum. As a result, the college emerged best in skills development in Korea. To address skills gap issue in Kenya, Joo's (2018) case that cites a successful PhD TVET principal in skills development needs to be considered. This study consequently sought to find out the kind of leadership styles used in the TTIs, the

qualification of the TTI managers and the relevancy of the qualifications to skills development in order to discern the causes of the skills gap in Kenya.

Demi's (2017) study studied the nature of leadership dilemmas in technical vocational education and training in Papua New Guinea. The study explicates several types of problems on which different dilemmas were based. This included but not limited to complex, routine, emergent and simple problems. The study findings show that whether complex or simple problem in a technical institution in Papua, leaders avoided solving problems as long as they did not have answers and means of solving them. For example, in a situation in which training institutions lacked finances to run a technical lesson or program, the leaders avoided the task or deferred it. Some leaders avoided the problem until another leader took over the responsibility. Moreover, leaders were faced with dilemmas during recruitment of staff members. In this case when the applicant is a close friend to the senior leader, the manager was confronted with the decision-making situation. The study showed that most leaders recruited friends in order to avoid losing them. The same dilemma applied to appraisal of friend employees whose work output was low and whose performance affected overall performance of the institution. Lack of integrity and fear of loss of friends affected outputs hence persistent issue of skills gap.

These findings show that, in Papua New Guinea, students are not well trained due to a leadership that is not professional and thus issues of skills gap even if they are not directly mentioned. The study thus recommended training of technical and vocational education leaders to empower them especially in the aspect of decision making. This study explored the nature of leadership dilemma but failed to explore the type of leadership style that can

be used to solve the problems raised in the technical and vocational training institutions. To fill this gap, another study could be required.

Robertson (2015) states that South Africa has a well-developed leadership curriculum for TVET leaders at all levels of training. Despite this, the technical institutions seem to be faced with leadership challenges in skills development. For instance, a study carried out by Burdenhorst and Radile (2018) in South Africa, sought to establish whether a distributed leadership style can be a solution to problems facing TVET institutions in which the skills learned and skills demanded by employers were different. The findings of the study showed a weakness in the open access policy in which pupils with primary school certificate and those of secondary school that did not qualify for university admission were admitted into same level of training. The presence of an over-described and a high aptitude curriculum than the student's led to skills gap in South Africa. Moreover, study found out that lecturers' lackadaisicalness and students' indiscipline during training lessons contributed to the issue of skills gap. Based on this finding, the study concluded that, the best solution to these problems is Distributed leadership style which focuses on principals guiding TVET institutional reforms and improving student achievements by involving all school leaders in the TVET management. The open access policy in South Africa seem to be similar to Kenya's (TVET Act ,2013) thus revealing causes of skills gap in Kenya. To fill this gap, the study introduced instructional leadership styles as an intervening variable in order to expansively address the issue of skills gap in Kenya.

Kedir and Geleta (2017) observes that in Ethiopia leadership style is not the problem in technical education skills development but TVET leaders who are below the employment criteria in which Ethiopia's minimum qualification is B' Level commonly known as the first degree, work experience of five years and competence in TVET center management. In relation to skills development, the researcher argues that without effective leadership, technical institutes move slowly, stagnate and lose their way. This shows probably why Kenya has experienced slow growth in TVET. For this concern, leadership style alone cannot enable a TTI manager manage the institute effectively. Kedir and Geleta (2017) observation alludes to the fact that, leadership styles should be studied alongside qualifications of the managers.

On the other hand, Razak and Hamidon (2015) emphasizes that Leadership requires a person that has the ability to influence thoughts, attitudes, and behavior of others while improving the skills with the changing times in the process of attaining set TVET goals. In this regard, Anindo (2016) shows that most of the technical institute leaders in Kenya have master degrees but the study did not indicate the kind of qualifications the managers obtained and how relevant they were with the management position held. Handiso and Cal's (2021) study on the same context and similar topic in Ethiopia revealed that most leaders in the institute lacked technical education background and leadership skills. This is as a result of the government lacking capacity to develop TTI leaders that can build vision and monitor skills learning processes in technical institutions and initiate change. In this context most leaders were one-sided persons in leadership as they were not able to combine task and employee relationships in the training institutions. Could the findings

of this study be the same in Kenya at this point in time? This study thus endeavored to establish whether qualifications of technical institute managers has an effect on student skills development in public TTIs in Kenya that enabled suggestions made in regard to the effective leadership styles in skills development.

Robertson and Frick (2018) observed that leadership in public TVET was becoming unclear as the leaders are from multi-dimension professional backgrounds. This included basic education teachers, business owners, social workers and technical education graduates. As a result, the researchers sought to understand the dichotomous role of leadership and management in technical colleges in South Africa in regard to the purpose of the institutions. The study established that technical institute leaders were not originally trained as skills experts but as primary and secondary school teachers thus could not cope with TVET sector as they lacked dynamics of the sector and a fair understanding of roles of different stakeholders. Those who were bonafide technical education were few and even if they were appointed leaders, they lacked policy interpretation and implementation knowledge of and ability to work with diverse range of stakeholders. Given that this is the scenario in a strong economy county (Schwab, 2018) what should be Kenya's state? On this basis, this study sought to address the issue of leadership styles gap in Kenya using interview schedule among TTI principals.

Nevertheless, Robertson and Frick' (2018) study established that leadership in technical colleges in South Africa offered service at the managerial level as most of them were promoted from basic education teaching positions. They were observed as less knowledgeable in interpreting data and making decisions and collaborating with other

stakeholders like industries but good at implementing decision. They lacked vision especially on getting in touch with what other countries were doing in skills development and consulting student leaders, unions employers, industry and business owners in order to garner ideas on TVET management for improved skilled graduate production. Further, the study ascertained that TVET leadership lacked communication skills within and outside the institutions especially with stake holders. As a result, the institutions failed to reform and transform the institutions for the purpose of conforming to industrial skill demands. The research thus recommended training of TVET leaders and get rid of the aspect of multi-dimensional leadership issue in South Africa TVET leadership. This study endeavored to find out whether the same issues in regard to leadership styles and skills development had an influence in skills development in Kenya.

A research carried out by Malechwanzi (2018) sought to investigate the impact of leadership styles on learning outcomes in vocational colleges in Kenya. The study revealed that the kind of leadership style applied determined the quality of graduates produced. Malechwanzi's (2018) literature review revealed a successful application of integrative principal leadership style of transformative and transactional styles, in USA vocational institutions as opposed to authoritative style that created student centered learning approach effective training results. These findings agree with a previous study carried out by Temple (2001) in the USA vocational training institutions. In Kuwait, authoritative style in technical and vocational training institutions yielded the effective outcomes. Nevertheless, Malechwanzi (2018) study finally concluded that what the literature reviewed revealed in regard to technical skills leadership styles was contrary to

his study findings in Kenyan technical and vocational institutions. Without disputing the results, the researcher found out that TTI principals in Kenya had no choice to make on leadership style because of the rigid Ministry of Education structure. As a result, the leadership in TTIs is limited to routines supervised by the government.

Most of the studies reviewed so far under the leadership variable show that transformational leadership style is the most recommended style in skills development in technical and vocational institutes worldwide. Amongst these available studies, Chelimo et al. (2020) study emerge different asserting that laissez-faire and servant leadership styles are effective in competence development in technical institutions. The application of multiple study design that included descriptive, exploratory and correlation designs makes the main strength of this study since the designs paved way for deeper analysis of the study problem hence ensuring maximum solicitation of information required for decision making in the study. The weakness of this study is that it failed to specify the group for which the referred competence was studied since a TVET institution have lecturers, principals, students, administrative staff and non-teaching employers. The aspect of Specific, Measurable, Attainable, Realistic and Time bound “SMART” rule was not observed. This shows why the study is contrary to others which agree that nations with the best competencies developed in technical and vocational education apply the transformational leadership style. Despite this difference, this study endeavored to establish the most effective leadership style in skills and how they influence development of skills.

Globally, there seems to be a consensus that the most effective technical education skills development leadership style is transformational style however currently there is no universally approved technical education skills development leadership style. Despite this, the consensus reveals what Kenya is not doing in technical and vocational skills development. Razak and Hamidon (2015) show that in Malaysia there are well developed, equipped, staffed and effectively managed technical institutions through transformational leadership style.

Malaysia is economically developed than Kenya yet the two countries obtained independence almost at the same time, 1957 and 1963 respectively. This advancement in economy can be solely attributed to technical training institutes using transformational leadership styles. Nevertheless, Joo's (2018) case that cited a PhD qualification in TVET curriculum leadership is exceptional. The study can be instrumental in diagnosing problems facing skills development in public TTIs in Kenya. UNESCO (2002) also shows President Roosevelt's contribution towards the initial development of institution based vocational education and training in America in 1906. Focusing on all the literatures reviewed, none of the studies reviewed above used an intervening variable in studying the phenomenon of skills gap. Focusing on all the literatures reviewed, none of the studies reviewed above used leadership styles as intervening variables in studying the phenomenon of skills gap. This study will thus endeavor to address the issue of the skills gap using the intervening variable of transformational (participative) and transactional (directive) in studying the phenomenon on in studied.

Odumeru and Ogbonna (2013) describe transactional leadership as a kind of leadership in which the leader supports conformity of his followers to an organization's vision, mission and goals through both rewards and punishment. Globally, the term transformational is synonymously used with participative and democratic terms. Antonakis and House (2013) view transformational leadership style as principles as effective in changing individuals, communities and organizations. The principles empower leaders in changing obsolete leadership patterns, values, beliefs and goals to new ones that encourage greater commitment. The leader thus takes an initiative of identifying with the strengths and weaknesses of the followers, aligns them with the organization's mission in order to optimize their performance (McCleskey, 2014).

In that sense, a knowledgeable leader that applies transformational leadership style has power to achieve exemplary high outcomes in any organization as explained by (Van Knippenberg & Sitkin, 2013). Breevaart et al. (2014) asserts that such exemplary outcomes would be possible by the leader's creative ability in organizing required change through inspiration and executing the change with the commitment of the team members. Moreover, Oduma and Ogbonna (2013) asserts that a transformational leadership style leader's behaviour can stimulate followers to an advanced level of thinking to an extent that they become problem solvers themselves in their area of jurisdiction and service and thus the whole organization. In the same regard, Odumeru and Ogboma (2013) further showed that the transformational leader is able to achieve this by alluring follower's morals and ideologies to enhance obligation to a well-developed vision and encourage them to be creative thinkers and problem solvers in their various areas of service.

Literature reviewed has shown that leadership in public TTIs in Kenya is inclined towards transactional leadership. This study thus endeavored to understand the influence transformational and transactional leadership styles have in the process skills development.

Odumeru and Ogbonna (2013) compared and contrasts transformational and transactional leadership styles. The study notes that transactional leadership is formal and organized unlike transformational. The researchers thus show that despite the fact that transformational leadership style is preferred in organizational leadership, it has several weaknesses that need to be addressed when it is applied in any organization. In this case, transformational leadership style does not show what the interacting variables between transformational leadership and specified work outcomes are. Secondly, the leadership style does not show how an organization's work is organized for effective utilization of employees and resources. Thirdly, the style does not give employees confidence on goals to be achieved and neither does it show members an agreement of priorities and objectives to be met. Transactional leadership possesses a converse of the listed characteristics of transformational styles. In regard to transactional leadership style, Malechwanz (2018) found out that TTIs in Kenya do not apply the style in TTI leadership because it has been found effective through research but because of the education and training structure that automatically applies transactional leadership style.

Odumeru and Ogbonna (2013) assert that transactional and transformational leadership styles can be related to the X and Y theory by Douglas Macgregor in which the X category represents transactional leadership style and the Y transformational style. This is so

because transactional style works within an organization's culture while the other one operates within groups and new ideas generated by the same groups. Relating this assertion to Malechwani's (2019) study findings that TTIs in Kenya operate on transactional style of leadership, the study can conclude that the X principles of management according to Macgregor are applied in running Kenya TTIs. To establish whether leadership styles had a relationship with the dependent and independent variables of this study, the phenomenon was studied qualitatively using interviews, observation and questionnaires.

Literature reviewed above reveal that the skills gap issue is an international issue raised by industries and employers worldwide manifesting as lack of adequate literacy, numeracy, technical, managerial and leadership knowledge and skills. In regard to the gaps identified, Anindo et al. (2016) assert that the skills, numeracy literacy and others as listed above can be enhanced through a well-coordinated system of relevant admission grades, effective teaching methods, relevant training equipment, and effective skills knowledge processing strategies in the hands of a well-trained teacher. The following section of the study thus explores global literature in regard to the dependent variable of this study.

2.8 Summary of Literature Reviewed

The literature reviewed on the dependent, intervening and dependent variables of this study show that skills gap is an international and systemic problem. The genesis of the problem can be traced to the year 427 BC in which period technical education was

considered inferior to liberal arts by Plato and Aristotle as reflected by (Okware & Ngaka, 2017). Plato and Aristotle assertively qualified thinking, philosophy and politics as the highest human activity and viewed physical work as activities for the province of slaves for which technical education is part. The thoughts have a high influence in current Ministries of Education and among common Kenyans thus limiting rational thinking in regard to technical and vocational skills development.

The literature reviewed attested that skills gap issue is experienced most by the developing nations. The term developing is synonymously used with the term 'poor'. This means that technical education is possible with the rich for which Kenya is striving to achieve through vision 2030 policy. In this regard, theses, dissertations, inaugural lecture, electronic media, journal articles, conference papers, sessional papers, books, government sources, and baseline studies reviewed in this study agreed that academic admission qualifications, instructional methods, training equipment and instructional leadership styles influenced skills development. Institutional problems facing skills development included low admission grades, inadequate pedagogical skills in which lecture method was preferred most, use of technologically obsolete equipment and use irrelevant leadership styles for skills development in developing nations. In this regard, TTIs in developing nations were found more theoretical than practical.

The literature reviewed revealed factors that lead to the discrepancy of skills between industry and TTIs that were not related to the objectives of this study. These include: political influence, inadequate financing, policy, emerging issues such as frequent and rapid change in technology that affected current curriculum, systemic issues, issues of

employer professionalism, student factors and ethical issues in regard to cords of conduct and chatters.

Political influence included road side declarations by individuals who have no knowledge in regard to skills development and adequate orientation towards the training when selling political manifestos that lack principles of the theory of change. Inadequate financing involved low national budgetary allocation for TTIs in many nations and as low as 1% of the national budget (Eicker et al., 2017). Emerging issues included new ideas generated globally that initiates change which developing nations' economies are not strong enough to cope with. This includes change brought about by Covid 19 pandemic in which distance learning or online learning was a challenge for technical education.

In regard to curriculum the following gaps were identified: use of a foreign language to teach skills, short courses that do not mould student behaviors, inadequate training duration, low opinion on life skills subject important in developing work place skills and use of a curriculum pitched higher than the students' aptitude. In regard to social issues that led to skills gap globally, the study revealed that poor relationship between students and lecturers in which carnal issues were pointed out (Malechwanzzi, 2018) and reluctance of dean of students in addressing their issues. Issues of work-based professionalism such as employment of youth without competence skills in economically developed nations especially in United Arab Emirates (Alharbi, 2014) also emerged. Conversely, the literature revealed instances where students had certificates of high qualifications but with not skills reflecting the qualifications (Anindo, 2016). Student factors such as lazy and physically weak student as observed by Burdenhost and Radile (2018) emerged as one

major cause of skills gap as no well-developed and financed curriculum in technical education can be successful with physically weak and unmotivated people.

Systemic problems facing skills development revealed in the literature included funding TTI administrative agencies such as MoE, TVETA, MoHEST and KNEC more than TTI tuition. Training funding priority was thus an issue. This revealed a waste of resources such as time and fiscal for students. Inadequate partnership between the government and private sector in skills training was also revealed as a source of skills gap in Kenya in which the private sector was reluctant in engaging interns in industrial activities. The literature reviewed opined that Distributed leadership style, Transformational style and Center-Focused Development Management Skills in TTIs are major means of addressing skills gap issues. Leadership styles alone are not sufficient enough in addressing the glaring issue of skills gap especially in Kenya. Despite these, issues of skills gap are still reported. A continuous study on student skills development in Kenya is therefore inevitable.

2.9 Theoretical Framework

Literature reviewed revealed that skills training challenges can be as a result of inconsistencies and deviations from the training norms and regulations. Based on this observation the study opted to select the systems and decision making theories to guide this study based on their principles suitable in tackling issues of TTIs. The Open Systems theory in education was originally developed by Ludwig Von Bertalanffy in 1930s and developed further after the Second World War (Adams et al., 2014).

2.9.1 The Systems Theory in Education

The theorist postulates that an open system is a complex of interacting elements that are open to, and interact with their environments in order to achieve set goals and objectives (Bertalanffy, 1972). The open system exhibits conditions of entropy as it is explained in the Second Law of Thermodynamics (Maera, 2018). If entropy is not reversed, the institutions disintegrate and die. A public technical training institute is a system comprising of students, lecturers and principals as its main elements and the inputs, through-puts and outputs as its sub- elements. In regard to the objectives of this study, academic admission qualifications and training equipment represent inputs, instructional methods through-puts and adequately trained graduates out- puts.

Mwambi (2020) advocates for the application of the open systems theory in educational institutions opining that an evaluation of the unity of both human and material resources and teaching strategies in the teaching processes that can help lecturers and principals discover deviations from norms, set standards and non-conformities that occur. Since an open system exhibits conditions of entropy, a review of the system is necessary and without which entropy will dominate and if not reversed, the institutions disintegrate and die. Moreover, Gupta and Gupta (2013) argues that when parents are dissatisfied with their children's learning outcome, the best way to address the problem is by the use of systems approach. This involves a study of the inputs and through puts in order to find problem causing the undesired outcomes. Karim (2009) supports the use of Systems theory to tackle problems related to learning outputs after conducting a successful study

aimed at improving an interdisciplinary program in Sweden. This theory is therefore significant to this study.

The theory was important in making an enquiry on how the principals and lecturers understood the functions of the technical elements through interview and questionnaires and especially in regard to inputs and through puts in the process of skills development. The theory was also important in understanding how students participated in the process of skills development in both theory and practical classes. Moreover, the principles of the theory enabled the study to understanding how entropy in TTIs is handled and challenges facing TTI principals in handing them. The theory principles were thus important in validating the findings of this study.

One of the major strength of the open systems' theory is advocacy of unity of elements for common goal and objective achievement and emphasis of entropy reverse for better achievement of objectives. The theory is about solving problems therefore it can be used as diagnostic tools for problems inherent in technical training institutions that might be leading to the current phenomenon of skills development. Moreover, the theory's principle of problem solving will be instrumental to the researcher in understanding weather the principals, lecturers and students conceptualized their roles in the process of skills development as it should be. Nevertheless, the systems theory is a classical theory that is universal and versatile thus can be applicable in educational systems like the technical training institutions destined for skills development.

The systems theory is scientific in nature and thus lacks the social aspect of decision making which is important in the process of skills development. To address this weakness, this study introduces the Problem-Solving Theory by Herbert Simon to help in addressing any social disadvantages inherent in the open systems theory. This approach of using more than one theory in a study is supported by Creswell (2014) asserting that the theories selected in a mixed research study ought to address both the quantitative and qualitative aspects of the study.

2.9.2 Decision-making theory by Herbert Simon

The Decision-Making theory was developed in 1947 by Herbert Simon, a professor of administration in Carnegie Technical University, USA, whose primary research interest was decision making within organizations (Mintrom, 2016). The theorist developed the theory with an intention of supporting systems and particularly managers in organizations in which technical training institutions are part. The theorist argues that human beings go through three stages in the quest of solving a problem that include intelligence, design and choice stages based on bounded rationality and satisficing principles. The three stages include identifying possible alternatives, determining all possible consequences of the alternatives and an evaluation of all possible consequences (Campitelli & Gobet, 2010). The satisficing principle focuses on selection of a most pragmatic solution to problems when confronted with numerous issues. Satisficing thus entails searching for a solution to a problem through available alternatives until the most acceptable and ultimate solution is obtained.

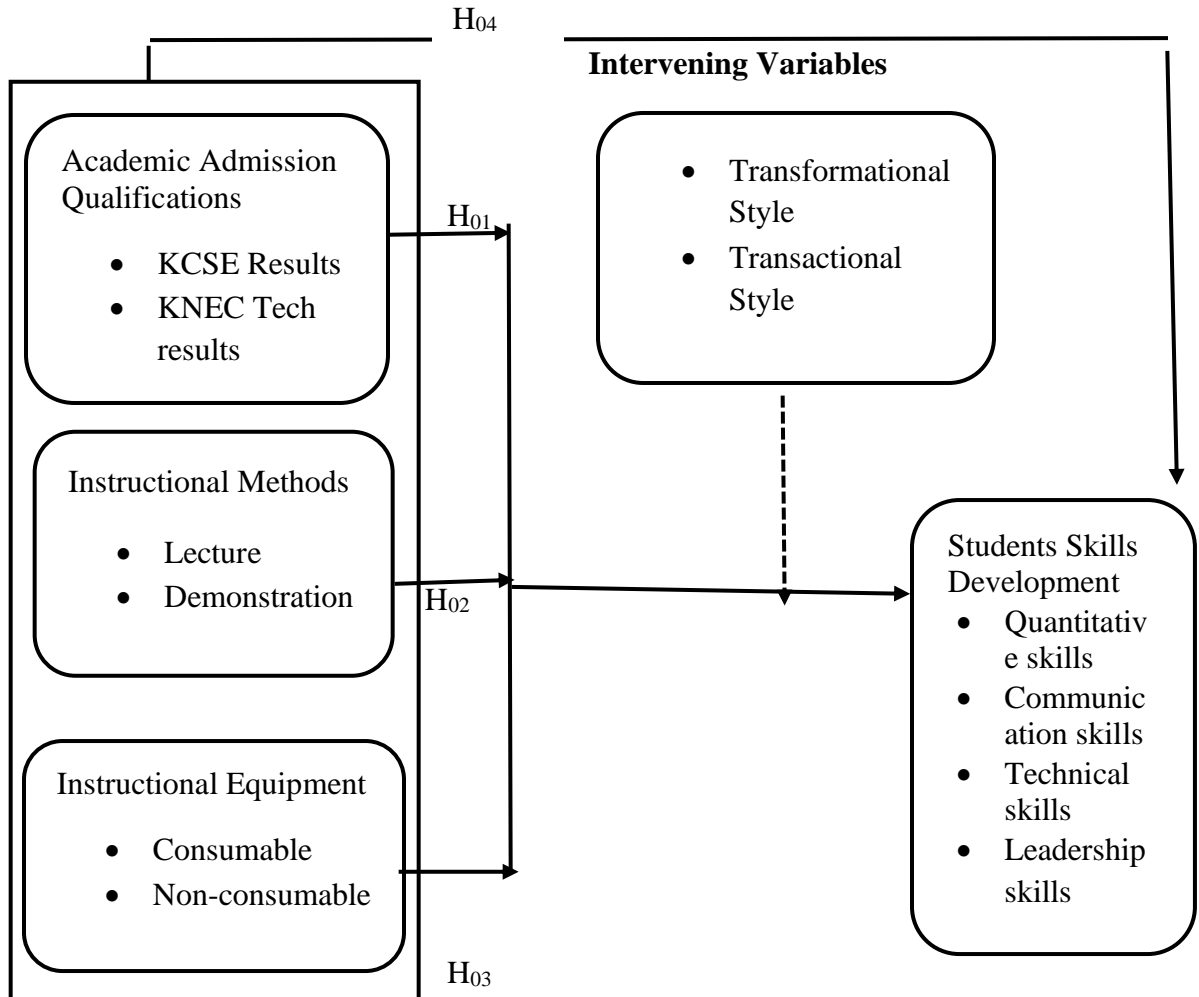
The importance of the Decision-making theory in the study is based on the theory's social role which the systems' theory lacks. The theory enabled the study to understand how academic admission qualifications, instructional methods and instructional equipment were arrived at by relevant stake holders, how the decisions are made and understand the role instructional leadership styles play in solving skills development problems. This enabled the study evaluate the findings and make relevant suggestions and recommendations regarding skills gap.

2.10 Conceptual Framework

The relationship between the independent and dependent variable as well as intervening variables contemplated has been depicted diagrammatically. The conceptual framework in figure 2.1 demonstrates the hypothesized relationship among the dependent, intervening and independent variables.

Fig 2.1:

Conceptual framework depicting the relationship amongst variables of the study



Independent Variables

Dependent

2.10.1 Operationalization of Conceptual framework

The conceptual framework in figure 2.1 demonstrates the hypothesized relationship among the dependent, intervening and independent variables. The relationship between the independent and dependent variable as well as intervening variables contemplated has been depicted diagrammatically. In the portrayed relationship, academic admission qualifications and instructional equipment represent inputs and instructional methods represent through puts while puts quantitative, communication, technical and leadership skills present out-puts. The intervening variables, transformational and transactional leadership styles, were believed to be found in the environment of the system, the technical training institutions, which may or may not exert influence on the outcome of skills training.

Academic admission qualifications include KCSE results and KNEC technical education for diploma students, final year. It is presumed that the quality of skills developed at the TTIs critically depends of the KCSE results. A high grade at KCSE is an indicator of quality skills development and a low grade may be an indicator of inadequate level of skills development. Improvement of skills development can be done through the application relevant instructions methods. Lecturer and demonstration methods are believed to be effective in enabling students to acquire and practice skills. Instructional equipment include both consumable and non-consumable. Consumable equipment include items such as reagents and textile products. Non-consumable equipment stitching machines, motor graders and tele-handlers among others. They are a core factor in the process of skills learning. In order to achieve desired results, a unity of purpose needs to

be enhanced. The conceptual framework shows quantitative, communication, technical and leadership skills as the dependent variable and the outcome of the interaction of the independent variables. Quantitative skills include all learning tasks that require use of numerals such as budget developing. Communication refers to tasks such as writing minutes, business letters, preparing for meetings and writing reports among others. The arrows in the conceptual framework show that the relationship of the studied variables is linear. Therefore, the conceptual framework provides a basis for a multiple linear relationship between the independent and dependent variables while considering the effect of the intervening variable on skills development.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents research philosophy, location of the study, research design, target population, sample size and sampling procedures, research instruments, piloting of research instruments, validity and reliability of data collection instruments, operationalization of variables, hypotheses testing, data analysis procedures and ethical considerations.

3.2 Research Philosophy

This study was guided by the Pragmatism philosophy. Ayiro (2021) describes pragmatism as a philosophy that combines post-positivism and constructivism philosophies in addressing a research problem. The philosophy focuses on what works in the quest of solving a problem using both quantitative and qualitative mixed researches. A post-positivism philosophy is about the concrete facts that can be observed. It is objective nature. This is what guided the researcher in selecting the quantitative approach which required raw data of KCSE results and final KNEC technical results on which a correlation study was conducted for hypothesis testing. The constructivism philosophy which is subjective in nature, allowed the researcher to take into consideration the views of the participants who were believed to be having a better understanding of the phenomenon of skills gap. Therefore, the need to collect both qualitative and quantitative compelled the

researcher to select the pragmatic philosophy which combine post-positivism and constructivist principles.

3.3 Location of the Study

Geographically, the study was based in Kenya covering 49 Public Technical Training Institutions (TTIs) recognized by Technical Vocational Education Authority (TVETA), Kenya National Examination Council (KNEC) and Higher Education Loan Board (HELB) by 2018. The reason for the geographical location is that there is a spatial distribution of the phenomenon of skills gap in the country. Before the inauguration of the new constitution of Kenya in 2010, Kenya was divided into eight regions. Each region had existing TTIs as shown in table 3.1. Since the study was for academic purposes only, the researcher organized the TTIs using regional perspective from which the forty-seven counties were curved to enable equitable sample determination and selection for the study.

Table 3.1*Public Technical Training Institutes Per County by 2018 in Kenya*

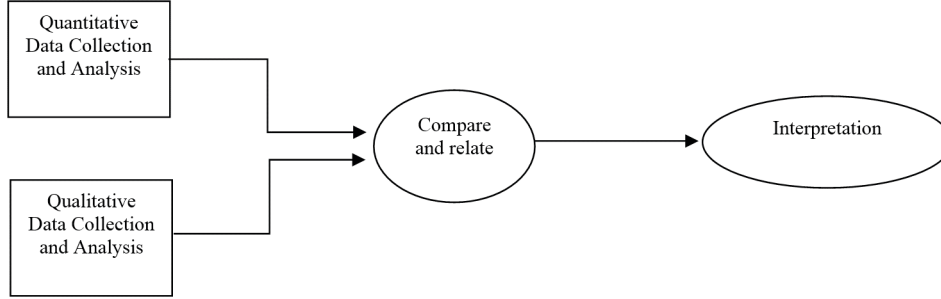
Regions	No. of counties per region	Number of public TTIs
Nairobi	1	4
Central	5	5
Eastern	7	7
Coast	6	4
Rift valley	14	18
North Eastern	4	0
Nyanza	6	7
Western	4	4
Total	47	49

Source: KNEC, TVETA & HELB Reports (2018)

3.4 Research Design

This study adopted a Convergent Parallel Mixed Method Designs. According to Crewell and Paddlo-Clark, (2011) and Mukoka, (2020), a Convergent Design requires that the researcher concurrently conducts the quantitative and qualitative elements in the same phase of the research process, weighs the qualitative and quantitative methods equally, analyses the two components independently, and interprets the results together. The study therefore adopted research design as quantitative and qualitative data were collected and analyzed concurrently as illustrated in figure 3.1.

Figure 3.1: *Convergence parallel mixed methods design*



Source: Demir & Pismek, (2018)

Selection of the convergence approach was guided by the supposition that both qualitative and quantitative data provide diverse types of information, which is in-depth explanation of the phenomenon through qualitative instruments and also statistical information through quantitative instruments, that together yield results that are complementary (Creswell, 2014). To achieve this, the objectives of the study facilitated collection of both qualitative and quantitative data required by this design.

According to Olive and Abel (2019), in a Convergence Parallel Design, a qualitative approach, a cross-sectional survey strategy, is used to garner data that described, explored and aided the study in understanding the phenomenon studied. In regard to this, a cross sectional survey collects data from a population of interest at a certain point, given a picture of attitudes and behaviour of the participants (Selvam, 2017). A cross-sectional survey was thus applied to the study as it was efficient in collecting data from lecturers, principals and students of various TTIs in Kenya.

3.5 Target Population

According to Majid (2018), a target population is the study's entire group of people or objects for which the researcher intends to generalize the study findings through a sample study of the population. The target population for this study consisted of forty-nine (49) principals, 4,199 third year Building and Construction and Clothing Technology students registered by KNEC and 348 lecturers making a total of 4,596. The TTI principals were targeted because they are endowed with the responsibility of over-seeing the entire technical skills development process by the Ministry of Education. Third year students were targeted because they are assumed to have better knowledge and hands on skills through TTI training and industrial attachment compared to Artisan, Craft students and Bachelor's degree students. Lecturers were targeted because they are assumed to be sufficiently trained in their area of specialization and they have sufficient first-hand knowledge and personal experience in regard to the problem of skills gap in Kenya.

3.6 Sampling and Sample Size Procedures

Sampling is a statistical process of selecting a representative sample of individuals from the population of interest (Majid, 2018). Because the population was heterogeneous, the study therefore applied stratified sampling method to obtain the study subgroups of principals, lecturers and students. Subsequently, the study applied probability and non-probability sampling procedures to determine and select samples from the sub-groups. Probability and non-probability sampling methods were selected given that the study was

based on the mixed research design. Probability sampling method included simple random sampling while non-probability methods included census.

3.6.1 Sampling and Sample Size of Technical Training Institutions

The classical formula by Fisher (1998) for a population that is less than ten thousand as explained by Buhat,(2019) was used to determine the sample size of the Public Technical Institutes for this study. Buhat (2019) advises that a ten to thirty percent sample size of the total population is sufficient. The formula was thus selected for TTI sample determination for this study.

$$nf = n/1 + n/N$$

where: nf = desired sample size, n = working sample of 30 % sample frame of 49 TTIs and N = estimate of population size

$$nf = 30\% \text{ of } 49 \div 1 + (n \div 49)$$

$$nf = 14.7 \div 1 + (14.7 \div 49)$$

$$nf = 11.3$$

Given that the study was dealing with nominal data in this case, the total numbers of TTIs to participate in the study were rounded off to the nearest whole number, eleven. After which the training institutions were randomly selected.

Table 3.2*Public Technical Training Institutions Per County by 2018*

Regions	No. of counties per region	Number of public TTIs	Sampling method	Number
Nairobi	1	4	Simple random	3
Central	5	5	-	-
Eastern	7	7	Simple random	2
Coast	6	4	-	-
Rift valley	14	18	Simple random	4
North Eastern	4	0	-	-
Nyanza	6	7	Simple random	2
Western	4	4	-	-
Total	47	49		11

Since this study was exclusively for academic purposes and not the government's, the participating regions were selected equitably based on years of existence and viability and fiscal strength of the researcher.

3.6.2 Sampling of Principals

Since the sampled TTIs had one principal each, census method was used in the selection of the principals. Therefore, all the eleven principals were automatically included in the study sample. The principals were selected to participate in this study because they are the custodians of TTIs with the responsibility of overseeing the overall strategies of curriculum implementation and nurturing future skilled persons in the country. The principals were expected to provide relevant and accurate information concerning the skills gap phenomenon in Kenya on admission qualification requirements, instructional methods, instructional equipment and instructional leadership styles. The principals were studied qualitatively since they have ethnographic characteristics due to similar

qualifications and experience of managing technical institutions and deployed by Public Service Commission (PSC).

3.6.3 Sampling and Sample size of Lecturers

The lecturers' sample was determined using Barttlett et al. (2001) formula for a larger population where.

$$n = N \div (1 + N (e)^2)$$

n = sample population, N = total population and e =alpha (0.10).

$$n = 348 \div (1 + 348 (0.10)^2) = 100$$

$$n = 100$$

The lecturers were selected to provide information necessary for the study because they are responsible for direct imparting of technical education skills and knowledge to students hence presumed that they understand the factors influencing skills development in Technical Training Institutions in Kenya. Simple random sampling was considered ideal for selecting lecturers as each lecturer was given an equal opportunity for selection. To obtain the determined number of participants, the researcher ascertained the number of participants for each TTI by dividing the sample determined (100) with the number of sampled TTIs which yielded a participatory number of nine of ten for each TTI. Meeting the lecturers at the TTI lounges, ten pieces of paper with the word 'Yes' and the rest with the word 'No' were folded and put in a tin for which every participant was given an equal

opportunity for selection. Those who picked ‘Yes’ papers in each institution constituted the study sample.

3.6.4 Sampling of Students

The students’ sample was determined using Barttlett et al. (2001) formula as shown above and in which n = sample population, N = total population and e = alpha (0.10).

$$n = 4,199 \div (1 + 4,199 (0.1)^2) = 100$$

$$n = 100$$

Simple random sampling method was used to sample student participants in each technical training institution selected. In this process, every participating student was given an equal and known probability of being included in a sample according to (Creswell, 2014). To obtain a sample of students from each technical institution, the researcher divided the total number of required student participants (100) with the number of TTIs participating (11) in the study which is $100 \div 11 = 9.09$. Since the study was dealing with nominal data, the study ascertained 10 student participants for each TTI.

Meeting the students in specified classrooms, pieces of paper with the word ‘Yes’ and ‘No’ were folded and put in a tin for which every student participant was given an equal opportunity for selection. Those who picked ‘Yes’ papers constituted the student study sample. The students were involved because they are the major element in the process of skills development and key players in the process of dealing with issues of skills gap in the country. They are also beneficiaries of TVET skills for which the country invests for

the attainment of vision 2030 and for self-reliance and sustainability hence expected to give primary data concerning the skills gap phenomenon.

Table 3.3

Research Participants Sample Framework

Research group	Target Population	Actual Sample	Sample determination Formula	Sample selection method
1. Principals	49	11 (22.4%)	Fisher (1998)	Census
2. Lecturers	348	100(13.61%)	Barttlett,Kottrlik Higgins &(2001).	Simple random
3. Students	4,199	100 (2.3%)	Barttlett, et al (2001).	Simple random
Total	4,596	211	-	-

Source: Kenya National Examination Council Technical (KNEC) July 2021 series

Key: - means no numerical data required

Table 3.4*Actual Number of Participants Per Sampled Technical Training Institution*

No.	Names of TTI s	No. of Principals	No. of Building Technology Lecturers	No. of Cloth Technology Lecturers	No of Cloth Technology Students	No of Building Technology
1	Rift Valley	1	16	N/A	N/A	56
2	Mawego	1	15	N/A	N/A	17
3	Kinyanjui	1	15	N/A	N/A	36
4	Buret	1	09	N/A	N/A	17
5	Sotik	1	05	N/A	N/A	04
6	Ekerubo Gietai	1	15	07	08	17
7	Wote	1	15	08	10	26
8	Nairobi	1(N/A)	N/A	N/A	N/A	N/A
9	Maasai Mara	-	-	-	-	-
10	Machakos	-	-	-	-	-
11	Karen	1	4	9	15	16
Total		9	94	23	33	189

*Source: Sampled Technical Training Institutions in Kenya**Key: N/A means the course is not available at the institution**- Means no permission granted for data collection**1(N/A) available but not participating in the study*

Table 3.4 shows the actual number of students and lecturers in the main TTIs from which sample selection was conducted. The table also presents a total number of 8 principals who were censured and 117 lecturers and 222 students randomized.

3.7 Research Instruments

The research tools to this study were derived from the objectives of this study. Upon analyzing the objectives, four major types of research instruments emerged: questionnaire, interview schedule, observation guide and document analysis guide. Questionnaires were used to collect both quantitative and qualitative data as they were composed of closed and

open ended questions for lecturers and students. Interview schedule was used to collect qualitative data from principals. In regard to the two research instruments, data that was not directly observable on academic admission qualifications, instructional methods, instructional equipment and instructional leadership styles was collected. Observation was used to gather qualitative data on instructional equipment in workshops and laboratories. Document analysis guide was used to collect both quantitative and qualitative data. Primary data was collected from lecturers, principals and students while secondary data was collected by use of the document analysis guide. The documents studied included Certificate of Secondary Education (KCSE) and Diploma BCT and CT final year KNEC results, admission letters, records of work and lesson plans.

The study applied the Delphi research method principles in developing research tools suitable in addressing skills gap problems that exist between training institutions and industries. This method was developed in 1950s in the United States of America (USA) by Norman Dalkey in order to aid military-based researchers in soliciting expert opinion to fill a military sector knowledge gap that existed at that time (Skumoski et al., 2007). The research tools included questionnaires, interview schedule, document analysis guide and observation.

The Delphi method was adopted because it comprises both qualitative and quantitative characteristics that include ability to be used anonymously, interactively, control feedback, statistically aggregate group response and identify research opportunities. Moreover, researchers are able to make predictions, improve understanding of a phenomenon and thus give solutions to a problem given the potential the Delphi method

embodies. The proponent of the Delphi method advises that questionnaires developed using this approach should be based on previous questionnaires whose question items have not been adequately answered and the study stops when the question has been answered (Skumoski et al., 2007). This study thus adopted and applied the stated principles.

3.7.2.1 Questionnaires

The study used questionnaires to collect primary data from lecturers and students. The research tool garnered both qualitative and quantitative data. The questionnaire comprised of six sections. Section A addressed demographic factors of the respondents, section B academic admission qualifications, section C instructional methods, section D instructional equipment, section E skills development factors and section F instructional leadership styles. The reason for adopting a questionnaire for this study is that the tool has the potential of reaching out large numbers of participants in a large geographical scope, as shown in table 3.2, within a very short period of time (Creswell, 2014).

3.7.3 Interview Schedule

The interview schedule was used to collect data from the principals. The tool was used to collect qualitative data. The instrument comprised of six sections. Section A address demographic factors of the principals, section B academic admission qualifications, section C instructional methods, section D instructional equipment, section E captured opinions on skills development and section F focused on the intervening variable of leadership styles. The interview guide was selected because of its potential in soliciting information from an original source believed to be professional, accurate, current and

experience based. The interview guide was also selected for this study because of its qualitative nature that fits the ethnographic population of TTI principals whose characteristics include similar academic qualifications, same employer and similar teaching and management experiences (TVET ACT 2013; TSC ACT, 2013).

3.7.1 Document Analysis Guide

The document analysis guide is a secondary data collection tool that is used to gather data that has already been published (Kabir, 2016). The tool was used to collect data quantitative data from the KCSE KNEC and TVET KNEC results. Available records of KCSE scores and TVET KNEC results as shown in appendix C were studied. The document provided data on which a co-relational test was based and conclusions made.

3.7.2 Observation Guide

Observation is a logical data gathering approach used to examine people in a natural setting. The research tool was used to collect both primary and secondary data, qualitative and quantitative in nature from laboratories and workshops. Despite the fact that access to some instructional facilities was not permitted, reliable data to the study was collected as the researcher was directly involved. The data was important to the study as its was used in validating responses provided by principals, lectures and students in regard to skills development.

3.8 Piloting of Research Instruments

Data collection instruments were pretested on a pilot study targeting participants in two Technical Training Institutions, Sikri and Keroka. The TTIs were similar to those that were sampled for the study but were not part of the actual study. The reason for the engagement of the two institutions is that they offered Clothing and Building Technology courses that were of interest to the study. In regard to this, Kothari (2010) advises that the number of pretest institutions should be small, about 1% to 10% of the target population. The two institutions therefore constituted 10% of the total number of sampled institutions as shown in table 3.5. The tools were pretested and administered again to the same population after a period of one week to find out whether they will yield the same results.

Table 3.5

Pilot Sample Framework

Strata	Sample determining	Results	Actual Sample
Principals	10/100 × 11	1.1	1
Lecturers	10/100 × 100	10	10
Students	10/100 × 100	10	10
Total			21

3.8.1 Validity of Data Collection Instruments

According to Kubai (2019), validity is the extent to which an instrument measures what it is meant to measure. The researcher endeavored to ensure that data collection instruments are valid by subjecting the instruments to the criteria of measuring face, construct and content validities using a Likert scale. To ensure construct validity, the researcher ensured

that the items in each research tool addressed the objectives of the study and gaps identified in the literature reviewed. To achieve this, the research participants were requested to read research tools and give their views. Their opinions on the extent to which the instruments relevantly captured the content regarding the topic of this study and objectives were verified and incorporated into the research instruments. In regard to content validity the researcher ensured that the research tools fully captured all areas the study was to measure by ensuring that the data collection tool questions reflected the study topic and objectives.

The sample size of the study was used to test the validity of the questionnaires. To achieve this, the respondents were asked to determine the extent to which the research items were effective in measuring what they were supposed to measure based on the three types of validities relevant to this study presented in the Likert scale below.

In regard to the interview guide, a five level Likert scale was administered to Keroka TTI principal to get views in regard to validity of the tool. The following overall results were obtained. Corrections and suggestions gathered were incorporated into the study.

Table 3.6

Validity Test Results for Interview Schedule Guide

Validity type	Very high	High	Moderate	Low	Very low
Face: Relevancy of question items to the research topic	1 (100)	0(0%)	0	0	0
Construct: Relevancy of questionnaire items to the objectives of the study	0(0)	1(100%)	0	0	0
Content: If the questionnaire is addressing the general purpose of the study	1(100%)	0(0%)	0	0	0

Since validity was opined as high, reliability for the tool was thus deemed high and thus suitable for data collection.

A five level Likert scale was administered to the dean of studies at Sikri TTI to get views in on how effective the tool was to the study. The following overall results were obtained.

Corrections and suggestions raised were incorporated into the study

Table 3.7*Validity Test Results for Document Analysis Guide*

Validity type	Very high	High	Moderate	Low	Very low
Face: Relevancy of document analyzed items to the research topic	1(100)	0(0%)	0	0	0
Construct: Relevancy the document content to the objectives of the study	0(0)	1(100%)	0	0	0
Content: If the documents analyzed are addressing the general purpose of the study	0(100%)	1(1000%)	0	0	0

Since validity was opined as high, reliability for the tool was thus deemed high and thus suitable for data collection.

A five level Likert scale was administered to the Deputy Principal, Keroka TTI, to get views on how effective the observation guide was. The following overall results were obtained. Suggestions raised were incorporated into the study.

Table 3.8*Validity Test Results for the Observation Guide*

Validity type	Very high	High	Moderate	Low	Very low
Face: Relevancy of observation guide to the research topic	1(100%)	0(0%)	0	0	0
Construct: Relevancy of observation questions to the objectives of the study	1(100%)	0(100%)	0	0	0
Content: If observation questions are addressing the general purpose of the study	1(100%)	0(100%)	0	0	0

Since validity was high, reliability of the study tool was thus deemed high.

In regard to the students' questionnaire, a five level Likert scale was used to test validity of the research instruments during a pilot test for data collected at Keroka TTI, Nyamira County. The pilot study sample participants for the principals, students and lecturers were asked to rate the tools' effectiveness for the study. The following results were generated.

Table 3.9

Validity Test Results for Student Questionnaires

Validity type	Very high	High	Moderate	Low	Very low
Face: Relevancy of questionnaire items to the research topic and measuring what they are supposed to measure	8 (80%)	2(20%)	0	0	0
Construct: Relevancy of questionnaire items to the objectives of the study and addressing gaps identified	7(70%)	3(30%)	0	0	0
Content: If the questionnaire is addressing the general purpose of the study	9(90%)	10(10%)	0	0	0

Table 3.10*Validity Test Results for Lecturer Questionnaires*

Validity type	Very high	High	Moderate	Low	Very low
Face: Relevancy of questionnaire to the research topic and measure what they purport to measure	10 (100%)	0	0	0	0
Construct Relevancy of questionnaire items are relevant to the objectives of the study and gaps identified:	8(80%)	2(20%)	0	0	0
Content The questionnaire is addressing the general purpose of the study:	10(100%)	0	0	0	0

High rates for validity tests and high reliability results are indicators of validity (Creswell, 2014). Therefore, the data collection instruments used in this study were valid.

3.8.2 Reliability of Data Collection Instruments

Drost (2011) defines reliability as the extent to which research instruments are repeatable when different people perform the measurements on different occasions under different conditions supposedly with alternative instruments which measure the construct skill. A test-retest method is favorable in testing reliability (Drost, 2011). In this regard the questionnaires are supposed to be administered not too soon and neither too late after the first test because respondents will either remember the responses on the first test and make a duplicate of it or derail from the main topic as changes in the subject factor may occur. In regard to this study, ten questionnaires for lecturers and ten for students for section B of the questionnaires on Likert scale questions were administered twice at an interval of one week on a similar population at Keroka and Sikri TTIs to conduct a pilot study. In the

first test, a reliability scores of 0.799 and 0.848 for lecturer and student questionnaire respectively were obtained while in the second score 0.892 and 0.853 scores were obtained as shown in appendix K. The two sets of scores were studied compared and contrasted and thus found reliable for the study.

3.9 Data Collection Procedures

Data collection commenced after obtaining required research documents from the directorate of postgraduate studies of the Kenya Methodist University, National Council for Science Technology and Innovation (NACOSTI), Technical Vocational Education and Training Authority (TVETA) and sampled Technical Institutions. Three TTIs declined data collection requests. These included: Nairobi for absence of the studied courses, Maasai Mara and Machakos due to Covid 19 pandemic. Subsequently, the researcher made schedule appointments with the eight TTIs specifying the date, time and place of data collection.

Questionnaires were administered to lecturers and students electronically after an introductory session by the researcher herself in the TTI lounges and classrooms in which the purpose of the questionnaire was explained and clarifications made. Completed questionnaires were submitted to the researcher's email address for analysis. The TTI principal's interviews were conducted by the researcher herself using both face to face approach and zoom meetings. Primary data was gathered using document analysis guide. To access the data, TTI principals authorized registrars to assist in availing required

records. In regard to observation, the TTI principals appointed heads of departments to facilitate access to all areas of interest within the institutions.

3.10 Operationalization of Variables

Operationalization of variables refer to the manner in which each variable studied and measured. Table 3.16 thus presents a summary of the measures.

Table 3.16

Measures of Academic Admission Requirement Dimensions

Construct	Indicators	Scale	Data collection method	Data analysis Method/tests
1. Academic admission qualifications	KNEC results	Ordinal Nominal	Record analysis Questionnaire interviews	Frequency Thematic Chi-square Statistical tables Kruskall Wallis Manwhitney
2. Instructional methods	Lecture & student-centered methods	Ordinal Nominal	Record analysis Questionnaire interviews	Frequency Thematic Chi-square Statistical tables Kruskall Wallis
3. Instructional equipment	Consumable & non-consumables	Nominal	Record analysis Questionnaire interviews	Frequency Thematic Statistical tables Kruskal Wallis Chi square
4. Leadership styles	Transformati onal & Transactional	Nominal	Interview Schedule Questionnaires	Thematic Kolmogolov Sminov Variance Inflation Factor Multiple linear regression

3.11 Data Analysis Techniques

The study gathered both qualitative and quantitative data. The data was analyzed using the convergence parallel approach in which the quantitative and qualitative data were analyzed concurrently, compared and contrasted and interpreted.

3.11.1 Quantitative Data Analysis

Quantitative data collected using questionnaires and document analysis guide was analyzed using descriptive and inferential statistics. Quantitative data was generated from the questionnaires' closed ended questions and KCSE and Technical KNEC final year results for diploma students. Descriptive statistics was applied to quantitative data and entailed the presentation of data using statistical distribution tables with percentages, frequencies, mean and standard deviations. For inferential statistics, chi square test and independent samples t-test was applied to determine if there was a significant difference or relationship between two independent samples of categorical data.

Multiple correlation analysis was used to compute the correlation between the leadership styles, the students' skills development, instructional equipment, instructional methods and the academic admission qualifications. Multiple linear regression analysis tests were conducted on the influence of the institutional factors on students' skills development. The intervening variable, instructional leadership style was introduced to test its influence on institutional factors and on student skills development. The multiple linear regression was performed in three different steps:

$$\text{Step 1: } Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Step 1 is the multiple linear regression model with the three institutional factors and how they influence students' skills development in the TTIs.

$$\text{Step 2: } Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Step 2: is the multiple linear regression model with three institutional factors and how they influence the intervening variable, the leadership styles in TTIs.

$$\text{Step 3: } Y = \beta_0 + \beta_1 Z + \varepsilon$$

Step 3: is the multiple linear regression model with the intervening variable, the leadership styles and how it influences the students' skills development in TTIs.

$$\text{Step 4: } Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 Z + \varepsilon$$

Step 4: is the multiple linear regression model with three institutional factors and the intervening variable, the leadership styles and how they influence the students' skills development in TTIs.

Where:

Y – Students skills development (Dependent Variable)

((Xs) = independent variables)

X1 – Academic Admissions Qualification

X2 – Teaching Methodology

X3 – Instructional Equipment

Z- Leadership styles (intervening variable)

ε -Error term

β_0 -Constant (Y- Intercept)

β_i - are the regression coefficients of each independent variable (i=1,2,3,4)

The Chi-square test, $\chi^2(\sum(O_i - E_i)^2) \div E_i$ Where; χ^2 = Chi squared, O_i = observed value and E_i = expected value, was applied for categorical data to compare the relationship between the two variables. Variance Inflation Factor test was conducted to test for multiple regression fitness. The Kolmogrov-Smirnov test was used to check for normality in the data. Since the test failed as the study sample size for the students and lecturers with quantitative data was below 50, the Kruskal Wallis and Mann-Whitney tests were used. Kruskal Wallis test was used to compare the three samples to test for significant difference amongst them. The Mann-Whitney test, similar to independent samples t-test was used to test for significant difference between two independent samples in the study.

The Statistical Packages for Social Sciences (SPSS) was used to perform all the analysis with a significance level (α) of 5 percent (0.05). From the sampling distribution, using SPSS a P value was generated. Using the values generated acceptance regions were determined based on judgment of critical values. Thus, a decision to retain or object the null hypothesis was made. Trends were determined that enabled comparisons among the study variables thus enabling the study to generate new knowledge through deductions, interpretations and conclusions. The trends identified also enabled the study to make policy recommendations and suggestions for further research.

3.11.2 Qualitative Data Analysis

Qualitative data analysis was based on data collected using open ended questions in the questionnaires, observation guide, document guide and the principals' interview schedule. After cleaning the data, the data was coded and analyzed thematically by identifying and generating the key themes from the data. Responses that were different were stated as they were elucidated.

3.16 Comparing, contrasting and interpretation of quantitative and qualitative data findings

Quantitative and qualitative data findings was compared and contrasted in order to raise concrete findings using the convergence parallel mixed methods model. Using the model, quantitative data analyzed using descriptive statistics and hypothesis tests was compared and contrasted with qualitative data on which new knowledge to the study was generated, recommendations drawn and conclusions made. Where the data results diverged, TVET policies, expert opinion and TTI legal document were used to evaluate results.

3.12 Ethical Considerations

Research is about truth. Research principles therefore require researchers to separate right from wrong and differentiating what is acceptable from unacceptable, avoiding falsifying of data, keeping values of accountability, trust, fairness with organizations associated (Priya, 2016; Resnik, 2015; Valentina, 2020). It is on this basis that the researcher obtained required research documents from the Kenya Methodist University through the office of

the Dean, Postgraduate and Social Science Studies, the National Council for Science Technology and Innovations (NACOSTI) and Technical Vocational Education and Training Authority (TVETA) who introduced me to all sampled TTI principals and authorized them to allow me collect data.

Data collection was conducted with utmost observance of the laid down regulations by the World Health Organization (WHO) and NACOSTI. The study participants consented to participate in the study by signing a consent statement provided at the introductory part of the questionnaire and interview schedule. While in the field, the researcher accorded participants freedom of responding to the questionnaire and to withdraw if they so wished. The questionnaire guidelines called upon the respondents not to disclose their identities so that no one can trace the source of the information received. Any sensitive observation made during the data collection period, whether related to this study or not, was treated with utmost confidentiality. Nevertheless, all sources of information used in this study have been duly acknowledged.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter is a presentation of the results of data analyzed and discussed based on the influence of institutional factors on student skills development in public Technical Training Institutions in Kenya. The structure of the chapter entails presentation of response rates, demographic information and quantitative and qualitative data analysis based on the study objectives using the convergence approach. Data was presented in statistical distribution tables and the results triangulated with literature review findings.

4.2 Response Rate Analysis

Response rate is defined by Morton, et al (2012) as the total number of participants interviewed or responded to questionnaires divided by the total number of participants who were eligible or the total number of completed interviews or questionnaires divided by total number of participants with whom contact was made. The difference between the two return rates is denominator. After examining Morton et al, (2012) explanation of the concept, the following formulae was developed to aid in analyzing the response rate of this study. The study chose response rate type two because it is likely to yield accurate results as it deals with the contacted respondents and not the sampled population. To avoid discrepancy between the sampled and the actual respondents type two response rate was selected for this study.

$$Rr_1 = \sum (Rq/Ic \div Ep)$$

Where Rr_1 represents response rate type one

Rq = Responded questionnaires

Ic = Interviews completed

Ep = Eligible participants

\sum of total number of participants interviewed

\sum of participants eligible

$$Rr_2 = \sum (Ci/Qc \div Pc)$$

Where

Rr_2 : Represents response rate type two

Ci = Completed interviews

Cq = Completed questionnaires

Cp = Contacted participants

Response rate formula for responses based on participants contacted

\sum of number of completed interviews or questionnaires

\sum of participants contacted

The eligible number for lecturers and student respondents was one hundred (100) each and eleven for institute principals while participants that were contacted included eighty (80) lecturers, eighty (80) students and eight (8) TTI Principals. Out of eleven Technical Training Institutions sampled for the study, nine TTIs responded for the study however one TTI had no BCT and CT courses offered. Therefore, only eight TTIs participated in the study. Eighty questionnaires were thus administered to lecturers in eight Technical Training Institutions and out of which 69 (86.5%) questionnaires were returned and 12 (13.5%) declined. Out of eighty student questionnaires that were issued to students in the

eight Technical Institutes, 70 (87.5%) responded while 10(12.5%) declined. Mugenda and Mugenda (2012) states that 50% return rate is adequate, 60% good and above 70% very good. The questionnaire return rate was thus considered very good to provide required information for the study.

Table 4.1

A Summary of Research Instruments Response Rate

N o.	Category of participants	Sample Size	Contacted participants	No. of Research tools administered	Research tools used	Returned
1	Lecturers	100	80	80	Questionnaire	69 (86.5%)
2	Students	100	80	80	Questionnaires	70 (87.5%)
3	Principals	11	8	8	Interview schedule	69 (85%)
Total		211	168	168	3	147 (87.5%)

4.3 Demographic Characteristics of Respondents

This study's demographic characteristics were based on lecturers, students and principals of public Technical Training Institutions in Kenya. Lecturers' demographic characteristics included gender, teaching experience, educational level and teaching programme. In regard to students, gender, age, course pursued and KCSE grades were considered. For principals, gender, age, leadership experience in terms of years and professional qualifications were considered. The results are as presented.

4.3.1 Lecturers' Characteristics

Lecturers' demographic characteristics included gender, teaching experience, educational level and Instructional programme. Results in regard to this were as presented in table 4.2 and table 4.3

Table 4. 2

Demographic Characteristics of Lecturers

Lecturers' demographic information

Description	Variable	Frequency	Percentage
Gender	Female	28	40.6%
	Male	41	59.4%
Teaching experience in Years	1-5	48	69.6%
	6-10	16	23.2%
	11-15	2	2.9%
	21& above	3	4.3%
Level of Education	Diploma	24	34.8%
	Bachelor's degree	43	62.3%
	Postgraduate diploma	1	1.4%
	Master's degree	1	1.4%
Instructional Programme	Clothing Technology	14	20.3%
	Building & Construction Technology	55	79.7%

4.3.1.1 Lecturers' gender

Table 4.2 reveals that there is gender disparity as more males, 41 (59.4%), and females, 28 (40.6%), are in the teaching staff. The genesis of this disparity can be traced back to the enrolment rates in table 4.4 in terms of gender as there are more male students (51) compared to females (19). These results thus reveal that gender policy and advocacy is perhaps not effectively implemented as well as the open admission policy.

4.3.1.2 Lecturers' teaching experience in years

In regard to teaching experience, majority of lectures 48(69.6%) in TTIs in Kenya have a teaching experience of between one and five years, 16 (23.2%) had an experience of between six and ten years, 3(4.3%) twenty-one and above years and 2(2.9%) eleven and fifteen years. These years of experience of lecturers are within the expected range captured given that Technical Education and Training was inaugurated in year 2013 by the constitution and in pursuit of Vision 2030.

4.3.1.3 Lecturers' level of education

In regard to level of education, 54 (78.26%) had Bachelor Degrees, 14 (20.29%) Diploma and 1 (1.45%) Master degree. The results thus show that TTIs in Kenya have complied with the employment policy. The results also show that there more lectures in the Building and Construction Technology (BCT) 59(79.7%) than Clothing Technology 14 (20.3%) courses. The low number of lecturers in the CT course is as a result of low enrolment rate hence one cause of skills gap in Kenya. Despite the fact that a high enrolment rate in a training is not a measure of quality skills development, another study will be required to establish the cause of these findings. Literature reviewed showed that one of the causes of skills gap in inadequate lecturers (Anindo, 2016; Mulenga & Chileshe, 2020). Therefore, adequate skills development depends of adequacy of lecturers as one factor. Based on this assertion, study sought to establish the number of lecturers and the following results were obtained.

4.3.1.4 Instructional Programme

Regarding Instructional Programme. The Lecturers were asked to indicate in which programme they were involved. The two programmes sampled were clothing technology and Building Techniques

Table 4.3*Summary of the lecturers' Instructional Programme in the TTIs*

TTI	Clothing Technology lecturers	Building Technology lecturers
Mawego	0	15
Rift Valley	0	16
Kinyanjui	0	15
Buret	0	9
Sotik	0	3
EkeruboGietai	7	15
Wote	0	12
Karen	4	9
Total	11	94

Table 4.3 reveals that there are more Building and Construction Technology lecturers 94(89.52%) as opposed to Clothing Technology 11(10.47 %) in public TTIs in Kenya. The table also reveals that most of the technical institutions in Kenya do not offer to skills gap especially the clothing industry as most TTIs 9(81.18%) do not offer the course. The results can also be used to show that the purpose, mission, vision and aim of TTIs in Kenya is not fully implemented.

4.3.2 Students' Characteristics

The TVET Act of 2013 states that admission to technical institutions should be open to all and non-discriminative in terms of courses applied for, gender and age. The students' demographic characteristics thus included, gender, age, course pursued and KCSE grades obtained and the results were as presented in table 4.4

Table 4.4

Demographic Characteristics of the Students

Students' demographic information

Description	Variable	Frequency	Percentages
Gender	Female	19	27.1%
	Male	51	72.9%
Age	18-23	35	50%
	24-30	32	45.7%
	31-40	3	4.3%
Course enrolled	Clothing Technology Building	13	18.6%
	technology	57	81.4%
KCSE grade Obtained	C+ & above	1	1.4%
	C Plain	25	35.7%
	C Minus	23	32.9%
	D Plus	12	17.1%
	D plain	3	4.3%
	Any other	6	8.6%

4.3.2.1 Students' gender

Tale 4.3 reveals that there is gender disparity as more males, 51 (72.9%) than females 19(27%) are enrolled. This therefore shows that the open admission policy and Education for All (EFA, 2010) policies are not fully embraced and advocated for in terms of gender.

4.3.2.2 Students' age

The modal class in terms of age is 18-23 years with 35 (50.0%) respondents, followed by 24-30 class of 32(45.7%) respondents and 31-40 class of 3(4.3%) respondents. The mean age is 20.5 years. The results show that students enrolled for TTI programmes are 18-40 years. This shows that transition policy from basic education to TTIs is embraced as there is no age limit issue. The results also indicate that there is compliance to the open

admission policy by TTIs as stipulated in the TVET Act, (2013) and international policies such as Education for All (2010).

4.3.2.3 Course enrolment

In regard to course enrolment, there are more students enrolled in BCT 57(81.4%) than CT 13 (18.6%). The low enrolment rate in CT is an indicator of skills gap in Kenya.

4.3.2.4 KCSE grades

Results in table 4.3 indicate that, TTIs have complied with the academic admission policy in which requires students to obtain a Craft certificate, grade C- or C for diploma programmes or C+ and above for those who wished to enroll for the programmes.

4.3.3 Principals' Characteristics

4.3.3 Principles Demographic Characteristics

The principals' demographic characteristics included gender, age, leadership experience in terms of years and professional qualifications. Results obtained were as presented in table 4.5.

Table 4.5

Demographic Characteristics of Principal

Principals' demographic information

Description	Variable	Frequency	Percentage
Gender	Male	6	75%
	Female	2	25%

leadership in Years	1-2	2	25.0%	
	3-5	3	37.5%	
	6-10	2	25.0%	
	Above 10 years	1	12.5%	
Level of Education	Bachelor's degree	5	34.8%	
	Postgraduate diploma	2	62.3%	
	Master's degree	2	1.4%	
Qualification Title	B.Ed in Building Technology	3	37.5%	
	Bachelor of Commerce	1	12.5%	
	Bachelor of Business Administration	1	12.5%	
	Post graduate Diploma in Education	1	12.5%	
	Master of Business Administration	2	25.0%	

4.3.3.1 Principals gender

Table 4.5 reveals that gender disparity exists among TTI principals as 6 (75%) are males and 2 (25%) are females. The findings can be used to emphasize the need for advocacy and policy implementation in regard to gender for TTIs in Kenya.

4.3.3.2 Principal's leadership experience in years

Majority of the respondents 3 (37.5%) have less than five years of experience, 2 (25%) 1-2 years, 2 (6-10 years and 1(12.5%) above 10 years. The years of experience were accurately revealed by the respondents since the TTIs policy came to existence in the year 2013 by constitution. Among the literature reviewed only Kadir and Geleta (2017) that mentioned the employment criteria of TTI principals. This included a minimum

qualification in 'B' level equivalent to the first degree in Kenya and work experience of five years. Any qualification below the qualification and experience established is a one of the causes of skills gap in Ethiopia. Therefore, a study establishing whether years of experience influence skills development in Kenya is required since 2(25%) of the principals have a two-year experience and 3 (37.5%) have an experience of between three and five years.

4.3.3.3 Principals' education level

In regard to level of education, 5(62.5%) had Bachelor's degree, 2 (25%) Master's degree and 1 (12.5%) postgraduate degree. The results thus indicate compliance to the TTI administration recruitment policy that ahead of any TTI in Kenya should be a holder of Bachelor's degree and above

4.3.3.4 Principals qualification titles

The findings show that the principals are trained in either a business or technical course. Technical education comprises both technical and business courses. In regard to this literature reviewed revealed that business courses are honored that technical courses. For this concern, the study assumes that the principals are well prepared of offering adequate instructional leadership to both courses.

4.5. Objective One Data Analysis on the Influence of Academic Admission Qualifications on Student Skills Development

The purpose of objective one was to examine the influence of academic admission qualifications on student skills development in public TTIs in Kenya. To achieve the objective document analysis guide, questionnaires and interviewed schedules were used. Quantitative data presented in this section was obtained from the KCSE and KNEC technical results using document analysis guide and closed ended questions in the questionnaires administered to lecturers and students. Qualitative data used was obtained by use of open ended questions and interview schedules. The data was analyzed and presented using the Convergence Parallel approach in figure 3.1. For tools that garnered both qualitative and quantitative data quantitative data was presented first. The two data set results were compared, contrasted and interpreted.

4.5.2 Lecturers' responses in regard to the influence of academic admission qualifications and student skills development

The lecturers' questionnaires garnered both qualitative and quantitative responses. Therefore, this section presents descriptive data on which inferential statistics were based and subsequently qualitative

4.5.2.1 Lecturers' quantitative data responses on objective one

Admission rate in TTIs is a sign of adequacy of skills in terms of availability or an indicator of skills gap. The lectures thus were asked to rate admission level to the TTIs and the following results were generated.

Table 4. 6

Academic Admission Rate to the TTIs

	Education admission rate of the institute	N	Mean Rank
Academic admission qualifications	Very low	1	38.00
	Low	5	10.80
	Moderate	20	27.68
	High	31	39.79
	Very high	12	44.67
	Total	69	

Table 4.6 shows that majority 31(44.93%) rank admission to TTIs as high, second majority 20(28.99%) as moderate, 12(17.39%) very high, 5(7.25%) low and 1 (1.45%) very low. The varied findings thus can be used to show that enrolment to the various TTIs in Kenya vary from one TTI to the other. The reason as to why the diversity will require another study since the TTIs studied acquired similar status in reference to academic admission qualifications, policy, curriculum, assessment, and administration factors.

In regard to the academic admission qualifications the lectures were asked to give opinions in regard to the following statement. The following responses were gathered.

Table 4. 7

Lecturers' Opinions on Academic Admission Qualifications and Skills Development

Statements	Response Percentages							Std. Deviation
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	Mean		
Admission grades are relevant to the course applied for	2.9	7.2	2.9	58.0	29.0	4.03	0.94	
Course work subject content is relevant to the aptitude	2.9	11.6	8.7	59.4	17.4	3.77	0.97	
Students perform well in Mathematics and Sciences	2.9	37.7	13.0	34.8	11.6	3.14	1.14	
No student gets a referral in math and science subjects at the national examinations	20.3	59.4	7.2	11.6	1.4	2.14	0.93	
All students reach the required level of skills development	2.9	49.3	8.7	31.9	7.2	2.91	1.11	
Admission grades influence skills development	2.9	7.2	2.9	53.6	33.3	4.07	0.96	

Table 4.7 shows that majority, 40 (58%) of the respondents were in agreement that the admission grades are relevant to the courses applied for while 20 (29%) strongly agreed, 2 (2.9%) were undecided, 5 (7.2%) percent disagreed and 2 (2.9%) strongly disagreed. Commensurable academic admission qualifications to the states in table 4.17 is an indicator of quality skills development. The vice versa is also true of the findings. The results thus show that TTI produce both high and low qualified graduates. This means that the probability of getting a qualified employee is half. In this regard, no literature reviewed made this observation. In this regard, the possibility of retraining graduates in order to meet the industry requirement is high hence an indicator of a waste of resources (Kyariz, 2016). Moreover, the results show that there is a problem with the open admission policy in which when students that do not obtain a university admission grade at KCSE

automatically qualify for a TTI programme. Similar findings were established by multiple studies globally among them, Alshamsi (2020) in Saudi Arabia in which the youth do not enroll for TTI courses but opt for oil company jobs that give them high pay and a sense of dignity. To fill the gap, the government a lot technical education jobs to foreigners who can accept a meagre pay as low as 2,000 United Emirate Rubies. These findings can be used to explain why Kenyans who make their way to such countries experience bad times as they opt to work without training and proper orientation.

The results also show that career guidance to TTI programmes lack at secondary school level and in the TTIs in Kenya. Similar findings were established by Al-Saaidh (2016) in Tajikistan in which students with high basic education qualification but wished to pursue a technical courses opted not to do so because the form of education was specifically set aside for low grade academic achievers. These findings thus show one global cause of skills gap.

In regard to relevance of course work subject content with student ability majority, 40 (59.4%) agree that the two are commensurable, 12 (17.4%) strongly agree, 9(11.6%) disagree, 6 (8.7%) were undecided, 2(2.9%) strongly disagree. The varied responses are thus indicators of enrollment of both strong and weak students to the same level of training. Similar findings established in South Africa by Burdenhost and Radile (2018) and Ngoveni (2018) revealed that many students in TTIs do not fare on well with the coursework due to high subject content intonation in relation to their admission grades. To address such issues, Koobonye's (2020) study shows that the main problem is lack of empirical studies suitable in addressing issues facing TTIs. Zauliatou makes similar

observation in Kameroun. In regard to these observations, Tambwe (2017) advises that a backward mapping strategy or chronological is required in addressing issues of skills training. This finding could form a basis for research on the relationship between academic qualifications and the type and level of technical education curriculum offered with the aim of addressing issues of skills gap.

In regard to whether students perform well in Mathematics and Sciences, majority, 26 (37.7%) disagreed, 24 (34.8%) agreed, 2(2.9%) disagreed, 9 (13.0%) were undecided, and 8 (11.6%) strongly agreed. Standard deviation is one point above the mean for all items presented in regard to the question on how students perform in Mathematics and Sciences. One point above the mean implies that the majority respondents agreed with the questions presented above. In this regard, a total majority (46.4%) are in agreement that the subject content is relevant to the aptitude level of the students. Similar findings carried out by Ngoveni (2018) in South Africa and Muthoni (2015) in Kenya agreed with this results in which students could not perform simple sums such as finding area of a surface and speed covered. In Botswan, Ngati (2015) made similar observations in which the researcher established that skills training lack credibility and rationale as the training model was a duplication of courses offered by universities. The reason why TTI curriculum at diploma level pose a problem could be it's a replicate of university level curriculum. This thus requires another study to address the issues.

In regard to whether students received fails and referral results in mathematics and science subjects at the KNEC Technical Examinations, majority, 41(59.4%) disagreed, 14 (20.3%) disagreed, 5(7.2 %)were undecided, 8(11.6%) agreed, and1(1.4%) strongly agreed. These results still reveal that there are many referrals and fails in TTIs in regard to Mathematics and Science subjects. One point above the mean implies that the majority respondents agreed with the question as presented in table 4.7 which reveals that many students have a problem with science and mathematics subjects as there are also many referrals in the Kenya National examinations for technical institutions. Similar findings were established in Ghana by Amedome and Fiagbe (2013) and Malechwanz (2018) in Kenya. In regard to the findings, students lamented that Mathematics and English subjects were an impediment to skills development as the policy required at least a pass in a national examination for the students to progress to the next level of the training. Progress in the training institutes. Due to multiple failures and referrals in national examinations the students demanded an exclusion of mathematics and English language from the course work. When such observations are made, Ngwato (2020) asserts that the problem is at the transition level of basic education to tertiary levels of learning. These results thus point out to the fact technical education is not about academic failures at basic level. Therefore, a study aimed at addressing is required.

The study also sought to find out if all students reached the required level of skills development in relation to the academic admission qualifications. Majority of the respondents showed that not all students reached the requires skills level as 34 (49.3%) disagreed with the statement, 22 (31.9%) agreed, 6 (8.7%) were undecided, 5(7.2%)

strongly agreed and 2 (2.9%) strongly disagreed. Fail and referrals are indicators of lack of skills and when majority of the respondents show that majority of students enrolled in TTIs do not reach the required level of skills development, the question whether the admission qualifications are logically arrived at arises. Similar findings were established by Eicker et al in 2017 in Sub-Saharan Africa that low admission qualifications led to inferior skills development that cannot compete at a global level. Unlike this observation in Cameroon admission to TTIs is based on a competitive examination administered prior to admission with a thorough scrutiny of academic credentials and educational background of the students against courses applied for (Daoudu, 2018). Daoudu' 2018 study can be used to show that despite challenges faced by developing nations in implementing technical education, the same nations are working toward the improving it.

The lecturers were asked to give their opinions whether the academic admission qualifications influence skills development. Majority 37 (53.6%) percent agreed, 23(33.3%) strongly agreed, 5(7.2%) disagreed, 2(2.9%) were undecided and 2(2.9%) strongly disagree. These findings thus mean that the higher the academic admission qualifications the quality of the skills expected. The findings thus reveal a weakness in the academic admission qualifications.

Subsequently, the study sought to establish the level at which students are able to perform communication related tasks. This was to enable the study establish the effectiveness of the academic admission grade with the course applied for. The lecturers thus were asked to show the extent to which students were able to perform selected practical tasks. The following results were generated.

Table 4.8*The Extent to which Students were able to Perform Selected Technical Skills*

Statements	Response Percentages				Mean	Std. Deviation
	Very Low	Low	Moderate	High		
Assembling training machines	28.6	17.1	48.6	5.7	2.31	0.956
Operating machines	30.0	12.9	51.4	5.7	2.33	0.974
Maintenance the machines	35.7	10.0	47.1	7.1	2.26	1.031
Practical lesson report	34.3	7.1	54.3	4.3	2.29	0.995

Table 4.8 shows responses obtained from a Likert scale in regard to students' ability to perform hands on tasks. In regard to ability to assemble training machines majority 35 (48.6%) indicated moderate, 21(28.6%) very low, 9(17.1%) low and 4 (5.7%)high. On operating instructional machines, majority 36(51.4%) indicated moderate, 21(30.0%) very low, 8(12.9%) low and 4 (5.7%) high. In regard to maintenance of instructional machines, majority, 32(47.1%) indicated moderate, 25 (35.7%) indicated very low, 7(10.0%) low and 5 (7.1%) high. On report writing for practical lessons, majority37(54.3%) indicated moderate, 24(34.3%) very low, 5(7.1%) low and 3(4.3%) high. Descriptive statistics applied to obtain the mean and standard deviation results showed that one standard deviation above the mean means that two thirds of the students have a problem with maintenance of training machines. The standard deviation for the other categories is averaging 1. Therefore, majority of students demonstrate deficiencies in the training in regard to practical learning. Similar findings were established in Ethiopia (Yizengaw, 2018) in which students were not able to make simple calculations, apply new knowledge, use machine user guides and explain what they are doing practically. Wambui (2016) revealed a state in which an industry was well equipped but had no one to operate the

machines in Kenya. The underlying reasons for this outcome are beyond the scope of this study and another study could be well placed in filling the gap.

The lecturers were thus asked to show the extent to which the student were able to perform quantitative tasks as specified in table 4.9. The following results were obtained.

Table 4. 9

Lecturers’ Responses in Regard to the Student Ability to Perform Quantitative Tasks

Statements	Response Percentages				Mean	Std. Deviation
	Very Low	Low	Moderate	High		
Keep inventory	27.6	36.1	28.6	5.7	2.31	0.856
Develop budgets	30.0	42.9	21.4	5.7	2.33	0.974
Write financial reports	37.7	28.0	27.1	7.1	2.26	1.031
Prepare purchase lists	32.3	19.1	44.3	4.3	2.29	0.795

Table 4.9 shows responses obtained from a Likert scale in regard to students’ ability to perform quantitative assignments. Descriptive statistics was applied to obtain the mean and standard deviation results. In regard to inventory keeping, majority, 25(36.1%) percent indicated low, 20(28.6%) indicated moderate, 19(27.6%) very low and 5(5.7 %) indicated high. On budget development, majority, 30 (42.9%), indicated low, 21(30.0%) very low, 15(21.4%) moderate and 4 (5.7%) percent very high. In regard to writing financial reports, majority 26(37.7%) indicated very low, 19(28.0%) low, 19 (27.1%) moderate and 5(7.1) high. None of the respondents indicated very high. These findings agree with Ngoveni’s (2018) findings in South Africa in which students has extreme difficulties in making progress in skills learning as high ability in Mathematics was required. Similar findings were established by Ayonmike (2018) in Nigeria in which

students could not progress from one level of training to the next due to low academic ability in Mathematics and Muthoni (2015) in Kenya where students could not perform simple mathematical calculations of distance and speed.

In regard to purchase lists preparation, majority 31 (44.3%) indicated moderate, 23(32.2%) very low, 13(19.1%) low and 32.3 (4.3%) high. The results thus show that majority of the students have challenges with subjects that require mathematics in regard to standard deviation results. One standard deviation score above the mean means that majority of the students have a problem with quantitative skills as the standard deviation for the other categories is averaging 1. These results concur with literature review results in which inadequate preparation of students at basic education level in regard to mathematics, led to embedded progress from one level of skills development to another. Similar observations were made in Ghana, Trinidad and Tobago, Tanzania, Kenya and South Africa (Amedorme and Fiagbe, 2013; Mark & White, 2019; in Trinidad; Munishi, 2015; Ringera, 2017; Ngoveni, 2018)

Amedorme and Fiagbe (2013) made similar observations in observations in Ghana, Mark and White (2019) in Trinidad and Tobago, Munishi (2015) in Tanzania, Ngoveni, (2018) in South Africa and Ringera (2017) in Kenya, Trinidad and Tobago in South America. The findings thus show that the open admission criteria lack credibility globally. Therefore, another study may be required to establish the cause of these findings.

To test hypothesis, inferential statistics was conducted based on descriptive statistics. On this to achieve this, a Kruskal Wallis test which is a rank based non-parametric test used

to determine relationship between two or more groups of an independent variable on a continuous or ordinal dependent variable was applied. In this study Kruskal Wallis test was used as an alternative test to ANOVA since the data tested did not qualify for ANOVA test as an ANOVA test conducted failed to achieve normal distribution qualification. Man-Whitney test as an extension of ANOVA was not selected for this test as it focuses on categorical data with one independent variable and one dependent variable. Kruskal Wallis test was found fit for the test as illustrated in table 4.10.

Table 4.10

Test for Normality for Influence of Academic Admission Qualification by Lecturers

Kolmogorov-Smirnov test			
Statistic	Df	Sig.	
.109	69	0.042	

In table 4.10 the Kolmogorov-Smirnov test was used as the sample size is more than 50. The Kolmogorov-Smirnov test shows that the data is not normally distributed ($p=0.042$, Statistic=0.109). The null hypothesis was rejected that the data is normally distributed. This implies that the One-Way Analysis of Variance (ANOVA) test cannot be used. The similar test for non-parametric data is the Kruskal Wallis test which is to test the significance difference in the groups of the data.

Table 4. 11*Ranks for the Kruskal Wallis Test*

	Extent subject content is relevant to student ability	N	Mean Rank
Academic admission qualifications	Very low	1	64.00
	Low	1	1.00
	Moderate	22	24.52
	High	38	38.76
	Very high	7	48.21
Total		69	

Table 4.11 shows the mean ranks for the Kruskal Wallis test for the academic admission qualifications based on how the lecturers perceived the relevance of the subject content they teach to the academic admission. If the p-value is less than or equal to the significance level then the null hypothesis is rejected and a conclusion that not all group medians are equal is made. If the p-value is greater than the significance level, then there is no sufficient evidence to reject the null hypothesis that the group medians are all equal.

Table 4. 12*Kruskal Wallis Test Statistic*

	Academic admission
Chi-Square	15.487
Df	4
Asymp. Sig.	.004

The Kruskal Wallis test in table 4.12 was thus performed to compare the statistical significant difference between academic admission qualifications and the attitude of the lecturers on the extent to which the content of the subject they teach was relevant to the academic admission qualifications. A Kruskal Wallis test showed that there was a

statistically significant difference in academic admission qualifications between the lecturer responses or attitude (chi-square=15.487, p=0.001, df=4) with a mean rank academic admission score of 64.0 for very low, 48.21 for very high, 38.76 for high, 24.52 for moderate and 10.80 for low. Therefore, the extent to which the lecturers perceived the content of the subject they teach to be relevant to the academic admission differed from very low to very high based on the mean rank of the results.

A similar test of Kruskal Wallis Test based on table 4.6 and 4.7 on the relationship between academic admission qualifications and admission rates to TTIs was conducted to find out the relationship between academic admission qualifications and admission rates to TTIs. The following results were generated.

Table 4.13

Ranks for the Kruskal Wallis Test

Academic admission qualifications	Education admission rate of the institute	N	Mean Rank
		Very low	1
	Low	5	10.80
	Moderate	20	27.68
	High	31	39.79
	Very high	12	44.67
	Total	69	

Table 4.13 shows the mean ranks for the Kruskal Wallis test for the academic admission qualifications based on the rating the lecturers gave on the education admission in their institutions.

Table 4. 14

Kruskall Wallis Test Statistic

Academic admission	
Chi-Square	14.660
Df	4
Asymp. Sig.	.005

In table 4.14, the Kruskal Wallis test was performed to compare the statistical significant difference between academic admission qualifications and how the lecturers rate technical education admission to their technical institute. A Kruskal Wallis test showed that there was a statistically significant difference in academic admission qualifications between the lecturer responses or attitude (chi-square=14.66, p=0.005, df=4) with a mean rank academic admission score of 44.67 for very high, 39.79 for high, 38.0 for very low, 27.68 for moderate and 10.80 for low. Therefore, how the lecturers rate the education admission to their technical institute and the academic admission qualification differed significantly from a very low to a very high perception.

4.5.2.2 Lecturers' qualitative data on objective one

This section presents analyzed data that was collected using upon ended questions. The questions aimed at getting depth understanding of the influence of academic admission qualifications on student skills development. To achieve this and in the first place lecturers were asked to explain how effectiveness the academic admission qualification is in skills development. Responses gathered showed that the policy is effective for some students and to some not. In this regard various responses were elicited. Despite the compliance to the admission policy to TTIs by the government, some lecturer responses expressed reservations towards the admission policy. For instance, lecturer number 34 of the

questionnaires distributed opined that, there are subjects that need high KCSE general grades and at the same time high grades at subject level. The respondents further explained that, at admission specific subjects' grades are not mentioned thus students with no proper academic foundation to the courses enrolled for courses become a challenge to them. In regard to this findings, the question whether the students understand the purpose of basic education arises as it is hoped that basic education prepares students for any task.

Further, lecturer respondent number 46 said that, "in Building and Construction Technology, high grades in physics and mathematics are required but only a general grade is mentioned at admission to the programmes by Kenya Universities and Colleges Central Placement Sector (KUCCPS)". Respondent number 33 stated that students lacked sufficient knowledge for the courses applied meaning that they were not well prepared at basic education level for the courses. On the same note, lecturer number 46 of the distributed questionnaires stated that there is lack of career guidance for these students. Moreover, there were common statement among the respondents that there is a problem with the KUCCPS in regard to subject clusters. In this regard, responses indicated that the sector admits students to TTIs programmes without consulting TTI lecturers who have practical teaching experience with the students and have proper knowledge and orientation in regard to the training. These findings thus show a systemic problem that needs to be addressed by all TVET stakeholders. Moreover, the systems theory in this study emphasizes unity of purpose and without which entropy is likely to occur as explained by the second law of thermodynamics. The TTIs therefore seem to be experiencing entropy

in regard to academic admission requirements and skills development that require a systems approach in tackling the issues

Subsequently the lecturers were asked to state what could be done to mitigate the challenges faced in regard to academic admission qualifications and student skills development. In regard to the above question, varied responses were gathered based on curriculum and stakeholders. On this regard, issues in regard to subject clusters that require a review by Kenya Universities and Colleges Central Placement Sector (KUCCPS) in collaboration with TTI lectures were pointed out. Moreover, the lecturers opined that students who did not pass mathematics and sciences subjects at basic education level should not be allowed to enroll for TTIs courses that require high grades in the subjects. The respondents also raised concerns in regard to the physically challenged students. For this concern, deaf students need to be considered when setting academic admission qualifications. Finally, students that scored E or obtained KCPE certificate should be admitted to their own level and not mixed with those of high school qualifications and irrelevant subjects to courses applied for need to be removed. In regard to these, relevant subjects were not stated hence requiring another study to establish the relevant subjects and suggest a solution to the problem.

4.5.2.3 Comparing and contrasting quantitative and qualitative data for lecturers

Hypothesis tested using Kruskal Wallis test in table 4.12, showed that there was a statistically significant difference in academic admission qualifications between the lecturer responses or attitude (chi-square=15.487, p=0.001, df=4). This shows that there

is a problem with academic admission qualifications and skills development. Qualitative data supported these findings as the responses showed that students had academic challenges especially in regard to courses that require high KCSE grades, KUCCPS and other stakeholders' challenges student admission to TTIs on skills development notwithstanding.

4.5.3 Students Quantitative Data Analysis on the Influence of Academic Admission Qualifications on Student Skills Development

Students' questionnaire comprised of both open and closed ended questions. Therefore, this section presents quantitative and qualitative findings.

4.5.3.1 Students' quantitative data analysis on objective one

Focusing on the objective, admission grades are important to this study because prior knowledge to technical courses is an essential prerequisite to skills development. Table 4.15 therefore presents academic admission grades for the 70 sampled students for the study.

Table 4.15*Sampled Students' Academic Qualifications at Admission Level*

KCSE Grade	Frequency	Percent (%)
C+ and above	1	1.4
C Plain	25	35.7
C Minus	23	32.9
D Plus	12	17.1
D Plain	3	4.3
KCPE Certificates	6	8.6
Total	70	100%

Table 4.15 shows that 1 (1.4 % of the students admitted to the TTIs had obtained grade C plus and above, 25 (35.7%) obtained grade C, 23 (32.7 %) C minus, 12 (17.1 %) D plus, 3 (4.3 %) D plain and 6(8.6 %) had earned a KCPE certificate. The findings thus show that TTI had complied with the academic admission qualifications policy to TTIs in Kenya as specified in the TVET Act, 2013 and the Kenya Universities and Colleges Central Placement Sector (KUCCPS).

One of the indicators of inadequate skills development is challenges in the process of skills learning which may be as a result of inadequate academic admission qualifications. The study thus sought to establish whether or not the academic admission qualifications as set are relevant to the course students were enrolled in by asking the students to show whether or not they had challenges in the learning process.

Table 4.16

Learning Challenges for TTIs Students

Students with learning challenges	Frequency	Percent
No	22	31.4
Yes	48	68.6

Table 4.16 reveals that majority of the student respondents 48(68.6%) had learning challenges and 22 (31.4%) had no challenges. In regard to these findings a 48.6 percent is a high figure which shows a serious problem in regard to academic admission grades and skills learning in TTIS. According to the TVET ACT (2013), admission to Diploma programmes in TTIs requires a minimum grade of C minus. When most students show that they have challenges in regard to skills learning it may indicate that the course content is pitched at a higher level than the students' academic ability as observed by Ngoveni, (2018) and Burdenhost and Radile, (2018) in South Africa. These findings thus require another study to establish the cause of the findings.

Literature reviewed indicated that one of the causes of skills gap globally, is low communication skills which were as a result of low academic admission qualifications. On this basis, the study sought to establish whether or not it was the same case in Kenya by finding out the Students' communication skills level. The following results were obtained.

Table 4.17*Responses on students' ability in Communication Skill Tasks*

Statements	Response Percentages				Mean	Std. Deviation
	Very Low	Low	Moderate	High		
Writing minutes	28.6	17.1	48.6	5.7	2.31	0.956
Writing reports	30.0	12.9	51.4	5.7	2.33	0.974
Writing business letters	35.7	10.0	47.1	7.1	2.26	1.031
Writing work plans	34.3	7.1	54.3	4.3	2.29	0.995

Table 4.17 shows responses obtained from a Likert scale in regard to students' ability to perform in communication skills related subjects. Descriptive statistics was applied to obtain the mean and standard deviation results. Majority in regard to writing minutes 34(48.6%) indicated moderate, 19 (28.6%) very low, 12(17.1%) low and 4(5.7%) high. On report writing, majority 35(51.4%) indicated moderate, 21 (30.0%) very low, 9 (12.9%) low, and 4(5.7%) high. In regard to writing business letters, 33(47.1%) indicated moderate, 25(35.7%) very low, 7(10.0%) low and 4(7.1%) high. In regard to writing business plans, majority 37(54.3%) indicated moderate, 24(34.3%) very low, 5(7.1%) low and 3(4.3%) high. None of the respondents in all the questions indicated 'very high'.

In regard to the standard deviation, one score above the mean means that majority of the students have a problem with communication skills. The standard deviation for the other categories is averaging 1. The majority of students thus demonstrate deficiencies in the training in regard to communication skills. These findings show why workplace skills are lacking. Similar findings were established by Alshaaideh (2016) in Jordan, Anindo et al. (2016) in Kenya, Koobonye (2020) in Ghana, and Ngoveni (2018) in South Africa. The

findings can be used to show that there is a relationship between academic admission grades and student skills development. Which means that the higher the KCSE score the better the level of knowledge and skills acquired at the TTIs. The fundamental reasons for this outcome are beyond the scope of this study and another study could be well placed in filling the gap.

4.5.3.2 Students' qualitative data on objective one

The qualitative data was generated using open ended questions on which in-depth information in regard the of academic admission qualifications was sought. In this regard the study sought to find out whether or not Students had challenges in regard to academic admission requirements and the course pursued

Responses obtained from the student respondents showed that the difficult subjects were the main problem to them. The other responses were financial challenges, inadequate lectures, practical lessons, learning material, training equipment, inadequately trained lecturers, over description of the syllabus and no serious learning for diploma students. on this regard, *responded number 24 lamented that "there are difficult subjects in the TTIs and some of them were not introduced at secondary school level such as technical drawing subject"* A second major challenge reported was finance. On this regard, student number 52 lamented that, *"here in this institution we experience delays by Higher Education Loan Board which is supposed to facilitate our school fee the beginning of the term but they do remit at the end of the term, and this has affected our learning because we couldn't be allowed to attend classes without fee clearance document by the accounts' office."*

Therefore, the study established that there is lack of coordination between TTIs and HELB hence a challenge among stakeholders.

Further, the students were asked to suggest solutions to the challenges in regard to academic admission grades and coursework. The following responses were obtained.

Course-work challenges facing students in relation to their academic admission grades were factored as human resource, prior knowledge of coursework, professional ethics, instructional equipment, curriculum and finance. In tackling human resource deficiencies, one respondent said, “there is need to employ qualified lectures”. The purpose of basic education is to offer basic knowledge that prepares learners for higher education regardless of the type and level of knowledge offered. Therefore, the study findings show that the students are not creative and receptive to learning or they are not qualified to be in the TTIs. Complains in regard to lack of prior knowledge show that there is lack of career guidance for these students in TTIs and this accounts for the issues of skills gap in the country.

4.5.3.3 Comparing and contrasting quantitative and qualitative data for lecturers

Quantitative and qualitative data agree that academic admission qualifications influence skills development. It seems that students are enrolled in TTIs as the last resort when they fail to get admissions to universities. Therefore, inadequate academic admission grades account for the issue of skills gap manifested.

Interpretations

Admission to technical institutions lacks logic in regard to general admission grade, subject grades and course for which students are admitted for. Therefore, TTIs need to be involved in decision making for matters pertaining admissions to the institutions.

4.5.4 Principals' responses in regard to objective one

This section presents qualitative data findings for principals' in regard to academic admission requirements and skills development. The study sought to understand how effective the academic admission qualifications were to skills development as set by the government. Diverse responses were obtained that revolve around student aptitude, student participation and basic education. In this regard, the following responses were garnered:

Interviewee 1: *The academic admission requirements are not adequately set as most students at diploma level do not reach the required level of skills development. Course work seem to be challenging specially to subjects that require high grades in mathematics and science subjects.*

Interviewee 2: *The grades are well set. It depends on the seriousness of every student himself or herself. The manager exclaimed that, "we have high school dropouts that perform better in the training than those who excelled in KCSE."*

Interviewee 3: *The academic qualifications are adequately set. The one problem is that students do not take learning seriously. "There are students that obtained high grades at KCSE but can't perform and the vice versa is true"*

Interviewee 4: *The qualifications are not favorable for deaf student. There is need of considering them because they are not able to express themselves the same way as the normal students.*

Interviewee 5: *No, the qualifications are not logical to some extent. There are issues of clusters that need to be reviewed by KUCCPS.*

Interviewee 6: *It is yes and no. This is because in some subjects, students lack sufficient background knowledge for their careers. For example, technical education subjects were scrubbed from primary school syllabus at primary school level and made optional at secondary school level. That is where the problem lies however CBC is the solution to this.*

Interviewee 7: *The set qualifications are relevant. Every student is required to excel in skills learning since they are specializing on a specific course. Unfortunately, most of our students really do not excel much in theory but do very well in practical work. At the end of training skills are acquired.*

Interviewee 8: *The grades are well sat, how students are taught matters a lot. All lectures are highly qualified and competent.*

Majority of the responses elucidated agree with the literature findings that open admission criteria is a challenge to skills development (Al-Saaideh, 2016; Doudou, 2018; Eicker et al., 2017; Munishi, 2016; Ringera, 2017). Therefore, another study will be required to verify the truthfulness of these findings.

Further, the study sought to understand how challenges in regard to academic admission qualifications can be mitigated. On this regard, the principals were asked to explain what could be done to mitigate challenges facing skills development in regard to academic admission requirements. Responses garnered focused on curriculum, politics, stakeholder, student responsibility and lecturer competence. In regard to student factor, the managers opined that skills development is a personal responsibility. Students that are focused on their studies acquire better skills than those who need to be pushed in order to work. In regard to stakeholder factor the principals opined that meanwhile the new system, 2.6.3.3.3 is underway, there is need for KCCUPS to mention subject grades required for courses that require high grades such as BCT course. Moreover, KUCCPS needs to review the issue of clusters in collaboration with TTIs. Responses that differed were raised as follows:

Interviewee 3: *There is no need of raising entry grades but there is need of employing qualified lecturers with the minimum qualification of a higher diploma because students admitted to TTI need a lot of attention in learning.*

Interviewee 4: *Admission to TTI is politicized as it emerges as a political agenda every election period in Kenya. This kind of strategy need to be stopped in quality skills need to be developed. Moreover, there should be different academic admission criteria for students with disabilities especially the deaf.*

Interviewee 6: *There is need for career guidance at secondary school level. Despite the fact that basic education is to prepare students for general subsequent levels of learning,*

students should not be allowed to be enrolled for courses they have no prior knowledge on at TTIs.

The findings show that systems thinking is lacking in regard to academic admission qualifications and skills development. Similar suggestions were made in Africa. For instance, in 2018, Ngoveni made a critical remark to the Ministry of South African Education that collaboration among TVET stakeholders was lacking as coursework development for technical colleges was allotted professors who had little knowledge and orientation for technical education. The studies established that TTI coursework is pitched higher than the students' academic ability. Moreover, the curriculum is developed by professors who have no sufficient knowledge and orientation in regard to technical education. In this regard, the expertise of a TTI lecturer is ignored. In this regard, the principles of the Open Systems Theory and the rationale of the decision-making theory by Herbert Simon of bounded rationality and satisficing seemed to be ignored.

The findings thus focus on curriculum developers and implementers that include universities and colleges that train TTI lecturers, TTI management, lecturers, National Skills Development Authority, Sector Skills Advisory Committee, Kenya National Examination Council and Kenya Universities and Colleges Central Placement Sector among others. The findings thus call for another study that will establish the cause of skills gap in regard the role TTI stakeholders play in skills development in Kenya.

4.5.5 Document Analysis guide findings in Regard to Academic Admission Qualifications and Skills Development

Document analysis was conducted on KCSE grades at admission and the final KNEC technical grades in TTIs. The purpose of this analysis was to generate data to aid in discerning whether or not academic admission grades influence skills development in TTIs in Kenya. Findings were presented as follows:

4.5.5.1 Cross tabulation of KCSE grades and KNEC technical results

The data was cross tabulated as presented in table 4.18 on the courses that students pursued that aimed at answering the question whether the KCSE results influence the final grade at TTI Data was thus collected on KCSE mean grade and final grade for diploma students in clothing Technology (CT) and Building and Construction Technology (BCT) courses in public TTIs in Kenya. On this regard, only quantitative data was collected using this tool in which descriptive and inferential statistics based.

Table 4.18*Cross Tabulation Test Table for KCSE Grades and KNEC Technical Grades*

Final KNEC Grade at TTI		KCSE Grade					C Plus and Above	Total
		E or KCPE Certificate	D plain	D Plus	C Minus	C plain		
Fail	Frequency	1	1	1	6	0	0	9
	Percent	1.4	1.4	1.4	8.7	0.0	0.0	13.0
Refer	Frequency	0	0	1	7	6	2	16
	Percent	0.0	0.0	1.4	10.1	8.7	2.9	23.2
Pass	Frequency	2	0	6	10	3	0	21
	Percent	2.9	0.0	8.7	14.5	4.3	0.0	30.4
Credit	Frequency	0	0	3	5	7	6	21
	Percent	0.0	0.0	4.3	7.2	10.1	8.7	30.4
Distinction	Frequency	0	0	0	0	1	1	2
	Percent	0.0	0.0	0.0	0.0	1.4	1.4	2.9
Total	Frequency	3	1	11	28	17	9	69
	Percent	4.3	1.4	15.9	40.6	24.6	13.0	100.0

Table 4.18 shows that out of the 70 students whose entry to TTIs results were studied shows that there were 9 (13%) students that had failed in KNEC technical examinations 1 with E and or KCPE certificate 1 D plain, 1 D+ and 6 with C-. No student that had C plain and above failed. The results show that the higher the entry grades the better the skills developed at the TTIS.

In regard to those that obtained a refer, table 4.18 shows that 16 (23.2%) had a refer. In this regard no student that had and E or KCPE grade or D plain failed but 1 with D+, 7 with C- and 6 with C plain grades. No student with C+ failed. This result show that student with lowest entry grade performed better than those with C- and C plain grades because they have been in the training longer than the C- and C plains student through artisan and craft levels of training which takes at least three years of study to obtain a diploma entry

certificate. The results thus justify the open admission policy. Despite the fact that grade E and KCPE certificate students performed better at Diploma level, a longer period of time is taken to complete the training, not less than six years according to the TVET ACT 2013. This is thus a very expensive venture hoped to be solved by the new system of education the 2,6,3,3,3.

Table 4.18 reveals that 21 (23.2%) obtained a pass of which two had E or KCPE certificate, none with D plain, 6 D+, 10 C- and 3 C plain grades and none with C+ and above. The table also reveals that out of the 21 (30.4%) that obtained credit, none of the students with E or KCPE certificate had a credit but 3 with D+, 5 C- 7 C plain and 6 C+. The table reveals that out of two (2.9%) students that obtained distinction 2 (2.9%) 1 obtained grade C and 1 C+ and above at KCSE. The results thus reveal that academic admission qualifications influence skills development.

Using the Kenyan KCSE and KNEC technical results grading system presented in appendices H and I, failure and referrals are indicators of lack of skills development. The results show that performance at KCSE determines the level of skills developed. This implies that basic quantitative and communication skills are essential in TTIs training programmes, a fact that should not be glossed over in policy directives on TTIs. Similar findings were established in Tanzania in which basic education offered is not strong adequate enough to prepare students for quality technical education (Munishi ,2016). In Kenya, Ringara (2017) makes a similar observation in which lecturers do not waste time teaching Mathematics to students that did not pass the subject at the national examination, KCSE. In 2019, Serikaya and Yildirim made similar observation in a European

conference for education and research. Technical training institutions should therefore not be institutions for academic failures and that underlying key education reform that must be informed by sound and scientific research on educational phenomena rather than political reward system or campaign strategy. Another study therefore will be required to establish the cause of these findings.

4.5.5.2 Chi-square test on KNEC Tech Grade and KCSE Grade

A chi-square test is a statistical test used to compare observed and expected results of categorical data with a purpose of determining the relationship between the results (Creswell, 2014). A small chi-square statistic means that an observed data fits expected data. If the chi-square calculated value is greater than the chi-square critical value, the null hypothesis is rejected. If chi-square value is less than the chi-square critical value, then a null hypothesis is accepted. The chosen significance level is 0.05 which means that the confidence level is 95%. In this study data in regard to final Diploma KNEC technical education for Building and Construction Technology (BCT) Clothing and Building Technology (CBT) courses and KCSE grades were tested. The results showed that the data qualified for a chi square test as the data were categorical.

Table 4.19*KNEC Tech Grade and KCSE Grade*

Chi-square test	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	33.471 ^a	20	0.030
Likelihood Ratio	37.058	20	0.012
Linear-by-Linear Association	5.958	1	0.015
N of Valid Cases	69		

a. 25 cells (83.3%) have expected count less than 5. The minimum expected count is 0.03.

In table 4.19 a Chi-square test was thus performed to find the relationship between KNEC technical examination and KCSE grade among the students. The test shows that there is a significant relationship ($p=0.03$, Chi-square=33.471, $df=20$) between KNEC technical examination and KCSE grade. In the KNEC examination, 30.4 percent had a pass while 30.4 percent had a credit with 2.9 percent obtaining a distinction. Approximately 14.5 percent of the students who scored C minus in KCSE had a pass in KNEC examination. No student with C plus and above had a fail in the KNEC examination. Therefore, academic admission grade has an influence on students' skills development at the TTIs. The findings imply that the better the performance at KCSE the higher the quality of skills produced at TTIs as observed globally by Anindo (2016) in Kenya, Burdenhost and Radile (2018) in South Africa, Furgason and Roofe (2018) in Jamaica, Munishi (2016) in Tanzania, Oviawe (2018) in Nigeria. The results thus can be used to conclude that one of the causes of skills gap in Kenya is low grades at admission to TTI programmes. These findings thus show that the admission policy to TTIs is not logically arrived at. Moreover, when the admission policy is found inadequate, the question whether Kenya will obtain

the critical mass of adequately skilled graduates for the achievement of vision 2030 looks critical.

4.5.5.3 Spearman correlation test between KCSE grade and KNEC technical examinations

A spearman correlation test between the two variables was conducted. The following results were generated:

Table 4.20

Students Skills Development

	Spearman Correlation	KNEC Technical
KCSE Grade	Correlation Coefficient	.302*
	Sig. (2-tailed)	.012
	N	69

*. Correlation is significant at the 0.05 level (2-tailed).

In table 2.20 the spearman correlation between the KCSE grade and KNEC technical examination results is 0.302 (p=0.012) which is statistically significant. Students who had performed higher in KCSE examination tend to perform higher in KNEC technical examination. Therefore, the student examination performance in KCSE national examination is important in selection of students to the TTIs.

4.5.5.4 Hypothesis Test Results Discussion for Objective One

Ho: There is no significant relationship between academic admission qualifications and student skills development in public TTIs in Kenya

The null hypothesis ($H_0: \beta_1 = 0$) was tested to find out if there is any statistical significant relationship between academic admission qualifications and student skills development in public TTIs in Kenya. The significance level (α) was set at 0.05. KCSE and Final KNEC technical education grades were used. In table 4.19, a Chi-square test using KNEC results for KCSE and KNEC Technical education was conducted to establish the relationship between KNEC technical examination and KCSE grade among the students. A Significant statistical relationship was established ($p=0.03$, Chi-square=33.471, $df=20$). In table 4.12, Kruskal Wallis test for lecturers' responses was performed to find out whether a statistical significant difference between academic admission qualifications and level curriculum content existed. A statistical significant difference was ascertained (chi-square=15.487, $p=0.001$, $df=4$). The results thus show that the lecturers and students are aware of this problem and therefore, the results can be used to testify that academic admission qualifications is one cause of skills gap in Kenya.

4.5.6 Comparing and Contrasting Quantitative and Qualitative Data for Objective One

The objective was about the influence of academic admission qualifications on skills development in public TTIs in Kenya. at the point at which quantitative and qualitative results meet, quantitative results supported the alternative hypothesis; *there is a statistically significant relationship between academic admission qualifications and skills development*. Qualitative results supported these results by indicating that students were challenged in courses that required adequate ability in quantitative knowledge. The results supported the literature review findings that open admission policy is one of the causes of

skills gap globally (Amedorme & Fiagbe 2013; Daoudou, 2016; Eicker et al., 2017; Munishi, 2015; Ringera, 2017; Serikaya & Yildirim, 2019). The open admission policy thus seems to be the cause of skills gap issues in Kenya.

4.5.7 Interpretation

There is a problem with the academic admission qualification policy. The policy lacks competitive criteria for selection of students and credibility as the government cannot employ students admitted to various courses in the TTIs due to low grades. Technical education is not for academic failures especially at Diploma level of learning. Therefore, students applying for diploma programmes in TTIs in Kenya need to obtain right qualifications if the issue of skills gap are to be ended.

4.6 Objective Two Data Analysis on the Influence of Instructional Methods on Student Skills Development

The purpose of objective two was to establish the influence of instructional methods on student skills development. Data presented was collected using questionnaires, document analysis guide and interview schedules. Questionnaires provided both qualitative and quantitative data. Document analysis guide and interview schedules generated qualitative data. Using the convergence parallel approach, quantitative data was presented first and qualitative second.

4.6.1 Lecturers' responses in regard to the influence of instructional methods and skills development

4.6.1.1 Lecturers quantitative responses in regard to objective two The data was collected using closed ended questions generated from instructional methods gaps identified in the literature review findings. On this regard the following data was generated upon which discussion and conclusions were drawn.

To begin with, instructional language is a prerequisite to instruction in technical education, (Lucas et al., 2012). Focusing on the gaps identified in the literature reviewed in regard to instructional methods and skills development, instructional language was one of the impediments raised in regard to quality skills development. The study thus sought to establish whether or not English language, the main instructional language in TTIs in Kenya posed challenges to students. The following responses were gathered.

Table 4.21

Lecturers' Opinions on Whether Instructional Language was a Challenge to Students

Statement	Frequency	Percent
No	38	55.1
Yes	31	44.9
Total	69	100%

Majority of the respondents in table 4.21, 38(55.1%), showed that TTI students do not have challenges with English language which is the instructional language of Kenya in TTIs while 31 (44.9%) indicated that there are challenges in regard to the language. The findings thus suggest that TTIs have both strong and weak students. A weakness noted in any context of learning in regard to instructional language understanding is an indicator of inadequate learning. Similar challenges were established in Ghana in which students

had difficulties in applying skills learned to their own context (Adogpa, 2016). Therefore, instructional language could be one of the causes of skills gap.

Subsequently, the study thus sought to establish the instructional methods used in the TTIs. The following responses were obtained.

Table 4.22

Instructional Method used in TTIs

Instructional method used in TTIs	Frequency	Percent
Lecture	59	28.78
Lecture and demonstration	32	15.61
Project work	28	13.66
Discussion	23	11.22
Experimentation	18	8.78
Field trip	16	7.80
Context based learning	11	5.37
Problem based learning	10	4.88
Simulation	6	2.93
None	1	0.49
Any other	1	0.49
Total responses	205	100

Table 4.22 shows that demonstration method is preferred most in instruction with a score of 59(28.78%) followed by lecture and demonstration 32(15.61%), project work 28(13.66%), group discussion 23(11.22%) Experimentation 18(8.78%), Field trip 16 (7.80%), context base learning 11 (5.37%), problem-based learning 10 (4.88%) simulation 6(2.93%) respectively. The findings show that lecturer method is the most ideal method for instruction in TTIs hence showing that TTIs in Kenya are very theoretical. Anindo (2016) makes a similar observation in Kenya. In such situations, Michael and Marino (2017) recommends a careful study of learners before selecting teaching methods. on the

same situation, observes that Technical education students in Malaysia prefer learning from what they see like pictures, videos, demonstration and films and as a result lecturers have challenges in teaching hand-on courses (Ahmed, et al, 2017; Ismail et al, 2018; Jailan et al, 2017). Therefore, the reasons as to why the method is preferred most in a psychomotor based domain needs to be established. Nevertheless, the responses show that the lecturers are aware of pedagogical strategies required in TTIs however most of them are traditional. The responses thus show that modern instructional methods are lacking in TTIs in Kenya and thus this could be another source of skills gap in Kenya and to find out if the dual system of the European Union can be adopted to aid in addressing instructional issues.

Further, the study sought to establish how Instructional methods' influence on skills development. Based on this, the lecturers were asked to show the extent to which the instructional methods influence skills development among students. The following results emerged.

Table 4.23

Instructional Methods Influence Skills Development

Extent instructional methods influence skills development	Frequency	Percent
Low	2	2.9
Moderate	18	26.1
High	38	55.1
Very high	11	15.9
Total	69	100

In regard to table 4.23, majority of the lectures 38 (55.1%) concur that there is a strong influence of instructional methods on student skills development. Only 2 (2.9%) of the

lecturers indicated a low influence. 18 (26.1%) of the lecturers indicated there is a moderate influence of instructional methods on skills development among TTI students. 11(15.9%) concur that there is a very high relationship between instructional methods and student skills development. The findings thus show that Tyler's (1949) rationale in regard to the four questions that an education system need to answer seem to be an oversight in TTIs. These include: objectives, activities, organization of the activities and evaluation of the activities. Focusing on the organization of the activity principles, instructional methods, TTIs lacks adequacy in pedagogical science knowledge and skills thus a likely cause of skills gap in Kenya.

Inferential statistics in regard to objective two was conducted based on descriptive data on the influences the choice of instructional applied. When there is a problem of skills gap, one of the causes of the problems is pedagogy in TTIS (Lucas et al., 2013). In this concern, one of the areas the study aimed to address was to establish if pedagogy has a relationship with skills development. using data in table 4.23 Pearson and Chi square tests were conducted.

Table 4.24 presents data on factors that influence choice of instructional methods. To test hypothesis a Pearson and Chi square tests were based on the results as presented in table 4.25.

Table 4. 24*If Instructional Methods Influence Skills Development*

Use of methodology in regard to:	If instructional method influence skills development			
	No		Yes	
	Frequency	Percent	Frequency	Percent
Number of students per class	8	15.38	39	22.674
Availability of training equipment	14	26.92	37	21.512
Time allocation	12	23.08	34	19.767
Work load allocation	5	9.62	20	11.628
Student ability	9	17.31	22	12.791
Class size	4	7.69	20	11.628

A Pearson and Chi-square test was thus performed to test hypothesis

Table 4. 25*Pearson and Chi-Square Tests on What Influences Instructional Methods Choice*

What influences methodology used?	If instructional methods influence	
	Chi-square	
		16.041
	Df	7
	Sig.	.025*

Discussing the Chi-square test

The results in table 4.25 (Chi-square 16.041, $p < 0.025$, df 7) demonstrates that instructional methods have an effect on student skills development since the findings are statistically significant. The results thus can be used to emphasize there is lack of pedagogical science knowledge among TTI lecturers.

4.6.1.2 Lecturers' qualitative data on the influence of instructional methods and skills development

The qualitative data was garnered using open ended questions. In the first place, the study sought to understand why the lecturers the stated instructional methods.

Responses gathered included, number of students per, availability of training equipment, time allocated and workload assigned. In this regard one responded expressed that, “For some topics that require practical learning, I am compelled to use lecture method because the institute lacks instructional equipment”. Another responded said that, “the number of students per class is greater than the available equipment. At times there is only one apparatus available for experiment. The students are to learn more during industrial experience period. Another responded showed that time allocated for both theory and practical learning is not sufficient as the coursework syllabus is over described. Another responded lamented that the work load allocation is too much for one lecturer. As a result, lecturers or group work is preferred. Similar finding were reported in South Africa in which time allocated for covering coursework in less compared to breath of the coursework (Burderhost & Radile, 2018; Ngoveni, 2018; Ngwato, 2020). The findings thus show that issues in regard to pedagogy in TTIs are system based in which some stakeholders are not performing their roles as expected. In regard to the findings the question whether the person responsible for lecturer recruitment for TTI is aware of such shortcoming arises.

Subsequently, the study sought to establish challenges lecturers are facing in regard to pedagogy in TTIs. Technical education comprises of both practical and theoretical subjects such as mathematics, communication skills, science subjects and business studies. The study thus sought to establish if there were any challenges facing lecturers in teaching the subjects. The following responses were gathered:

Theoretical subjects were a challenge to the students therefore most students preferred practical subjects: low level of mathematics and science comprehension. Instructional language barrier, low ability in library knowledge search for students, irrelevant subject content to areas of specialization, low self-expression ability especially for deaf students and incommensurable KCSE grades with level of coursework. The responses thus ranged from low subject comprehension, language barrier and curriculum implementation.

4.6.1.4 Comparing and contrasting quantitative and qualitative findings of the lecturers' responses

At the point the two sets of data results converge, hypothesis test results attest that, there is a statistically significant relationship between instructional methods and student skills development. At the same time, qualitative data findings have supported quantitative findings as a wrong instructional method is preferred in the psychomotor based domain as low pedagogical science knowledge among lecturers was established.

4.6.1.5 Interpretations of the results

The two sets of data in regard to lecturers demonstrate that the genesis of skills gap in regard to instructional methods is in the pedagogical institutions responsible for training lecturers for TTIs.

4.6.2 Students Responses in regard to the Influence of Instructional methods and Student Skills Development

Data presented in this sections was generated using a questionnaire comprising of both open and closed ended questions in regard to the influence of instructional methods and skills development. On this regard, quantitative data is presented first.

4.6.2.1 Students' quantitative data in regard to the influence of instructional methods and skills development

To achieve the desired goal in this case the study sought to understand whether or not, students were satisfied by the way they were taught. The following results were generated:

Table 4.26

Student Satisfaction with Instructional Method Used

Satisfied by lecturer teaching methods	Frequency	Percent
No	18	25.7
Yes	52	74.3
Total	70	100%

Table 4.26 shows that majority of the students 52(74.3%) were not satisfied by the way they were taught while 18 (25.7%) were satisfied. When majority 52 (74.3%) show that they are not satisfied by the way they are taught, the aspect of competence of their lectures is questionable. In 2018, similar findings were established by TVETA among TVET lectures in Kenya in which lectures were observed skipping topics that they had insufficient knowledge on. A similar observation was made in the Caribbean countries in which skill lecturers had challenges teaching a new curriculum, Education for Sustainable development, which the government orders an integration with the old curriculum (Roofe

& Furgason, 2018). Inadequately trained lecturers is thus another cause of skills gap in Kenya.

Moreover, the students were asked to give their opinions in regard to their lecturers' instructional competence. Using a Likert scale of five levels, the following results were generated.

Table 4.27

Students' Opinions in Regard to Competence of their Lecturers

Instructor competence	Frequency	Percent
Very low	17	24.3
Low	6	8.6
Moderate	32	45.7
High	6	8.6
Very High	9	12.9
Total	70	100%

Majority of the student in table 4.27, 32 (45.7%) rated the competence of their lecturers as moderate, 17 (24.3%) as very low, 9(12.9%) as very high, 6 (8.6%) as high and 6 (8.6%) as low. Given the fact that majority of the students 32 (45.7%) are rating their lecturers' competence as average and second majority 17 (24.3%) as very low, the possibility that students are not learning as required is very high. The data in general shows that students lack the capacity to evaluate their lecturers in regard to teaching capacity another study will be required on pedagogical competence and skills development

Inferential Statistics in regard to the students' responses on objective two was conducted using Likert scale results on lecturer competence and student satisfaction with the teaching. The following results were obtained:

Table 4.28*Likert Scale on Lecturer Competence and Student Satisfaction with the Teaching*

Satisfied with teaching		Instructor competence					Total
		Very low	Low	Moderate	High	Very High	
No	Frequency	0	2	6	2	8	18
	Percent	0.0	2.9	8.6	2.9	11.4	25.7
Yes	Frequency	17	4	26	4	1	52
	Percent	24.3	5.7	37.1	5.7	1.4	74.3
Total	Frequency	17	6	32	6	9	70
	Percent	24.3	8.6	45.7	8.6	12.9	100.0

A satisfaction survey was conducted on lecturer competence and student satisfaction on the teaching as shown in table 4.28. Those satisfied with the teaching 17(24.3% Percent rated the competence of their instructor as very low and 8(12.9%) rated them as very high. In regard to the findings, majority 45 (64%) of the students do not rate their lecturers favorably with regard to competence. The reason as to why students are unsatisfied with the way they are taught could be attributed to Macgregor's X and Y theory. The theory asserts that human beings are lazy animals who do not want to work but would like to be paid. Not unless the lecturers that fall on the X category are supervised, skills developed in TTIs are likely to be inadequately trained. Mwangi (2015) explain the genesis of this situation as failure of lecturer to prepare course outlines, lesson plans, lesson notes, and instructional materials. These findings thus form another basis for further research.

These results thus show that instruction in TTIs is not adequately supervised. In 2018, TVETA found out that lecturers were incompetent in teaching as some were observed skipping topics. Therefore, when student evaluate their teaching staff this way, the question whether the lecturers have right academic qualifications and were adequately

trained in TTI pedagogy emerges. The findings thus explain one of the root causes of skills gap in Kenya.

Subsequently, a Chi-square test on the lecturer competence in practical lessons and student satisfaction with learning was conducted and the following results were generated.

Table 4. 29

Lecturer Competence in Practical Lessons and Student Satisfaction with Learning

Chi-square test	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	25.866 ^a	4	0.000
Likelihood Ratio	27.366	4	0.000
Linear-by-Linear Association	18.584	1	0.000
N of Valid Cases	70		

a. 6 cells (60.0%) have expected count less than 5. The minimum expected count is 1.54.

In table 4.29 a Chi-square test was performed to compare the relationship between lecturer competence and the students' satisfaction on how they were taught practical skills. The test shows that there is a significant relationship ($p < 0.001$, Chi-square=25.866, $df=4$) between lecturer competence and student satisfaction with subject being taught. The results thus reveal that students seem to be non-committal to their instructors' competence. This depicts an ambivalent position that there are both competent and incompetent lecturers in TTIs in Kenya as descriptive statistics results also revealed. The reason for this observation can be related to the principals' responses in regard to lecturer competence that TTIs were once vocational training schools and upon upgrade of to TTIs, the instructors were automatically absorbed without retraining and proper orientation to TTI teaching. The observation can also be related to lack of effective instructional supervision and inadequate external stakeholder's role performance.

4.6.2.2 Students qualitative data in regard to the influence of instructional methods and skills development

Data presented in this section was generated using open ended questions. On this regard, the students were asked to explain why were not satisfied with the way they were taught. Various responses were gathered.

Findings showed that students were reserved in the way they evaluated their lectures. Responses gathered captured opinions regarding professional competence. There seemed to be an agreement among students that there were both high and low competent lecturers in the TTIs. In regard to lecturer competence, majority opined that some lecturers were not able to teach course unit allocated and therefore, employment of qualified lecturers was an urgent issue. The student respondents also lamented that field trips and library sources lacked in their training. Marino and Marino (2017) asserts that hands on learning should not be limited to classroom, workshops and laboratories. For this concern, field trips are important as technical education is an open system and therefore another will be required to address these issues. Moreover, issues of and indiscipline among lecturers were raised. Similar findings were established by Malechwanzi in 2018 at the TTIs of the Coastal Region of Kenya in which lecturers were not committed to teaching and students lamented on immoral behavior among lecturers.

When students raise such grievances in regard to education and training, the main person pointed out here is the manager. The finding shows that instructional supervision is lacking in which the managers are not performing their roles in ensuring that teaching is

effectively done, deans of studies and students' life are performing their roles effectively and that the code of conduct or charters that are meant to instill discipline among lecturers and students are well implemented. Lack of all these show that conducive learning environment in TTIs in Kenya is not provided as a trickle-down effect of the misconduct among lecturers to students is likely to manifest.

4.6.2.3 Comparing and contrasting student quantitative and qualitative findings in regard to instructional methods and skills development

Hypotheses tested have attested to the fact that there is a problem in regard to instructional methods and skills development. Qualitative data agree based on the student's grievances of satisfaction with teaching amidst harassment which is against the code of conduct for TTIs and charters for universities.

4.6.2.4 Interpretation

There is inadequate preparation for lecturers at the pedagogical institutions. Another study therefore will be required to address this issue.

4.6.2.3.4 Hypothesis Two Test Results Discussion

***H₀:** There is no significant relationship between instructional methods and student skills development in TTIs in Kenya*

The null hypothesis ($H_0: \beta_1 = 0$) was tested to find out if there is any statistically significant relationship between instructional methods and student skills development in public TTIs in Kenya. Significance level (α) was set at 0.05. Focusing on the results presented in table 4.29, students' responses, a Chi-square test was performed based on student responses on the lecturer competence and the students' satisfaction with teaching. Results presented in table 4.24 indicated that statistical relationship exists where ($p < 0.001$, Chi-square=25.866, $df=4$). The null hypothesis was therefore rejected and the alternative retained. In regard to the results presented in table 4.41, a Chi-square test based on the lecturers' responses was performed to find out if there was any statistical relationship between instructional methods and skills development. The results (Chi-square =16.041, $p < 0.025$, $df=7$) demonstrated that a relationship exists. These results thus show that there is an agreement between students and lectures that there are anomalies in the TTI instruction processes. Another study will therefore be required to ascertain the cause of these findings.

4.6.3. Principals' qualitative data analysis in regard to the influence of instructional methods and skills development

Qualitative data presented in this sections was generated using an interview schedule comprising of open ended questions.

In regard to technical education instructions, the classical education experts recommend that every educator need to be well grounded in educational psychology. In regard to this, the principals were asked to explain how well the lecturers were prepared to teach subjects allocated. Responses gathered focused on lecturer competence in the perspective of McGregor' X and Y theory, student population and instructional materials and equipment factors. In this regard, majority of the lecturers were in agreement that the lecturers are well prepared by their pedagogical colleges and universities however, the same lecturers were not well prepared to teach Competence Based Education Curriculum (CBET) curriculum. The principals' responses also revealed that despite the fact that the lecturers were trained by various universities and colleges there is a tendency of choosing not to apply pedagogical science knowledge acquired. Responses that differed included the following:

Interviewee 1: *We have both qualified and unqualified lecturers. This is because the institute was once a vocational training school and when the institute was upgraded, all trainers were absorbed without proper training and orientation towards technical education. This thus is a challenge to the collective pedagogical efforts in this institution.*

In this regard, some lecturers cannot express themselves in English but by the fact that they are able to teach practical lessons we move on with them.

Interviewee 5. *The TTI has high numbers of students therefore to match effective teaching with the number of students is a challenge. Student lecturer and student equipment ratios are incommensurable. In that case, lecturers are overwhelmed in the teaching and thus prefer lecturer method.*

Similar findings were established by Roofe and Furgason (2018) in Jamaica and among the Caribbean countries, (Mwangi, 2015; TVETA 2019;) in Kenya in which the lecturers were observed to be lacking capacity to align curriculum components that included objectives of TVET education and instructional methods. In the case in which the principals expressed that the lecturers were well prepared for TTI pedagogy but decided to ignore the skills while teaching is a crime. In a law court, the accused with such a crime is heavily sentenced. If this could be the case, a number of TTI lecturers could be sued. The findings reveal a similar state in which the lecturers know the right pedagogical strategies to use in TTIs but decide not to apply them.

The X and Y principles of Macgregor's theory opines that in a work place, an average person is likely to cheat. The theory further opined that human beings are lazy animals which dislike work and like money and not unless they are supervised no work will be done especially when the X category is considered. The finding thus reveal that this is the case in the TTIs. Who then can be held responsible of these undesirable findings? The vocational school teacher that was elevated to TTI teaching or the university graduate? A

study will be required to establish the cause of this undesirable findings. Moreover, lack of adequate training equipment, high student population than TTIs can accommodate and inadequate number of lecturers reveal that stakeholders are not performing their roles as required. A lack of these can have detrimental repercussions of skills development in Kenya thus another study could be well placed to established the cause of these findings and suggest solutions to the same.

The principals were thus asked to suggested solutions to pedagogical challenges in the TTIs. The principals were asked to explain what could be done to mitigate challenges facing pedagogy in the TTIs. Various responses were elucidated as focusing on academic qualifications; training and supervision. In this regard, the managers opined that is need for the government to raise academic admission grades to those who wish to join the teaching profession. A higher diploma qualification was suggested as the least qualification for TTI lecturers as other the government policies in regard to lecturer training are adhered to. Those who explicated different responses included the follows:

Interviewee1: *There is need for intensive training of lecturers in Information Communication Technology*

Interviewee 2: *Performance appraisal strategy similar to the teacher Performance Appraisal and Development System (TPADS) need to be introduced to perform the role of reviewing and improving lecturer standards through a systemic appraisal approach.*

Interviewee 5: *TTIs should select well performing students and also talented in their area of specialization and move with them to higher pedagogical colleges and universities.*

The findings agreed with global findings showing that adequate training and supervision of skills learning processes could be a solution to skills learning (Anindo, 2016; Baglow, 2016; Ifenyiwe & Serum, 2016; Joo, 2018; Kryriz, 2016; Nyizeyimana, 2016; Osman & Kamis, 2018). In this regard, Mosomi et al. (2014) established that TPADS were only effective in library, inventory and teaching and learning material management but not to skills learning in classrooms workshops and laboratories. By the fact that issues in regard to skills development are being reported to this day, more studies will be required to establish the cause of the persistent causes of skills gap and in this regard, the solutions to the problems facing skills gap in regard to academic admission qualifications, TTI teacher training and supervision.

4.6.4 Document analysis data analysis in regard to the influence of instructional methods and skills development

The document in regard to objective two was used to generate qualitative data only. Documents analysis included course-work syllabus, records of work, course-outlines and lesson plans. The study noted that all TTIs had the syllabi. Moreover, available professional records showed that preparation for instruction depended on the individual lecturer as records of work were updated and course outlines available in some institutions and others not. The study moreover observed lesson notes were preferred to lesson plans. Professional records are prerequisites to instructional methods in any institution of learning. Lack of such documents, as spelled in the curriculum is a sign of inadequate skills development (Lucas et al, 2012; TVET ACT, 2013). The study thus established that

lack of lecturer professional skills in regard to TTI pedagogy is a one of the causes of skills gap in Kenya.

4.6.7 Comparison and Contrasting of Quantitative and Qualitative Data in Regard to Objective Two

Hypothesis tested indicated a significant statistical relationship between instructional methods and skills development. In this regard, descriptive data showed several anomalies regarding instructional methods and skills development, preference of lecturer method in a psychomotor domain being one of them. Qualitative data supported these findings as responses showed aggrieved students about the competence level of their lecturers, presence of adequately trained lecturers by their pedagogical colleges and universities but choose not to apply the knowledge and opinions that instructional methods were less important in technical course instruction as the focus is on practical learning

4.6.8 Interpretations of compare and contrasted results on the influence of instructional methods and skills development

Relevant instructional method application is inevitable in the process of skills learning as asserted by Lucas et al in 2012. The results thus can be used to demonstrate that open system theory principles and Tyler's (1949) rationale on instructional methods as key component of technical education are lacking in the TTIs. Therefore, the whole question of pedagogical strategies reveals a lot to be desired hence another study will be required to address the issues raised.

4.7 Objective Three Data analysis on the Influence of Instructional Equipment of Student Skills Development

The purpose of objective two was to explore the influence of instructional equipment on student skills development. According to DeKeyser (1998), skills learning requires tools for procedural learning in the second and third stages of skills development that include associative and automation stages. The tools comprise of both consumable and inconsumable instructional materials. This section thus presents quantitative and qualitative data collected using a convergence approach on data collected by use of questionnaires for lecturers and students, interview schedules, document analysis guide and observation. Questionnaires provided both qualitative and quantitative data. Interviews and document analysis provided qualitative data only.

4.7.1.1 Lecturers' quantitative responses in regard to the influence of training equipment and skills development

The study sought to establish the ratio of student training equipment in order to enable the study assess the effectiveness of instructional equipment in the training. On this regard, the following results were generated.

Table 4.30

Lecturers' Opinions in Regard to Training Equipment Ratio and Skills Development

Ratio	Frequency of use	Percent (%)
1:1	3	4.34
1:2	4	5.79
1:3	15	21.74
1:4	20	28.99
1:5 and above	20	28.99
Low	7	10.15
Total	69	100

Table 4.30 reveals that most TTIs in Kenya lack adequate training equipment as majority 20 (28.99%) gave a ratio of 1:5 and above and at the same time 20(28.99%) gave a ratio of 1:4 while 15 (21.74%) gave a ratio of 1:3 which is the recommended ratio by KIE (1990) and the current CBET. 4 (5.79%) gave a ratio of 1:2 and 3 (4.34%). The results show that the lecturers agree that the equipment ratio does not meet the policy requirement 1:3. Similar findings were established by Eicker et al. (2017) in the whole of sub-Saharan Africa, Mwila (2016) in Zambia in which an instructional room designed for ten students in used by over fifty students. This means that students are learning theoretically or using one equipment to demonstrate the skills. Anindo (2016) made a similar observation in Kenya in which student did not even have an opportunity to touch the training equipment.

These results thus revealed that there is a possibility of students graduating from TTIs without practical learning experience.

To respond to the issue of disparity between industrial and technical institution equipment, the lecturers were asked to give opinions in regard to similarities of training equipment with those of the industry. The following results were obtained:

Table 4. 31

Similarities of Training Equipment with those of the Industry

Statement	Level	Frequency	Percent
Similarity of training equipment with those of those of the industry	Low	8	11.59
	Moderate	29	42.03
	High	21	30.43
	Very high	11	15.94
No response		10	14.49
Total		69	100

Table 4.31 reveals that majority of the lecturers 29(42.03%) rated the similarity of the available training equipment with those of the industry as moderate, 12 (30.43%) as high, 11 (15.94%) very high and 10 (14.49%) gave no response. These results show that skills acquired in TTIs are to some extent similar to those offered in industries as the equipment are not similar. This implies that TTIs students on attachment are trained a new so that they may fit in the industries where they are attached. In 2015, Ngure showed that the industry in Kenya lamented over disparities between TTI skills and those of the industry. When a government invests its resources in trainings whose outputs are rejected, it is a big shame as resources are wasted that include time of young people on the nation. More resources would be required for retraining in order to give required services at the industry. Therefore, a study suitable for addressing these issues is required

Moreover, the lecturers were asked to state the frequency of practical lessons offered in TTIs. The following responses were gathered:

Table 4.32

The Frequency of Practical Lessons

Statement	Application	Frequency	Percent
Frequency of practical lessons	Weekly	61	88.40
	Fortnightly	3	4.35
	Monthly	2	2.89
	Quarterly	4	4.79
Total		68	100%

Majority of the respondents in table 4.32, 61 (88.4%) reveals that practical lessons are offered weekly, 4 (79%) quarterly, 3 (4.35%) fortnightly and 2 (2.89%) monthly. In regard to KIE (1990) and CBET syllabus, the findings show that TTIs have complied with practical lesson recommended in which all students should be subjected to at least seven practical lessons of seven hours each within a period of twelve to fourteen weeks.

The lecturers were asked to show whether or not time allocated as prescribed in the syllabus and by TTIs for practical learning is adequate. In this regard, the following responses were obtained.

Table 4. 33*Adequacy of Time Allocation for Practical Learning*

Question	Response	Frequency	Percent
Is allocated practical time adequate?	Yes	22	31.9
	No	47	68.1

In regard to table 4.33 majority 47(68.1%) indicated that the instructional time allocated was not adequate while 22 (31.9%) opined that the time was adequate. Lecturers are believed to possess expert opinion to the challenges facing instruction in TTIs. Therefore, when the majority state that time allocated in not adequate for the training, there is a probability that the syllabus is not covered and thus skills are not adequately learned. Similar observations were made in South Africa in which time allocated for syllabus coverage was inadequate (Burdenhost & Radile, 2018). Another study on TTI syllabus coverage and skills development in Kenya will be required.

The study also sought to know the frequency in which instructional equipment are serviced in order to gain an in-depth understanding of the cause of skills gap in Kenya. The following responses were obtained.

Table 4.34*Frequency to which Instructional Equipment are Serviced*

Statement	Rate	Frequency	Percent
Frequency equipment serviced	Weekly	7	10.1
	Monthly	12	17.4
	Quarterly	19	27.5
	Annually	31	44.9
Total		69	100%

In regard to table 4.34, majority of the respondents 31 (44.9%) showed that the equipment are serviced annually, 19 (27.5%) quarterly, 12 (17.4%) monthly and 7 (10.1%) weekly. When majority of the lecturers indicate that instructional equipment are serviced annually it shows the equipment are not serviced as per the manufacturer requirements, as required by the users or they are serviced during examination period only. When training equipment are not serviced there is a possibility that students are learning skills theoretically since the equipment are not working hence another possible cause of skills gap in Kenya. Similar findings were established in Nigeria in which consumable and non-consumable instructional materials and library sources that support curriculum implementation lacked (Ifenyinwa & Serum, 2016). These findings thus show that inadequate instructional equipment is a big issue in Africa. Despite the fact that Eicker et al. (2017) show that the main cause is finance based, an empirical study is required to address these issues.

Further, the study endeavored to establish whether there is consistence in the process of skills development by establishing the rate at which broken equipment are replaced in the TTIs. The lecturers were thus asked to state the rate at which broken equipment were replaced. The following responses were obtained.

Table 4.35*Rate of Broken Equipment Replacement*

Statement	Rate	Frequency	Percent
Frequency broken equipment are replaced	Weekly	1	1.4
	Monthly	14	20.3
	Quarterly	13	18.8
	Annually	32	46.4
	Not at all	9	13.0
Total		69	100%

Majority of the respondents in table 4.35, 32 (46.4%) in showed that broken equipment were replaced annually, 14 (20.3%) monthly, 13 (18.8%) quarterly, 1 (1.4%) weekly and 9(13.0%) not at all. When majority lecturers give such responses in which broken equipment are replaced annually chances are TTIs in Kenya are very theoretical. This thus shows that practical learning in TTIs is lacking thus another curriculum-based skills gap established.

Nevertheless, the study endeavored to establish the extent to which instructional equipment influence skills development. The lecturers were asked to show the extent to which instructional equipment influence skills development. The following responses were gathered.

Table 4.36*The Rate in which Instructional Instruments Influence Skills Development*

Statement	Rate	Frequency	Percent
Extent equipment influence skills development	Moderate	21	30.4
	High	33	47.8
	Very high	15	21.7
Total		69	100%

Majority of the respondents in table 4.36, 33 (57.8%) showed that instructional equipment have a high influence in regard to skills development, 21 (30.4%) moderate, and 15 (21.7%) very high. Majority 48(80%) are in agreement that training equipment are very essential in the process of skills learning. The better the physical state of the equipment, the adequate the skills development and vice versa is possible. Therefore, the quantitative findings in regard to instructional equipment can be used to conclude that the wanting state of the equipment in the TTIs accounts for the current state of skills gap in Kenya.

Inferential Statistics were conducted based on the descriptive data generated for Lecturers in Regard to Instructional Equipment and Skills Development. On this regard, a Chi-square test for ratio of instructional equipment and similarity to those of the industry. The following results were generated:

Table 4. 37*Ratio of Instructional Equipment to students and Similarity to those of the Industry*

Equipment similar to industry's		Ratio of the instructional equipment					Total
		1:1	1:2	1:3	1:4	1:5 and above	
Low	Frequency	0	0	2	0	6	8
	Percent	0.0	0.0	2.9	0.0	8.7	11.6
Moderate	Frequency	0	0	7	15	7	29
	Percent	0.0	0.0	10.1	21.7	10.1	42.0
High	Frequency	2	3	5	4	7	21
	Percent	2.9	4.3	7.2	5.8	10.1	30.4
Very high	Frequency	1	1	4	3	2	11
	Percent	1.4	1.4	5.8	4.3	2.9	15.9
Total	Frequency	3	4	18	22	22	69
	Percent	4.3	5.8	26.1	31.9	31.9	100.0

A chi square test was conducted and the following results were generated:

Table 4. 38

Chi-square Test for Ratio of Equipment to students and Similarity to those of the Industry

Chi-square test	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.127 ^a	12	0.036
Likelihood Ratio	25.609	12	0.012
Linear-by-Linear Association	7.002	1	0.008
N of Valid Cases	69		

a. 14 cells (70.0%) have expected count less than 5. The minimum expected count is 0.35.

In table 4.38 a Chi-square test was performed to compare the relationship between ratio of the instructional equipment and extent the equipment similar to those described in the curriculum. The test shows that there is a significant relationship ($p=0.036$, Chi-square=22.127, $df=12$) between ratio of instructional equipment and the extent the lecturers felt they were similar to those described in the curriculum. Therefore, the revealed state of equipment cannot account for issues skills gap.

A test on the extent to which available instructional equipment were similar to those of the industry. The following test results were generated.

Table 4.39*Extent Available Instructional Equipment were Similar to those of the Industry*

		Extent training equipment similar to those in the industry				
Ratio of instructional equipment to students		Low	Moderate	High	Very high	Total
1:1	Frequency	0	0	2	1	3
	Percent	0.0	0.0	2.9	1.4	4.3
1:2	Frequency	0	0	3	1	4
	Percent	0.0	0.0	4.3	1.4	5.8
1:3	Frequency	2	7	5	4	18
	Percent	2.9	10.1	7.2	5.8	26.1
1:4	Frequency	0	15	4	3	22
	Percent	0.0	21.7	5.8	4.3	31.9
1:5 and above	Frequency	6	7	7	2	22
	Percent	8.7	10.1	10.1	2.9	31.9
Total	Frequency	8	29	21	11	69
	Percent	11.6	42.0	30.4	15.9	100.0

In table 4.40, a Chi square test was conducted to test hypothesis. The results were as presented.

Table 4.40*Ratio of Equipment to Students and Equipment Similar to those in the Industry*

Chi-square test	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.127 ^a	12	0.036
Likelihood Ratio	25.609	12	0.012
Linear-by-Linear Association	18.584	1	0.008
N of Valid Cases	69		

a. 14 cells (70.0%) have expected count less than 5. The minimum expected count is 0.35.

There is a strong relationship between the ratio of students to equipment as indicated by linear to linear association that is pointing to one (1) which is a very strong relationship. This thus accounts for another cause of skills gap in Kenya.

A Chi test on the frequency instructional equipment are serviced was conducted based on the data on table 4.41.

Table 4.41

Frequency Equipment are Serviced

Damaged equipment replaced		Frequency equipment are serviced				
		Weekly	Monthly	Quarterly	Annually	Total
Weekly	Frequency	0	0	0	1	1
	Percent	0.0	0.0	0.0	1.4	1.4
Monthly	Frequency	3	6	2	3	14
	Percent	4.3	8.7	2.9	4.3	20.3
Quarterly	Frequency	2	0	9	2	13
	Percent	2.9	0.0	13.0	2.9	18.8
Annually	Frequency	2	6	3	21	32
	Percent	2.9	8.7	4.3	30.4	46.4
Not at all	Frequency	0	0	5	4	9
	Percent	0.0	0.0	7.2	5.8	13.0
Total	Frequency	7	12	19	31	69
	Percent	10.1	17.4	27.5	44.9	100.0

The results in table 4.41 show that equipment are not promptly replaced and serviced as the majority show that they are annually serviced. The efficiency and wastage of resources is not part of this study. Therefore, TTIs need to have policy to curb pilferage of resources.

A Chi test conducted on the frequency of replacement of damaged equipment and frequency of servicing the equipment. The following results were generated:

Table 4. 42

Frequency of Replacement of Damaged Equipment

Chi-square test	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	36.603 ^a	12	0.000
Likelihood Ratio	39.163	12	0.000
N of Valid Cases	75		

a. 15 cells (75.0%) have expected count less than 5. The minimum expected count is 0.1.

The results in table 4.42 thus show that TTIs are facing problems in regard to instructional equipment and skills development. The results confirm what descriptive data has indicated as true. Similar findings were established in the whole of sub-Saharan Africa in which technical institutions are allocated one percent (1%) on the annual budgetary allocation (Eicker et al, 2017). How then could the TTI manage the equipment for effective instruction? The findings thus show that technical education is either an expensive venture for African nations or its about trivializing the form of education as physical work fit for the province of slaves (Onkware & Ongako, 2017). A study therefore will be required to establish whether or not management of instructional equipment is improving or not.

4.7.1.2 Lecturers' qualitative responses on objective three

Open ended questions were used to obtain the responses in regard to the influence of instructional equipment on student skills development in this regard the lecturers were asked to comment of the influence of instructional equipment on student skills development.

Responses gathered focused on curriculum, finance, management and stakeholders. This included: inadequate equipment and lack of funds for repair, replacement and servicing of the equipment. In this regard findings showed that the equipment are available for some course units and even if they are available, they are not adequate. In regard to this response, lecturer number 16 in the questionnaire distributed stated that, a lecturer in the BCT course stated that, “the students are not learning in this institute because we do not have equipment for demonstration, here we are asked to tell students to expect practical learning when they go out for industrial experience.” Lecturer respondent number 23 of the Clothing Technology course wrote that, “we lack teaching materials that should be provided by students themselves”. These responses showed that equipment procurement in TTIs is a cost sharing strategy between the government and parents.

The strategy thus reveal that the lessons learned from the Kamunge’s (1988) report were not implemented as cost sharing policy in the implementation of the 8.4.4 system failed. Similar issues are reported in other parts of Africa. For instance, Adjrah (2014) established that instructional materials were in an appalling state in Togo and if they were available, the student equipment ration was incommensurable. Kermevor and Kassah (2015) reported that vandalized equipment were hardly replaced. When such issues are reported, it means that learning is not taking place and thus skills gap will continue widening.

The Lecturers’ were also asked to give their views on the relationship between industry and available instructional equipment in the TTIs. Responses elicited were based on technology, finance ad stakeholder factors. In this regard, lecturer respondent number 14 asserted that, “*TTIs equipment and those of the industry will never be the same because*

the industries are constantly changing in regard to the market demands while TTIs are focusing on the rigid curriculum.” The difference between the TTIs and industry equipment is thus one cause of skills gap in Kenya as what is taught in the TTIs is different from that of the industries. In regard to this response, lecturer number 42 stated that, *“there are new industrial machines that industries are not ready to expose to interns because slightest mistake made may damage or cause accidents and thus incur high expenses for repair and replacement”* As a result, the industries may not expose interns to industrial equipment hence a possible cause of skills gap in Kenya. In this regard, the respondent opined that despite the reality, industries are the ones to change and not TTIs in terms of equipment.

The findings thus show that collaboration among stakeholders. Similar findings were established in Nigeria in which industries and technical institutions were empty and when they were equipped, it was so with obsolete equipment, library sources included (Ayonmike, 2014). In Ghana, similar instances were reported in which libraries are equipped with old text books and industries equipped with old machines (Sherry & Yesueneagbe 2013). In Subsaharan Africa, only one study established adequate and current instructional equipment (Nizeyimana, 2016). Another study therefore will be required to establish the cause of these findings and suggest possible solutions to the problem.

4.7.1.3 Comparing and Contrasting quantitative and qualitative data findings

Quantitative data findings have revealed a significant statistical relationship between instructional equipment and student skills development through hypothesis tested. Qualitative findings agree that there are anomalies in regard to the instructional equipment and skills learning the have led to the current manifested skills gap as a ratio of 1:4 and above, lack of training equipment, presence of inadequately trained lecturers on the use of the equipment and the discrepancies between TTI instructional equipment and those of the industry are noted.

4.7.1.4 Interpretations

The results can be used to show that technical institutions cannot rely on industries for skills training and the industries cannot rely on TTIs for manpower training. The genesis of this observation seem to be fiscal and thus an expensive venture for developing nations. Therefore, stakeholders need to synergize, enhance and systems thinking in order to end issues of skills gap.

4.7.2 Students' Responses in Regard Objective Three

This section presents quantitative and qualitative findings on the influence of instructional equipment and student skills development. Data presented was collected by means of questionnaire that provided both quantitative and qualitative data. Quantitative data was presented first.

4.7.2.1 Students’ quantitative responses on the influence of instructional equipment and skills development

In order to understand the issue of skills gap in Kenya, ascertain the student equipment ratio is important the students therefore were asked to indicate the ratio of available instructional equipment with the students’. The following results were generated:

Table 4. 43

Ratio of Available Instructional Equipment to students

		Frequency	Percent
Ratio of Training Equipment	1:1	7	10.0
	1:2	3	4.3
	1:3	18	25.7
	1:4	10	14.3
	1:5 and above	32	45.7
Total		70	100%

In regard to table 4.43, majority 32(45.7%) apply a ratio of 1:5 and above in regard to student and instructional equipment, 18(25.7%) 1:3, 10 (14.3%) 1:4, 7 (10.0%) 1:1 and 3 (4.3%) 1:2. In regard to training equipment, Kenya recommends a ratio of 1:3 based on the Competence Based Curriculum policy and the old syllabus still in use (KIE 1990). When majority respondents show equipment ratio of 1:5 and above there is a problem of inadequate equipment in TTIs in Kenya. In 2019, Barasa and Kwisira (2019) made similar observation in Kakamega county, Bogonko (2018) made same observation in Nyamira county, Malechwanz (2018) at the coastal region, Mosoti (2017) in Nairobi TTIs, and Onditi (2015) in Kwale county. The findings therefore can be used to demonstrate that the

phenomenon of skills gap in a national problem. These results thus confirm that lack of adequate instructional equipment in Kenya is one cause of skills gap and therefore the problem needs to be addressed by the national government and also given that technical education is a national government civic responsibility

Further, the students were asked to show the extent to which available training equipment in both the industries and TTIs were related. The following responses were obtained:

Table 4. 44

Relationship Between TTI and Industrial Equipment

Statement	Level	Frequency	Percent
Extent training equipment related to those of the industry	Very low	27	38.6
	Low	5	7.1
	Moderate	28	40.0
	High	8	11.4
	Very High	2	2.9
Total		70	100%

Majority in table 4.44, 28(40%) reveal that the equipment are moderately related, 27 (38.6%) indicated very low extent, 8 (11.4%), 5 (7.1%) and 2(2.9%). In this regard the majority 55 (78.57%) opine that the similarity is low. This means that there is lack of collaboration between industries and TTIs in regard to skills training. In this regard, collaboration among stakeholders such as sector skills advisory committee and national skills development authority with industries and TTIs seems to lack. As result TTIs are likely to experience entropy in the process of training as skills as learning in TTIs is irrelevant to that of the industry hence a cause of skills gap in Kenya. In 2015, Ngure made

similar findings in Kenya showing resentments of employers on skills developed by TTI in Kenya. However, the study did not show whether the employers are part of the problem or not. Yasin et al (2013) made a similar observation in Asia in which technical institutions had few workshops equipped with obsolete equipment that were irrelevant to those of those of the industry. Therefore, there is need for another study to address this issue.

Frequency of practical lesson in the TTI according to the syllabus is an indicator of quality learning in the TTIs. The students were asked give opinions in regard to on the frequency at which of practical lessons offered. The following results were generated:

Table 4.45

Frequency of Practical Lessons Offered

Statement	Rate	Frequency	Percent
Frequency of practical lessons	Annually	4	5.7
	Fortnightly	5	7.1
	Monthly	9	12.9
	Not at all	12	17.1
	Weekly	40	57.1
Total		70	100%

In regard to table 4.45 majority 40(57.1%) indicated that practical lessons are offered weekly, 12 (17.1%), not at all, 9 (12.9%) monthly, 5 (7.1%) fortnightly and 4 (5.7%) annually. According to the syllabus, KIE (1990) and CBET curriculum, all TTI students are entitled to at least seven practical lessons in a span of twelve to thirteen weeks. Focusing on the findings, majority of the students are exposed to the lessons, some occasionally and others not at all. Similar findings were established in the whole of Sub-

Saharan African (Eicker et al, 2017). The findings thus can be used to show that inadequate curriculum implementation is another cause of skills gap in Kenya.

Industrial attachment places attended by students were significant to the study in discerning the cause of skills gap in regard to instructional equipment. In the first place, the student respondents were asked to name the institution attended during the attachment experience period. Responses were obtained as follows:

Table 4.46

Industrial Attachment Places Attended by Students by 2019

Statement	Specification	Frequency	Percent
Industrial attachment place	Government	16	22.9
	Private	32	45.7
	Unspecified	20	28.6
	None	2	2.9
Total		70	100%

Table 4.46 shows that most student 32(45.7%) preferred private institutional for industrial experience, 20 (28.6) did not specify, 16 (22.9%) preferred government institution and 2 (2.9%) had no experience. Technical education is a civic role of the national government thus students are expected to attend attachment sessions in the institutions owned by their own government. Conversely, students prefer a foreigner’s institution as private building and construction and textile institutions are owned by foreign investors such as Chinese and Indians. None of the literature reviewed established these findings. Option to practice skills with a foreigner is a sign of skills gap in Kenya in which the government lacks the means to establish institutions of the required standards. Moreover, option for private

institutions may mean that private institutions are well equipped and managed thus offering a conducive environment for students to practice acquired skills. Findings in regard to students that did not attend attachment sessions show that students in TTIs can graduate without an attachment experience. The results thus account for another cause of skills gap in Kenya.

The students were asked to show whether they were satisfied with the attachment experience. The following responses were obtained:

Table 4.47

Students Satisfaction with Attachment Experience

Statement	Response	Frequency	Percent
If satisfied with attachment experience	Yes	60	85.7
	No	10	14.3
Total		70	100%

Table 4.47 shows that majority of the students 60 (85.7%) were satisfied with the industrial attachment experience unlike 10(14.3%). These findings are contrary to the findings of the question that sought to establish if students were satisfied by the way they were taught in TTIs. In the TTIs students were not satisfied but in the industries they were. These findings confirm Ahmed et al’s (2017) findings that technical education students prefer learning that involves visual aids. To address such issues, Saefudin and Sumardi (2019) suggests an adoption of behaviorism and creative thinking theories into practical learning lessons to stimulate learning. These findings require further investigation. Moreover, when majority say that they were satisfied by the experience, this may mean

that the institutions had effective management and conducive environment for the students to practice skills acquired.

Inferential statistics on the influence of instructional equipment and skills development was conducted on the students' descriptive statistics. A Chi-square test on the extent to which TTI instructional equipment were related those of the industry was conducted and the following results were obtained:

Table 4.48

Extent to which Instructional Equipment are Related to those of the Industry

Ratio of equipment to students		Extent training equipment related to industrial attachment					Total
		Very low	Low	Moderate	High	Very High	
1:1	Frequency	3	0	4	0	0	7
	Percent	4.3	0.0	5.7	0.0	0.0	10.0
1:2	Frequency	0	1	1	0	1	3
	Percent	0.0	1.4	1.4	0.0	1.4	4.3
1:3	Frequency	11	0	6	1	0	18
	Percent	15.7	0.0	8.6	1.4	0.0	25.7
1:4	Frequency	4	3	1	2	0	10
	Percent	5.7	4.3	1.4	2.9	0.0	14.3
1:5 and above	Frequency	9	1	16	5	1	32
	Percent	12.9	1.4	22.9	7.1	1.4	45.7
Total	Frequency	27	5	28	8	2	70
	Percent	38.6	7.1	40.0	11.4	2.9	100.0

In table 4.48, a Likert scale was used to collate data on how the equipment in the public technical training institutions in Kenya simulates industrial equipment in which the

students were attached by 2019. A chi square test was conducted and the following results were generated:

A Chi-square test on the relationship between TTI equipment and those of the industry was conducted on the student respondents when they were asked to compare TTI instructional equipment with those of the industry in which they were attached by 2019. A chi square test conducted on data collected generated the following statistical results:

Table 4.49

A Comparison of TTI Instructional Equipment to those of the Industry using Chi Square Test

Chi-square test	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	34.556 ^a	16	0.005
Likelihood Ratio	29.085	16	0.023
Linear-by-Linear Association	1.529	1	0.216
N of Valid Cases	70		

a. 21 cells (84.0%) have expected count less than 5. The minimum expected count is 0.09.

In table 4.49, a Chi-square test was performed to compare the ratio of equipment to students and the extent the training equipment were related to the industrial attachment. The test shows that there is a significant relationship ($p=0.05$, Chi-square=34.556, $df=16$) between ratio of equipment to students and the extent the training equipment were related to the industrial attachment. This means the higher the level of similarity of training equipment is with those of the industry, the adequate the skills developed. Therefore, TTIs in Kenya cannot rely on industries to offer practical training to their students as

revealed by the qualitative data of this study and literature reviewed by Anindo (2016). The government as well as other stake holders must play a big role in coming together in providing institutions with relevant equipment.

In regard to whether or not students were satisfied with attachment experience, the following results were obtained by a chi- square test conducted.

Moreover, a chi square test was conducted student satisfaction responses in regard to industrial experience and the following results were obtained:

Table 4.50

Satisfied with Attachment Experience and Where Attachment was Carried Out

Satisfied with attachment experience		Where attachment was carried out				Total
		Government	Private	Unspecified	None	
No	Frequency	0	7	1	2	10
	Percent	0.0	10.0	1.4	2.9	14.3
Yes	Frequency	16	25	19	0	60
	Percent	22.9	35.7	27.1	0.0	85.7
Total	Frequency	16	32	20	2	70
	Percent	22.9	45.7	28.6	2.9	100.0

The results in table 4.50 were used for hypothesis test as presented in table 4.50.

Table 4.50

Students' Satisfaction on Attachment Places and Experience

Chi-square test	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.580 ^a	3	0.001
Likelihood Ratio	15.855	3	0.001
Linear-by-Linear Association	2.780	1	0.095
N of Valid Cases	70		

a. 5 cells (62.5%) have expected count less than 5. The minimum expected count is 0.29.

In table 4.50, a Chi-square test was performed to compare the student satisfaction with attachment experience and where the student carried out the attachment. The test shows that there is a significant relationship ($p=0.001$, Chi-square=17.58, $df=3$) between the student satisfaction with attachment experience and where the student carried out the attachment. This means that the more the conducive environment for industrial attachment is, the better the skills developed. Therefore, industrial attachment accounts for the issues of skills gap in Kenya

4.7.1.4 Hypothesis Test Results Discussion for Objective Three

***H₀:** There is no statistical significant relationship between available training equipment and student skills development in public TTIs in Kenya*

The null hypothesis ($H_0: \beta_1 = 0$) was tested to find out if there is any statistical relationship between available instructional equipment and student skills development in public TTIs in Kenya. The significance level (α) was set at 0.05. In regard to table 4.38, a Chi square test on the lecturers' responses was performed to find out if there was any statistical relationship between instructional equipment and those of the industry. The test

results showed that a statistical relationship exists ($p=0.036$, Chi-square=22.127, $df=12$). In table 4.48 a Chi square test was performed on the student responses to find out whether a statistical relationship between instructional equipment and those of the industry existed. The results indicated that a statistical relationship existed ($p=0.05$, Chi-square=34.556, $df=16$). The null hypothesis was therefore rejected and the alternative retained. Comparing the two results, there is an agreement among students and lecturers are aware that there are challenges facing instructional process in the TTIs could form a basis for the issue of skills gap troubling the country. Therefore, another study could be best placed to ascertain the cause of these findings.

4.7.2.2 Students' qualitative responses in regard to the influence of instructional equipment and skills development

In order to obtain responses sufficient in tackling the issue of skills gap, the experience of student in the TTI in regard to the influence of instructional equipment skills development. Students' experience in TTI and industrial instructional equipment. On this basis he students were asked to explain their experience in regard to industrial and TTI equipment.

Findings in regard to the question raised, the responses focused on technology, professionalism, management and ethics. In this regard most respondents showed that the equipment were different depending of the level and type of internship industry. The respondents also showed that TTIs lacked adequate equipment and as a result the students were expected to practice the skills during the industrial attachment period. In this regard, student number 27 stated that, "the equipment I found in the industry were quite different

from the TTI's as they were digital, faster and efficient unlike the TTI's." On the same question, student number 63 stated that, "the equipment in the industry were new as we did not have training equipment at the TTIs and no lecturer for the practical subject, we struggled learning on our own." Moreover, ethical issues were raised in regard to this, the responded number 51 lamented that, "the manager was tribal as he only allowed students from his tribe to access industrial equipment." In 2020, Mulenga and Chileshe established that industrial internship was a challenge to students as most industries and business owners do not want to expose internees to their equipment for fear of damage that are associated with high financial implications for repair and replacement. A case in which a manger demonstrates unprofessional behaviors is an offence that can be treated as one cause of skills gap in Kenya. Nonetheless, the findings were beyond the scope of this study hence required another study to establish the cause of the findings.

4.7.2.3 Comparing and Contrasting qualitative and quantitative results

Test of hypothesis for objective three indicated a statistically significant relationship between instructional equipment and skills development. In regard to this descriptive data revealed an incommensurable student equipment ratio, equipment were inadequate unreliable instructional equipment servicing, replacement, audit and repair rate of the equipment. Qualitative data agreed with these findings as respondents especially students were aggrieved with the inadequate state of instructional equipment, presence of inadequately trained lecturers for practical skills learning, and discrepancy of training equipment and those of the industry.

4.7.2.4 Interpretation of the results

The technical institutions lack the capacity to produce adequately trained graduates. As a result, industries cannot rely on the training institutions for employees. The results continue to show that there is a problem among stakeholders in the TVET sector as systems thinking and adequate decision making lacks. Moreover, the study has revealed that there is a lot to be desired in the TTIs than not therefore there is need for another study to addresses the issues raised.

4.7.3. Principals' Responses in Regard to the Influence of Training Equipment and Skills Development

Data presented in this section was collected using interview schedules. Therefore, only qualitative data was collected. To obtain required data suitable for tackling issues in regard to the influence of instructional equipment on skills development, the principals were asked to comment on the state of training equipment. The principals were asked to comment on the state of equipment in the TTIs. Two principals, number one and number eight, expressed that the TTIs had adequate and working instructional equipment. Those who had different responses raised the following:

Interviewee 1: *We have the equipment though not adequate for every department. We also lack adequately trained workforce as the equipment require sufficient manufacturer knowledge which is lacking.*

Interviewee 2: *We have equipment for the existing courses but we cannot afford to offer Clothing Technology course as the cost of procuring and maintaining the equipment is very high.*

Interviewee 3: *The equipment are inadequate as we have high numbers of students enrolling annually and that students are not able to provide equipment and materials required of them*

Interviewee 4: *The equipment are inadequate especially to the deaf students and other physically challenged students. The manner in which the equipment were designed cannot be used by some students and thus we cannot admit students with some disabilities. The government need to think about disabled gifted students now that we have the technology. For example, we have a blind student who wanted to be a pilot but could not pursue the course. As an institution we could admit the student to an available course. That is all we could do to help the student.*

Interviewee 5: *We have a challenge with inadequacy of training equipment as a slight change in the industry has a trickle-down effect to the TTIs. TTIs cannot afford to adjust to the change brought about by the rapid technological change.*

Interviewee 6: *We have a challenge of training equipment as cases of vandalization and theft are rampant. The cost of repair and replacement is higher than the institution can raise.*

The finding show that the managers are in agreement that inadequate training equipment are a cause of skill gap in Kenya. Lack of manufacturer knowledge and high student

enrolment rates focus on the issue of stakeholders and in this case the industries and KUCCPS. There seems to be lack of collaboration between the manufactures and TTI and KUCCPS with TTIs. In regard to absence of technical courses in public TTI in Kenya, there is a possibility that Kenya is likely not to meet vision 2030 and major courses important in the achievement of the policy are lacking. The findings also show that TTIs are copying universities and the main courses for which they were founded are lacking. The issues of cost sharing policy are revealed by the findings of this study. When the students are not able to acquire required training equipment and materials, it still means no much lesson was learned from Kamunge's (1988) report in regard to cost sharing policy in TTIs in Kenya. Another study therefore will be required to establish the causes of these findings.

Auditing of TTI is key in ensuring consistence in skills development and thus quality skill development ([TVET ACT], 2013). Focusing on this assertion, the principal's responses on auditing of instructional equipment. The study thus sought to understand how the equipment are audited. Findings showed that the principal complied with the government policy in which the equipment are audited annually. The response thus shows that the equipment are audited at the same time with TTI finance which is in order with skills development procedures in TTIs.

Servicing of instructional one way of ensuring adequate skills instruction. The study thus sought to know how the instructional equipment are serviced. Majority of the principals said that the equipment in the institutes are serviced as required by various departments. Those that raised different responses explicated the following:

Interviewee 2: *Our equipment are serviced as recommended by the manufacturer and as per the orders placed by the departments.*

Interviewee 4: *Our institutes' equipment are serviced annually and occasionally where there is sheer need as the cost of repair is higher than the institute's budget.*

These findings thus show that level skills development from one TTI to another differ as the state of instructional equipment depends on the management. The findings show that skills learning environments are different among the TTIs as the instructional equipment are uniformly serviced. Moreover, when training equipment are serviced annually, the implication is that the equipment are serviced during examination time and thus students might have not used the equipment to learn the required skills.

This thus shows another cause of skills gap in Kenya.

4.7.4. Observation findings in regard to the influence of instructional equipment and skills development

Data presented in this section was collected by use of an observation guide. The research tool generated qualitative data on inventory for the Clothing Technology and Building and Construction Technology (BCT) courses. The data collection tool method was applied workshops and laboratories of the technical institutions

Findings established that records are available but not updated especially on to purchase dates, service dates, replacement, audit, order and return dates. Lack of updated records is an indicator of inadequate skills development. When such instances are revealed, the person responsible in the principal as adequate supervision lacks. This findings thus show is one of the causes of skills gap.

The study revealed that most technical institutions were equipped with both manual and electrical equipment. Clothing and Technology lacked computer mediated machines. This observation answers the question why Kenya imports second hand textile products yet TTIs exist to offer such services. This was unlike the Building and Construction Technology department equipment. Vandalism of equipment was observed in which the damaged machines abandoned in the workshops were used as book shelves for students. Majority of the equipment available were operational. The study observed that TTIs had both competent and incompetent lecturers for equipment use as some of the lecturers could not express themselves using the instructional language. This was as a result of automatic absorption of vocational training skills lecturers into TTIs without proper orientation and preparation at a time when the vocational schools were elevated to diploma institutional levels. These findings raise the question of the effectiveness of the academic admission criteria on which the TTI employment policy is based. Nevertheless, none of the literature reviewed in this study made this observation. The findings thus can be used to show that Kenya is likely not to obtain vision 2030 as TTIs lack some key technical courses and required training equipment that will enable Kenya move to the second world economy.

4.7.5 Comparing and Contrasting quantitative and qualitative data findings in regard to objective three

The purpose of the objective was to assess the influence of instructional equipment on student skills development. Hypotheses tested on all quantitative data for this objective indicated a statistical relationship between instructional equipment and skills development. Qualitative data supported these findings as the student equipment ratio was

incommensurable, 1:4 and above, instructional equipment irregularly repaired, replaced and at times not at all repaired and replaced. Nonetheless, the results reveal a discrepancy between industry and training equipment showing that the TTI issues regarding instructional equipment and skills development are systemic and therefore stakeholders lack synergy in order to end the issues raised.

4.7.6 Interpretation of the results

Technical education is an expensive venture for developing nations. The term “developing” is used euphemically to refer to poor nations. At the point where the findings converged, the two data sets revealed a lot to be desired than not in regard to instructional equipment and skills development. Therefore, technical institutions cannot rely on industries for skills training and neither can industries rely on TTIs for manpower training. Despite the fact that the developing nations are faced with financial challenges, stakeholders need to synergize as the systems theory and the decision making theory of Herbert Simon suggests in order to end the issue of skills gap in Kenya.

4.8 Data Analysis on the Influence of Instructional Leadership Styles on Student Skills Development –Intervening Variable

The purpose of the intervening variable was to establish whether instructional leadership styles have influence on student skills development regard to academic admission qualifications, instructional methods and instructional equipment. Data presented in this chapter was collected by means of interview schedule for principals, questionnaires for lecturers and students. Interview schedules provided qualitative data only. The principals

were key respondents here and thus their responses were presented first in this section. Questionnaires for lecturers provided both quantitative and qualitative data. Student questionnaires provided quantitative data only. Where the two data sets were provided, quantitative data was presented first and qualitative second.

4.8.1 Principals qualitative data findings in regard to the influence leadership style and skills development

This section presents findings obtained by use of interview schedules for principals. In the first place, the principals were asked to state the preferred style in executing their duties. Response obtained showed that all principals preferred a combination of transactional and transformational styles however there was awareness among the principals that transactional style was applied most based on the nature of the curriculum and organizational structure. In relation to the preferred leadership styles in skills development, the principals were asked to explanation of how leadership styles influence skills development. Responses elucidated showed that the principals are aware that transformational leadership style influences skills most as compared to transactional. In regard to this, principal number 8 said that, *“if each TTI is given the freedom of developing its own curriculum in regard to the needs of the industry, then transformational style could work and the issues of skills gap will be done away with.”* Principal number 3 said that, *“Currently, transactional leadership style is applied as it enables principals to instill discipline among students and focus on the curriculum implementation.”* These findings were in agreement of Malachwanzi’s (2019) findings that transformational leadership is

preferred in Kenya but transactional style is applied most. The findings thus show that an application of a wrong leadership style is a cause of skills gap in Kenya.

The principals were asked to comment skills development in relation to leadership skills. Most of them, number 1,3,5,6,7 and 8, expressed that curriculum implementation is well supervised as majority of the students reach the required level of skills development and get employment. All principals pointed out that mathematics was a main challenge to most students as they stressed that TTIs studies are about mathematics and science. In that sense leadership styles are compromised. All principals expressed that students that are not pass and are not gifted in mathematics should not be admitted to the courses that require high grades in the subjects and sufficient background knowledge in the two subject areas. Those who had unique opinions, for example the second interviewee said that, *“our lecturers are committed to teaching skills but most students admitted to the TTI are not serious with the learning. In most cases the students are absent. So we move ahead with students that are ready to learn. As a result, not all students reach adequate levels of skills development”*. When an institutional custodian makes such remarks, the question whether adequate supervision is offered arises. At the same time, the question of the kind of leadership style applied arises. Moving on with students who comply with training rules only can be a cause of skills gap in Kenya. For this concern, a question whether similar issues are faced by private technical institutions and how they are addressed arise. Nevertheless, the findings can be used to explain whys not all students in public TTIs reach the required level of skills development. Regarding such findings, Osman and Kamis (2019) advise TTI leadership to create capacity to deal with such issues by

enhancing collective thinking to generate new ideas, take risks, make decisions solve the problems and implement the decisions.

Interviewee number four expressed that, *“not all students reach adequate levels of skills learning as deaf students find difficulties in expressing themselves. Only the deaf with high intelligence quotient end up acquiring required level of skills as it is easy for the lecturers to guide them”*. Focusing on these responses a question arises, “if students with no disability are not helped to reach the required level of skills development, what about those with physical disability? Another study therefore will be well placed to respond to this question as the issues pointed out seem to contribute to the current issue of skills gap.

Focusing of what the principals explicated, the reason why leadership styles and compromised by the students’ behavior in the process of skills development is likely because of the application of an irrelevant leadership style. Malechwenzi’s (2019) study on the impact of leadership on learning outcomes, made similar observation in the TTIs of the coastal region of Kenya where student absence from the institutions were high as well as lack of student motivation. The findings thus show that one of the causes of skills gap in Kenya is the leadership style applied.

Further, the principals were asked to comment of the issue of the existing skills discrepancy between the TTIs and the industry. Responses gathered focused on stakeholder, technology and human resource factors. In this regard various responses were elucidated as follows.

Interviewee 1: *Skills produced by TTIs will never be the same. This is because industries are evolving as technology evolves. It is therefore the responsibility of the industries to adapt students to the industrial requirements and that is why industrial attachment period exists in the syllabus.*

Interviewee 2: *The difference exists but not entirely. The only way to tackle the issue is regular review of the curriculum and integrate the curriculum with emerging issues in regard to industry which is not an easy task as its cost implications are high. Nevertheless, our lecturers at subject level do integrate new knowledge with the regular coursework.*

Interviewee 3: *Skills gap between industry and TTIs exist as effective collaboration among stakeholders is lacking.*

The findings show that there is constant skills development challenge facing TTIs due rapid technological change. Moreover, there is evidence of inadequate collaboration among stakeholders. Nevertheless, if it is only the industries to change as the respondents suggest, then the skills gap will widen as the TTI stand aloof. Therefore, the findings can be used to emphasize that lack of collaboration among stakeholders is a major cause of skills gap in Kenya.

Focusing on current issues pointed toward technical education and training outcomes such collapsing of buildings in Kenya and reliance of second hand textile imports, leadership styles seem to be compromised. The principals were asked to explain the phenomenon in regard to leadership styles and skills development in Kenya. Responses obtained show that it is not the TTIs to blame but the industry in regard to corruption that includes taking

bribes to construct buildings against the approved standards of National Construction Authority (NCA), hiring of incompetent or untrained workers, lack of supervision, hiring cheap labour, and absence of engineers at the construction site. None of the literature reviewed came up with similar findings. In regard to the question, some of the principals elucidated diverse responses.

Interviewee 1: *The issue is not for the TTIs but for the industry. If it is poor leadership styles in the TTIs, why then is a building collapsing within the government vicinity? (The interviewee was referring the Nyamira county assembly building that collapsed on May 28th 2021).*

Interviewee 6: *In regard to import of second-hand textile products, Kenya lacks industries and adequate skills that can produce textile products for the approximated 49.5 million population. Moreover, decline of industries like Gikomi, RivaTex and Raymond in collaboration with Moi university led to the current skills gap manifested.*

Interviewee 7: *TTI mandate is not cloth production but training of highly skilled graduates in the profession.*

When graduates fail to deliver required skills, always human being will seek to know, the school, college or university that trained them. In regard to the question that sought to establish the cause of buildings collapsing and taking lives in Kenya, the principal responses seem to exclude TTI leadership roles in skills development from the scene. By the fact that findings have already established that application of irrelevant leadership styles and lack of collaboration among stakeholders is a major cause of skills gap, there is

need of another study to establish the cause of these undesirable state of skills gap associated TTI graduates.

Nevertheless, the principals were asked to give suggestions in regard to instructional leadership and skills development challenge mitigation. Common responses gathered include; empowering TTI in research in regard to the two courses and all other courses as well because the courses work as a system, increase of lecturer qualification, adequate financing and proper orientation toward Competence Based Education and Training for lecturers is required. Responses that differed were recorded as follows:

Interviewee 4: *Clothing Technology courses need to be attached to a textile industry as it is to schools of nursing and hospitals.*

Interviewee 6: *Industrial training needs to be enhanced by adopting the Germany dual system*

Interviewee 7: *There is need for stakeholder collaboration for effective skills development. For example, financial remittance delays by HELB affects student skills learning. Lack of industrial attachment places also affects skills learning. So, there is need for the government to create avenues for students to practice skills in developed countries.*

Interviewee 8: *The TTI should identify capable but talented students in the TTIs and consider them for further training and deployed to the same TTI as lecturers.*

Responses garnered by interview schedules have revealed a weakness in leadership style applied that gives less opportunity to innovation and creativity. At the same time, a leadership weakness has been revealed among the leaders despite high academic qualifications acquired. Baglow's (2016) study indicated that principals in New Zealand polytechnics had no formal leadership skills and so they applied school and workplace experiences in managing the polytechnics. Though they were not very effective, they delivered services. This is unlike principals in Kenya who have the high academic qualifications of the principals are therefore not adequately utilized. The responses also revealed that systems thinking is lacking in the TVET sector as lack of collaboration among the stakeholders have been revealed as having detrimental effects on students during the training and after. To tackle such issues, Ahmed and Ejaz (2019) effective TTI leadership for skills development is achieved through leaders that inspire lecturers, apply idealized influences, support the lecturers one at a time and carry out continuous intellectual stimulations through workshops. This implies use of transformational leadership style. Relevant leadership styles are therefore important skills development.

4.8.2. Lecturers responses on the effect of leadership styles on student skills development

Responses presented in this section were obtained by use of questionnaire that provided both quantitative and qualitative data. In this case, quantitative data is presented first and qualitative data second.

4.8.2.1 Lecturers quantitative responses on the effect of instructional leadership styles on student skills development

Literature reviewed revealed that relevant instructional leadership style or styles increased skills development and while a wrong style decreased skills development (Joo, 2018; Malechwani, 2018). In this regard, the most advocated leadership style for effective skills development was transformational or a combination of democratic leadership styles. Transactional was deemed inadequate in skills development. on this basis, the lecturers were asked to state the leadership style used most in the technical institutions. The following responses were gathered:

Table 4.51*Lecturer Responses in Regard to Leadership Styles Applied in TTIs in Kenya*

Statement	Specific leadership style	Frequency	Percent
Leadership style	Transformational	19	27.5
	Transactional	15	21.7
	Both transactional and transformational	25	36.2
	Laissez-faire	5	7.2
	Servant-ship	5	7.2
Total		69	100%

In table 4.51 25 (36.2%) in table 4.51 shows that a combination of both transformational and transactional leadership styles is preferred in TTIs in Kenya, 19 (27.5%) indicated transformational leadership, 15 (21.7%) transactional style, 5 (7.2%) Laissez-faire style and 5 (7.2%) Servant-ship style. Focusing on the majority and second majority respondents, the findings are in agreement with most studies that a combination of transformational and transactional styles are effective in skills development (Burdenhost & Radile, 2018; Joo, 2018; Malechwani 2018; OECD Temple, 2001). If Kenya applies the styles, it is likely to succeed in skills development.

Joo (2018) shows that a successful skills development process requires frequent review of the government curriculum in relation to the current knowledge which involves emerging issues. A curriculum that allows inclusion of new knowledge into the old, is transformational or democratic (Malechwani, 2018). Based on this, the study sought to know the frequency at which curriculum is reviewed in order to discern the type of leadership applied in the TTIs to enable adequate discernment of skills causes of skills gap in Kenya. The following results were obtained:

Table 4.52*Frequency of Curriculum Review*

Statement	Rate	Frequency	Percent
Frequency curriculum is reviewed	Annually	33	47.8
	Not at all	21	30.4
	Quarterly	11	15.9
	Weekly	2	2.9
	Monthly	2	2.9
Total		69	100%

In table 4.52 majority 33(47.7%) in regard to table 4.52 indicated annually, 21 (30.4%) not at all, 11 (15.9%) quarterly, 2 (2.9%) weekly and 2 (2.2%) monthly. A combination of the majority respondents 33 (47.7%) and 21 (30.4%) show that Kenya utilizes transactional leadership style which is less receptive to new knowledge integration. The study thus finds out that use of a rigid leadership style- transactional style – is one of the causes of skills gap in Kenya. Similar findings were established by Malanchwanzi (2018) in which higher vocational colleges at the coastal region of Kenya utilized transactional leadership styles. In regard to this findings, Kenya can improve skills learning if TTIs adopt transformational or democratic leadership styles as an earlier study conducted in the USA, Temple, (2001) advises among current studies (Hadiso & Cal, 2021; Osman & Kamis, 2019; Razak & Hamidon, 2015);) which observed that nations with high Gross Domestic Product (GDP) such as Malaysia apply transformational leadership style in skills development.

Moreover, the frequency at which departmental meeting are conducted in regard to skills development determine the kind of leadership styles applied. The more the meetings held, the styles applied is either transformational or a combination of democratic styles relevant

to skills development and the vice versa is transactional (Burdenhost & Radile, 2018; Joo, 2018). Based on this assertion, the lecturers were asked to state to the frequency in which departmental meeting were held in order to aid the study discern the genesis of skills gap

Table 4.53

Frequency of Departmental Departments

Statement	Rate	Frequency	Percent
Frequency of departmental meetings	Monthly	33	47.82
	Quarterly	29	42.03
	Fortnightly	8	11.59
Total		69	100%

Findings in table 4.53 shows that departmental meetings are held monthly as majority 33 (47.8%) indicated, 29, (42.0%) indicated quarterly and 7 (10.1%) fortnightly. The results show that transactional leadership style has some impact in regard to empowering lecturers in offering relevant training to students as curriculum is reviewed every month as indicated by 33 (47.8%) of the respondents. In regard to this, Razak and Hamidon (2015) assert that instructional leadership requires a person that has the ability to influence thoughts, attitudes and behavior of others while improving skills with changing times with an aim of obtaining set goals. Therefore, it is not only the frequency of departmental meetings that matter the level to which the leader is able bring about effective skills development out of the meetings. Therefore, if the review aims at incorporating new knowledge with the formal curriculum, quality skills developments are expected (Joo, 2018).

4.8.2.2 Lecturers' qualitative findings in regard to the effect of instructional leadership styles on student skills development

Thus the study sought to establish the most effective leadership style and the effect the style has on skills development in public TTIs in Kenya. Findings established that most of the lecturers had less knowledge in regard to the style as most of them did not respond to the question. For instance, lecturer number 63 stated that *“Honestly, I know the leadership styles but don't know how they work and neither do I know how they are applied to skills development processes”*. In this regard, lecturer number 46 stated that, *“I guess transformational works better for skills development as it is flexible and involves all in decision making unlike transactional style of leadership.”* Furthermore, lecturer respondent number 17 stated that, *“leadership styles have no purpose in regard to skills development as the focus is on practical learning.”* None of the literature reviewed showed similar findings. These shows that technical education is under researched thus a possible cause of skills gap globally. When lecturers give such responses, there is a possibility that universities and colleges responsible for training TTI lecturers are either lacking leadership and management skills for the students or ignore the application of the knowledge.

The findings show why TTI graduates lack administrative skills regardless of their excellent scores on their certificates (Anindo, 2016). In Ethiopia, Handiso and Cal (2021) made an observation that TTI principals were one sided persons, if they were not focusing on work done only they focused on people management in getting work done and goals achieved. The study observed that TTIs lacked leaders with vision, and professional skills

to monitor skills development processes. Therefore, issues in regard to leadership in skills development are all over Africa.

4.8.2.3 Comparing and contrasting qualitative and quantitative responses of lecturers.

At the point where quantitative and qualitative converge, there is an agreement that transformational leadership is the most effective style in skills development however, transactional style is most utilized in Kenya. The findings also agree that leadership knowledge is lacking among the TTI lecturer, an issues that must not be ignored by relevant stakeholders in the process of addressing skills issues in Kenya.

4.8.2.4 Interpretation

The problems faced by TTIs in relation to instructional leadership ca be traced back to the pedagogical colleges and universities that have the mandate of preparing lecturers not only to teach but also up leadership roles in the TTIs. Another study therefore will be required to address issues regarding the instructional leadership style and skills development.

4.8.3. Students' responses in regard to the effect of instructional leadership styles on skills development

According to the current competence based curriculum, leadership knowledge and skills is part unlike the old curriculum (KIE, 1990b; TVETA, 2019). Literature reviewed revealed that leadership styles lacked among TTI graduates as failure to deliver leadership

services were complained of (Anindo, 2016; Ngoveni, 2018). These was as a result of rigid curriculum. Based on this incidence, the students were asked to show the frequency in which curriculum is reviewed in their various TTIs. The following results were obtained.

Table 4.54

Frequency of Lecturer Student Discussion of New Knowledge

Question	Rate	Frequency	Percent
What is the frequency of subject meetings for new knowledge discussion?	Annually	0	00
	Quarterly	0	00
	Monthly	0	00
	As it emerges	11	15.71
	Not at all	59	84.71
Total		69	100%

In table 4.54, majority of the respondents, 59 (84.71%) in table 4.54 show that curriculum is not at all reviewed while 11 (15.71%) showed that the curriculum is reviewed as new knowledge arises. These findings can be used to emphasize that transactional leadership styles are utilized in most TTIs in Kenya hence the cause of skills gap in the country.

4.8.4 Inferential Statistics on in regard to in regard to the intervening variable and skills development

The purpose of the intervening variable was to establish whether instructional leadership styles have influence on student skills development when combined with academic admission qualifications, instructional methods and instructional equipment in public TTIs in Kenya. Correlation and regression tests were conducted to address the quest of this objective. The following results were obtained:

4.8.4.1 Correlation and regression analysis for quantitative findings

A correlation and regressions tests were conducted to quantify the degree to which the studied variables were related. The following results were as presented.

Table 4. 55

Correlation Between Student Skills Development and Institutional Factors

		Skills Dev.	Academic Adm.	Instructional Math	Equipment	Leadership Styles
Pearson Correlation	Skills Dev.	1.00	.479	.439	.264	.425
	Academic Adm. Qualifications	.479	1.00	.426	.223	.581
	Instructional Methods	.439	.426	1.00	.376	.424
	Instructional Equipment	.264	.223	.376	1.00	.321
	Leadership Styles	.425	.581	.424	.321	1.00
	Sig. (1-tailed)	Skills Dev.		.000	.000	.014
Academic Adm. Qualifications		.000		.000	.033	.000
Instructional Mth		.000	.000		.001	.000
Equipment		.014	.033	.001		.004
Leadership Styles		.000	.000	.000	.04	
N		Skills Dev.	69	69	69	69
	Academic Adm.	69	69	69	69	69
	Instructional Mth	69	69	69	69	69
	Equipment	69	69	69	69	69
	Leadership Styles	69	69	69	69	69

In table 4.55 on skills development in the TTIs is significantly correlated to academic admission qualifications (AAQ) (correlation of 0.479, $p < 0.001$), instructional methods (correlation of 0.439, $p < 0.001$), equipment (correlation of 0.264, $p = 0.014$) and leadership styles (correlation of 0.425, $p < 0.001$). An increase in academic admission had the highest impact on the skills development followed by instructional methods then leadership styles

and instructional equipment. The highest positive correlation of 0.581 ($p < 0.001$) is observed between academic admission qualifications and instructional leadership styles. The instructional methods correlation with leadership styles is 0.424 ($p < 0.001$) while instructional equipment and instructional leadership styles correlation is 0.321 ($p = 0.004$). The three institutional factors, the skills development and leadership styles are positively correlated and significant. This indicates that an increase in the institutional factors and instructional leadership style increases skills development in the TTIs.

4.8.4.2 Multicollinearity Test results

The multicollinearity test determines whether the variables under study are highly correlated. This can pose a problem to the multiple regression analysis. The test yielded results as follows:

Table 4.56*Multicollinearity Test for The Study Variables*

	Collinearity Statistics	
	Tolerance	VIF
(Constant)		
Academic Admission	0.623	1.605
Instructional Method	0.712	1.404
Instructional Equipment	0.826	1.210
Leadership style	0.604	1.654

Table 4.56 shows the Variance inflation factor (VIF) for the academic admission is 1.605, instructional method is 1.404, equipment is 1.210 and a leadership style is 1.654. Variance Inflation Factor is a measure of the amount of multicollinearity in a set of multiple regression variables. If the VIF is less than 1.0, this rules out the possibility of multicollinearity among the study variables. Thus, the institutional factors, leadership styles and the interaction between leadership styles and institutional factors are ideal for multiple regression analysis.

4.8.4.3 Regression Model and Coefficients Summary

The regression summary for institutional factors that includes academic admission qualifications, instructional methods and instructional equipment was conducted and presented in table 4.57.

Table 4.57*Multiple Regression Analysis Results for Institutional Factors*

		Statistic	P-value
R		0.551	
R Squared		0.304	
Adjusted R Squared		0.272	
F-Statistic (df1, df2)	(3, 65)	9.452	0.000
	Coefficients	t-value	P-value
Constant	1.157	2.539	0.014
Academic admission (AA)	0.386	3.049	0.003
Instructional methods (IM)	0.174	2.126	0.037
Instructional Equipment (IE)	0.063	0.797	0.428

Dependent Variable: Skills Development

The Multiple linear regression equation is expressed as

$$\text{Skills Development} = 1.157 + 0.386 * AA + 0.174 * IM + 0.063 * IE$$

Where AAQ is academic admission qualification, IM is the instructional methods and IE is the instructional equipment.

In table 4.53, the R-value is 55.1 percent with the R squared being 30.4 percent with $F(3,65)=9.452$ ($p<0.001$). This model explains 30.4 percent of the variation in the skills development in TTIs based on the institutional factors, the academic admission qualification, instructional methods and institutional equipment, while 69.6 percent is explained by other variables not taken into account in this model.

The academic admission coefficient is positive and statistically significant at (0.386, $t=3.049$, $p=0.003$). A unit increase in academic admission significantly increases the skills

development in TTIs by 0.386 units. Thus, academic admission increases the skills development in TTIs.

The instructional methods coefficient is positive and statistically significant at (0.174, $t=2.126$, $p=0.037$). A unit increase in instructional methods significantly increases the skills development in TTIs by 0.174 units. Thus, instructional methods increase the skills development in TTIs.

The instructional equipment coefficient is positive (0.063, $t=0.797$, $p=0.428$). A unit increase in instructional equipment increases the skills development in TTIs by 0.063 units. Thus, instructional equipment increases the skills development in TTIs.

4.8.4.4 Multiple regression for institutional factors

For this study, the purpose of a multiple regression analysis was to model the linear relationship between the independent variables, also referred to as explanatory variables; academic admission qualifications, instructional methods and instructional equipment, and dependent or response variables that included quantitative, communication, technical and leadership skills. The regression test results were presented in table 4.59.

Table 4. 58*Multiple Regression for Institutional Factors*

		Statistic	P-value
R		0.629	
R Squared		0.396	
Adjusted R Squared		0.368	
F-Statistic (df1, df2)	(3, 65)	14.180	0.000
	Coefficients	t-value	P-value
Constant	-0.463	-0.729	0.469
Academic admission qualifications (AAQ)	0.788	4.465	0.000
Instructional methods (IM)	0.166	1.450	0.152
Instructional Equipment (IE)	0.162	1.469	0.147

Dependent Variable: Leadership Styles

The Multiple linear regression equation is expressed as

$$\text{Leadership Styles} = -0.463 + 0.788 * \text{AAQ} + 0.166 * \text{IM} + 0.162 * \text{IE}$$

Where AAQ is academic admission qualifications, IM is the instructional methods and IE is the instructional equipment.

In table 4.54, the R-value is 62.9 percent with the R squared being 39.6 percent with F (3,65)=14.18 (p<0.001). This model explains 39.6 percent of the variation in the leadership styles in TTIs based on the institutional factors, the academic admission, instructional methods and instructional equipment, while 60.4 percent is explained by other variables not taken into account in this model.

The academic admission coefficient is positive and statistically significant at (0.788, t=4.465, p<0.001). A unit increase in academic admission significantly increases the skills

development in TTIs by 0.788 units. Thus, academic admission increases the skills development in TTIs. The instructional methods and instructional equipment influence on the leadership styles is not statistically significant.

4.8.4.4: Linear Regression analysis with leadership styles

The test was conducted and the results were as presented in table 4.60

Table 4.59

Linear Regression with Leadership Styles

		Statistic	P-value
R		0.425	
R Squared		0.181	
Adjusted R Squared		0.169	
F-Statistic (df1, df2)	(1, 67)	14.806	0.000
	Coefficients	t-value	P-value
Constant	2.421	8.907	0.000
Leadership styles (LS)	0.284	3.848	0.000

Dependent Variable: Skills Development

The Multiple linear regression equation is expressed as

$$\text{Skills Development} = 2.421 + 0.284 * \text{Leadership Styles}$$

In table 4.54, the R-value is 42.5 percent with the R squared being 18.1 percent with F (1,67) =14.806 (p<0.001). The leadership styles in the model explains 18.1 percent of the variation in the skills development in TTIs, while 81.9 percent is explained by other variables not taken into account in this model.

The leadership styles coefficient is positive and statistically significant at (0.284, t=3.848, p<0.001). A unit increase in leadership styles significantly increases the skills development in TTIs by 0.284 units. Thus, leadership styles intervene in the skills development of students in TTIs.

4.8.4.5 Multiple Regression analysis for institutional factors and leadership styles

Table 4.60

Multiple Regression Analysis for Institutional Factors and Leadership Styles

		Statistic	P-value
R		0.562	
R Squared		0.316	
Adjusted R Squared		0.273	
F-Statistic (df1, df2)	(4, 64)	7.379	0.000
		t-value	P-value
Constant	1.200	2.626	0.011
Academic admission qualification (AAQ)	0.312	2.159	0.035
Instructional methods (IM)	0.159	1.908	0.061
Instructional Equipment (IE)	0.048	0.595	0.554
Leadership Styles (LS)	0.094	1.055	0.295

Dependent Variable: Skills Development

The Multiple linear regression equation is expressed as

$$SkillsDevelopment = 1.2 + 0.312 * AAR + 0.159 * IM + 0.048 * IE + 0.094 * LS$$

Where AAQ is academic admission qualifications, IM is the instructional methods, IE is the instructional equipment and LS is the leadership style.

In table 4.61, the R-value is 56.2 percent with the R squared being 31.6 percent with F(4,64)=7.379 (p<0.001). This model explains 31.6 percent of the variation in the skills

development in TTIs based on the institutional factors; the academic admission requirements, instructional methods and institutional equipment, while 68.4 percent is explained by other variables not taken into account in this model.

The academic admission coefficient is positive and statistically significant at (0.312, $t=2.159$, $p=0.035$). A unit increase in academic admission significantly increases the skills development in TTIs by 0.312 units. Thus, academic admission increases the skills development in TTIs.

The instructional methods coefficient is positive at (0.159, $t=1.908$, $p=0.061$). A unit increase in instructional methods significantly increases the skills development in TTIs by 0.159 units. Thus, instructional methods increase the skills development in TTIs.

The instructional equipment coefficient is positive (0.048, $t=0.595$, $p=0.595$). A unit increase in instructional equipment increases the skills development in TTIs by 0.048 units. Thus, instructional equipment increases the skills development in TTIs.

The leadership style coefficient is positive (0.094, $t=1.055$, $p=0.295$). A unit increase in leadership style increases the skills development in TTIs by 0.094 units. Thus leadership style increases the skills development in TTIs.

4.8.4.6 Multiple Regression Analysis Models Summary

Table 4. 61

Multiple Regression Analysis Models Summary

Dependent Variable	Independent Variables	Coefficients	p-value	R-Squared
Skills Development	Constant	1.157	0.014	0.304
	Academic Admission q.	0.386	0.003	
	Instructional Methods	0.174	0.037	
	Instructional Equipment	0.063	0.428	
Leadership styles	Constant	-0.463	0.469	0.396
	Academic Admission q.	0.788	0.000	
	Instructional Methods	0.166	0.152	
	Instructional Equipment	0.162	0.147	
Skills Development	Leadership styles	2.421	0.000	0.181
Skills Development	Constant	1.200	0.011	
	Academic Admission q.	0.312	0.035	
	Instructional Methods	0.159	0.061	
	Instructional Equipment	0.048	0.554	
	Leadership styles	0.094	0.295	0.316

Table 4.61 summarizes the four regression models showing the independent variable and dependent variable in each case. The respective coefficients, p-values and R-squared values are presented.

The introduction of the intervening variable, leadership style had the following effects: First, it increased the explanatory power of the model from 30.4 percent to 31.6 percent. Second, it increased the constant coefficient from 1.157 to 1.2 but reduced the academic admission coefficient from 0.788 to 0.312, instruction methods coefficient decreased from 0.166 to 0.159 while instructional equipment decreased from 0.162 to 0.049. Third, the

institutional factor significant was negatively influenced where academic admission remained significant without and with the leadership styles in the model. Instructional methods were significant before the introduction of the leadership styles but its power of significance reduced with the intervening variable. Even though leadership style is not significant, it has a positive influence in the model. Therefore, leadership styles have an influence on the skills development of students in TTIs.

Skills development is positively and significantly influenced by leadership styles but the model power is 18.1 percent. Therefore, other factors are important in determining the level of skills development in TTIs in Kenya.

4.8.4.7 Intervening Variable Hypothesis Test Results Discussion

H₀: The intervening variable of instructional leadership styles has no relationship with the institutional factors and student skills development in public TTIs in Kenya

The null hypothesis ($H_0: \beta_1 = 0$) was tested to find out if there is any relationship between the intervening variable, instructional leadership styles and the institutional factors on student skills development. The significance level (α) at 0.05. Results in table 4.68 shows that leadership has a positive and significant correlation with students' skills development ($r=0.425$, $p<0.001$), academic admission qualifications ($r=0.581$, $p<0.001$), instructional methods ($r=0.424$, $p<0.001$), and training equipment ($r=0.321$, $p<0.004$).

In table 4.68, a unit increase in leadership styles increases student development by 0.284 units ($\beta_1 = 0.284$, $p<0.001$) when the institutional factors are excluded in the model. The results in table 4.68 shows that a unit increase in academic admission qualification

increases leadership styles by 0.788 ($\beta_1 = 0.788$, $p < 0.001$). Academic admission qualifications, instructional methods and training equipment contribute 39.6 percent to the leadership styles ($r^2 = 0.396$). The training equipment and instructional methods do not significantly influence leadership styles. The leadership styles have influence on skill development based on academic admission qualifications and not on instructional methods and training equipment. Therefore, the null hypothesis is retained that there is no significant relationship between leadership styles and instructional methods with student skills development.

4.8.5: Discussion of the intervening variable results

The multiple linear regression analysis established the order in which the variables studied influenced student skills development. The results demonstrated that instructional leadership styles variable is an intervening variable only in regard to academic admission qualification. The findings that the instructional leadership style is not an intervening variable to instructional methods and instructional equipment is a fallacy. A fallacy is a false argument that does not follow the rule of logic. None of the studies reviewed established this. The reasons why the respondents are saying so can be linked to results which showed that TTIs are highly theoretical and that pedagogical science knowledge was inadequate among the TTI lecturers.

4.8.6 Interpretation of the findings

Deficiencies and anomalies revealed in the study account for the current issue of skills gap. Leaning on theoretical aspects at the expense of practical learning has detrimental effects on skills development. There must be a balance between theory and practice in the

technical institutions. If this is the state of affairs in Kenya, another study could elucidate other evidence based facts on this phenomenon as the findings are beyond the scope of this study.

4.9 Conclusion on the Influence of Institutional Factors on Student Skills Development

The purpose of the study was to investigate the influence of institutional factors on student skills development in public Technical Training Institutions in Kenya in order to provide evidence based findings suitable for addressing the problem of skills gap in Kenya. At the point in which quantitative and qualitative findings of the three institutional factors studied converge, there is an agree that institutional factors influence student skills development in Kenya. therefore, stakeholders need to synergize in order to end the issue of skills gap in Kenya.

CHAPTER FIVE
SUMMARY OF THE FINDINGS, CONCLUSIONS AND
RECOMMENDATIONS

5.1 Introduction

This chapter is a summary of the research findings, reflections on the research undertaken, conclusions and recommendations. The study investigated the influence of institutional factors on student skills development in public Technical Training Institutions in Kenya. The summary of the study was based on the objectives studied. Research reflections included knowledge contributions to curriculum, policy, instructional leadership and literature, the credibility of the study and a concede of the study limitations. Conclusions and recommendations were presented as per the objectives.

5.2 Summary of the Findings

The purpose of the study was to investigate the influence of institutional factors on student skills development in public Technical Training Institutions (TTIs) in Kenya. The study focused on three objectives that included: the influence of academic admission qualifications, instructional methods and instructional equipment on student skills development in public Technical Training Institutions in Kenya. Intervening variable of instructional leadership styles on student skills development in the public TTIs was considered. Dependent variables included quantitative, communication, practical and

leadership skills. The study established that there exists a statistical significant relationship between institutional factors and skills development.

5.2.1 Demographic findings

Demographic information of the study was based on principals, lecturers and diploma students for Clothing Technology and Building and Construction courses in Public Technical Institutes in Kenya. The study established that gender disparity exists among students, lecturers and principals despite the fact the TTIs had complied with the admission policy that advocates open admission for both genders. In this case there were more males than females in the student population as well as the lecturers and principals'. All lecturers and principals had a mean work experience of five years. Majority of the lecturers, (70%), had a teaching experience of between one and five years. In regard to educational level, majority, (62.3%,) of the lecturers' highest level of education was Bachelor's degree and the least (1.44%) master's degree. Similarly, majority lecturers, (62.5%), had Bachelors' degree as highest qualification. Majority of the students were aged between 18-23 (50%) followed by 24-30 (45.7%) as second majority and the least 3 (4.3%) aged between 31-40 years. In regard to the demographic data of all respondents, gender disparity seemed to be the key issue in all aspects of technical education as there were more males than females among the student population, teaching staff and among TTI lecturers. Despite this, the findings showed that TTIs have complied with admission and employment policies of the government.

5.2.2 Academic admission qualifications and skills development

Academic admission qualification is based on Kenya Certificate of Secondary Education (KCSE) results and Kenya National Examination Council (KNEC) final year results for Building and Construction Technology and Clothing Technology Diploma students in the TTIs. Findings indicated that there is a statistical significant relationship between academic admission qualifications and skills development. In this regard, the null hypothesis thus rejected and the alternative hypothesis retained that there is a statistical significant relationship between academic admission qualifications and skills development was retained as KCSE and Final KNEC technical grades were analyzed and results presented showed that $r=0.479$ and $p<0.001$. Qualitative findings supported these results as the minimum academic qualification for entry to diploma courses was found inadequate in tackling issues of skills gap in Kenya. By the fact that Kenya Certificate of Secondary Education (KCSE) constitutes basic education structure in the national education system, basic quantitative and communication knowledge and skills are key factors in any education system. Therefore, the study concluded that Kenya Universities and Colleges Central Placement Sector (KUCCPS) needs to consider subject qualifications for courses that require high grades in mathematics and physics or science subjects and that students in Kenya must meet the admission qualifications for standards to be maintained. Students also need to be guided in their career.

5.2.3 Instructional methods and skills development

The methods included lecture and student centered methods. Hypothesis test results indicated that a statistical relationship between instructional methods and skills development exists as the null hypothesis was rejected and the alternative retained where ($p < 0.001$, Chi-square=25.866, df=4) between lecturer competence and student satisfaction with subject being taught. Qualitative data supported these findings as a preference of lecture method in a psychomotor domain was revealed. Qualitative data moreover revealed that instructional methods are less important in the process of skills development as the focus was on hands on learning. The study thus concluded that there are deficiencies in the Public TTIs in Kenya in regard to pedagogical processes. A comparison and contrast of qualitative and quantitative findings revealed that irrelevant curriculum is one of the causes of skills development in Kenya as TTIs lack of collaboration with industry and other stakeholders. The study also concluded that lack of career guidance for students on courses applied for was a contributory factor to skills gap in Kenya. This formed a basis for another research.

5.2.4 Instructional equipment and skills development Instructional equipment comprises of both consumable and non-consumable instructional materials. The null hypothesis was rejected ($p = 0.05$, Chi-square=34.556, df=16) between ratio of equipment to students and the extent the training equipment were related to the industrial attachment by students and ($p = 0.036$, Chi-square=22.127, df=12) between ratio of instructional equipment and the extent the lecturers felt they were similar to those of the industry. A

similar test for lecturers was in favor of the alternative hypothesis. Qualitative data supported the findings by revealing that skills development in TTIs is highly theoretical.

5.2.5 The effect of the intervening variable on the relationship between institutional factors and skills development

A critical remark in regard to the influence of instructional leadership styles and skills development when combined with institutional variables is the question whether leadership styles have an impact on student skills development. The study findings in this regard showed deficiencies in the TTIs in which leadership skills lacked among TTI students and lecturers. The null hypothesis ($H_0: \beta_1 = 0$) was tested to find out if there is any relationship between the intervening variable, instructional leadership styles and the institutional factors on student skills development. The significance level (α) at 0.05. Results show that leadership has a positive and significant correlation with students' skills development ($r=0.425$, $p<0.001$), academic admission qualifications ($r=0.581$, $p<0.001$), instructional methods ($r=0.424$, $p<0.001$), and training equipment ($r=0.321$, $p<0.004$). A unit increase in leadership styles increased student development by 0.284 units ($\beta_1 = 0.284$, $p<0.001$) when the institutional factors are excluded in the model. A unit increase in academic admission qualification increases leadership styles by 0.788 ($\beta_1 = 0.788$, $p<0.001$). Admission academic qualifications, instructional methods and training equipment contribute 39.6 percent to the leadership styles ($r^2 = 0.396$). The results thus showed that the training equipment and instructional methods do not significantly influence leadership styles. The leadership styles have influence on skill

development based on academic admission qualifications and not on instructional methods and training equipment. Therefore, the null hypothesis was retained that there is no statistical significant relationship between leadership styles and instructional methods with student skills development. The results were consistent with literature reviewed and qualitative results which revealed that adequate leadership and management knowledge and skills lacked among TTI students and lecturers.

5.3 Contributions made by the study

This study has contributed knowledge to four important areas of technical education. The areas include curriculum, policy, instructional leadership and literature

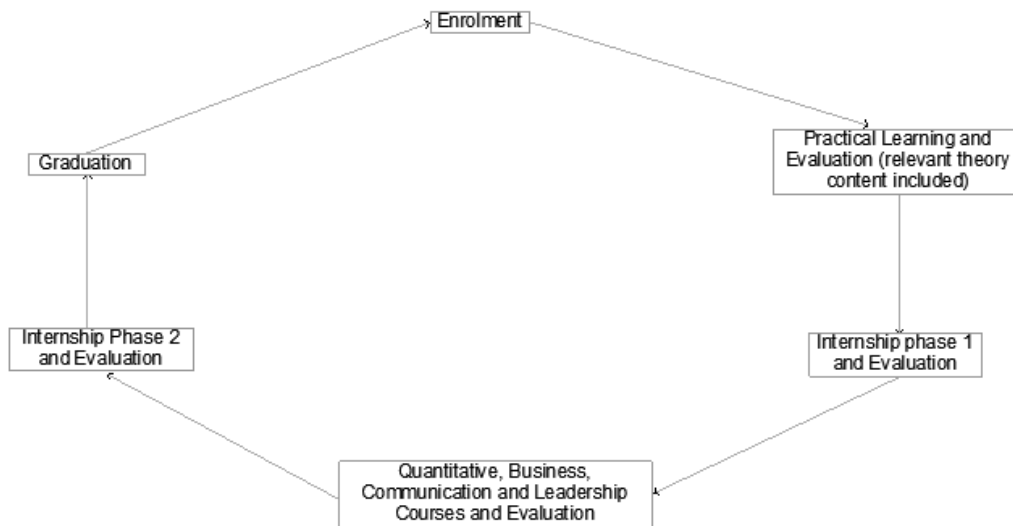
5.3.1 Contribution to Curriculum

The study suggested a perceptual curriculum implementation model that separates practical learning from theory. It provides a basis for harnessing all stakeholders in the TVET sector, one at a time, working systemically, enhancing inputs, through puts and out puts for quality skills development. In this model, students focus on practical learning first before proceeding to quantitative and communication learning which equips them with generic knowledge that enabled graduates to thrive in the job market. The model provides a step by step basis for principals and other stakeholders to implement and supervise learning, enhance system thinking and decision making in process of skills development. In this model, students focus on practical learning first before undertaking an industrial internship program. Subsequently the students will be required to enroll for quantitative, communication and leadership courses in order to develop generic skills necessary for

thriving in the industry. The model is suitable for the second and third world economies in which Kenya is part.

Figure 5.1

Suggested Conceptual Framework for Addressing Skills Gap Issues in Kenya



5.3.2 Contribution to policy

The study has made contribution to technical education policy especially in regard to academic admission qualifications and lecturer employment. In this regard, the open admission policy to TTIs was found inadequate in addressing the issue of skills gap. The study findings have contributed the conditions under which the policies can be reviewed to facilitate eradication of issues of skills gap in Kenya.

5.3.3 Contribution to knowledge

This study has made contribution knowledge that can be used to verify in institutional factors influence skills development. Previous studies had established that technical education suffered low opinion as it was preserved for low academic achievers. This study's findings can be used to address such issues and issues in regard to admission criteria, pedagogical sciences, instructional equipment and leadership.

5.3.4 Contribution to instructional leadership

Literature review suggested application of a distributed leadership style, transformational, Pragmatic and Center-Focused Development Management leadership styles as the most ideal in skills development. The study findings provide technical institution leaders researched ideas suitable for tackling issues facing the institutions in relation to skills learning instead of relying on their personal their thinking and creativity.

5.3.5 Contribution to literature

The intention of the study was to bring to the existing literature evidence based ideas on the influence of institutional factors on student skills development. The study thus contributed to the literature by examining the influence the independent variables of academic admission qualifications, instructional methods and instructional equipment had on students' skills development while considering the effect the intervening variable if instructional leadership styles. The study confirmed that institutional factors influence skills development and that the intervening variable has effect to skills development with regard to academic admission qualifications and not instructional methods and equipment which is a fallacy. The study thus diagnosed several issues facing skills learning in technical institutions and proposed systemic ways of addressing the issues in order to end issues of skills gap. To my knowledge, no previous study has ever addressed the issue of skills gap to this level.

5.3.6 Credibility of the study

The study conducted is credible and its credibility can be demonstrated in various ways. Several related literatures to the study were studied and out of which, with the research topic was developed. Subsequently, a robust assessment of various theories and study in relation to the topic was conducted obtain the two suitable theories which formed a solid foundation. Inductive approach with scientific and theoretical background increased internal validity of the study. Multiple tools of data collection, varied study populations groups and the application of a convergence parallel mixed research design ensured the depth and breadth of this study. Data collection involve risks. In regard to this to obtain personal professional record that were required for this study involved a lot of humility,

befitting language and tact. Nevertheless, data was successfully collected, analyzed and discussed by the researcher herself. This ensured production of original, valid, verifiable, credible results and thus ownership of the research. Nevertheless, data collection methods, data analysis and triangulation of findings with the literature reviewed enabled validation of the findings.

5.3.7 Conceding the study limitations

A triangulation of the study findings with the literature reviewed showed that the study undertaken was consistent with studies conducted previously. In this regard, the study concluded that there were minimal biases on the questionnaires administered to student and lecturers. Moreover, the agreement of the study findings with those of the literature reviewed justifies the effectiveness of the online data collection tool used as an alternative to the print means which was a solution to the Covid 19 pandemic limitation. Nevertheless, non-English literature required for the study, had minimal effect of the study as adequate English language journal publications were available for the study.

5.4 Conclusion

The institutional factors studied are decisive factors in skills development and have impact on student skills development in public TTIs in Kenya. For this regard, several conclusions were drawn from the study findings. They include and not limited to the following:

5.4.1 Conclusion based on the influence of academic admission qualifications and skills development

Academic admission qualifications at entry to TTIs play a critical role in skills development and has the greatest impact in student skills development in public TTIs in Kenya. Failure and referrals are indicators of low quality skills development a fact that should not be glossed over in policy directives for technical institutions. The TTIs therefore should not be institutions for academic failures thus key education reforms ought to be informed by sound and scientific research and not political reward systems or campaign strategy.

5.4.2 Conclusion on the influence of instructional methods on student skills development

Although the perception of lecturers in the study with regard to instructional methods is skewed, instructional methods cannot be disregarded in the process of skills development. In regard to diversity of lecturer qualifications where some have superfluous qualifications that are not relevant to TTI teaching whereas others have low qualifications that cannot

adequately address issues of skills gap, the solution could be the standardization of the qualifications by relevant authorities.

5.4.3 Conclusion on the influence of instructional equipment on student skills development

Instructional equipment influence acquisition of skills in TTIs despite lack of clear guideline and policies in regard to access of the equipment by students both in technical institutions and places of attachment. In regard to this, student grievances over deficiencies in the training have remained unsolved. Therefore, standard guidelines governing instructional processes in all TTIs in Kenya need to be provided.

5.4.4 Conclusion on the influence of instructional leadership styles and skills development

Educational psychology studies in which instructional leadership styles is embodied was found lacking in the instructions. The role principals play in ensuring the right leadership style is applied in the process of skills development is important. Nevertheless, instructional leadership styles influence skills development despite the rigid curriculum that provides minimal opportunities for instructional leadership creativity. Therefore, instructional leadership needs to be supervised and audited by relevant authorities if quality skills are to be produced.

5.5 Recommendations for practice

In quantitative and qualitative analysis of data through thematic analysis three categories of recommendations emerged based on the objectives of the study. They included curriculum, policy and leadership. Therefore, recommendations converge on a tri pattern based on the objectives studied.

5.5.1 Recommendations in regard to the influence of academic admission qualifications and skills development

There is low enrolment for technical courses at diploma level and the coursework seems to be a challenge to majority of students. Therefore, there is a need of academic admission qualifications being at par with other middle level colleges as well as universities.

Admission criteria of students by the Kenya Universities and Colleges Central Placement Sector (KUCCPS) was established a challenge to the technical institutions. For this concern, KUCCPS admitted students with challenges in science subjects and mathematics to courses that required high grades than they scored at KCSE. Therefore, there is a need of involving lecturers in the student selection process for by KUCCPS will be important in addressing issues of skills gap.

5.5.2 Recommendation in regard to the influence of instructional methods on student skills development

Technical Training Institutes were found very theoretical and hands-on courses unavailable in 5(62.5%) of Public TTIs and especially Clothing Technology course. Business courses were dominant. Therefore, Technical Institutions should offer specialized courses in technical domains and should not be allowed to replicate courses offered by universities.

There is need for standardization of lecturer qualification as others had superfluous qualifications and some low.

Life skills subject is taught in TTIs but not examined yet it is a very important subject in fostering work place communication and relationship skills. Therefore, its importance in skills development needs to be reviewed.

Lecturers need to be well trained in pedagogical sciences such as sociology of education and training, philosophy of education, psychology of education and administration. This will enable the lecturers bridge the existing gaps in instructional methods.

Clothing Technology studies need to be conducted in a well-equipped institution attached to a textile industry.

Academic and students' welfare deans need to address student problems as they arise and rectify them at the earliest time possible so as to nip in the bud any conflict that might emerge because of their grievances.

There is need to regularly update lecturers' instructional skills in relation to industrial and current needs through in-service training programs.

The government needs to invest in research by allowing lecturers to undertake research in their various areas of instruction order to end issues of skills gap.

5.5.3 Recommendation is regard to the influence of instructional equipment and skills development

The decision making theory by Herbert Simon opined that where bounded rationality failed in addressing organizational issues, satisficing principal should be applied. In this regard, the government needs to harness instructional equipment in few TTI than spreading them in many TTIs with few students to reduce wastage.

Technical training institutions as well as industries need to conform to the current technology to reduce wastage of resources such as students' time and government finances.

Findings reveled that students had challenges with industrial internship programs such as unavailability of internship places and harassment. Therefore, the purpose of industrial internship program needs to be reviewed by both industries and the technical institutions.

In regard to issues of inadequate instructional equipment raised, un updated inventories and vandalized equipment, relevant authorities need to audit technical institutions regularly.

5.3.4. Recommendations on the influence of instructional leadership styles on student skills development

A study that cited a PHD holder in the management of a technical institution provided adequate ways of instructional management in technical institutions. Therefore, a consideration of PhD qualification for technical institution management could be important in addressing issues of skills gap.

Quantitative and communication knowledge and skills were found lacking among technical education students though well developed in the curriculum. Therefore, the study recommends a separation of practical instruction from theory to enable students concentrate on practical leaning before enrolling for theory that included quantitative and qualitative skills to enable them thrive in the job market.

5.5.4. Recommendation on the influence of institutional factors on student skills development

Technical education was initially a missionary activity in Kenya as most TTIs were formally vocational institutions of either catholic or protestant churches. Now that the sector is under the management of the national government need to find out how the institutions were run by the founders of these institutions could be important in tackling the institutional challenges faced in skills development in Kenya.

5.6 Recommendations for Further Research

The issue of skills gap was established as a global problem specially in developing nations. To address this issues, other studies could be best placed to provide reached evidence suitable in tackling issues of skills gap.

5.6.1 Recommendations in regard to the influence of academic admission qualifications on student skills development

- i. A study on whether it is necessary to abolish the open admission policy for TTIs in Kenya be carried out
- ii. An investigation into the cause of multiple referrals and fails at KNEC technical examinations at diploma level
- iii. The cause of low enrolment of student at diploma level in the Clothing Technology and Building and Construction Technology Courses in Kenya be established

5.6.2 Recommendations in regard to the influence of instructional methods on student skills development

- i. The influence of TTI lecturers' qualifications on student skills development
- ii. The role of High Education Loan Board on student skills development in Kenya
- iii. The role of universities in the training of technical education lecturers
- iv. The role of industry on student skills development in Kenya

- v. The effectiveness of cost sharing policy on student skills development in public TTIs in Kenya
- vi. Whether distance learning is effective in skills development in Kenya
- vii. The causes of inadequate coursework syllabus coverage in public TTIs in Kenya

5.6.3 Recommendations in regard to the influence of instructional equipment on student skills development

- i. A study on the effect of the disparity that exist between industries and technical training institutions
- ii. A study on industries and technical training institutions collaboration in offering internships to students

5.6.4 Recommendations in regard to the influence of instructional leadership styles and skills development

- i. The role of pedagogical colleges and universities in preparing skill lecturers for technical training institutions in Kenya
- ii. Factors affecting effective implementation of Competence Based Curriculum in public technical training institutions in Kenya
- iii. The effect of instructional leadership styles on student skills development requires further research
- iv. The role of TVET stakeholders such as sector and national skills development authority in developing leaders for technical education

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Appendix I: Letter of Introduction

Kenya Methodist University

P O Box 45240, 00100

Phone no. 0793875051

Nairobi

TO ALL PARTICIPANTS

RE: EDUCATIONAL DATA COLLECTION

I am a PhD student in Educational Leadership and Management Course at the Kenya Methodist University. I am carrying out a research on influence of institutional factors on student skills development in public technical training institutions in Kenya. I will appreciate if you may kindly take few minutes to fill the attached questionnaire which may take you about ten minutes. The information on the questionnaire will only be used for the purpose of this research. This research has received authorization from the Kenya Methodist University and the National Commission for Science, Technology and Innovation (NACOSTI). Kindly contact these authorities on telephone number 064-3131279 and 020 26733550 respectively in case of any queries. Your identity will remain anonymous and therefore do not write your name anywhere in the questionnaire. If you agree or do not agree to participate in this research, please put a tick [] in the boxes provided below.

I agree [] I do not agree []

Thank you

Yours faithfully,

Gladys Kemuma Nyangweso

Appendix II: Lecturers' Questionnaire

The aim of this questionnaire is to gather information on the influence of institutional factors on student skills development in public technical training institutes in Kenya. Kindly provide your responses without reservations as this is only for academic purposes. Where applicable put a tick [] in the box provided or fill in the blanks. Your identity will be treated with utmost confidentiality. Do not write your name anywhere in this questionnaire.

I agree [] Not agree []

Section A: Demographic Information

1. What is your gender? Male [] Female []
2. How many years including the current one have you been teaching in this TTI? 1-5 years [] 6-10 [] 11-15 [] 16-20 [] 21 & above
3. Please state your highest level of education attained so far
Diploma [] Bachelor's Degree [] Postgraduate Diploma []
Masters Degree [] PhD []
4. Which course do you teach? Cloth Technology [] Building and Construction Technology []

Section B: Influence of Academic Admission Qualifications of Students in Skills

Development

- a) Based on to the academic admission grades of your students, what is your opinion in regard to the following statements? In which 1= strongly agree 2= Agree 3= Disagree 4= strongly Disagree

Description	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
The admission grades are relevant to the course applied for	[]	[]	[]	[]	[]
The subject content is relevant to the aptitude of the students	[]	[]	[]	[]	[]
Students perform well in mathematics and sciences for technical education	[]	[]	[]	[]	[]
No student gets a referral at the national examinations	[]	[]	[]	[]	[]
All students reach the required level of skills development	[]	[]	[]	[]	[]
Admission grades influence skills development	[]	[]	[]	[]	[]

- b) What is the academic admission rates to this TTI?

Very high [] High [] moderate [] Low [] very low []

- c) To what extent are students able perform he following technical skills?

Statements	Very low	Low	Moderate	High	Very high
Assembling Machines	[]	[]	[]	[]	[]
Operating Machines	[]	[]	[]	[]	[]
Maintaining machines	[]	[]	[]	[]	[]
Practical lesson report Writing	[]	[]	[]	[]	[]

d) The what extent are the students able to perform in the following quantitative skills?

Statements	Very low	Low	Moderate	High	Very high
Keep inventory	[]	[]	[]	[]	[]
Develop Budgets	[]	[]	[]	[]	[]
Write financial reports	[]	[]	[]	[]	[]
Prepared purchase lists	[]	[]	[]	[]	[]

e) Kindly explain the effectiveness of Academic Admission requirement

f) What do you think can be done to mitigate challenges facing skill development in Kenya in regard to academic admission requirements?

Section C: Influence of instructional equipment on skills development

- a) Based on the courses you teach, what is the ratio of the instructional equipment with the students? 1:1 [] 1:2 [] 1:3 [] 1:4 [] 1:5 [] More than 1: 5 []
- b) In your own experience, what is the extent to which the training equipment are similar to the industry? Very high [] High [] Moderate [] Low [] Very Low []
- c) What is the frequency of the practical lessons? [] Weekly [] Fortrightly [] Monthly [] Quarterly [] Not at all
- d) Is the time allocated adequate for practical skills learning? Yes [] No []
- e) State the frequency in which the equipment are serviced. Weekly [] Monthly [] Quarterly [] Annually [] Not at all []
- f) How often are the damaged equipment replaced? Weekly [] Monthly [] Quarterly [] Annually [] Not at all []
- g) To what extent do the instructional equipment influence skills development? Very high [] High [] Moderate [] Low [] very low []

Section D: Influence of instructional methods in students' skills development

- a) In your own opinions is the instructional language is a challenge to students?
- b) Which instructional methods are used in the TTIs? Lecturer [] Demonstration [] Project work [] Group discussion [] Experiments [] Field trip [] Context based learning [] Problem based learning [] simulation [] any other []
- c) To what extent do interactional methods influence skills development? Very high [] high [] moderate [] low [] very low []
- d) What are the reasons for the instructional method choice?
- e) What challenges are you facing in regard to instructional methods?
- f) What do you suggest can be done to mitigate the challenges?

Section E: Intervening variable

- a) Which leadership style is used in this institution? Transformational [] Transactional [] Transformational & transactional [] Laissez-faire [] Servant ship [] Any other?
Explain your answer in (a) above _____
- b) What is the frequency of curriculum review in this TTI? Annually [] quarterly [] monthly [] weekly [] not at all []
- c) What is the frequency of departmental meetings the TTI? Annually [] quarterly [] monthly [] weekly [] not at all []
- d) To what extent is the leadership style effective in skills development? Very high [] High [] Moderate [] Low [] Very low []

- e) Please explain your response in b above _____
- f) How often are departmental meeting held? Weekly Fortnightly Monthly Quarterly Annually Not at all
- g) How often is the curriculum reviewed and merged with the emerging issues? Fortnightly Monthly Quarterly Annually Not at all
- h) To what extent is the leadership style effective in technical skills development in this institution? Very high High Moderate Low

Section F: Dependent variable

- a) Comment of skills development in this TTI
- b) To what extent are your students able to perform the following? Put a tick in the boxes provided where Very high =1, High=2, Moderate=3, Low=4, 5= Very low

No.	Task	Very high	High	Moderate	Low
1	Interpret task manuals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Assemble training machines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Keep equipment inventory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Business plans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- c) To what extent are your students able to perform the following administrative tasks? Put a tick in the provided boxes in the table below.

Statements	Very low	Low	Moderate	High	Very high
Writing minutes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Writing reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Writing business letters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Developing work plans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank you for your participation

Appendix III: Students' Questionnaire

The aim of this questionnaire is to gather information on Influence of institutional factors on student skills development in Public Technical Training Institutes in Kenya. Kindly provide your responses without reservations as this is only for academic purposes. Where applicable put a tick in the box [] provided or fill in the blanks. Your identity will be treated with utmost confidentiality. Do not write your name anywhere in this questionnaire.

Section A: Demographic Information

- a) What is your gender? a) Male [] b) [] Female
- b) What is your age? 17 [] 18- 23 [] 24-30years [] 31- 40years [] 41- 50years [] 50 and above []
- c) Which course are you enrolled in?
Cloth technology [] Building and Construction Technology []
- d) Which admission grade did you obtain? C+ and above [] C Plain [] C minus [] D+ [] D [] D- [] E [] KCPE Certificate [] Any other specify_____

Section B: Influence of academic admission requirement on student skills development

- e) Which grade did you attain at KCSE? C+ and above [] C Plain [] C minus [] D+ [] D [] D- [] E [] KCPE Certificate [] Any other specify_____

f) To what extent are the students able to perform in the following communication skill tasks?

Statements	Very low	Low	Moderate	High	Very high
Writing minutes	[]	[]	[]	[]	[]
Writing reports	[]	[]	[]	[]	[]
Writing business letters	[]	[]	[]	[]	[]
Developing work plans	[]	[]	[]	[]	[]

g) Do you have learning challenges in regard to the course you are enrolled in? If yes, kindly explain

h) What do you think can be done to mitigate learning challenges identified?

Section C: Influence of the Instructional equipment on student skills development

- a) What is the ratio of the training equipment in your institute of training? 1:1 [] 1:2 [] 1:3 [] 1:4 [] 1:5 and above []
- b) To what extent were the training equipment related to your industrial attachment's equipment? Very High [] High [] 3 Moderate [] 4 Low [] Very low []
- c) What is the frequency of practical lessons offered? [] Weekly [] Fortnightly [] Monthly [] Annually [] Not at all
- d) Where did you carry out attachment experience? _____
- e) Were you satisfied by your attachment experience? Yes [] No []. If no, please explain your answer _____

Section D: Influence of teaching methods in student skills development

- a). Were you satisfied by the way you are taught? Yes [] No []
- b). To what extent are your instructors competent in instruction? Very high [] High [] Moderate [] Low [] Very low
- c). Explain your response in c above _____

Section E: dependent variable - quantitative, communication, technical and leadership skills

- a) To what extent are you prepared to perform the following communication skills and leadership tasks? Put a tick in the boxes provided where Very high =1, High=2, Moderate=3, Low=4, 5= Very low

No.	Description	Very high	High	Moderate	Low	Very low
1	Writing meeting minutes	[]	[]	[]	[]	[]
2	Writing reports	[]	[]	[]	[]	[]
3	Writing business letters	[]	[]	[]	[]	[]
5	Preparing work plans	[]	[]	[]	[]	[]

- b) To what extent are you prepared to perform the following quantitative skills? Put a tick in the boxes provided where Very high =1, High=2, Moderate=3, Low=4, 5= Very low

No.	Description	Very high	High	Moderate	Low	Very low
1	Keep inventory	[]	[]	[]	[]	[]
2	Develop budgets	[]	[]	[]	[]	[]
3	Write financial report	[]	[]	[]	[]	[]
4	Write minutes	[]	[]	[]	[]	[]

- c) To what extent are you able to perform the following? Put a tick in the boxes provided where Very high =1, High=2, Moderate=3, Low=4, 5= Very low

No.	Task	Very high	High	Moderate	Low
1	Interpret task manuals	[]	[]	[]	[]
2	Assemble and reassemble training machines	[]	[]	[]	[]

- | | | | | | |
|---|--------------------------------|-----|-----|-----|-----|
| 3 | Maintain the machines | [] | [] | [] | [] |
| 5 | Write practical lesson reports | [] | [] | [] | [] |

Section F: Influence of leadership skills on skills development

How often are lecturer students meeting conducted in regard to new industrial knowledge discussion? Annually, [] quarterly,[] monthly[], weekly [] not at all []

Thank you for your participation

Appendix IV: TTI Principals' Interview Schedule

The aim of this interview schedule is to gather information on the influence of institutional factors on student skills development in public technical training institutes in Kenya. Kindly provide your responses without reservations as this is only for academic purposes. Your identity will be treated with utmost confidentiality.

Section A: Demographic information

- a) What is your gender? Male [] Female []
- b) How many years including the current one have you been a manager of this institution? Less than 1 year [] 1-2 years [] 3-5 years [] 6-10 years [] Above 10 years []
- c) Which is your highest level of educational attained so far?
 - a. Diploma [] Bachelor's Degree []
 - b. Postgraduate Diploma [] Masters [] PhD [] Untrained []
- d) Kindly specify the title (s) of qualification (s)
- e) How many technical education lecturers are there in this institution?

Section B: Influence of academic admission qualification of students in skills development

- a) Comment of the effectiveness of academic admission qualifications to TTIs
- b) If there are challenges in regard to academic admission qualification what to you think can be done to mitigate the challenges

Section C: Influence of instructional equipment on student skills development

- a) Comment on the training equipment in this institution
- b) How often are the equipment serviced?
- c) How often are the training equipment audited?
- d) What are the challenges the institution is facing in regard to skills development and training equipment?
- e) What do you suggest should be done to mitigate the challenges?

Section D: Influence of instructional methods in student' skills development

- a) The classical education experts recommend that every educator need to be well grounded in educational psychology. In regard to instructional methodology, how well are your teachers prepared to teach the subject allocated?
- b) What do you suggest can be done to respond to the needs of the industry in regard to skills development?

Section E: Intervening variable

- a) What is your preferred leadership style in executing duties?
- b) How does the style influence skills development in this TTI?

Section F: Dependent variable

- a) Comment of skills development in the TTI
- b) What is your opinion towards the skills gap that exist between TTIs and industry?
- c) Comment on the issue outbuilding collapsing in Kenya and taking lives and import of second-hand textile products
- d) What do you suggest can be done to mitigate issues facing skills development in TTIs?

Thank you for your participation

Appendix V: Questionnaires' Pilot Test Results

Lecturers' first pilot test results

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
.799	.799	6

very reliable.

Inter-Item Correlation Matrix

	subject_content	Student_performance	No_referral	skills_level	Admission_grades_development	admission_grade_course_applied
Subject_content	1.000	.362	.165	.400	.640	.178
Stdperformance	0.362	1.000	.784	.625	.567	-.083
Referral	0.165	.784	1.000	.580	.497	.018
Skills_level	0.400	.625	.580	1.000	.625	.354
Admission_grades_development	0.640	.567	.497	.625	1.000	.278
Admission_grade_course_applied	.178	-.083	.018	.354	.278	1.000

Analysis of Variance (ANOVA)

		Sum of Squares	Df	Mean Square	F	Sig
Between People		13.051	12	1.088		
Within People	Between Items	10.731	5	2.146	9.828	.000
	Residual	13.103	60	.218		
	Total	23.833	65	.367		
Total		36.885	77	.479		

Grand Mean = 2.96

Correlation Analysis

		admission grade	Subject content	Std performance	referral	Skills level	Admission grades
Admission grade	Pearson Correlation	1	.178	-.083	.018	.354	.278
	Sig. (2-tailed)		.561	.787	.952	.235	.358
	N	13	13	13	13	13	13
Subject content	Pearson Correlation	.178	1	.362	.165	.400	.640*
	Sig. (2-tailed)	.561		.224	.591	.176	.019
	N	13	13	13	13	13	13
Std performance	Pearson Correlation	-.083	.362	1	.784**	.625*	.567*
	Sig. (2-tailed)	.787	.224		.002	.022	.043
	N	13	13	13	13	13	13
Referral	Pearson Correlation	.018	.165	.784**	1	.580*	.497
	Sig. (2-tailed)	.952	.591	.002		.038	.084
	N	13	13	13	13	13	13
Skills_level	Pearson Correlation	.354	.400	.625*	.580*	1	.625*
	Sig. (2-tailed)	.235	.176	.022	.038		.022
	N	13	13	13	13	13	13
Admission_grades	Pearson Correlation	.278	.640*	.567*	.497	.625*	1
	Sig. (2-tailed)	.358	.019	.043	.084	.022	
	N	13	13	13	13	13	13

*. Correlation is significant at the 0.05 level (2-tailed).

** . Correlation is significant at the 0.01 level (2-tailed).

Lecturers' second pilot test results

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.892	.905	6

Inter-Item Correlation Matrix

	BBa1	BBa2	BBa3	BBa4	BBa5	BBa6
BBa1	1.000	.557	.719	.689	.959	.606
BBa2	.557	1.000	.645	.145	.645	.408
BBa3	.719	.645	1.000	.563	.833	.527
BBa4	.689	.145	.563	1.000	.563	.802
BBa5	.959	.645	.833	.563	1.000	.527
BBa6	.606	.408	.527	.802	.527	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
BBa1	19.20	9.289	.886	.990	.855
BBa2	19.10	10.100	.542	.778	.897
BBa3	19.30	8.233	.806	.949	.857
BBa4	20.70	8.233	.633	.947	.897
BBa5	19.30	8.011	.865	.991	.846
BBa6	18.90	10.100	.704	.792	.880

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between People	19.017	9	2.113		
Within People					
Between Items	20.883	5	4.177	18.277	.000
Residual	10.283	45	.229		
Total	31.167	50	.623		

Total	50.183	59	.851		
-------	--------	----	------	--	--

Grand Mean = 3.88

Student Questionnaire Pilot Test One Results

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.848	.861	6

Inter-Item Correlation Matrix

	Boperate_machines	Bmanuals_machines	Bmaintain_inventory	Bmanage_production	Bprepare_plans	Bknowledge_innovation
Boperate_machines	1.000	.632	.000	-.263	-.171	.250
Bmanuals_machines	.632	1.000	.775	.581	.542	.632
Bmaintain_inventory	.000	.775	1.000	.965	.840	.612
Bmanage_production	-.263	.581	.965	1.000	.856	.525
Bprepare_plans	-.171	.542	.840	.856	1.000	.857
Bknowledge_innovation	.250	.632	.612	.525	.857	1.000

ANOVA

		Sum of Squares	Df	Mean Square	F	Sig
Between	People	7.472	5	1.494		
Within	Between Items	1.139	5	.228	1.000	.438
People	Residual	5.694	25	.228		
	Total	6.833	30	.228		
Total		14.306	35	.409		

Grand Mean = 3.14

Correlations

		Operate Machin es	Manual machin es	maintai n inventor y	Manage producti on	Prepa re Plans	knowled ge innovati on
Operate_machines	Pearson Correlati on	1	.632	.000	-.263	-.171	.250
	Sig. (2- tailed)		.178	1.000	.615	.745	.633
	N	6	6	6	6	6	6
Manuals_machines	Pearson Correlati on	.632	1	.775	.581	.542	.632
	Sig. (2- tailed)	.178		.070	.226	.266	.178
	N	6	6	6	6	6	6
Maintain_inventory	Pearson Correlati on	.000	.775	1	.965**	.840*	.612
	Sig. (2- tailed)	1.000	.070		.002	.036	.196
	N	6	6	6	6	6	6
Manage_production	Pearson Correlati on	-.263	.581	.965**	1	.856*	.525
	Sig. (2- tailed)	.615	.226	.002		.030	.285
	N	6	6	6	6	6	6
Prepare_plans	Pearson Correlati on	-.171	.542	.840*	.856*	1	.857*
	Sig. (2- tailed)	.745	.266	.036	.030		.029
	N	6	6	6	6	6	6
Knowledge_innova tion	Pearson Correlati on	.250	.632	.612	.525	.857*	1
	Sig. (2- tailed)	.633	.178	.196	.285	.029	
	N	6	6	6	6	6	6

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Students Second Pilot study result

Reliability Statistics

Cronbach's Alpha	N of Items
.853	6

Item Statistics

	Mean	Std. Deviation	N
Maintain equipment inventory	3.80	.632	10
Manage service production premises	3.70	.949	10
Prepare work plans	3.90	.738	10
Bring new knowledge	4.10	.316	10
Preparing work plans	3.80	1.135	10
Making decisions	3.90	.316	10

Inter-Item Correlation Matrix

	Maintain equipment inventory	Manage service production premises	Prepare work plans	Bring new knowledge	Preparing work plans	Making decisions
Maintain equipment inventory	1.000	1.000	.905	.111	.867	-.111
Manage service production premises	1.000	1.000	.905	.111	.867	-.111

Prepare work plans	.905	.905	1.000	.524	.769	-.048
Bring new knowledge	.111	.111	.524	1.000	.062	.111
Preparing work plans	.867	.867	.769	.062	1.000	.248
Making decisions	-.111	-.111	-.048	.111	.248	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Maintain equipment inventory	19.40	7.822	.930	.	.781
Manage service production premises	19.50	6.278	.912	.	.765
Prepare work plans	19.30	7.344	.906	.	.775
Bring new knowledge	19.10	10.989	.201	.	.882
Preparing work plans	19.40	5.600	.860	.	.794
Making decisions	19.30	11.344	.031	.	.894

ANOVA

	Sum of Squares	df	Mean Square	F	Sig
Between People	17.267	9	1.919		
Within Items	.933	5	.187	.660	.656
People Residual	12.733	45	.283		
Total	13.667	50	.273		
Total	30.933	59	.524		

Grand Mean = 3.87

APPEDIX VI: Document Analysis Guides

Document 1: KCSE & KNEC tech results analysis guide: The aim of this document is to gather information on the influence of institutional factors on student skills development in public technical training institutes in Kenya. Data was collected by the researcher and by the help of various registrars in the various TTIs studied.

Kenya Certificate of Secondary School Examination (KCSE) entry grades and KNEC Technical Kenya National Examination Council (KNEC) Results for third year students

TTI no. 1

Student	Course	KCSE grade	KNEC Tech final grade	Subject referred	Gender	Remarks
Student A	Building technology	C+	Credit	-	Male	A high general KCSE grade is not always an indicator of adequate skills development
Student B	Building technology	B+	Distinction	-	Male	The higher the KCSE grade the higher the level of skills developed

Student C	Building Technology	C	Refer	303 & 304: Math and Survey & Estimation and costing	Male	Technical education require high grades and Math and Science subjects
Student D	Building technology	C-	Refer	303 & 304: Math and Survey & Estimation and costing	Male	”
Student E	Building technology	C	credit	-	Female	Gender does not influence skills development
Student F	Building technology	D+	Pass	-	Male	“
Student G	Cloth technology	C	Credit	-	Female	“
Student H	Cloth technology	C-	refer	Fashion Marketing	Female	“
Student I	Cloth technology	C-	Credit	-	Female	“

TTI no. 2

Student	Course	KCSE grade	KNEC Tech final grade	Subject referred/failed	Gender	Remarks (refer to TTI no.1 Table)
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Student A	Building technology	C	Pass	-	Male
Student B	Building technology	C-	Pass	-	Male
Student C	Building Technology	C	credit	-	Female
Student D	Building technology	C-	Referred	303 & 304: Math and Survey & Estimation and costing	Male
Student E	Building technology	C	referred	303 & 304: Math and Survey & Estimation and costing	Male
Student F	Building technology	D+	Pass	-	Male
Student G	Building technology	C	Fail	301,302,&304	Male
Student H	Building technology	C-	Referred	301: Mathematics & Survey	Female
Student I	Building technology	C-	Referred	301: Mathematics & Survey	Female

TTI no. 3

Student	Course	KCSE grade	KNEC Tech	Subject referred/failed	Gender	Remarks
---------	--------	------------	-----------	-------------------------	--------	---------

			final grade		(refer to TTI no.1 Table)
Student A	Building technology	C-	Referred	Mathematics and survey & Structures and designs	Male
Student B	Building technology	C-	pass	-	Male
Student C	Building Technology	C	Pass	-	Male
Student D	Building technology	C-	Referred	Estimation and costing	Male
Student E	Building technology	C	Credit	-	Male
Student F	Building technology	D+	Pass		Male
Student G	Building technology	C	Fail	Estimation and costing & Mathematics and survey	Male
Student H	Building technology	C-	Pass	-	Female
Student I	Building technology	C-	Pass	-	Female

TTI no. 4 (4 students only)

Student	Course	KCSE grade	KNEC Tech final grade	Subject referred/failed	Gender	Remarks Remarks (refer to TTI no.1 Table)
Student A	Building technology	C-	Referred	301: Mathematics & Survey	Male	
Student B	Building technology	C	Pass	-	Male	
Student C	Building Technology	C -	Fail	Mathematics and survey & Building construction and computer aided designs	Male	
Student D	Building technology	C-	Pass	None	Male	

TTI no. 5

Student	Course	KCSE grade	KNEC Tech final grade	Subject referred/Failed	Gender	Remarks Remarks (refer to TTI no.1 Table)
Student A	Building technology	C	Credit	None	Male	

Student B	Building technology	C-	pass	-	Female
Student C	Building Technology	C	Pass	None	Female
Student D	Building technology	C-	Referred	301: Mathematics & Survey	Male
Student E	Building technology	C	credit	-	Female
Student F	Building technology	D+	Pass	-	Male
Student G	Clothing technology	C-	credit	-	Male
Student H	Clothing technology	C-	Credit	None	Female
Student I	Clothing technology	C-	Credit	None	Female

TTI no. 7

Student	Course	KCSE grade	KNEC Tech final grade	Subject referred/Failed	Gender	Remarks Remarks (refer to TTI no.1 Table)
Student A	Building technology	No record	Credit	None	Male	
Student B	Building technology	No record	Referred	301: Mathematics & Survey	Female	

Student C	Building Technology	No record	Pass	None	Female
Student D	Building technology	No record	Referred credit	Mathematics & Survey	Male
Student E	Building technology	No record			Female
Student F	Building technology	No record	Pass	-	Male
Student G	Cloth technology	No record	Referred	Structures and designs	Male
Student H	Cloth technology	No record	Credit	None	Female
Student I	Cloth technology	No record	Credit	None	Female

TTI no. 8

Student	Course	KCSE grade	KNEC Tech final grade	Subject referred/failed	Gender	Remarks (refer to TTI no.1 Table)
Student A	Building technology	C	Credit	None	Male	
Student B	Building technology	C-	Referred	Structures and designs	Female	
Student C	Building Technology	C	Pass	None	Female	
Student D	Building technology	C-	Referred	Mathematics & Survey	Male	
Student E	Building technology	C+	credit		Female	
Student F	Building technology	D+	Pass	-	Male	
Student G	Cloth technology	C-	Referred	Mathematics & Survey	Male	
Student H	Cloth technology	C-	Credit	None	Female	
Student I	Cloth technology	D+	referred	Industrial organization management and quality control	Female	

Observation Guide

Domain	Observation results	Remarks
Workshops Laboratories Classrooms	Availability of equipment depended on the unity taught Equipment maintained and some vandalized Inventories not updated Equipment adequate for diploma students as the enrolment rate was low in every TTIs	Students equipment ratio was in favour of diploma students only

Appendix VII: KNEC Grading System for Secondary and Primary Schools

Numeric Aggregate	Grade	Points
81-84	A	12
74-80	A-	11
67-73	B+	10
60-66	B	9
53-59	B-	8
46-52	C+	7
39-45	C	6
32-38	C-	5
25-31	D+	4
18-24	D	3
11-17	D-	2
7-10	E	1

Appendix VIII: KNEC Grading System for TTIs

Raw Scores	Grades	Class
80-100	1	Distinction one
75-79	2	Distinction two
70-74	3	Credit
60-69	4	Credit
50-59	5	Pass
40-49	6	Pass
0-39	7	Fail

Appendix IX: Contacts of the Pilot and Sampled TTIs for the study

Technical institute	Purpose of selection	Manager/deputy contacts	Location/county
1. Sikri	Pilot study	0722109462	Homabay
2. Keroka	Pilot study	0726588558	Nyamira
3. Wote	Actual study	0728658649	Makueni
4. Machakos	Actual study	0733844614	Machakos
5. Karen	Actual study	0721118356	Nairobi
6. Kinyanjui	Actual study	0720266591	Nairobi
7. Sotik	Actual study	0792518945	Bomet
8. Buret	Actual study	0721656877	Kericho
9. Ekerubo Gietai	Actual study	0723832618	Nyamira
10. Riftvalley	Actual study	0704244244	Uasin Gishu
11. Nairobi	Actual study	0721233394	Nairobi
12. Mawego	Actual study	0734156640	Homabay
13. Maasai Mara	Actual study	0799213300	Narok

Interpretation key: highlighted institutes were sampled but did not participate in the actual study

Appendix X: Map of Kenya showing the 47 Counties on which the sampled TTIs are based



Appendix XI: Approved Technical Institutions in Kenya by HELB, KNEC & TVETA on which the Study Sample was drawn



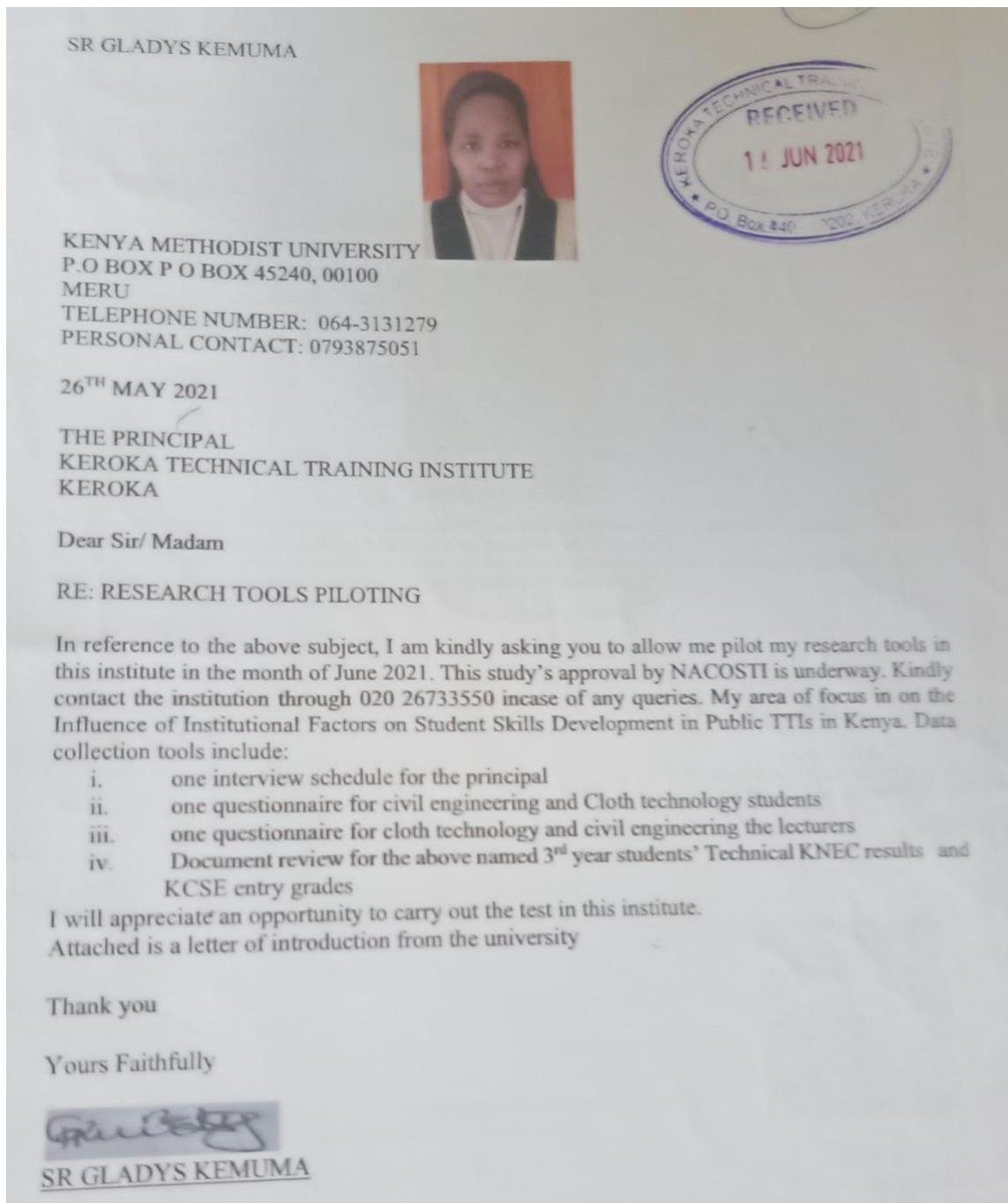
APPROVED TVET INSTITUTIONS CURRENTLY FUNDED BY HELB AS AT AUGUST 2018

	Approved TVET Institutions	Codes
	Universities	
1	Co-operative University of Kenya	CUCK
2	Dedan Kimathi University of Technology	KMU
3	Meru University of Science and Technology	MEU
4	Technical University of Kenya	KPU
5	Technical University of Mombasa	MPU
6	Murang'a University of Technology	MURCTEC
	Polytechnics	
7	Eldoret National Polytechnic	ELDPOL
8	Kabete National Polytechnic	KABTTI
9	Kenya Coast National Polytechnic	MOMTTI
10	Kisii National Polytechnic	GUITEC
11	Kisumu National Polytechnic	KISPOL
12	Kitale National Polytechnic	KITTTI
13	Meru National Polytechnic	MERTI
14	North Eastern Province National Polytechnic (NEP)	NEPTTI
15	Nyeri National Polytechnic	NYERTTI
16	Sigalagala National Polytechnic	SIGTTI
	Technical Institutes	
17	Aldai Technical Training Institute	ATTI
18	Baringo Technical College	BARTC
19	Bondo Technical Training Institute	BONDOTTI
20	Bumbe Technical Training Institute	BUMTTI
21	Bureti Technical Training Institute	BURET

22	Bushiangala Technical Training Institute	BUSTTI
23	Chuka Technical and Vocational College	CHUTVC
24	EkeruboGietai Technical Training Institute	EKERUTTI
25	Emining Technical Training Institute	EMTTI
26	Endebess Technical Training Institute	ENDETTI
27	Gitwebe Technical Training Institute	GITTTI
28	Godoma Technical Training Institute	GODTTI
29	Jeremiah Nyaga Technical Training Institute	RWITEC
30	Kaiboi Technical Training Institute	KAITTI
31	Karen Technical Training Institute	KARENTTI
32	Karumo Technical Training Institute	KARUMOTTI
33	Katine Technical Training Institute	KATINETTI
34	Kenya Technical Teachers College	KTTC
35	Keroka Technical Training Institute	KERTTI
36	Kiirua Technical Training Institute	KIITTI
37	Kisiwa Technical Training Institute	KISTTI
38	Konoin Technical Training Institute	KONTTI
39	Koshin Technical Training Institute	KOSHINTTI
40	Maasai Mara Technical and Vocational College	MASMATTI
41	Machakos Technical Training Institute for the Blind	MACTTIB
42	Masai Technical Training Institute	MASTTI
43	Mathenge Technical Training Institute	MATTTI
44	Matili Technical Training Institute	MATILITTI
45	Mawego Technical Training Institute	MAWTTI
46	Michuki Technical Training Institute	MICTTI
47	Mitunguu Technical Training Institute	MITTTI
48	Mukiria Technical Training Institute	MUKTTI
49	Mukurwei-ini Technical Training Institute	MUKURWE_IN I
50	Musakasa Technical Training Institute	MUSAKASATT
51	Nairobi Technical Training Institute	NAITTI
52	Naivasaha Technical and Vocational College	NTVC
53	Nkabune Technical Training Institute	NKATTI
54	OILessos Technical Training Institute	LESSOSTTI
55	P C Kinyanjui Technical Training Institute	PCKINTTI
56	Rift Valley Technical Training Institute	RVTTI
57	Shamberere Technical Training Institute	SHAMTTI

58	Siala Technical Training Institute	STTI
59	Sot Technical Training Institute	SOTTTI
60	Sotik Technical Training Institute	SOTIKTTI
61	St. Josephs Technical Institute for the Deaf-Nyangoma	SJTID
62	Thika Technical Training Institute	THITTI
63	Tseikuru Technical Training Institute	TSEIKURUTTI
64	Weru Technical and Vocational College	WTVC
65	Wote Technical Training Institute	WOTTTI
66	Ziwa Technical Training Institute	ZTTI
	Institutes of Technology	
67	Coast Institue of Technology	COIT
68	Friends College Kaimosi	FRKCY
69	Kiambu Institute of Science and Technology	KIAISTSC
70	Nyandarua Institute of Science and Technology	NYTTI
71	Ramogi Institute of Advanced Technology	RAIATEC
72	Rift Valley Institute of Science and Technology	RVIST
73	Sang'alo Institute of Science and Technology	SAISCTEC
74	Siaya Institute of Technology	SIITEC

Appendix XII: Sample pilot study authorization letter



Appendix XIII: TVETA Research Authorization Letter



TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING AUTHORITY

Utalii House, Utalii Street
P. O. BOX 35625 - 00100
NAIROBI

Tel. +254 20 2392140
Email info@tveta.go.ke
Website: www.tveta.go.ke

When replying please quote:

REF: TVETA/7/4 (58)

15th June 2021

All Directors
Directorate of University TVET Colleges

All Principals
National Polytechnics

All Principals
Public Technical and Vocational Colleges

RE: DATA COLLECTION BY SR. GLADYS KEMUMA

The above named is a PhD Student at Kenya Methodist University. She would like to collect data for her project titled "Influence of Institutional Factors on Student Skills Development in Public Technical Training Institutes in Kenya". The findings from this study is expected to provide information on ways of improving acquisition of skills by trainees in our TVET institutions.

The purpose of this letter is to request you to allow the student to collect the data for her study.

Kindly provide her the necessary assistance.

Dr. Kipkirui Langat, PhD, FIETK
DIRECTOR GENERAL/CEO



VISION

Appendix XIV: Research Permit

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 975976	Date of Issue: 11/June/2021
RESEARCH LICENSE	
	
<p>This is to Certify that Sr. Gladys Kemuna Nyangweso of Kenya Methodist University, has been licensed to conduct research in Bomet, Homabay, Kajiado, Kericho, Kiambu, Kisii, Kisumu, Machakos, Makeni, Meru, Nairobi, Narok, Nyamira, Siaya, Uasin-Gishu on the topic: Influence of Institutional Factors on Student Skills Development in Public Technical Training Institutes in Kenya for the period ending : 11/June/2022.</p>	
License No: NACOSTI/P/21/10923	
975976 Applicant Identification Number	 Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
	Verification QR Code 
<p>NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.</p>	