A COMPARISON OF TECHNICAL EDUCATION TEACHERS' COMPETENCIES: A STUDY OF MOI UNIVERSITY AND KENYA TECHNICAL TECAHERS COLLEGE GRADUATES IN TECHNICAL INSTITUTIONS IN KENYA.

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RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF EDUCATION OF THE UNIVERSITY OF NAIROBI.

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DECLARATION

DECLARATION BY THE CANDIDATE

This research project is my original work and has not been presented for a degree in any other University. No part of this research project may be reproduced without prior permission of the author and / or the University of Nairobi.

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DECLARATION BY THE SUPERVISOR

This research project has been submitted for examination with my approval as University of Nairobi Supervisor.

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DEDICATION

To my beloved wives: Jane and Roselinda; and my children Peninah, Kenneth, Emmanuel, Tony. Abigael and Flavia: for the love and kind moral support, encouragement, understanding, patience as I sat for long hours to prepare this proposal.

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W.G.C.O

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ABBREVIATIONS AND ACRONYMS

TIQET	**Totally Integrated Quality Education and Training**
TIVET	**Technical, Industrial and Vocational and Entrepreneurship Training (Kenyan version)**
TVET	**Technical, Vocational and Entrepreneurship Training (international version)**
MOHEST	**Ministry of Higher Education, Science and Technology**
KTTC	**Kenya Technical Teachers College**
MU	**Moi University**
TTC	**Technical Teacher Competencies**

EXECUTIVE SUMMARY

This research project explored the relationship between Moi University trained and KTTC trained technical teachers. The study was occasioned by the feeling among some technical teachers that graduates of Moi University prefer to teach Mathematics and Physics. However, little is known about the cause of these noted differences.

The study adopted a causal-comparative approach. Participants were selected by simple random sampling technique.

Document analysis was used to establish the curricular in the two institutions. Teacher self-assessment questionnaire was used to obtain teachers' shared perceptions of their knowledge and skills levels and exposure to training equipment/machines. Data from the principals' interview schedule was used to examine technical teacher practices, use of resources and challenges encountered in the running of TTI programs.

The results of this study indicated that whereas the two curricular were relatively similar, there was a difference in the training duration. Furthermore, the study identified five key competencies relevant to Technical Education Teachers out of which subject area competency and communication competency were rated as of essential importance. These competencies were not significantly different between the graduates of the two institutions. The study however, established that training equipment/machinery positively impacted on technical teachers' competencies.

The findings of this study suggest that the observed differences between the graduates of the two institutions could be as a result of exposure to training equipment/machinery and not as a result of training.

CHAPTER 1

INTRODUCTION

1.0 Background of the study

This chapter presents the discussion of the background to the problem, statement of the problem, objectives of the study, research questions, hypotheses, justification and purpose of the study, theoretical framework, and significance of the study, scope and limitations of the study, assumptions and operational definition of the relevant terms.

According to Ashington Ngigi & Daniel Macharia in an Education Sector Policy Overview Paper (2006), the provision of education and training to all Kenyans is fundamental to the success of the government's overall development strategy. The long-term objective of the government is to provide every Kenyan with basic quality education and training, preserve and utilize the environment for productive gain and sustainable livelihoods. The development of quality human resource is central to the attainment of national goals for industrial development.

Education and training in Kenya is governed by the Education Act (1968) and other related Acts of Parliament, including TSC Act, KNEC Act, Adult Education Act, University Act, and various Acts and Charters for universities. However, the Education Act of 1968, and the related Acts are not harmonized, and are no longer adequately responsive to the current and emerging trends in education and training. The legislation governing the sector has, therefore, not kept pace with new developments.

Education in Kenya, since independence, has been characterized by changes, often initiated by or emanating from, the political elite of the day. During this period, which spans over four decades, the government of Kenya has addressed the challenges facing the education sector through Commissions, Committees and Taskforces.

The first Commission was the Kenya Education Commission (Ominde Report, 1964) which sought to reform the education system inherited from the colonial government to make it more responsive to the needs of the country. The Commission proposed an education system that would foster national unity and creation of sufficient human

capital for national development. The Ndegwa Commission of 1970 emphasized on the development of adequate skills for employment and economic growth.

The Report of the National Committee on Educational Objectives and Policies (Gachathi Report. 1976), focused on redefining Kenya's educational policies and objectives, giving consideration to national unity, and the economic, social and cultural aspirations of the people of Kenya. It further recommended the vocationalization of the school curriculum. It resulted in government's support for 'Harambee' schools.

The Report of the Presidential Working Party on the Second University in Kenya (Mackay Report, 1981) led to the removal of the advanced (A) level of secondary education and the expansion of other post-secondary training institutions. In addition to the establishment of Moi University, it also recommended the establishment of the 8:4:4 system of education.

The Report of the Presidential Working Party on Education and Manpower Training for the Next Decade and beyond, (Kamunge Report, 1988) focused on improving education financing, quality and relevance. This was at a time when the government scheme for the provision of instructional materials through the National Textbook Scheme was inefficient and therefore adversely affected the quality of teaching and learning. From the recommendations of the Working Party in 1988, the government produced Sessional Paper No 6 on Education and Training for the Next Decade and Beyond. This led to the policy of cost sharing between government, parents and communities.

The Commission of Inquiry into the Education System of Kenya (Koech Report, 1999) put emphasis, in its recommendations, on the rationalization and financing of TVET skills for competitive employment and job creation.

The Commission of Inquiry into the Education System of Kenya (Koech Report, 2000) was mandated to recommend ways and means of enabling the education system to facilitate national unity, mutual social responsibility, accelerated industrial and technological development, life-long learning, and adaptation in response to changing

circumstances. The Report recommended Totally Integrated Quality Education and Training (TIQET).

As Kerre (2010) has noted, the Kenyan school curriculum has often oscillated from being vocationalized prior to independence and in the 60's, highly academic in the 70's to being vocationalized in the 80's and back to being academic in the late 90's. From the outgoing commissions and their recommendations (some implemented, some ignored with political and/or economic considerations), it emerges that while Technical Education received attention from most of the commissions (Ndegwa, Gachathi, McKay, Kamunge and Koech), implementation on the part of government has been wanting. The case in point is the haphazard implementation of McKay's recommendations without due regard to putting sufficient infrastructure in place (like workshops, equipment and materials), adequate preparation of the teachers to teach the new curriculum, lack of clear policy on the type and nature of TVET to be offered, implementing the programme without first piloting it in order to learn its weaknesses and strengths and hence make adequate preparations for country-wide implementation, and general concentration by government on the provision of general academic education at the expense of Vocational and Technical Education and Training. This, then, calls for inclusion of TVET in the general education curriculum as recommended by UNESCO.

To the public, as noted by Kerre (2010), the image of TVET has been traditionally tainted and often viewed as fit for those who are unable to prosper academically. This has been due to lack of knowledge; for TVET plays such an important role in national development. There is need, therefore, to make TVET both attractive and competitive in the school curriculum so that it becomes a career of choice for the school students for both salaried employment and self employment. This can be done in a number of ways:

a) Providing seamless pathways for one to progress from lower levels of entry to higher levels of education and training for those with the desire and quest,
b) Making the pay for those in TVET competitive so as to attract more people to it,

c) Making TVET curricula core subjects and examinable at both primary and secondary levels. This will form the foundation and provide continuity at higher levels of training.

d) Government to invest heavily in TVET through provision of adequate and sufficient workshops, modern equipment e.t.c. as sufficient commitment to show that TVET is crucial in national development and in Kenya's industrialization as envisaged in the Vision 2030.

The "casual" treatment government has given to TVET in general, and to Technical Teacher training since the pre-colonial days through independence to date (as discussed in Chapter 2), poses the question: "What is the future of Technical Education in Kenya in the 21st Centaury?" And what challenges do Trained Technical Teachers face? These two related questions, in the investigator's view, are central to the general nature of the training offered in the technical training institutions in Kenya today. Kenya is aspiring to industrialize by the year 2030. This process largely depends on the quality of technical training offered to trainees in various institutions mandated to provide the training. The curricula these institutions follow, in view of the emerging issues, are aspects of attention that deserve investigation to determine their relevance and effectiveness in producing products who are dependable in making Kenya attain her Vision 2030. Indeed the equipment and machinery used by the training institutions are core aspects that attract attention in establishing the quality of the graduates of these institutions, considering that TVET teachers /trainers are reported to lack the pre-requisite experience and technical competence to prepare the youth for the dynamic 21st century, (Kerre, 2010).

Technical Education is seen as a fundamental element of Kenya's new Vision 2030 which aims at a globally competitive and prosperous nation with a high quality of life by 2030. It's recognized that in today's global market, it takes the expertise of talented engineers and technologists together with the skilful hands of craftsmen and technicians to produce high quality goods and services for both local and export markets. This calls for thorough knowledge of the technical skills the graduates acquire from the institutions offering technical education. Similarly, those tasked with the provision of the technical education to the learners also need to be experts in their respective areas of specialization.

Kerre (2010) noted that national reviews of education and training reveal that almost 90% of vocational teachers and instructors working in the public vocational training system require continuous upgrading of training skills. The Government of Kenya launched Session Paper No.1 of 2005 which outlined a new Policy Framework for Education, Training and Research that addressed key reforms in TVET. It recommended the establishment of a Technical, Industrial, Vocational and Entrepreneurship Training (TIVET) System in the country with the aim to provide and promote life-long education and training for self reliance.

1.1 Statement of the problem

There is a general feeling among the members of staff of tertiary technical training institutions that a variance exists between technical teachers trained in the country's two institutions: Kenya Technical Teachers College and Moi University. This feeling arises from a trend in which graduates of Moi University's education technology department prefer to teach either mathematics or physics in these institutions rather than their core technical subjects. While the researcher is aware that the two institutions are different in the levels of their training, he wonders whether the trend has anything to do with the curricula, training facilities/equipment or training duration offered by the training institutions.

This study, therefore, is to examine the competencies of trained technical teachers in teaching their core technical subjects in these tertiary technical institutions under the Ministry of Higher Education Science and Technology (MoHEST).

1.2 Purpose of the study

The purpose of this study was to compare the Moi University trained and the KTTC trained technical teachers' competences in, and attitudes towards, teaching their major technical subjects. The views in this study on the determination of competence were two-fold: functionalistic and professional.

On the one hand, functionalistic competency, the study is essentially concerned with the evaluation of performance, in accordance with established norms. Functionalistic competency refers to the group of skills and knowledge which are applied in order to

carry out a task or function in accordance with the requirements imposed by the job. Professional competency, on the other hand and according to G. Bunk's definition (1994) and as quoted by Kerre (2010), is defined thus "a person has professional competency if he or she has the knowledge, skills, and abilities he requires to carry out an occupation, if he or she can solve independently and flexibly and is both willing and able to plan ahead in his working sphere and within work-organizational structures."

There is a general feeling among some teachers in middle level technical institutions that trained technical teachers appear to be biased against the teaching of technical subjects and lack the competencies to impart the necessary technical skills and knowledge to their learners. This feeling requires an investigation to authenticate it.
In most parts of Africa, as noted by Kerre (2010), no meaningful attention has been given to the development and training of TVET teachers. Besides, due to increased technological innovations and the demand for higher education and skills in the modern workplace, much more is demanded of a trained technical teacher today than ever before.

This study, therefore, aimed to find out how competent trained technical teachers were in imparting technical skills to their learners and their attitude toward technical education generally. The study compared the competences and attitudes of trained technical teachers from Moi University and Kenya Technical Teachers College and addressed any possible disparities that existed.

1.3 Objectives of the study

The purpose of the study was to compare the competencies between Moi University trained and the KTTC trained technical teachers. The specific objectives were:-

i) To compare the technical education curricular offered at KTTC with that offered at Moi University
ii) To identify the key competencies relevant to technical education teachers
iii) To compare the knowledge and skills competencies of Moi University trained and KTTC trained technical education teachers.

iv) To investigate the influence of training equipment/machinery on technical teacher competencies.

v) To assess the challenges facing technical education teachers in Kenya

1.4.0 Research questions

i. Is there any difference between the technical education curricular offered at Moi University with that offered at the KTTC?

ii. What are the key competencies relevant for the technical education teacher?

iii. Is there any significant difference in knowledge and skills competencies of Moi University trained and the KTTC trained teachers?

iv. Is there any significant relationship between exposure to training equipment/machinery and technical education teacher competencies?

v. What are the challenges facing technical education teachers in Kenya?

1.5 Significance for the study

The study aims to investigate the general feeling that trained technical teachers seem to lack the competence to teach their core technical subjects and appear to have negative attitude towards technical education. The apparent dislike by these teachers to perform their core mandate (i.e. to disseminate practical skills and knowledge to the youth undertaking technical education at the technical middle colleges) is a serious challenge that deserves an investigation. Since the achievement of Kenya's Vision 2030 critically depends upon the skills and competences of the technical graduates of middle level colleges and Universities, technical education and training form a vital element in the education system. Having technical experts who have achieved the highest level of training is, therefore, expected to be the impetus for technological development. To achieve this objective, it's important to determine the competences of these drivers of technological development so as to improve the quality of teacher training in Kenya.

1.6 Research assumptions

This study was based on the following assumptions:-

i. Moi university-trained and Kenya Technical Teachers College-trained Technical Teachers are competent to teach their core technical subjects.

ii. The respondents from the institutions were to provide honest views on the issues raised by the researcher in the questionnaire.

iii. The respondents were to answer and send back majority of the questionnaires (60% and above) they received.

iv. The findings of the study would be found useful by the government of Kenya (G.o.K) in improving the quality of training technical teachers receive in the country's training institutions.

1.7 The scope of the study

This study was conducted among the Joint Admission Board and Module Two graduates of Moi University's education technology department and Kenya Technical Teachers College graduates currently teaching in the middle level technical training institutions under the Ministry of Higher Education, Science and Technology, namely: Institutes of Technology, Technical Training Institutes and National Polytechnics. The Trained Technical Teachers in this study are the Diploma holders from the KTTC and graduates from Moi University's Department of Education Technology teaching in the following disciplines: Mechanical Engineering, Electrical Engineering, Automotive Engineering and Building Construction Engineering. The mature entrants to Moi University with previous technical training obtained from Kenya Technical Teachers College and teaching the same disciplines mentioned above are a third category of trained technical teachers covered in this study.

1.8 Limitations of the study

In this study the following were considered important Iimitations:-

i. It was be limited to Trained Technical Teachers teaching in the middle level technical training institutions under the Ministry of Higher Education, Science and Technology (MoHEST).

ii. Due to financial limitations of the investigator, the institutions considered in the study were some of those within the North Rift region of the Rift Valley Province and Western Province; but the findings of the study can be applicable and generaliseable to all the Trained Technical Teachers teaching in the middle level institutions within the MoHEST in Kenya since they

(teachers) in these institutions are all trained from the same institutions (KTTC and Moi University).

1.9 The delimitation

The study was limited to Trained Technical Teachers in the following specialization areas:-

a. Mechanical engineering
b. Automotive (Motor vehicle) engineering
c. Electrical engineering
d. Building construction (masonry)

1.10 Definitions of operational terms

a. Attitude: Moon and Mayes (1984) defines attitude as a disposition to think or act in a particular way in relation to oneself and other individuals or groups in society. They say that attitudes determine response to problems, issues and situations. In this study, therefore, attitude referred to the feelings of individual trained technical teachers towards technical subjects they trained and specialized to teach.
b. Positive attitude: According to Longman dictionary of Contemporary English, positive attitude is the favourable feelings and opinions that someone has about something. In this study, therefore, positive attitude referred to favourable opinions and feelings technical teachers have towards technical education.
c. Negative attitude: Refers to the unfavourable opinions and feelings trained technical teachers have towards technical education.
d. Self-concept: Kreitner and Kinicki define self-concept as the concept an individual has of himself as a physical, social and spiritual or moral being i.e. one who has self-concept recognizes oneself as a distinct human being. In this study, self-concept referred to trained technical teachers recognising themselves as individuals with distinct abilities and capacities to think and apply technical knowledge and skills and imparting the same to their learners.

e. Competence: The Longman dictionary of contemporary English defines competence as the ability to do something well. Kerre (2010) says that the traditional meaning of competence refers to one's ability to perform prescribed occupational or job functions. Competencies relate to those skills, knowledge, attitudes and experiences that enable one to perform satisfactorily in employment. In this study, competence meant the ability of trained technical teachers teaching their specialized technical disciplines well in terms of mastery of subject matter, subject covery, correct use of equipment and machinery and subject delivery.

f. Technology Education: According to the American Industrial Arts Association (1976) and Kerre (1991), Technology Education is an educational process which involves the preparation, growth and guidance of an industrial student for modern living through an instructional program; including the technical aspects of industries and technology. For the purpose of this study, technology education referred to technical education cluster of disciplines offered at the middle level technical colleges and universities comprising mechanical, electrical, automotive and building construction engineering courses.

g. Trained Technical Teacher: Means a teacher who has acquired pedagogy in education and technical training in a specific discipline or technical area.

h. In this study, trained technical teacher referred to a teacher who had acquired pedagogical education and competency skills in the following technical areas: mechanical, automotive, building and electrical engineering

ii. Untrained Technical Teacher: Means a person who has acquired technical training in a specific discipline or technical area but who has not trained as a teacher i.e. a person who, despite possessing technical skills in a specific discipline, lacks pedagogy in education and is engaged to carry out teaching duties in a technical training institution.

iii. Technical and vocational education - United Nations Educational, Scientific and Cultural Organization (UNESCO) (1984) defines technical and vocational education as the educational process which involves, in addition to the general education, the study of technologies and related sciences and the acquisition of practical skills and the knowledge relating to occupation in various sectors of economic and social life. To make a distinction between the two terms, UNESCO (1984) further defines vocational education as education designed to prepare skilled personnel at lower levels of qualifications, trades or jobs; and technical education as education designed at upper levels to prepare middle level personnel such as technicians and at university level to prepare engineers and technologists for higher management positions.

In this study, vocational and technical education was defined as follows:-

a. Vocational education referred to education at lower levels e.g. at youth polytechnics, vocational and industrial institutions etc that prepare learners at artisan and/or trade test levels in specific trade areas.

b. Technical education referred to education at middle level colleges and universities that prepares learners at certificate (craft), Diploma, Higher National Diploma and Degree levels; equipping them with competency skills, knowledge and understanding that enables them to perform specific tasks in specialized areas.

These specialized areas include:

Mechanical engineering

Automotive (Motor vehicle) engineering

Electrical engineering

Building construction (masonry)

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

The issue of technical and vocational training particularly with regard to the need of skills development as a result of the changes in technology coupled with changes in work organization, and the need for trade openness, competition, and foreign direct competition has continued to attract a lot of interest. This chapter reviews the existing empirical literature associated with technical and vocational training. The chapter reviewed, among others, the forms of TVET, the role of TVET in national development, the TVET sector in developing countries, technical training in the Kenyan context and teacher competencies.

2.1 Forms of TVET

Technical and Vocational Education and Training referred to as TVET has been defined variously by different stakeholders. The 2001 UNESCO and ILO General Conference on Technical and Vocational Education and training referred to TVET as 'those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge related to occupations in various sectors of economic and social life' (UNESCO and ILO, 2002). In the developing world, TVET has broadly been envisaged as 'skills development' (Netherlands Ministry of Foreign Affairs. 2009). Forms of TVET in various developing countries have therefore taken on an approach that tend to mirror TVET as a means of preparing for occupational fields and effective participation in work related affairs.

Kenya, for example, requires a policy framework that, among other needs, would identify and implement strategies that target appropriate technologies necessary for the national development framework outlined in vision 2030. Kerre and Kwende (1995) identified three forms that could be adopted for the effective implementation of such a policy. 'Use a traditional approach and offer Technical and Vocational Education (TVE) as a separate system in its own separate TVE institutions', 'Offer TVE alongside general education in the same institutions but maintain a separate

trajectory', and "Integrate TVE and general education by making TVE curriculum a requirement for all learners at certain levels but optional at higher levels'.

In its broadest sense, TVET could therefore be viewed as a unified system that combines technical education, vocational education, vocational training, on the job training, or apprenticeship training. As reiterated by Kerre (1991) and Kerre (1996), such a unified systems does not separate academic and vocational routes but recognizes that to fulfil the aims of a highly qualified workforce, a wide range of different combinations of academic and vocational studies need to be possible that do not separate students into distinct tracks (p. 20).

Similar caution about vocationalization of the curriculum was echoed by Young (1993) and Bennel (1993). Young (1993) noted that for a unified system to be received as a widely professional consensus in the education community there must be strategic thinking on the part of industrial leaders and trade humanists, political will on the part of the national government and a high value placed on education within the culture as a whole.

2.2 TVET and National Development

Kenya, like all nations in the world, is faced with challenges of improving the capacity of its workforce in order to respond to her development needs, and to the demands of the rapidly changing, and globally competitive world. The need for new skills to match advances in information, communication and technology has indicated the return of TVET to the International agenda (Joo, (n.d)), World Bank institute, website accessed in April, 2011.

Besides, there is enormous pressure on secondary and vocational systems, which are still very small in many countries. Accommodating an increasingly diversified population calls for the provision of a variety of learning pathways, including technical and vocational subjects (Netherlands Ministry of Foreign Affairs, 2009).

Kerre (1995) underscored the significant role played by TVET, by listing 10 specific objectives related to exposure to a wide range of practical activities at the basic education level, equipping the students with relevant production and entrepreneurial

skills, provision of skilled labour, refinement of technological skills, and encouraging equal access and participation of girls and women in technical and vocational education among others.

2.3 TVET and skills development

Human resource development can suitably be developed through TVET. Skills development provides individuals with a better chance to obtain productive and profitable employment which leads to sustained increase in earning power and access to a quality life through being able to afford quality health care, food, clothing and shelter (MGDI; UN, 2010). Consequently, when TVET curricular are focused on creating self-employment, the unemployment levels in developing countries can be reduced (Netherlands Ministry of Foreign Affairs, 2009). Caillods (1994) observes that skills development, and by extension skills formation systems, are important because of their contributions to individual and company incomes, and to national productivity. He further contends that enhanced skills enable individuals to be more productive and generate higher incomes. Workforce skills make enterprises more productive and profitable, and help national economies raise production and create wealth. He sums up this by noting that "Vocational education and training are indispensable instruments for improving labour mobility, adaptability and productivity, thus contributing to enhancing firms' competitiveness and redressing labour market imbalances."

Research has further shown complementarities between capital and skills. Human capital was found to be a significant determinant of physical capital investment in an economy whereby, a higher level of human capital enables plant and machinery to be used more efficiently, raising the rate of return on investments (Ashton and Green, 1999). O'Conner and Lunati (1999) contend that Capital-skill complementarities largely reflect the skills required to master technologies in newly acquired capital equipment.

2.4 TVET and Technological Change

Recent acceleration in technical changes has led to greater numbers of workers with higher skills. Booth and Snower (1996) noted that "without a workforce that is continuously acquiring new skills, it would be difficult to reap most of the returns

from technological progress. They further contend that when people acquire skills, they commonly also make themselves more adaptable. The advancement of knowledge and innovation, and the diffusion of new methods of production are aided by higher levels of education and training (Ashton et al. 1999). Technological change has shifted demand towards higher skills in the labour force (World Bank 2002). This view is supported by IMF (2001), that new technologies are knowledge and skill intensive, and there is need to train people to work with those technologies.

Existing literature also indicates that the integration of technology is an essential component to augment technical and vocational training programs. It is noted that for vocational studies, the exposure to and experience with modern and advanced technologies easily translates into marketable skills when entering the labour force (JISC, 2006). JISC further notes that the inclusion of learning technologies will supplement the students experience by giving direct access to broad resources, diversify skills and develop one's adaptability and creativity. Literature suggests that trainers and instructors need to remain proficient in the latest trends, methods and equipment for both digital and mechanical technologies (Temple, 2007). He observes that spaces for learning technologies will remain more cost-efficient and better serve user purposes for longer periods if designed flexibly, rather than expressly for technologies with uncertain longevity. As observed by Mayer (2000),

> *Technological improvements in backward countries are closely interrelated with their educational attainment: skill supply influences the amount and degree of sophistication of technology which can be adopted and use efficiently, while in turn the amount and sophistication of newly introduced technology impacts on the demand for skills (Mayer 2000).*

Continued reliance on technology requires that spaces be flexible in their design to include and allow for new technological methods and devices. Lonsdale and Vavoula (2004), observe that to maximize infrastructure utility, appropriations for digital technology need to be organized in a way to maintain and support rapidly changing advancements and learning space needs. Rapidly changing industry technologies mean that equipment and machines are rendered outdated relatively quickly. Cutshall (2003), suggests that the need for hands on exposure to the latest technologies and equipment raises the need for institutions to partner with local companies, business,

which would improve student access to and training with current industry technologies and consequently enhancing educational outcomes.

2.5 Competency development and the increasingly dynamic employment market

Emerging concepts in the field of TVET such as competence-based training and employability have meant that TVET is no longer merely expected to provide learning opportunities for skill development, but also to enable employees to prove themselves to have requisite competencies. According to Hillage and Pollard (1998), 'Employability refers to an individual's capability to move self sufficiently within the labour market through the knowledge, skills and attitudes which they possess, the way they use these assets and present them to employers, and application of these qualities in the variable contexts within which they seek work'.

Literature suggests that changing technological advances calls for diversification of methods of developing competencies (Zimnyaya, 2003). The author noted that the concept of "qualification pathways' has become a central point for many TVET systems and therefore there is need for the design and implementation of a qualification framework which validates what has been acquired by professional experience in addition to education.

Competency has been defined in various ways in the existing literature. Earnest (2001) in his definition stated that 'the competency is a statement which describes the integrated demonstration of a cluster of related knowledge, skills and attitudes that are observable and measurable, necessary to perform a job independently at a prescribed proficiency level. The Netherland's Ministry of Foreign Affairs (2009), on its part defines competence as the application of knowledge and skills relative to an industry standard of performance and focuses on what is expected of an employee in the work place, rather than on just knowledge acquisition. Earnest (2001), sums up these definitions by emphasizing the following:-

Firstly, that the competency is an overt and measurable performance in terms of quantity, quality, time cost or a combination of any of these. Secondly, that the competency is a cluster of broad skills consisting of cognitive (intellectual) skills, practical skills and social skills/attitudes, skilfully weaved together into an integrated whole.

2.6 TVET and training facilities

Training equipment and facilities serve a variety of purposes for trainees and the surrounding community, most importantly to develop knowledge and skills for trainees. Literature on the impact of the physical environment on learning outcomes though insufficient, some researchers have found that curriculum and facility design are related which demonstrates that the physical learning environment has an influence on student's social and scholastic behaviour (Jameson, Dane and Lippman, 2005).

Research conducted to examine the links between school infrastructure and student performance was at best unquantifiable observation (AMA, 2006). This view was confirmed by Temple (2007) in a review of literature, demonstrating that any connections between the learning environment and educational activities lack firm evidence.

Further literature indicates that the educational infrastructure for TVET programmes service a more specific purpose of preparing students to enter the workforce with a set of specific, technical skills. Cutshall (2003) observes that while the issues of facility planning for technical schools are not markedly different from those in other academic facilities, there are other challenges with regards to the maintenance and improvement of specialized equipment that is needed for instruction. Spaces for TVET have distinct requirements for constructing the infrastructure, which include equipment, room size and providing resources for a range of activities, in addition to providing conventional classrooms for academic instruction (JISC, 2006).

JISC (2006), and Cutshall (2003), observed that in technical schools, instructional rooms and space design tend to be driven by the highly specialized equipment, furnishings, machinery and tools needed to properly instruct students. TVET facility planning, therefore, necessitates flexible design with considerations for the future and accompanying changes to pedagogical approaches and changes in labour market demands (Wolff, 2002; JISC, 2006). Isler and Doerig (2008) contended that architects should design spaces with little definition of function so that spatial elements can evolve or redevelop. Indeed, Jameson (2000) examined space from the teacher

perspective, and noted that the physical environment was likely to influence how the teacher constructed activities. Besides, specialized or defined space provides a setting for students to develop critical thinking and problem solving abilities, practice pertinent skills and gain hands-on experience with industry equipment (Worthington, 2007; Wolff, 2002).

Practical instructional spaces need to emulate the eventual work environment that students are likely to enter upon completion of training. Laboratories and workshops that simulate actual work settings can contribute to student achievement, and it is this physical environment that will properly prepare students for employment (Cutshell, 2003). Furthermore, arranging teacher offices and student learning areas in close proximity promotes collaborations, so that students can easily interact and engage with teachers (Jameson et al, 2000).

2.7 Historical background on the training of technical teachers

The Kenya Education Commission (Ominde Report, 1964) stated that the provision of a well educated, keen, competent, respected and contented teaching force is the most important contribution the government can make to the schools of Kenya. Further, the report said that prior to 1969, there was no formal teacher training offered to technical instructors. Rather, skilled training was offered by skilled artisans who were recruited from industry and the military.

Koech Report (1999) noted that one of the major objectives of education is the development of creative and innovative minds. In its recommendation, the report said that gifted and talented individuals (in technical education) be identified early and their potentials appropriately focused and developed.

The first attempt at providing training to technical teachers was done at the Kenya Polytechnic where a group of students was admitted in 1969. At the time, a radical approach was adopted. The first one involved admitting successful graduates of secondary education for an initial technician training, it included an appropriate work experience (during and after the technician training). Successful candidates were then given a one-year pedagogical training, making the entire course to last five years.

The second approach involved recruiting trainers from industry who had already gained at least two years' work experience. They were then to undertake a one-year pedagogical training. This original technical teacher training programme recognized the need for these teachers to he provided with, and be confident in, communication skills. The demonstration and evidence of this training programme were one's performance in secondary school level, evidence of technological proficiency and proven work experience. The basic technical qualifications for technical teachers' grade were either an Ordinary Diploma or Technician part III Certificate for one to be able to teach in a Technical Secondary School.

2.8 Comparison of the Moi University and KTTC curricula

2.8.1 The KTTC curriculum

Koech Report (1999) noted that the rising need for trained technical teachers made the government of Kenya to enter into an agreement with the Canadian government which culminated in the construction of the Kenya Technical Teachers College (KTTC) in 1976 and subsequent equipping of the college and provision of teaching staff. According to KTTC website (www.kttc.ac.ke), the college was established with the primary objective of training technically skilled personnel not only to teach at the Technical Training Institutions, but also for employment in all sectors of the economy. The college had its first batch of admitted students in 1978 briefly trained both at the Kenya Polytechnic and Kiambu Institute of Science and Technology (K1ST). The college was officially opened on 161h March, 1979. The college then admitted both the '0' level and 'A' level school leavers who trained either as 3-year Diploma in Industrial Teacher Education or 4-year Diploma in Technical Teacher Education. The diploma in technical education combined a one-year pedagogical course in teacher education and either Craft III or Technician II in a specific technical discipline of one's specialization as the mandatory requirements for employment as technical teachers. Possession of Technician part III was an added advantage.

The KTTC's general curriculum includes the following:

- Communication Skills I and II
- Comparative Education
- Curriculum Development

- Educational Administration
- Entrepreneurship Education I, II and III
- Entrepreneurship Education Project I, II and III
- Guidance and Counselling
- History of Education
- Industrial attachment (minimum 2 months)
- Introduction to Computers
- Library User Education
- Life Skills
- Mathematics I, I and III
- Philosophy of Education
- Research Methods 1 and II
- Sociology of Education
- Technical Drawing I and II
- Tests and Measurements
- Trade Project

The Koech Report (1999) stated that the KTTC now runs a one-year and a two-year teacher training programmes, producing trained Technical Teachers at three levels:-

I. Certificate Technical Teachers

II. Diploma Technical Teachers

III. Higher National Diploma Technical Teachers

2.8.2 Moi University Curriculum

According to Moi University website (www.moiuniversity.ac.ke), the department of technology's Bachelor of Education (Technology Education) programme is designed to produce competent graduate TVET teachers to teach technical subjects at secondary and post- secondary school levels. The objectives of the programme include, but are not limited to, preparing graduate teachers who will be able to teach the secondary and post-secondary level technical group of subjects, namely: Mechanical Engineering Technology, Woodwork, Building Construction, Drawing and Design, Electrical and Electronics, Power Mechanics, and Automotive Engineering and Computer studies; improving the quality of teaching of the technical subjects in the Kenyan technology system of education, preparing teachers to teach

- Educational Administration
- Entrepreneurship Education I, II and III
- Entrepreneurship Education Project I, II and III
- Guidance and Counselling
- History of Education
- Industrial attachment (minimum 2 months)
- Introduction to Computers
- Library User Education
- Life Skills
- Mathematics I, I and III
- Philosophy of Education
- Research Methods 1 and II
- Sociology of Education
- Technical Drawing I and II
- Tests and Measurements
- Trade Project

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technical education for training institutions where such level of competence may he needed and laying a firm foundation for individuals who intend to pursue Postgraduate studies in Technology Education.

To be admitted into the degree of Bachelor of Education in Technology programme, a candidate must satisfy the minimum entrance requirements of Moi University i.e. a candidate must have obtained a minimum grade of B- at KCSE level (or equivalent) in each of the following subjects: Mathematics, Physics or Physical Science and English. The duration of the Bachelor of Education in Technology Education course is four academic years. Courses are structured in units. A unit is defined as the equivalent of one lecture hour per week for one semester. One hour of lecture is equivalent to two (2) hours of tutorials and three (3) hours of practical work.

The programme is planned such that students will be exposed to a broad based common first year courses. Thereafter, students will be required to specialize in any of the following areas of study:

i) Power Mechanics and Automotive Technology
ii) Electrical and Electronics Technology
iii) Building and Civil Technology
iv) Mechanical Engineering Technology

Students in the department take their departmental courses as well as all common courses approved for the programme. There is also a 12-week industrial (field) attachment at the end of the second year.

The curriculum includes the following common TVET and education units:

- Communication Skills I and II
- Computer Applications
- Curriculum Development
- Development Project Appraisal
- Education Administration and Management
- Education Media and Resources
- Educational Measurement and Evaluation
- Educational Planning and Economics
- Engineering Mathematics 1, II and III

- Entrepreneurship Education
- Environmental Education
- General Educational Psychology
- General methods of teaching
- History of Education
- Human Behaviour and Learning
- Introduction to Education I and II
- Introduction to Technology Education
- Philosophy of Education
- Quantitative Skills I and II
- Research Methods
- Sociology of Education/Comparative Education
- State, Society and Development
- Subject Methods - Technology
- Teaching Practice (12 Weeks)
- Technical Drawing I, II, III and IV
- Workshop Planning and Management

2.9 Comparison of the two curricula

Table 2.1 below shows how the courses offered in the two institutions compare.

Table 2.1: Comparison of Courses offered at KTTC and Moi University

Common courses	Courses only at KTTC	Courses only at Moi University
Communication skills	Mathematics	Computer applications
Curriculum development	Tests and measurements	Engineering mathematics
Entrepreneurship education	Trade projects	Environmental education
History of education	Introduction to computers	Human behaviour and learning
Research methods	Life skills	Introduction to technology education
Philosophy of education	Library user Education	State, Society & Development
Technical drawing	Entrepreneurship Education Project	Educational Planning and Economics
Sociology of education	Guidance and Counselling	Educational Media & Resources
Comparative education		Development Project Appraisal
Educational administration		Quantitative skills
General methods		Subject methods- Technology Workshop
Educational psychology		Planning and Management
Teaching practice		
Industrial attachment		

Source: curricula of KTTC and MU

2.10 Challenges facing technical teachers in Kenya

Koech Report (1999) points out that the technical teachers previously and currently trained at the KTTC lack sufficient practical skills due to insufficient industrial exposure. The former technical secondary schools' technical teachers inherited by the converted Technical Training Institutes (TTIs) were never and have never been re-oriented and upgraded for training at the tertiary level they are currently deployed. He further notes that many of the technical teachers have diplomas in technical education with either Technician part III or Craft part III certificates. These teachers teach the same courses they went through in their pre-service teacher training without any additional advantage, except age and classroom experience. Lack of staff development by the government through the Teachers Service Commission (TSC),

such as sponsorship for further studies and short in-service courses to upgrade the teachers' knowledge, skills and work experience have contributed to the stagnation of these teachers at the pre-service level of training.

By way of addressing these challenges, the report made a number of recommendations to the government; among them;-

1) Teachers of Craft certificates and diploma level courses be given opportunities to upgrade their academic qualifications to first degree level. Those not able to upgrade to be appropriately deployed;
2) All entrants into the Technical, Industrial, Vocational Education and Training (TIVET) be required to have a minimum of three years verifiable work experience to ensure their competence in handling practical subjects of their specialization. KTTC then be required to intensify recruitment of Higher National Diploma (HND) holders into the one-year teacher training programmes;
3) Entrants into the Bachelor of Education (B.Ed) Technology teachers' programme at Moi University be recruited from graduates of Technician Diploma to ensure that such teachers have sufficient practical skills and competence with post-graduate pedagogical programmes being implemented for those who already have a first degree.
4) Short term courses in skills development be enhanced for technical teachers in tertiary technical institutions.

It's worthy noting that once teachers have completed their pre-service training, there are limited opportunities to enhance their professional growth and development. Those who struggle on their own to upgrade their skills encounter financial challenges in meeting their university fees, accommodation, meals, text books and transport. The 21^{m} Century challenges for these teachers are quite demanding; for they will be handling students who will be well informed and knowledgeable of not only their rights but also their obligations as well. Teachers with no or little knowledge in information technology (IT) will particularly feel challenged by the well versed learners in ICT. According to a study carried out by the Association of Professional Teachers and published by the Daily Nation on 15th January, 2010, "a large number of teaching force does not use internet, especially while preparing their lessons to get

updated information". The association found that a paltry 4% of the teachers visited important websites in their profession. This is a disturbing trend, especially as the government in its Vision 2030 plan aspires to ensure that teachers have a higher level of training and knowledge of modern technology to boost quality standards in schools. Vision 2030 stipulates that teachers are expected to possess high technological skills, so that they can impart on their students for the country to industrialize. This incompetence should serve as a wake up call on how teachers are trained, and more so, their ability to deliver on science, technology and innovation-related subjects.

The Koech Report (1999) further recommended that teaching needs to be professionalized so that the teacher is more efficient and effective in the delivery of educational services to the learners and that universities need to play a more significant role in supporting TIVET than they have hitherto done. These universities have been difficult to convince to provide credits to TIVET graduates wishing to continue with university education, yet TIVET graduates with appropriate qualifications have been admitted to foreign universities. Consequently, TIVET graduates wishing to join Kenyan universities have been forced to enter the university programmes alongside the fresh secondary school graduates. This causes them frustration and makes it wasteful in learning the same basics they already know and paying fees for longer periods of time.

Kerre (1986) envisioned that the establishment of graduate and post-graduate programs in vocational and technical education in the Kenyan universities would foster commitment to excellence in disciplined inquiry, personnel development and service. He concluded that that though programs of vocational education are a major part of Kenya's educational and training systems, it's surprising to note that our national universities do not have any vocational teacher education. However, this observation has since been overtaken by events; for Moi University now offers technical teacher education. Kerre made this observation before the establishment of the Second University in Kenya (Moi University) which was planned to offer technical teacher education alongside other graduate teachers.

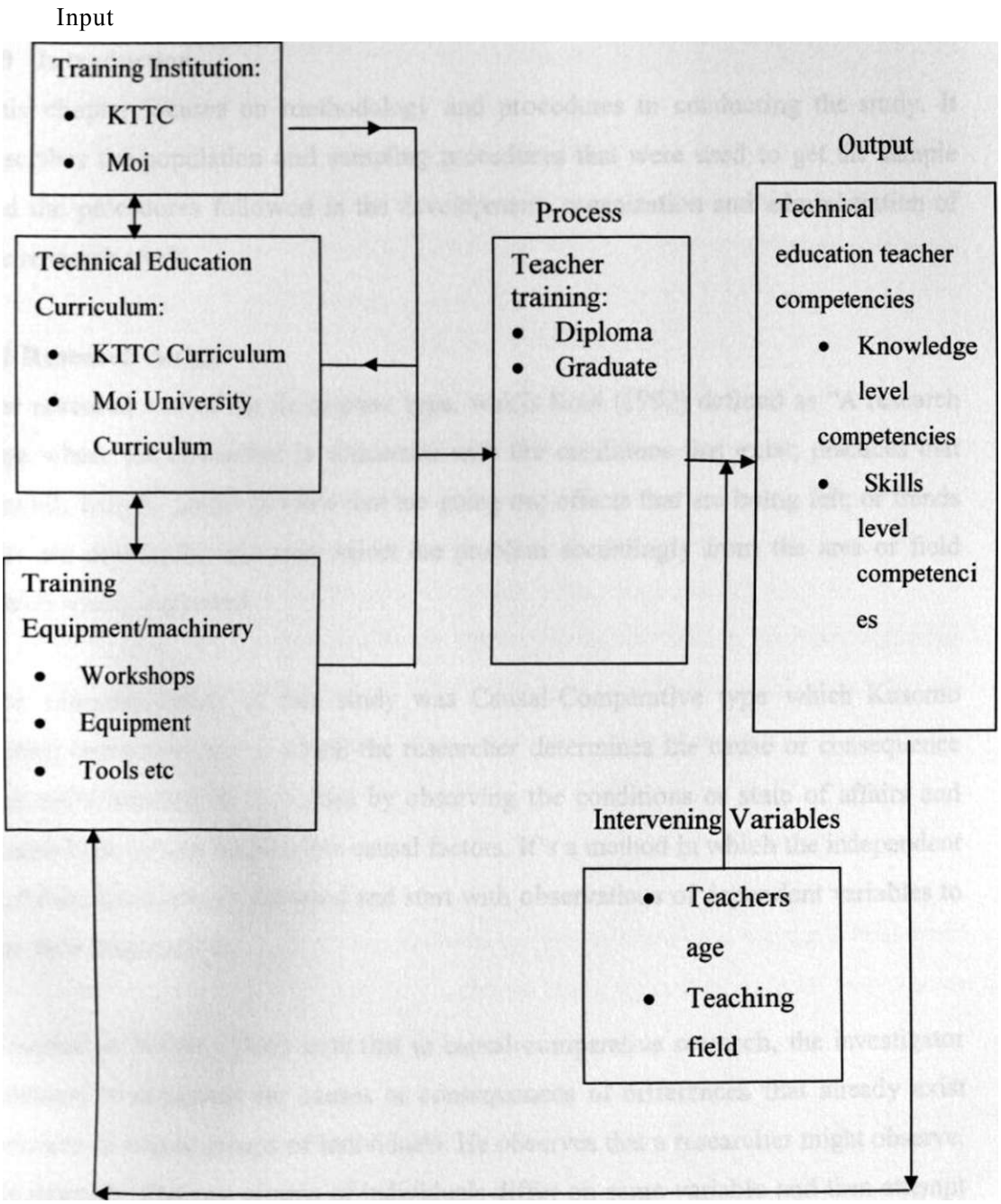
According to Kerre (1987), there was a need in Kenya to develop a high number of new teachers with technical and vocational background. He concluded that among the three problems causing serious constrains in schools for vocational and technical education (i.e. facilities, equipment & materials and insufficient and poorly trained teachers), "the most serious constraint faced by both Primary and Secondary schools is the availability of qualified vocational teachers". He argued that "up to a minimum total of 5 vocationally trained teachers were required for each of the 12,943 Primary Schools in the country. Adding the secondary and post- secondary schools to these primary schools makes a clear case that there was a definite need for attracting and training vocational and technical teachers.

2.11 Conceptual framework

In Kenya, examinations are used to measure educational outcomes or outputs of educational processes. These outcomes are based on the type of inputs into the educational process. They (inputs) include educational resources (like training equipment, tools and machinery, the curriculum), the student (e.g. competence), the teacher (e.g. his/her subject content mastery, content delivery) and the institution (e.g. conducive learning environment). These inputs undergo an educational process to yield educational results (or outputs) which are denoted by performance. Performance, then, becomes a function of the interaction between these inputs. A good interaction between the inputs yields good performance, and vice versa. Inputs in this case are the independent variables and output is the dependent variable.

In the training of TVET teachers in Kenya, the performance of these teachers in their teaching career depends on the training they underwent in their training institutions: their trainers' competencies in handling their course content, the TVET teacher trainees' entry behaviour (grades), the equipment and other facilities used to train them and the institutions' learning environment. These inputs play significant roles to produce the quality of Technical Teachers. The conceptual framework described above is illustrated diagrammatically below.

Table 2.2: Relationship between input sand outputs in technical teacher education institution



CHAPTER 3

RESEARCH METHODOLOGY DESIGN

3.0 Introduction

This chapter focuses on methodology and procedures in conducting the study. It describes the population and sampling procedures that were used to get the sample and the procedures followed in the development, organization and administration of the research work.

3.1 Research design

The research was of the descriptive type, which Koul (1992) defined as "A research type where the researcher is concerned with the conditions that exist; practices that prevail; beliefs, points of view that are going on; effects that are being felt; or trends that are developing and may select the problem accordingly from the area or field which s/he is interested.

The research design of this study was Causal-Comparative type which Kasomo (2006) defines as one in which the researcher determines the cause or consequence that exist between the variables by observing the conditions or state of affairs and search back in time for possible causal factors. It's a method in which the independent variables have already occurred and start with observations of dependent variables to see their relationships.

Fraenkel & Wallen (2000) note that in causal-comparative research, the investigator attempts to determine the causes or consequences of differences that already exist between or among groups of individuals. He observes that a researcher might observe, for example, that two groups of individuals differ on some variable and then attempt to determine the "reasons for" or the results of these differences. Kasomo adds that causal-comparative design (also called ex-post facto, from the Latin for "after and fact") research. The group difference in ex-post facto research is either a variable that cannot be manipulated (e.g. ethnicity) or one that might have been manipulated but for one reason or another has not been.

In causal-comparative research, it is not possible to establish the cause-effect relationship of the variables to be investigated. The only conclusion that can be drawn in reference to the variables is that they appear related.

3.2 The study institutions

The purposive sampling technique was used to get institutions that were offering technical courses relevant to this study. The purposive technique was chosen on the account of the researcher's limited financial ability to cover a wider geographical area. In this regard, the following institutions lie within reach of the investigator's financial ability:

a. Rift Valley Technical Training Institute (RVTTI),
b. Kitale Technical Training Institute (KTTI),
c. Kaiboi Technical Training Institute (KTTI),
d. O'Lessos Technical Training Institute (OTTI),
e. San'galo Institute of Science and Technology (SIST).

The first four are found within the North Rift region of Rift Valley Province while the last one is in Western Province, within Bungoma town. These institutions are generally within one geographical area which the researcher accessed within his financial ability.

3.3 The Target Population

The target population for this study included trained technical teaching and Principals of technical institutions. These trained technical teaching and Principals were drawn from the technical institutions purposively sampled.

3.4 Sampling and sample size

3.4.1 Sampling

The study was conducted within the TTI's as described in 3.2 above.

Each Principal of the sampled institution was used in the study.

For each of the identified institutions, simple random sampling technique was employed to obtain the sample of technical teachers drawn from the engineering departments of that particular institution. The sum of 75 sampled teachers from the five institutions was then used to constitute the required sample used in the study.

Simple random sampling was chosen because it is regarded by many researchers and statisticians as being the most practical method of sampling that is free from bias. Fraenken & Wallen (2000) observe that "Any differences that exist between the sample and the population should be small and unsystematic. Any differences that do occur are as the result of chance rather than on the part of the researcher".

Kerlinger (1976) also observes that "A sample drawn at random is unbiased in the sense that no member of the population has any more chance of being selected than any other member'. The researcher, therefore, chose this technique in order to ensure that there was no bias in selecting the teachers that constituted the sample. In carrying out simple random sampling to get the sample, names of all trained technical teachers in each of the five identified institutions (as obtained from the list of the TSC monthly returns for each institution) were used. These names were written on pieces of paper of equal size, shape and type. The pieces of paper were carefully folded and placed in a tin and thoroughly shaken to ensure proper mixing. Simple random sampling was then done by picking out one piece of paper at a time. The picked piece of paper was opened and the teacher's name on it recorded; the piece was returned back into the tin. The picking and recording was continued until the required number of teachers was obtained. The samples from all the five institutions were then merged up to obtain the sample required for the study. The institutions were identified by the following codes to protect their identities: V, W, X, Y and Z.

3.4 Sample size

For determining sample size, Fraenkel & Wallen (2000), drawing conclusions about a population after studying a sample is never totally satisfactory, argued that researchers can never be sure that their sample is perfectly representative of the population. Some differences are bound to occur between the sample and the population, but if the sample is randomly selected and is of sufficient size, these differences are likely to be relatively insignificant and incidental.

Since there is no clear-cut answer as to what really constitutes an adequate or sufficient sample size, the best sample should be as large as the researcher can obtain with a reasonable expenditure of time, money and energy. Prakashan (2003) says that the size of the sample should neither be excessively large, nor too small. It should be

optimum i.e. one which fulfils the requirements of efficiency, representativeness, reliability and flexibility. He adds that a sample size should, technically, be large enough to give a confidence interval of desired width and as such the size of the sample must be chosen by some logical process before the sample is taken from the universe. The sample should be determined by the researcher keeping in mind the nature of the universe, number of classes proposed, type of sampling, standard accuracy and acceptable confidence level, availability of finances and nature of study.

Kasomo (2007) observes that researchers use the largest sample possible because statistics calculated from a large sample are more accurate. He suggests that for co-relational research, 30 cases (subjects) or more are recommended. Best (1977) argues that the ideal sample should be large enough to serve as an adequate representation of the population about which the researcher wishes to generalize; and small enough to be selected economically in terms of subject availability, expense in both time and money, and complexity of data analysis. He adds that there is no fixed number or percentage of subjects that determines the size of an adequate sample. He concurs with Kasomo that samples of 30 cases or more are considered large samples, and those with fewer than 30 cases, small samples.

According to Prakashan (2003), the following formula can be used in case of infinite population when an estimate of the proportion is to be made in the universe.

$$n = \{z^2 (pq)\}/e^2$$

Where: n = sample size

z = standard error associated with the chosen level of confidence (1.96)

p = estimated percent in population

q = 1-p

e = acceptable sample error

But in case of finite population, the above formula can be changed to:

$n = \{z^2.p.q.N\}/ [e^2 (N-1) + z^2.p.q]$

Where N = size of the population and other variables are as above.

The formula requires that the:

i) Amount of confidence be specified

ii) Variance in the population be estimated

iii)Level of desired accuracy needed be specified

By estimating that the population of trained technical teachers in the sampled institutions to be 300. and the chance of successfully identifying a trained technical teacher to be .07, then with 95% confidence interval:

N=300

P =0.07

e=0.05 (since the estimate should be within 5% of the true value)

z =1.96 (as per table under normal curve for the given confidence level of 95%)

Substituting, we have: $n = \{1.96^2(.07)\ (1-.07)\ (300)\}/\ \{.05^2(300-1)\ +1.96^J(.07)\ (1-.07)\}$

$= 75.2$

$\underline{n \sim 75}$

Hence the sample size desired was 75 and this sample was picked by simple random sampling method as described above. These teachers were categorized by the level of training attained i.e.

a) Diploma Trained Technical Teachers

b) Graduate Technical Teachers

c) Hybrid (holders of both KTTC Diploma and Moi University degree)

3.5 Research Instruments

Two data collection instruments were developed for this data.

3.5.1 Teacher-self assessment Questionnaire

The first research instrument was the teacher-self assessment questionnaire. This questionnaire was designed and used to collect data from the sampled teachers. Concepts of technical teacher competencies were adopted as the conceptual framework for the study.

The questionnaire comprised of five sections (see appendix 1): Background information on the technical teachers, competencies and teacher perceptions of their importance, teacher perceptions of their knowledge levels, teacher perceptions of their skills levels, and teacher perceptions of their exposure to training equipment and machines.

The respondents were asked to indicate their responses from the above sections using a five point likert scale. Likert type scale was developed as a five point bipolar response format and was found ideal in this study.

3.5.2 Interview Schedule for Technical Institute Principals.

The second research instrument used was the Principals' Interview Schedule (see appendix 2). This was a structured interview schedule employed to seek the views of the selected technical institute Principals from the sampled TTI's. The interviews were informally conducted using a set of structured questions. The interview schedule contained ten questions (see appendix II). These questions focused attention on the following areas of the study: teacher's possession of key competencies relevant for technical education, perceptions of teachers' knowledge and skills levels, challenges facing TVET, and suggested policies to be put in place for effective TVET.

Questionnaires and the interview schedule were used since, according to Kasomo (2003), most techniques for measuring perceptions and attitude rely heavily on verbal material in the form of interviews and questionnaires. Prior to them being administered, the instruments were scrutinized by experts on technical and vocational education. Based on their comments, some items were re-worded, while others were modified to eliminate any ambiguity.

3.6 Pilot study

To check for the reliability of the study instruments, they (instruments) were pre-tested through a pilot study which was carried out on a sample of 10 subjects drawn from a neighbouring private technical training institution. Pre-testing the measurement instrument was a critical component of minimizing measurement errors in a survey research (Best, 1977). This process helped to determine internal consistency as well as to get feedback on issues such as representativeness of the items for particular constructs, clarity of questions, questionnaire format, clarity of instructions, and specificity of items.

3.7 Reliability and Validity of the Instruments

3.7.1 Reliability of the instrument

Cronbach Alpha was used to provide reliability estimates for the instruments and for likert point items. The items were then considered reliable if they yielded a reliability coefficient of at least 0.70. which is the value considered respectable and desirable (Best, 1977).

3.7.2 Validity of the Instruments.

To determine the validity of the instruments the researcher requested the experts in technical education to examine the instruments for content, and make suggestions and comments which were then used as a basis for modification. The instruments were also be piloted so as to give respondents a chance to point out any ambiguities.

3.8 Data Analysis and Interpretation

Data analysis in a qualitative paradigm requires that the analyst breaks data down into constituent parts to obtain answers to research questions and to test research hypothesis (Kasomo, 2006).

The teacher questionnaire (Appendix 1) was pre-coded according to themes or constructs that have an impact on technical teacher competencies. Pre-coding helped to facilitate data entry and verification after the data had been collected and collated. After the data had been collected, field inventory data for each objective/study population was reviewed. The data was then sorted and analyzed using the Statistical Package for Social Science (SPSS version 15.0).

Frequency distributions were used to present the analysis results of teacher characteristics, teacher perceptions of key competencies and their importance, and Principals' rating of teacher competencies.

Factor analysis was used to reduce data by extracting the knowledge level and skills level factors from the teacher questionnaire items. Independent a samples't' test was then used to test the significance of the mean differences in knowledge and skills competencies between the two groups of teachers. Pearson correlation coefficients were used to investigate the relationship between exposure to equipment and machinery and competency levels.

3.9 Ethical considerations

Ethical considerations in any research should be of utmost importance since the manner in which research is conducted and the findings that are realized both have a direct or indirect consequences to people's lives (Mutchnic and Berg, 1996).

In view of this, the current study ensured total confidentiality of the respondents. In addition, the study sought consent from the would be respondents.

Confidentiality refers to an agreement between persons that limits others access to private information (De Vos, 2002). In this regard, the questionnaires did not have the respondents name with the intention that they would not be identified after filling the questionnaires. Babbie (1990), as quoted in De Vos (2002), states that anonymity means that no one, including the researcher, should be able to identify any subjects afterwards. Informed consent refers to telling potential research participants about all aspects of the research that might reasonably influence their decision to participate (De Vos, 2002). The participants of this study were informed about all aspects of this study throughout the research process.

CHAPTER 4

DATA ANALYSIS AND PRESENTATION

4.0 Introduction

This chapter presents the findings of this study.

A variety of data from the sampled technical education teachers and institutions were used to conduct the study analysis.

a) Self reported data from participating teachers were used in analysis of demographic characteristics of the teachers, teacher perceptions of their knowledge and skills levels, and exposure to training equipment/machines (Teacher self assessment questionnaire).

b) Data from the Principal's interview schedule was used to examine technical teacher practices, use of resources and challenges encountered in the running of technical training programmes.

c) Answers from the focused group discussions were used to examine the curriculum composition of the respective institutions.

4.1 Demographic Characteristics of the Respondents

4.1.1 Age of Respondents

Analysis of data from the teachers self assessment questionnaire pertaining to the participating teachers' age distribution yielded the data presented in table 4.1.

Table 4.1: Distribution of respondents by age

Age bracket	No of teachers	Percentage of teachers
Under 25 years	2	2.6%
25 years - 34 years	27	36.0%
35 years - 44 years	17	22.7%
45 years and above	29	38.7%
Total (n=75)	**75**	**100%**

Source: Teachers Self assessment questionnaire (2011)

Table 4.1 indicates that a large proportion of the sampled teachers were aged above 25 years. Two teachers corresponding to 2.6% of the entire sample were aged less than 25 years. Twenty-seven participating teachers corresponding to 36% were aged

between 25years and 34 years; 17(22.7%) were aged between 35 years and 44 years; while 29 (38.7%) were aged 45 years or above.

4.1.2 Institution in Which Respondents Trained.

An analysis of the teachers self assessment questionnaires pertaining to the institution in which the participating teachers trained produced the data presented in the frequency distribution table shown in table 4.2

Table 4.2. Distribution of Respondents by Institution in which they trained

Institution	No. of respondents	Percentage of respondents
Moi university	28	37.3%
KTTC	45	60.0%
KTTC & Moi University	2	2.7%
Total (n=75)	**75**	**100%**

Source: Teachers self assessment questionnaire (2011)

As shown from table 4.2, 45 (60%) of the participating teachers reported that they trained in KTTC; 28 (37.3%) reported to have trained in Moi University while 2 (2.7%) stated that they trained in both KTTC and Moi University.

These findings tend to suggest that most (60%) of the serving technical education teachers were trained from KTTC.

4.1.3 Respondents' Teaching Field

A cross-tabulation of the teaching field against the institution in which the participating teachers trained in revealed the data presented in table 4.3.

Table 4.3: Distribution of Respondents by teaching field across the institution in which they trained

Institution in which trained	Teaching Field										Total
	MECH		Electrical		Automotive		Building		Other		
	No	%	No	%	No	%	No	%	No	%	
Moi University	6	21.4	4	14.3	14	50	4	14.3	0	0	28
KTTC	11	24.4	2	4.4	15	33.3	13	28.9	4	8.9	45
KTTC & Moi University	0	0	0	0	2	100	0	0	0	0	2
Total	17		6		**31**		**17**				75

Source: Teachers self-assessment questionnaire

As shown from the table, out of the 28 Moi University trained participating teachers, 6(21.4%) majored in mechanical engineering; 4(14.3%) in electrical engineering; 14(50%) in automotive engineering; while 4(14.3%) were in building construction. Out of the 45 teachers who trained in KTTC, 11(24.4%) majored in mechanical engineering; 2(4.4%) in electrical engineering; 15(33.3%) in automotive engineering; 13(28.9%) in building and construction; while 4(8.9%) majored in other technical fields such as entrepreneurship. The two participating teachers who trained in both the two institutions majored in automotive engineering.

Analysis of teaching field by the institution trained does not indicate any discernible difference in the fields of training offered. Thus, both institutions appeared to offer similar areas of specialization. Furthermore, there is no clear trend of training filed preference which implies that choice of field of specialization is independent of the institution in which one trained.

4.1.4 Respondents' Teaching Experience

Table 4.4 summarizes difference in teaching experience over the institutions of training reported. An examination of the differences indicate that out of the 28 participating teachers who trained in Moi University, 12(42.9%) had been teaching for less than 5 years; 2(7.1%) had been teaching for between 5 and 10 years; while 14(50%) had been teaching for between 11 and 20 years. None of the teachers had been teaching for over 20 years. On the contrary, out of the 45 participants who

trained in KTTC, 9(20%) had been teaching for less than 5 years; 3 (6.7%) had been teaching for between 5 and 10 years; 8(17.8%) had been teaching for between 11 and 20 years, while 25 (55.6%) had been teaching for over 20 years. The two participants who trained in both KTTC and Moi University had been teaching for less than 5 years.

Table4.4. Distribution of Respondents teaching experience across the institution in which they trained

Institution trained in	Teaching Experience								Total
	Less than 5 years		5-10 years		11-20 years		Over 20 years		
	No	%	No	%	No	%	No	%	
Moi University	12	42.9	2	7.1	14	50	0.0	0.0	28
KTTC	9	20	3	6.7	8	17.8	25	55.6	45
KTTC & Moi University	2	100	0.0	0.0	0.0	0.0	0.0	0.0	2
Total	23		5		22		25		75

Source: Teachers self-assessment questionnaire

Analysis of the data pertaining to teaching experience suggests that most of the teachers trained in KTTC had an experience of over 20 years. This could be expected given that for a long time, KTTC was the only institution training technical education teachers.

4.2 Technical Education Curriculum Offered in Moi University and KTTC

An analysis of data from the focused group discussion pertaining to the technical education curriculum offered in Moi University vis a vis KTTC revealed the data presented in the matrix shown in table 4.5

Table 4.5: Comparison of KTTC and Moi University Technical Education Curricula

Curriculum Aspect	KTTC	Moi University
Course duration	3-4 years	4 years
Course Content	Communication skills	Communication skills
	Curriculum development	Curriculum development
	Educational administration	Educational administration & management
	Entrepreneurship education	Entrepreneurship education
	History of education	History of education
	Introduction to computers	Computer applications
	Mathematics	Engineering mathematics
	Research methods	Research methods
	Philosophy of education	Philosophy of education
	Comparative education	Sociology education/Comparative education
	Technical drawing	Technical drawing
	General methods	General educational psychology
	Sociology of education	Environmental education
	Tests & measurements	General methods
	Life skills	Human behaviour and learning
	Trade projects	Introduction to technology education
		State, society & development

Source: focused group discussion

As shown from the matrix, the curriculum for KTTC is designed to cover 3-4 years while that of Moi University is designed to cover 4 years. The general education courses are relatively similar in both institutions, but differ mainly in depth of units and a few additional content areas such as state, society & development which is offered in Moi University but not in KTTC.

The results show that there is no major difference in the education curricula for the two institutions except in depth of the units.

4.3 Key Competence's Relevant to Technical Education Teachers

Analysis of data from the teachers' self-assessment questionnaire pertaining to teacher perception of key competencies and their importance revealed the data presented in table 4.6

Table 4.6: Teacher Perceptions of Key Competencies and Their Importance.

Respondents response	Communication competency		Cultural competency		Information competency		Intellectual/ Pedagogical competency		Subject area competency	
	No	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
Not important	6	8	4	5.3	2	2.7	2	2.7	2	2.7
Less than average	2	2.7	12	16.0	4	5.3	2	2.7	0	0.0
Average importance	8	10.7	30	40.0	8	10.7	8	10.7	7	9.3
More than average importance	12	16.0	22	29.3	34	45.3	25	33.3	15	20.0
Essential importance	47	62.7	7	9.3	23	30.7	34	45.3	47	62.7
Total (n=75)	**75**	**100**	**75**	**100**	**71**	**94.7**	**71**	**94.7**	**71**	**94.7**

Source: Teacher's Self-Perception questionnaire

As shown in the table, all the questionnaires pertaining to communication and cultural competencies were returned. In the case of information, intellectual/pedagogical and subject area competency, 94.7% of the questionnaires were returned. This was well above an acceptable response threshold of 80%.

Out of the 75 teachers who respondent on communication competency, 12(16.0%) rated it as more than of average importance while 47 (62.7%) rated it as of essential importance. Only 8(10.7%) rated it as of less than average or no importance. Out of the 75 teachers who responded on cultural competency, 30 (40.0%) rated it as of average or of no importance. The remaining 29 teachers (38.6%) rated it as of more than average or essential importance.

In the case of information competency, out of the 71 teachers who responded, a total of 57 (76%) rated it as of more than average or essential importance. Only 6(8.0%) rated it as of less than average or of no importance. Regarding intellectual/pedagogical competency, 34 teachers corresponding to 4.3% rated it as of essential importance; 25 (33.3%) rated it as of more than average importance. Only 4 teachers (3.4%) rated it of less than average or no importance. Concerning the subject area competency, 47 (62.7%) of the 71 teachers who responded rated it as of essential importance; 15 (20%) rated it as of more than average importance. Only 2(2.7%) of the teachers rated it as of no importance.

From these results, five key competencies stood out as relevant to technical education teachers. On the basis of ranking based on essential importance, subject area competency and communication competency were identified as being equally essential. They were closely followed by intellectual/pedagogical competency an information competency in that order. A majority of the sampled teachers identified cultural competency as not being very essential.

4.4 Rating of Technical Teacher Competencies by the Principals

Analysis of data from the interview schedule for principal's comparing technical teachers' competencies revealed the data presented in Table 4.7

Table 4.7: Distribution of the Principals by the rating of technical teacher competencies

Competency		Principals Rating								Total
		Excellent		Good		Fair		Poor		
		No	%	No	%	No	%	No	%	
Knowledge of research- based strategies	Diploma	0	0.0	3	37.5	5	62.5	0	0.0	8
	Graduate	2	25	6	75.0	0	0.0	0	0.0	8
Theories and factors affecting learning	Diploma	2	25	4	50	2	25	0	0	8
	Graduate	2	25	5	62.5	1	12.5	0	0	8
Ability to collaborate with colleagues	Diploma	2	25	4	50	2	25	0	0	8
	Graduate	4	50	1	12.5	3	37.5	0	0	8
A variety of Technical tools	Diploma	0	0	3	37.5	3	37.5	2	25	8
	Graduate	1	12.5	4	50	2	25	1	12.5	8
Implementation of Technology experiences	Diploma	1	12.5	5	62.5	3	37.5	0	0	8
	Graduate	3	37.5	1	12.5	0	0	0	0	8
Planning and designing Practical activities	Diploma	4	50	4	50	0	0	0	0	8
	Graduate	3	37.5	4	50	1	12.5	0	0	8
Mentoring, coaching Consulting skills graduate	Diploma	1	12.5	4	50	3	37.5	0	0	8
	Graduate	1	12.5	7		0	0	0	0	8

Source: Interview Schedule for Principals.

As shown in the table, out of the expected 10 principals, 8 corresponding to 80% availed themselves for the interview. The 8 principals rated their teachers as follows: Regarding knowledge of appropriate research based strategies and instructional methods, none of the principals rated diploma teachers as excellent whereas 2(25%) rated graduate teachers as excellent; 3(37.5%) rated diploma teachers as good while 6(75%) rated graduate teachers as good; 5(62.5%) rated diploma teachers as fair while none rated graduate teachers as fair. On the basis of these ratings, it would appear that

graduate technical teachers are perceived to have better knowledge of appropriate research-based strategies and instructional methods than the diploma technical teachers.

Regarding knowledge of theories and factors affecting learning, 2(25%) rated diploma teachers as excellent while 2((25%) also rated graduate teachers as excellent; 4(50%) rated diploma teachers as good while 5(62.5%) rated graduate teachers as good; 2(25%) rated diploma teachers as fair while 1(12.5%) rated graduate teachers as fair. These ratings indicate that the principals perceive graduate and diploma technical teachers to have comparably similar knowledge on theories and factors affecting learning in technical disciplines.

In the case of ability to collaborate with colleagues to link student needs and abilities with appropriate technologies, 2(25%) of the principals rated diploma teachers as being excellent while 4(50%) rated graduate teachers as excellent; 4(50%) rated diploma teachers as good while 1(25%) rated graduate teachers as good, 2(25%) rated diploma teachers as fair while 3(37.5%) rated graduate teachers as fair. These ratings indicate high level of collaboration among the teachers. Furthermore the collaboration does not really depend on whether the teacher is of diploma or graduate level.

Regarding knowledge of a variety of technical tools, including assistive and instructional technologies, 1(12.5%) principal rated graduate teachers as excellent while none rated diploma teachers as excellent; 3(37.5%) rated diploma teachers as good while 4(50%) rated graduate teachers as good; 3(3.5) rated diploma teachers as fair while 2(25.0) rated graduate teachers as fair; 2(25%) rated diploma teachers as poor while 1(12.5%) rated graduate teachers as poor. On the basis of these ratings, it is noted that principals perceive graduate technical teachers to have a better knowledge of a variety of tools compared to the diploma technical teachers.

Regarding implementation of technology enhanced learning experiences, 1(12.5%) principal rated diploma teachers as excellent while 3(37.5%) rated graduate teachers as excellent; 4(50%) rated diploma teachers as good while 5(62.5%) rated graduate teachers as good; 3(37.5%) rated diploma teachers as fair while none rated graduate teachers as fair. These ratings imply that the sampled principals perceived both

diploma and graduate technical teachers' as having the ability to implement appropriate learning experiences that use technology enhanced instructional strategies.

As for the ability to plan and design practical activities that are accessible to students with diverse needs and abilities, 4 principals corresponding to 50% rated diploma teachers as excellent while 3 principals rated graduate teachers as excellent; 4(50%) each rated both diploma and graduate teachers as good. These ratings show that the principals perceived the abilities to plan and design practical activities as being high among the technical education teachers irrespective of whether diploma or graduate.

Regarding mentoring, coaching and consulting skills, 5 principals corresponding to 62.5% rated diploma teachers as being good or excellent while all the 8 principals rated graduate teachers as being good or excellent. These ratings indicate that there is not much difference in the two groups of teachers regarding the ability to use mentoring, coaching and consulting skills and strategies to facilitate team building for promoting student and teacher use of technology in the teaching and learning environment.

4.5 Comparison of the perceptions of knowledge and skills level between KTTC trained and Moi University trained technical teachers.

Factor analysis using SPSS 15.0 was used to extract factors from the 38 items targeting knowledge and skills competencies in the teachers self assessment questionnaire. By employing the principal component analysis as the extraction method and varimax rotation, four factors each for knowledge and skills levels were extracted from the 38 items. After reviewing the results extracted from factor analysis, the four knowledge level factors were labelled as follows: knowledge of students, knowledge of content, knowledge of learning environment, and knowledge of subject matter. Similarly, the four skills level factors were labelled as follows: - confidence on reflective practices; confidence in collaborative practices; confidence in workplace readiness; and confidence on life skills. The description of each factor and some selected statements under each factor are listed in table 4.8 and 4.9 respectively.

Tahlc4.8 Internal consistency reliability (Cronbach Alpha Coefficient) and factor loadings for instrument (knowledge factors).

Factors extracted	Factor description	Loadings	Cronbach Alpha
I. Knowledge of students • Taking care of individual differences • Improving teacher-student relation • Building mutual respect among students	Using knowledge of students to address their needs	0.61 0.74 0.80	0.90
2. Knowledge of content/instructional resources • Choosing appropriate strategies for teaching particular topics. • Promote learning of critical concepts • Giving a variety of activities to practice skills • Acquiring appropriate teaching materials.	Applying appropriate class/workshop practices	0.65 0.53 0.61 0.63	0.86
3. Knowledge of learning environment • Showing care and concern to students • Managing students with behavioural and learning problems. • Managing student discipline	Managing student behaviour and discipline	0.50 0.73 0.57	0.85
4. Knowledge of subject matter • Planning lessons that take into account the different abilities of students. • Motivating students • Designing assessment tools	Understand the subject-specific and programme specific knowledge to be taught.	0.72 0.65 0.38	0.77

Source: Teachers self- assessment questionnaire

Table 4.9: Internal consistency reliability (Cronbach Alpha Coefficient) and factor loadings for instrument (skills factors)

1. Confidence on reflective practice • Detect the strengths and weaknesses of students in the learning situation • Believe in continual program improvement • Recognize responsibility in engaging and supporting appropriate professional practices	Professional development initiative	0.64 0.73 0.82	0.89
2. Confidence in collaborative practices • Value collaboration • Recognizing the value of professional organizations within the teaching area • Value ideas, opinions, and perception of business and industry.	Professional development and outreach	0.65 0.53 0.63	0.87
3. Confidence in workplace readiness • Believe in current work experiences as an educational tool. • Recognize the importance of understanding work ethics. • Being sensitive to the impact of trends and issues on the workplace.	Life skill preparation	0.60 0.70 0.63	0.81
4. Confidence on life skills • Believe in the need for cultural awareness • Believe that high self-esteem and self-awareness are important to learning. • Introduce students to resources for lifelong training experiences.	Acquisition of life skills	0.50 0.73 0.57	0.85

Source: Teachers self- assessment questionnaire

As shown in the tables. Cronbach alphas for all the eight factors ranged from 0.77 to 0.90. The alpha values showed that all the eight factors extracted are fairly reliable as an alpha level of higher than 0.70 is acceptable in most social science research, hence the data reported in table 4.7 and 4.8 show that the instrument created using the 38

selected items is a reliable one for assessing the teacher's self assessment of the level of their knowledge and skills in pedagogy and classroom management.

4.6 Comparison of knowledge level competency means based on extracted factors

On the basis of the extracted factors, independent samples' t'tests were conducted to compare the means of each factor between the KTTC trained and Moi University trained technical teachers. This data analysis would help to achieve the third research objective of this study: to compare the perceptions of knowledge level between KTTC trained and Moi University trained technical education teachers.

Table 4.10: Independent sample T-test Composition of means of the four extracted factors on knowledge level competencies between Moi university trained and KTTC trained technical education teachers ('Statistical significant at P<0.05 level).

Extracted factors	Means for Moi University	Means for KTTC	t	P-value
Knowledge of students	3.83	3.76	0.510	0.612
Content and instructional resources	3.92	3.56	3.429	<0.05*
Learning environment	3.93	3.94	-0.085	0.932
Subject matter	3.90	3.94	-0.311	0.757

Source: Teachers Self assessment questionnaire

As shown from the table, a comparison of the means of the four factors between the Moi University trained and KTTC trained teachers show slight differences except for content and instructional resources in which the mean for Moi University trained technical teachers was 3.92 while that for KTTC trained technical teachers was 3.56. The independent samples't'test showed that this difference was statistically significant (p-value<0.05).

These results imply that both the Moi University trained and KTTC trained technical education teachers do not perceive any difference in most of the knowledge level competencies except for knowledge in content and instructional resources.

4.7 Comparison of skill level competencies means based on the extracted factors.

Using the extracted factors, independent samples 't' tests were also conducted to compare the means of each of the skill factor between the KTTC trained and Moi University trained technical teachers. This data analysis would help to achieve the fourth research objective of this study to compare the perceptions of skills level competencies between KTTC trained and Moi University trained technical education teachers. Table 4.11 presents the results of this analysis.

Table4.11: Independent samples t-test comparison of means of the four extracted factors on skills levels competencies between Moi University trained and KTTC trained technical education teachers ('statistically significant of P<0.05 level).

Extracted factors	Means for Moi university	Means for KTTC	t	p-value
Reflective practice	3.857	3.927	-0.526	0.600
Collaborative practice	3.786	4.098	-2.029	<0.05*
Work place readiness	3.800	3.805	-0.037	0.971
Life skills	3.671	3.849	-1.178	0.243

Source: Teachers self assessment questionnaire

As shown in the table, a comparison of the means of the four skills factors between the Moi University trained and the KTTC trained technical education teachers show very slight differences a part from the case of collaborative practice for which the mean of the Moi trained teachers was 3.786 while that of the KTTC trained teachers was 4.098. The independent samples 't'-test showed that this difference was statistically significant (P-value<0.05).

These results indicate that as in the case of knowledge level competencies, the Moi University trained and the KTTC trained Technical education teachers do not vary much in their skills level competencies. However, the results seem to suggest that

there is a higher collaborative practice among the KTTC trained teachers as compared to teachers trained at Moi University.

4.8 The influence of training equipment/machinery on technical teacher competencies.

To establish the influence of training equipment/machinery on technical teacher competencies, a correlation analysis of teacher perception of exposure to equipment/machinery on knowledge and skills level competencies was performed.

4.9 The influence of training equipment/machinery on knowledge level competencies.

Table4.12 presents the correlation results of teacher perception of exposure to equipment/machinery on knowledge level competencies.

Table4.12: Teacher perceptions of exposure to equipment/machinery and knowledge level competencies. (Statistical significant at 0.05 level).

Independent variable	Dependent variable	Correlation coefficient	P-value
Teacher perception of exposure to equipment/machinery	Knowledge level competencies	0.886	<0.05

Source: Teachers self assessment questionnaire

The results indicate a highly significant relationship between teacher perception of exposure to equipment/machinery and knowledge level competencies ($r=0.886$, $p<0.05$). Thus the results suggest that teachers perceive that a high exposure to equipment/machinery results in high levels of knowledge level competencies and vice versa.

4.10 The influence of training equipment/machinery on skills level competencies.

Table 4.13 presents the results of the correlation analysis of teacher perception of exposure to equipment/machinery and skills level competencies.

Table4.13: Teacher perceptions of exposure to equipment/machinery and skills level competencies (Statistically significant at 0.05 level).

Independent variable	Dependent variable	Correlation coefficient	P-value
Teacher perception of exposure to equipment/machinery	Skills level competencies	0.599	<0.05

Source: Teachers self assessment questionnaire

As shown from the table, there is a highly significant relationship between teacher perception of exposure to equipment/machinery and skills level competencies ($r=0.599, p<0.05$). Thus the results suggest that when teachers perceive a high exposure to equipment/machinery, they are likely to have high levels of skills competencies and vice versa.

4.11 Challenges Facing Technical Education Teachers

Figure4.1 presents the challenges facing technical education in Kenya.

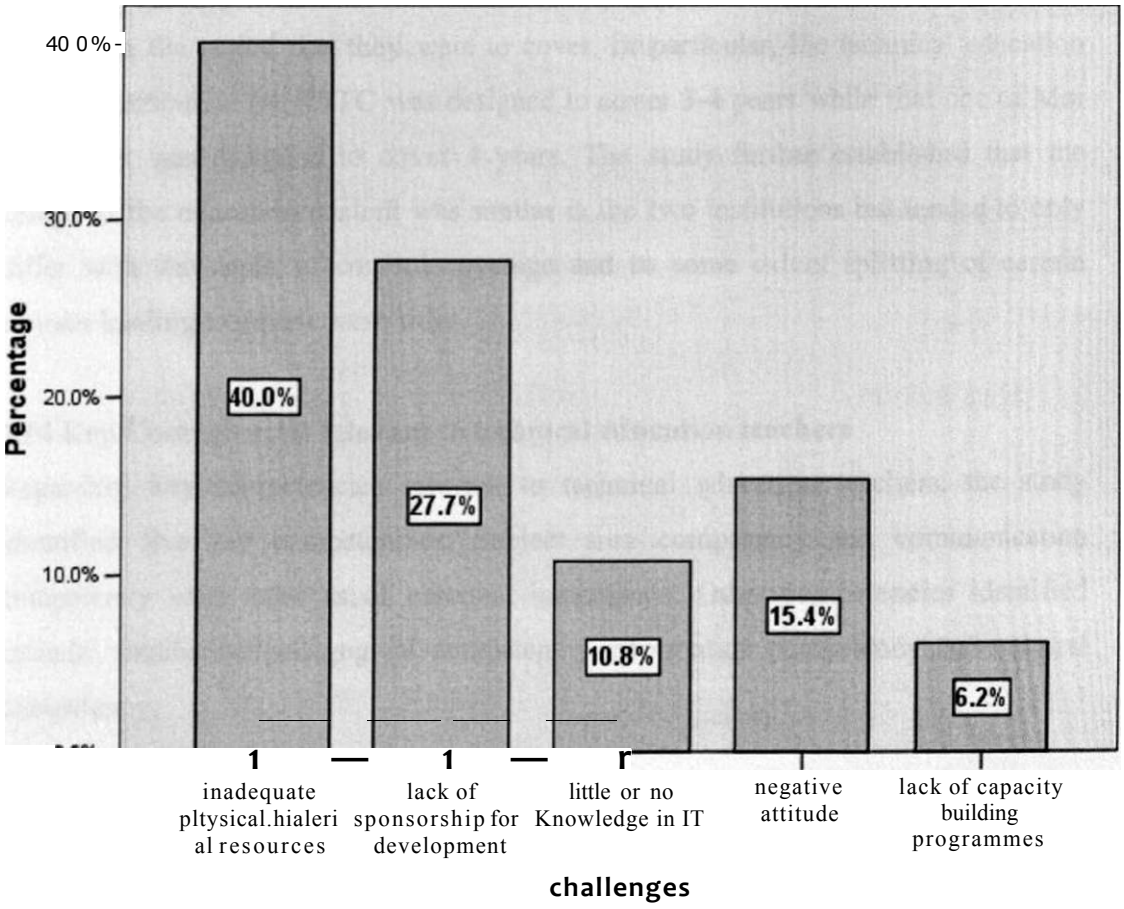


Fig.4.1: Challenges facing technical education teachers

As shown in the figure, 40% of the sampled teachers identified inadequate physical/material resources as the major challenge facing technical education teachers in Kenya. This was followed with lack of sponsorship for self development as reported by 27.7% of the sampled teachers. Other notable challenges were: negative attitude towards technical training (15.4%); little or lack of knowledge in IT (10.8%); and lack of capacity building programmes (6.2%). These results imply that other than the competency challenges, there exist other infrastructural challenges that technical education teachers encounter in their operations.

4.12 Summary of the findings

The purpose of this study was to compare technical education teachers' competencies. In retrospect, the following findings were made.

4.13 Technical Education teacher Curricula

The study established that the technical teacher curricula between the two institutions differed in the period that they were to cover. In particular, the technical education teacher curriculum for KTTC was designed to cover 3-4 years while that one of Moi University was designed to cover 4 years. The study further established that the design of the education content was similar in the two institutions but tended to only differ with the depth of content coverage and to some extent splitting of certain courses leading to other course titles.

4.14 Key Competencies relevant to technical education teachers

Regarding key competencies relevant to technical education teachers, the study identified five key competencies. Subject area competency and communication competency were rated as of essential importance. Other competencies identified include: intellectual/pedagogical competency, information competency and cultural competency.

4.15 Comparison of Knowledge and Skills competencies of the KTTC trained and Moi University trained technical education teachers

Regarding knowledge and skills competencies, the study established that there was no significant difference in knowledge level competencies between the two groups of technical education teachers except for knowledge in content and instructional resources, for which the Moi University trained technical teachers tended to score higher.

The study established that there were no significant differences in most of the skills level competencies between the two groups of teachers except for collaborative practice for which the KTTC trained technical teachers faired better than the Moi University- trained technical teachers.

4.16 The Influence of training equipment/machinery on technical teacher competencies

Regarding the influence of training equipment/machinery on technical teacher competencies, the study established that there was a highly significant positive correlation between teacher perception of exposure to equipment/machinery and knowledge level competencies. The high value of the correlation coefficient indicates that the influence of training equipment/machinery on technical teacher knowledge level competencies is high. The study further established that there was also a highly significant positive correlation between teacher exposure to equipment/machinery and skills level competencies.

4.17 Challenges facing technical education teachers

The study established that other than the competency challenges, technical education teachers also face other infrastructural and developmental challenges. These challenges include; inadequate physical/material resources; lack of sponsorship for personal development, negative attitude towards technical education, little or no knowledge in IT and lack of capacity building programmes.

CHAPTER 5

DISCUSSION, CONCLUSIONS AND RECOMMEDATIONS

5.0 Introduction

This chapter discusses the study findings thematicaliy in line with the objectives and in reference to existing literature, conclusions are drawn on the basis of the findings and recommendations made thereof. In retrospect, the following objectives were used

- To compare the technical education curricular offered at KTTC with that offered at Moi University
- To identify the key competencies relevant to technical education teachers
- To compare the knowledge and skills competencies of Moi University trained and KTTC trained technical education teachers.
- To investigate the influence of training equipment/machinery on technical teacher competencies.
- To assess the challenges facing technical education teachers in Kenya.

5.1 Discussion of the findings

5.1.1 Technical education teacher curricula

The findings that the technical education teacher curricula between the two institutions differed in the period that they were to cover reflects the qualifications expected on completion of the course in the respective institutions. The KTTC curriculum comprised of either a 3-year diploma in industrial teacher education or a 4-year diploma in technical teacher education. On the contrary, the Moi University curriculum is a 4-vear Bachelor of Education in technology degree programme.

Furthermore, the finding that the design of educational content was similar is consistent with the pedagogical requirement of teacher education. Besides, technology education is a field of study that seeks to promote technological literacy for all students irrespective of the institution. These findings are consistent with the observations of Wright and Lauda (1993), that technology education as a programme is designed to help students "develop an understanding and competence in designing, producing and using technological products and systems and in assessing the

appropriateness of technological actions". Consequently, the processes associated with technology should then be the key elements in the technical education curriculum. Sanders (2001) concur by contending that solving problems in the context of technological systems has been identified as a key aspect of the curriculum commonly associated with technology education.

5.1.2 Key competencies relevant to technical education teachers

The finding in this study that among key competencies relevant to technical education teachers include subject area competency; communications competency, information and cultural competencies is consistent with the views for Hillage and Pollard (1998), that employability refers to an individual's capability to move self sufficiently in the labour market through knowledge, skills and attitudes which they possess, the way they use these assets and communicate them to employers and application of these qualities in the variable contexts within which they seek to work.

This finding is further supported by others (e.g. Gudmunsdottir 1990; Wilson and Wineburg 1988; Hashweh 1987; Lenihard and Smith 1986), who have shown that the level and quality of knowledge of the subjects substantive (concepts) and syntactical (methods) structure have an impact on how teachers present their material to their students in particular with regard to didactic planning and content selection. They further note that teachers whose original training is least related to the content they are required to teach are also those that tend to follow textbooks most slavishly. Reynolds et al (1988) also reported similar results, stating that teachers with the soundest backgrounds in their subjects are also the most likely to distance themselves from textbook content structures and adopt the most flexible approaches. Hashweh (1987) on his part, showed that the teacher's knowledge of the subject may have an impact on the quality of the examples used and the explanations given, and on the teacher's critical attitude to the basic textbook.

The finding regarding the need for communication competency is supported by Ouellon and Dolbec (1999), who observed that all future teachers, including those who hope eventually to teach in the vocational stream, must therefore, be able to express themselves well both orally and in writing. They contend that good quality language is language that gives access to all facets of knowledge and to the broadest

possible range of communication opportunities, language that allows individuals to express their thoughts clearly and add shades of meaning, both orally and in writing.

5.1.3 Comparison of knowledge and skills competencies of the KTTC trained and Moi University trained technical education teachers.

The findings that there are no significant differences in the knowledge and skills level competencies between the KTTC trained and Moi University trained technical education teachers reflects the expectations of emerging concepts in the field of TVET such as competency based training and employability which expect TVET to enable employees to prove themselves to have requisite competencies. As observed by Zimnyaya (2003), changing technological advancement calls for diversification of methods of developing competencies in all institutions of technology. This finding is also consistent with the observations of Wright and Lauda (1993), who argued that technology education as a programme should be designed to help students develop an understanding and competence in designing, producing and using technological products and systems.

This, in essence, means that the expected knowledge and skills competencies for TVET teacher should not depend on the training institution, rather on the designed curricula. This finding is however contrary to the findings of Jameson et al (2005), that the physical environment has an influence on student's social and scholastic behaviour. It is however noted that behaviour may not be inclusive of competency. Temple (2007) confirms this view in demonstrating that any connections between the learning environment and educational activities lack firm evidence. Cutshell (2003) holds the same view by contending that issues of facility planning for technical institutions are not markedly different.

5.1.4 The influence of training equipment/machinery on technical teacher competencies.

The finding that there was a positive correlation between technical education teachers exposure to equipment/machinery and knowledge and skills competencies is consistent with the observations of Cutshell (2003) that in technical institutions, instructional rooms and space design tend to be driven by the highly specialized equipment, furnishings, machinery and tools needed to properly instruct students.

Wolff (2002) concurs by noting that TVET facility planning necessitates flexible design with considerations for the future and accompanying changes to pedagogical approaches. The findings further support the findings of Jameson (2000) that the physical environment was likely to influence how the teacher constructed activities. Worthington (2007) and Wolf (2002) support this idea by contending that specialized or defined space provides a setting for students to develop a critical thinking and problem solving abilities, practice pertinent skills and gain hands-on experience with industry equipment. Cutshell (2003) adds that Labs and Workshops that stimulate actual work settings can contribute to student achievement, and it is this physical environment that will properly prepare students for employment. Jameson et al (2001) supports this notion by asserting that arranging teacher offices and student learning areas in close proximity promotes collaborations, so that students can easily interact and engage with teachers.

The findings are further supported by IMF (2001), that new technologies are knowledge and skills intensive and there is need to train people to work with those technologies. JISC (2006) supports these views by adding that for vocational studies the exposure to and experience with modern and advanced technologies easily translates into marketable skills when entering the labour force. Besides, the inclusion of learning technologies will supplement the students experience by giving direct access to broad resources, diversity skills and develop one's adaptability and creativity. Temple (2007) adds to the existing literature by observing that trainers and instructors need to remain proficient in the latest trends, methods and equipment for both digital and mechanical technologies. Kerre (2010) supports the views by noting that due to increased technological innovations and the demand for higher education and skills in the modern work place, much more is demanded of a trained technical teacher today that ever before.

5.2 Conclusion

In view of the research findings it is concluded that technical teacher education is offered at both diploma and degree levels with the diploma level taking a period of three to four years, while the degree level takes a period of four years. The curricular for both diploma and degree levels are relatively the same, particularly with regard to the pedagogical requirements, and differs only in the depth of the content covered.

Subject area and communications competencies are the key competencies relevant to the technical education teacher. However, intellectual/pedagogical, information and cultural competencies are also necessary for technical education teachers. Knowledge and skills level competencies are not significantly different among the KTTC and Moi University trained technical teachers. Observed differences in the two groups of teachers may be due to the available infrastructure in the respective institutions. This is, however, contrary the general feeling that the technical teachers from Moi University appear to lack knowledge and skills to handle their core technical subjects they trained to teach.

Exposure to training equipment/machinery has a direct influence on knowledge and skills level competencies and may lead to observed differences in competencies between the KTTC trained and Moi trained technical education teachers. Other than the major challenge of knowledge and skills competencies, technical education teachers constantly encounter challenges of inadequate physical/material resources during their instruction. Lack of sponsorship has meant that these teachers hardly undertake personal development and therefore continue to lag behind in the appropriate classroom practices. The negative attitude directed to vocational training continues to be a challenge to TVET programmes and teachers.

5.3 Recommendations

Based on the above findings and conclusions, the researcher recommends the following;

(a) Provision of adequate physical equipment/machinery to the technical training institutions so as to address the challenge of lack of modern training resources.

(b) Enhance sponsored capacity buildings programmes that may equip technical education teachers with latest technological innovations and appropriate classroom practices.

(c) Increase employment opportunities for technical institution trainees so that the publics attitude towards vocational training can improve.

(d) Embrace stakeholders to promote effective use of ICT infrastructure in technical education. Encourage use of computing software such as CAD, CAM etc.

5.4 Suggestions for Further Study

Issues emerging in technical and vocational training are many and may not be covered in one single study. Further studies are therefore suggested to be carried out in the following areas;

(a) The role of the industrial attachment on technical education trainee competency

(b) The impact of stakeholders on the sustainability of the technical education institution.

(c) To investigate the predictor variables for successful implementation of TVET programmes.

BIBLIOGRAPHY

AMA Alexi Marmot Associates and haa design (2006). Spaces for learning: a review of learning spaces in further and higher education. AMA Alexi Marmot Associates, London.

Ashton, D. & Green, F. (1999). Education, Training and the Global Economy: Cheltenham; Edward Elgat.

Authors' Guide. Themes in the Study of the Foundations of Education. Nairobi: The Jomo Kenyatta Foundation, (2006).

Bennell, P. (1993). The Cost-effectiveness of alternative training needs: engineering artisans in Zimbabwe. In Comparative Education Review, VOL. 37, No.4. Chicago: University of Chicago.

Best, J. W. (1981). Research in Education (4th edn). Englewood Cliffs, New Jersey: Prentice Hall.

Cutshall, S. (2003). Building 21st Century Schools: Designing Smarter, Sleeker Higher Tech Facilities. Techniques, Vol.78, No. 3. Association for Career and Technical Education, Virginia.

Dane, J. And Lippman, P. (2005). Moving beyond the classroom: Accommodating the Changing Pedagogy for Higher Education. Referred Proceedings of AAIR 2005 Forum, Australasian Association for Institutional Research, Victoria.

De Vos As (ed) (2002). Research at grassroots: a primer for the caring professionals. Pretoria, J L Van Schank.

Fraenkel, J. R. and Wallen, N. E. (4th Edn). How to Design and Evaluate Research in Education. McGraw Hill.

Hashweh, M.Z. (1985). An explanatory study of teacher knowledge and teaching: The effects of Science Teachers. Knowledge of subject matter and their conceptions of learning on their teaching. Stanford University, Stanford.

http://unesdoc.unesco.org/images/0012/001260/126Q50e.pdf

http://www.academic journals.org/ijsa/.../kasomo2 pdf.pdf

Ister, R. (2008). 'School house architecture: The response to Social Change'. School Buildings- The State of Affairs: A new architecture for a new education.MIT Exhibit Opening and Symposium, Boston.

Jameson, P. et al (2000). Place and Space in the Design of New Learning Environments.
Higher Education Research and Development, Vol. 19, No. 2, Rontledge Taylor & Francis Group, London.

JICA, (2006). Vocational and Industrial Human Resource Development Through TVET in Africa: Changing Assistance Environments and Demands Needs, National Graduate

Institute for Policy Studies. http://info.\vorldbank.org/etools/docs/library/.../btvet%20 delivery pdf

Kasomo, D. (2007). Research methods in humanities and education. Eldoret: Zapf Chancery research Consultants and Publishers.

Kasomo, D. W. (2006). Statistics in Humanities and Education.

Kerlinger, F. N. (1986). Foundations of Behavioural Research (3rd ed). Fort Worth, TX Holt,
Rimehart and Winston.

Kerre, B. W. (2010). Technical and Vocational Education and Training (TVET): A Strategy for National Sustainable Development. Eldoret: Moi University Press.

Kombo, D. K. and Tromp. D. L. A. (2006). Proposal and Thesis Writing: An Introduction. Nairobi: Paulines Publications Africa.

Mugenda, O. M. and Mugenda, A. G. (2003). Research Methods: Quantitative and Qualitative Approaches. Nairobi: Acts Press.

Mungatu, F. K. (2001). An analysis of Girls' and Teachers' Attitudes Towards Girls' Participation In Industrial Education: A Case Study of Eldoret and Nakuru Municipalities- Kenya. Eldoret: Moi University, M. A.Thesis, Unpublished.

Mutchinc, R. J. And Berg (1996). Research Methods for the Social Sciences: Practice and
Applications. Boston, Allyn and Bacon.

Nafukho, F. M., 'Reforms in Education and Training Curriculum as a Strategic Approach to
Workforce Development Competencies in Kenya.' A Chapter in Innovations in Career and Technical Education, by King, K. P.

Netherlands Ministry of Foreign Affairs (Development Cooperation Division). September
2009. Knowhow for Skills: Reference document for Dutch Embassies in Supporting Skills Development & Technical and Vocational Education and Training (TVET) in Partner Countries, The Hague.

O'Conor, D. And Lunati, M. R. (2008). Economic Opening and the Demand for Skills in
Developing Countries: A Review of Theory and Evidence, OECD, Paris.

Ostroff, T. (2005). Changing the Image of Technical Education Through Design: Connecticuts Antinozzi Associates gives schools new self-respect. AI Architect, The American Institute of Architects, Washington D C.

Prakashan, W. (2003). Research Methodology. New Delhi: New Age International Publishers Limited.

Republic of Kenya. Kenya Education Commission Report: Part I. (1964) Nairobi: Government Printer.

Republic of Kenya. Kenya Education Commission Report: Part II. (1965) Nairobi: Government Printer.

Republic of Kenya. Ministry of Education, Science and Technology. Kenya Education Sector Support Programme 2005-2010. (2005). Nairobi: Government Printer.

Republic of Kenya. Totally Integrated Quality Education and Training (TIQET). Report of the Commission of Inquiry into the Education System of Kenya. (1999). Nairobi: Government Printer.

Reynolds, J. A. Et al (1988). Teachers and curriculum materials: Who is driving whom? Curriculum perspectives 8, no. 1.

Sanders, M. (2001). New Paradigm or Old Wine? The status of teaching technology education practices in the United States. Journal of Technology Education.

Sifuna, D. N. (1976). Vocational Education in Schools. Nairobi: East African Literature Bureau.

Sifuna, D. N. and Otiende, J. E. (2006). An introductory history of education (revised edition). Nairobi: University of Nairobi Press.

Temple, P. (2007). Learning space for the 21st Century: a review of the literature. The Higher Education Academy, London.

UNESCO and ILO (2002). Technical and Vocational Education and Training for the Twenty-first Century; UNESCO and ILO Recommendations, UNESCO-UNEVOC Publications.

Worthington, R. M. "Vocational Education's Role in Defence Preparedness". VOCATIONAL EDUCATION AND DEFENCE PREPAREDNESS SEMINAR PROCEEDINGS. Arlington, VA: American Vocational Association.

Wright. R. T. And Lauda, D. P. (1993). Technology Education- A position statement. The

Technology Teacher.

Wright, S. (2003). Advancing the concept of technology education. Techniques, Vol. 78, No.

3. Association for Career and Technical Education.

Young, M. F. D. (1993). Beyond Vocationalism: a new perspective on the relationship

between work and education. In D. Gleeson (ed), Training and its Alternatives, Milton Keynes: Open University Press.

APPENDIX 1

TEACHER SELF-ASSESSMENT QUESTIONNAIRE

SECTION A: RESPONDENTS DEMOGRAPHIC INFORMATION.

Please answer the following questions by ticking (V) the most appropriate response to you.

1. Age

a) Under 25 years { } b) 25-34 years { }

c) 35-44 years { } d) 45-55 years { }

e) Over 55 years { }

f) In which Institution did you train?

Moi university { } KTTC { }

Other { }

g) Which is your teaching field ?

Mechanical Engineering { } Electrical Engineering { }

Automotive Engineering { } Building Construction { }

Other { }

h) For how long have you been teaching in this field?

Less than 5 years { } 5-10 years { }

11 -20ears { } Over 20 years { }

SECTION B: COMPETENCIES AND TEACHER PERCEPTIONS OF THEIR IMPORTANCE

i) Rank the following competencies according to your perceived level of acquisition

i. Communication
ii. Cultural
iii. Informational
iv. Intellectual and pedagogical
v. Competence in subject area

j) On scale of 1 -5 where;

1 = the competence is not important

2 = the competence is of less than average importance

3 = the competence is of average importance

4 = the competence is of more than average importance

5 = the competence is of essential importance.

Indicate the degree to which you perceive that technical education teachers should possess each of the following competencies.

	1	2	3	4	5
Communication : Ability to communicate and interact in different situations	{}	{}	{}	{}	{}
Cultural: Ability for continuous self-development of personality with regards to assimilation of cultural values.	{}	{}	{}	{}	{}
Informational: Ability to work with information flows and to suggest different ways to work with information flows	{}	{}	{}	{}	{}
Intellectual and pedagogical: Ability to set and solve learning process correctly	{ }	{ }	{ }	{ }	{ }
Competence in subject area : Ability to evolve and grow depending on creativity	{}	{}	{}	{}	{}

SECTION C : TEACHER PERCEPTIONS OF THEIR KNOWLEDGE LEVELS.

On a scale of 1-5 where;

1 = No knowledge at all

2 = Not so knowledgeable

3 = Uncertain

4 = Knowledgeable

5 = Highly knowledgeable

Indicate the degree to which you perceive your knowledge on the following items

1. Knowledge of students	**1**	**2**	**3**	**4**	**5**
a) Learners individual needs { }	{ }	{ }	{ }	{ }	

b) Legal and administrative support services

{ }

available for exceptional need learners

c) Cultural diversity

{ }

d) Various learning styles

{ }

e) A variety of motivational techniques

{ }

f) Strategies appropriate for various learner needs

{ }

2. Content and Instructional Resources

a) Technology

{ }

b) Basic skills and appropriate technology for

{ }

applying mathematical principles

c) Terminology, machinery, tools and materials

{ }

within your area

d) Trends of industry, crafts and trades

{ }

e) A variety of instructional media

{ }

f) A variety of instructional resources

{ }

3. Learning environment

a) Basic human relationships as they relate to

{ }

successful employment

b) Skills in organization and time management

{ }

c) Good work and study habits

{ }

d) Safety regulations at school & work sites { } { } { } { } { }

4. **Subject matter**

a) A variety of assessment and evaluation techniques! } { } { } { } { }

b) A repertoire of teaching strategies and resources { } { } { } { } { }

c) Teaming skills { } { } { } { } { }

d) Applying academic skills in the content area {} {} {} {} {}

e) Techniques of designing instruction {} {} {} {} {}

f) Developing learners' thinking {} {} {} {} {}

and problem-solving skills

SECTION D: TEACHER PERCEPTION OF THEIR SKILLS LEVEL

On scale of 1-5, where;

1 = No confidence at all

2 = Not so certain

3 = Uncertain

4 = Confident

5 = Extremely confident

Indicate the degree to which you perceive your confidence on the following items.

1. Reflective practice	**1**	**2**	**3**	**4**	**5**
a) Using new and changing technology	{ }	{ }	{ }	{ }	{ }

occupational requirements, work etiquette and instructional strategies

b) Evaluative process including methods o f inquiry and problem solving	{ }	{}	{}	{}	{}
c) Using measured learner progress as a means of evaluating programme effectiveness and quality.	{}	{}	{}	{}	{}
2. Collaborative practice					
a) Identifying organizations within your area of specialization	{}	{}	{}	{}	{}
b) Integrating academic skills with applied techniques	{}	{}	{}	{}	{}
c) Sharing ideas and techniques	{}	{}	{}	{}	{}
3. Work place readiness					
a) Maximizing professional skills	{}	{}	{}	{}	{}
b) Applying skills and knowledge required in your area of specialization	{}	{}	{}	{}	{}
c) Providing learners with simulated occupational experiences	{}	{}	{}	{}	{}
d) Using educational professionals, trade Professionals and research to enhance learner understanding of process, knowledge and safety	{}	{}	{}	{}	{}
e) Understanding trends and issues in the work place	{}	{}	{}	{}	{}
4. Life skills					
a) Evaluating cultural diversity and its effect on learner interaction and self esteem	{ }	{ }	{ }	{ }	{ }
b) Applying techniques and strategies which enhance cooperative learning	{}	{}	{}	{}	{}
c) Addressing a variety of family, social, and civic values of the community	{ }	{ }	{ }	{ }	{ }
d) Using strategies that promote self-awareness and an appreciation of diversity	{}	{}	{}	{}	{}
e) Preparing learners to use social skills	{}	{}	{}	{}	{}

SECTION E: TEACHER PERCEPTIONS OF THEIR EXPOSURE TO TRAINING EQUIPMENT/MACHINES

On the scale of 1-5, where

1 = Almost never

2 = Seldom

3 = Some-time

4 = Often

5 = Almost always

Indicate the degree to which you perceive your exposure to the following training equipment/ machines during your training.

During my training, I was able to.	1	2	3	4	5
a) Access a fully equipped and spacious laboratory/workshop	{ }	{ }	{ }	{ }	{ }
b) Use equipments of latest technology	{ }	{ }	{ }	{ }	{ }
c) Use computer aided design(CAD) systems	{ }	{ }	{ }	{ }	{ }
d) Use computer aided manufacturing systems(CAM)	{ }	{ }	{ }	{ }	{ }
e) Use computer numerical control(CNC) systems	{ }	{ }	{ }	{ }	{ }
f) Set up equipments and experiments	{ }	{ }	{ }	{ }	{ }
g) Run computer simulations that test new designs virtually.	{ }	{ }	{ }	{ }	{ }

SECTION F: CHALLENGES EXPERIENCED

Please list some of the challenges that you have experienced in the course of teaching your course

APPENDIX 2

PRINCIPALS' INTERVIEW SCHEDULE DESIGNED TO COMPARE TECHNICAL TEACHERS COMPETENCIES

1. Would you rate your technical teachers' knowledge of appropriate research-based strategies and instructional methods for technical instruction as excellent, good, fair or poor?

   Excellent { } Good { }

   Fair { } Poor { }

   a) If you have both diploma and graduate technical teachers on your staff, how would you compare their knowledge of appropriate research-based strategies and instructional methods?

   b) Please give specific examples

2. Would you rate the teachers' knowledge of theories and factors that affect learning in technical disciplines as excellent, good, fair or poor?

   Excellent { } Good { }

   Fair { } Poor { }

   a) If you have both diploma and graduate technical teachers on your staff, how would you compare their knowledge of theories and factors that affect learning in technical disciplines?

   b) Please give specific examples

3. Would you rate the teachers' ability to collaborate with colleagues to link student needs and abilities with appropriate technologies as excellent, good, fair or poor?

Excellent	{ }	Good	{ }
Fair	{ }	Poor	{ }

a) If you have both diploma and graduate technical teachers on your staff, how do you compare their ability to collaborate with colleagues

b) Please give specific examples

4. Would you rate the teachers' knowledge of a variety of technical tools, including assistive and instructional technologies as excellent, good, fair or poor?

Excellent	{ }	Good	{ }
Fair	{ }	Poor	{ }

c) a) If you have both diploma and graduate technical teachers on your staff, how do you compare their knowledge of a variety of technical tools?

b) Please give specific examples

5. Would you rate the teachers' ability to implement appropriate learning experiences that use technology -enhanced instructional strategies as excellent, good, fair or poor?

Excellent	{ }	Good	{ }
Fair	{ }	Poor	{ }

a) If you have both diploma and graduate technical teachers, how do you compare their ability to implement appropriate learning experiences that use technology -enhanced instructional strategies

a) Please give specific examples

6. Would you rate the teachers' ability to plan and design practical activities that are accessible to students with diverse needs and abilities as Excellent, Good, Fair or Poor?

Excellent	{ }	Good	{ }
Fair	{ }	Poor	{ }

a) If you have both diploma and graduate technical teachers, how do you compare their ability to plan and design practical activities accessible to students with diverse needs and abilities?

b) Please give specific examples

7. Would you rate the teachers' ability to use monitoring, coaching and consulting skills and strategies to facilitate team building for promoting student and teacher use of technology in the teaching and learning environment as Excellent, Good, Fir or poor?

Excellent	{ }	Good	{ }
Fair	{ }	Poor	{ }

a) If you have both diploma and graduate technical teachers on your staff, how do you compare their ability in using monitoring, coaching and consulting skills and strategies?

b) Please give specific examples

8. Would you rate the teachers' ability to promote awareness of and support for technology-enhanced instruction in the learning environment as Excellent, Good, Fair or Poor?

Excellent	{ }	Good	{ }
Fair	{ }	Poor	{ }

a) If you have both diploma and graduate technical teachers on your staff, how do you compare their ability to promote awareness of and support for technology-enhanced instruction

b) Please give specific examples

9. Would you rate the ability of the teachers to work with other teachers , administrators and other stake holders to identify professional development needs, promote support for professional-development programmes and advocate professional-development opportunities as Excellent, Good , Fair or Poor?

Excellent	{ }	Good	{ }
Fair	{ }	Poor	{ }

a) If you have both diploma and graduate technical teachers on your staff, how do you compare their ability to identify professional development needs, promote support for professional-development programmes and advocate professional-development opportunities?

b) Please give specific examples

10. Please list some of the challenges you encounter in running the technical training programmes.

APPENDIX 3

TRANSMITTAL LETTER

Matili Technical Training Institute
P.O Box 76-50204
KIMILILI

The Principal,

Dear Sir.

RE: RESEARCH QUESTIONNAIRE

This is to request you to allow a section of your teaching staff fill the enclosed questionnaire.

The researcher is a master's student of the University of Nairobi (school of education) undertaking research in the training of technical teachers in Kenya.

The researcher will greatly appreciate if the sampled teachers will complete the questionnaire and return it in the enclosed stamped, self-addressed envelope by 30th March 2011. The researcher realizes your schedule is a busy one and that your time is valuable, but is sure that you want to improve the quality of teacher training as he does. Your responses shall be kept completely confidential.

The investigator wants to thank you in advance for your co-operation.
Yours faithfully,

WILSON G C ORONI
E55/P/8661/06

APPENDIX 4

WORK PLAN

S/N	ACTIVITY	TIME	RESPONSIBLE PARTY	EXPECTED OUTCOME	CRITICAL ASSUMPTION
1	Developing research strategy	January 2011	Researcher	Research topic developed	Availability of research funds
2	Developing sampling frame	January 2011	Researcher	Sampling frame	Sampling frame is non-existent
3	Sampling and identification of subjects	February 2011	Researcher	Sample	Sampling frame developed
4	Developing research instruments	By February 2011	Researcher	Draft instrument	Draft developed
5	Review of draft instruments	By March 2011	Researcher and moderators	Instruments revised as necessary	Draft instruments developed in time
6	Training research assistants	By April 2011	Researcher	Trained research assistants	Research assistants identified
7	Presentation and defence of research proposal	April 2011	Researcher	Approval of proposal and green light to continue with research work	Presentation and defence will pass the test
8	Pre-testing instruments	May 2011	Researcher and research assistants	Pre-tested instruments	Training of assistants done
9	Application for research permit	May 2011	Researcher	Research permit obtained	All conditions for permit met
10	Data collection	June 2011	Researcher and research assistants	Raw data	No major difficulties in the field
11	Data analysis and interpretation	July 2011	Researcher	Draft report	Data analysis done on time
12	Writing and typing draft research report	August 2010	Researcher	Written and proof read report done, typed and bound	Report writing complete and submitted

APPENDIX 5

BUDGET

A. Proposal Development

No.	Item	Amount
1.	CDs @ 80 x 4	320.00
2.	Photocopying papers @ 390 x 4 reams	1,560.00
3.	Photocopying @ 2 x 50 x 18	1,800.00
4.	Laptop Computer 1	75,000.00
5.	Printer	12,000.00
6.	Internet (Modem) Access	3,000.00
7.	Travel and subsistence	8,000.00
8.	Library charges	2,000.00
9.	Binding @ 80 x 18	1,280.00
	Sub Total	104,960.00

B. Corrections and Submission to Post Graduate School

No.	Item	Amount
1.	Photocopying papers @ 390 x 1	390.00
2.	Photocopying @ 2 x 50 x 5	500.00
3.	Binding @ 80 x 5	400.00
	Sub Total	**1,290.00**

D. Research Permit

No.	Item	Amount
1.	Research Permit	1,000.00
2.	Travel & Accommodation	4,000.00
	Sub Total	**5,000.00**

E. Data Collection

No.	**Item**	**Amount**
1.	Photocopying papers @ 390 x 6	2,340.00
2.	Photocopying @ 2 x 20 x 6	5,000.00
3.	Stationery (Assorted)	2,500.00
4.	Travel and Accommodation 5,000 x 45 days	40,000.00
	Sub Total	**49, 840.00**

F. Data Analysis

No.	**Item**	**Amount**
1.	Stationery	4,000.00
2.	Presentation Charges	6,000.00
	Sub Total	**10,000.00**

G. Presentation of Draft Research Project

No.	Item	Amount
1.	Stationery	2,000.00
2.	Photocopying papers @ 450 x 4	1,800.00
3.	Binding @ 100x5	500.00
	Sub Total	**4,300.00**

H. Defense

No.	Item	Amount
1.	Presentation Equipment	3,000.00
	Sub Total	**3,000.00**

I. Corrections & Presentation of Final Research Project

No.	Item	Amount
1.	Photocopying papers @ 400 x 10	4,000.00
2.	Photocopying @ 3 x 390 x 10	11,000.00
3.	Binding @ lOOOx 7	7,000.00
	Sub Total	**22,000.00**

Total A - H = **201,3900.00**

Contingency = **20,000.00**

Grand Total = **221,390.00**

MVfcWSi» «
<IKUYt» LJBRAP*
1 Q, Box 30^{IC}"~

APPENDIX 6:

RESEARCH CLEARANCE PERMIT

CONDITIONS

1. You must report to the District Commissioner and the District Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed with-out prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2)/four (4) bound copies of your final report for Kenyans and non-Kenyans respectively.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.

REPUBLIC OF KENYA

RESEARCH CLEARANCE PERMIT

PAGE 2

THIS IS TO CERTIFY THAT:

Prof./ Dr./ Mr./ Mrs./ Miss.....QJ8PJNJ..

..WILSON,

of (Address).....UNI VER§i J3X..QE...HAJ.RQRI

...?...O.:...BQX..30197,...Npj

has been permitted to conduct research in

T.RMS..MZ.QJA

District

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for a period ending.....?.:.. j ji 31ST DECEMBER 20, 10

PAGE 3

Research Permit Ho. NCST/RRI/1 KJU.&&L? 19

DateofiMue..li/.9.6/2010

Fee received .SHS..1 A 000-

Applicant's Signature

Secretary National Council for Science and Technology