PREPARATION OF GRADUATE AUTOMOTIVE TEACHERS FOR THE WORLD OF WORK IN KENYA

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DECLARATION

Declaration by the Candidate

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Declaration by Supervisors

This thesis has been submitted for examination with our approval as University supervisors.

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DEDICATION

This thesis is dedicated to my beloved parents Stephen Cheruiyot and Linnah Cheruiyot, my wife Emmaculate Jelagat and my son Bradley Kiptoo for their sacrifice, support, inspiration and unconditional love.

ABSTRACT

Quality and relevance of education and training are global issues of concern. They are more critical in Technical and Vocational Education and Training (TVET) which form the link between education and the world of work. Automotive teacher education and training in Kenya is aimed at preparing effective teachers to facilitate the learning process in secondary and post-secondary TVET institutions offering power mechanics and automotive engineering respectively. The concern of this study was whether the quality of graduate automotive teachers (GATs) in Kenya, meets the current workplace demands. This study assessed the adequacy in preparation of graduate automotive teachers for the world of work in Kenya. Areas considered were; the knowledge and skills acquired during training and those required in the world of work, availability of training facilities, equipment and materials, instructional methods used in teacher preparation and attitudes of supervisors towards job performance of trainees at workplaces. The study was of descriptive survey design and it adopted heuristic methodology. Purposive sampling was applied in selecting institutions while snowball sampling was used to select automotive industries. Stratified random sampling was applied in selecting GATs and GAT trainees while the supervisors were sampled purposively. The sample population for the study was twenty (20) GATs and (4) heads of departments in public TVET institutions, fifteen (15) fourth year GAT trainees in TVET teacher training institution and six (6) industry-based supervisors; all in Uasin Gishu and Nandi Counties. The data collected through questionnaires, interview schedules, observation schedule, and document analysis was analyzed using descriptive statistics with the help of Statistical Package for Social Sciences (SPSS). Content analysis was also applied appropriately. The findings reveal that there is some mismatch between the training acquired and workplace requirements; much is required of the teachers than what they learnt. The study also found out that most of the training facilities and equipment were unavailable; those which were available were inadequate. It was also established that teacher preparation employs industrial attachment, teaching practice, project work and lecturing as the main methods of instruction; the usage of other methods is limited. Finally, workplace supervisors had almost similar attitudes towards job performance of teacher trainees; they rated them from average to good in most of the skills they exhibit during job performance. The study recommends a review of the teacher training curriculum to reflect the additional courses and contents in the revised Kenya Institute of Curriculum Development (KICD) Modular syllabus in TVET institutions. It also recommends that the training facilities, equipment and materials should be upgraded to match those found at the workplace. In addition, the usage of industrial attachment, industrial visits, project work and practice should be emphasized in imparting the relevant competencies to trainees. Finally, the link between the teacher training institution and the world of work should be strengthened and be of mutual benefit in the face of changing technological trends. TVET teacher training institutions should liaise closely with the automotive industry as well as KICD on issues pertaining to curriculum design and review at all times.

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LIST OF ABBREVIATIONS

ATT	Automotive Technician Training
CAD	Computer Aided Design
EFI	Electronic Fuel Injection
GAT	Graduate Automotive Teacher
ILO	International Labour Organization
KCSE	Kenya Certificate of Secondary Education
KICD	Kenya Institute of Curriculum Development
KNEC	Kenya National Examination Council
KTTC	Kenya Technical Teachers College
TVE	Technical and Vocational Education
TVET	Technical and Vocational Education and Training
UNESCO	United Nations Educational Scientific and Cultural Organization
UNEVOC	United Nations Project for Vocational Education
UoE	University of Eldoret
VVTi	Variable Valve Timing with Intelligence

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CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter introduces the study by providing its background, statement of the problem and purpose of the study. It also covers research objectives, research questions, significance of the study, and justification of the study, scope of the study, and limitations and assumptions of the study. Conceptual framework and operational definitions of terms are also outlined.

1.1 Background of the Study

The automotive industry is one of the fastest growing industries with the need for style, speed, and power impacting on design and manufacture (Kitainge, 2003). Like any other technology, automotive technology is a discipline that has always been affected by technological changes and standards of the industry. Current automobiles are a challenge to repair because of advanced technology, but the future automobile will continue to be more complicated (Riley, 1995). This requires automotive teachers to have advanced knowledge and skills if they are to deliver effectively in training automotive technicians. The challenge these teachers face is to prepare learners for further education as well as entry into the world of work. Service managers and technicians with advanced technical skills on automobiles are in demand and it is anticipated this demand will be greater in the future (Cornish, 1996).

People who have the relevant knowledge and skills not only make capital equipment more productive but also make effective use of machines and equipment they work with (Obudho, 2008). Obudho further argues that this enables firms to invest more on sophisticated materials and productive machines. Without a workforce that acquires skills continually, it is not easy to benefit from the technological progress taking place currently. The changing nature of workplace may contribute to a mismatch between the human resources and the form of employment available in the job market.

Speelman and Stein (1993) stated that qualified well-educated technical personnel are increasingly in demand as technology continues to develop. To meet this demand for these workers, training institutions need to prepare individuals in these areas. However, most operators in the technical sector who wish to join the industry do not have relevant technological skills and competencies, tools and equipment to enable them cope with the rapid changes in technology (Kerre, 1995). This is traced back to the lack of linkages between technical training institutes and industry which has often resulted in disharmony between the labour market on one hand and the technical training and research institutions on the other hand (Kerre, 1995).

While there is the general assumption that education and training supports work performance, the link is not clear as to how training should be framed to promote acquisition of the skills, attitudes and knowledge that are useful for work and life in general. This situation is aggravated by the fact that workplace and work conditions are changing quickly in line with technology changes, whereas the changes in the facilitation

of learning within institution's training are not as fast. According to Kerre (2000), many training institutions (especially government-funded ones) have not modernized their curricula and facilities so there have been a lot of complaints about mismatch between the products of the education systems and the labour market demands. Critics have also argued that the lack of inputs from prospective employers into curriculum design and training delivery in universities and colleges is partly responsible for the mismatch.

A large number of the trainees are not effectively/ appropriately trained to offer what the labour market requires (Nyerere, 2009). There is the absence of an effective labour market mechanisms, such as tracer surveys and consultations with employers and alumni, to enable training institutions (including universities) adjust curricula in order to meet the changing needs of industry (Riechi, 2010). The Kenyan tertiary institutions face a deficit in terms of quantity and quality of our human resources (Republic of Kenya, 2004). The question remains: Is Kenya's graduate automotive teacher education and training effective, as regards adoption of modern technology, innovation in transforming the knowledge generated into final products and imparting the graduates with the necessary knowledge and skills necessary to be accomplished workers? This concern motivated this study.

Nyerere (2009) asserts that the current TVET curriculum is weak and not flexible enough to meet the technological changes and diverse needs of different clients. He observed that the quality of TVET graduates seems to have declined in recent years due to poor instructional methods, outmoded/inadequate training equipment and lack of meaningful

work experience and supervision during attachment. The graduates of TVET have experienced technology shock when they finally enter the job market. Trainers lack necessary industry-based technological skills updated through industrial attachment. This, to a great extent, compromises quality of education especially when resources are lacking. Teachers in TVET institutions rarely go for refresher courses which put them at the mercy of their students who are more exposed. This calls for ways and means of ensuring quality and relevance of initial teacher training in the teacher training institutions.

It is noted that the education and labour market in Kenya exist separately from each other and while the importance of the school-to-work transition of students is being advocated, discussion of these matters has failed to probe deeper, resulting in a lack of realistic policy linking school education to the labour market. Kenya has had several proposals (Ramani, 2002 cited in Kitainge, 2003) in her educational system within a span of approximately 40 years, all of which have pointed at the issue of relevance in education. The Kamunge (1988) and Koech (2000) reports suggested that education in Kenya should place emphasis on the relevance and the quality to enhance development. Consequently, the government of Kenya's policies and objectives on education and training as contained in the sessional paper No. 8 of 1988 based on the Kamunge Report stated:

> The future policies in education and training should lay emphasis on and give priority to; the quality and relevance of education and training, the eradication of illiteracy, the development of science and technology, the vocationalisation of education, research, management entrepreneurship training, the development of the handicapped, and the development of centres of excellence (Kamunge, 1988).

Relevance and quality of education and training which were the key concerns of this study are conspicuous features in these commissions and they are still vital goals aspired to be achieved if the nation has to develop and realize vision 2030. The research study looked at the issue of relevance in the training of graduate automotive teachers in the context of a changing world and work conditions through assessing the adequacy in preparation for the world of work.

1.2 Statement of the Problem

The world of work is ever changing and influences of the new technologies have altered the workplace with employers demanding workers to have diverse skills to handle several tasks. To thrive in such a dynamic and constantly changing technological world (World Bank, 1991) demands radical restructuring of TVET programmes charged with the responsibility of imparting skills and knowledge to trainees.

Burgess (1986) argues that young people who have undergone TVET programme acquire knowledge of particular subjects, but are ill equipped to use the knowledge in ways which are relevant to the world outside the educational system. This imbalance, he states, is harmful to the society and industry. A good training programme should impart knowledge and skills relevant to the job market. Job-specific training is most important for creating self-employment as well as meeting new challenges in the world of work, but TVET programmes have not innovated to accommodate the rapid changing work environment characterized by new technologies and work organizations that demand

adaptive skills, due to lack of appropriate training equipment and teachers (Kerre, 2000). Maleche, Ongeti, Wando, Kadenyi & Barasa (2006) report that:

> At a meeting of the committee of Deans (2003) it was noted that although B.Ed graduands are well endowed in methodology, they lack depth in content teaching subjects. In other fora within universities, claims of poor quality B.Ed graduates have been raised. The accusation of deficiency in content is conveniently placed at the door of Schools of Education, ironically by those faculties specifically charged with teaching content… (p. 213).

To ensure quality TVET programmes the quality of the teacher is critical among other important considerations such as training equipment and learning and teaching materials (Ferej, Kitainge & Ooko, 2012). TVET training institutions expect automotive teachers to prepare technicians who will be able to: service, diagnose and repair faults in vehicles, manage an automotive workshop and market vehicle parts while upholding professional ethics and standards. It was thus uncertain, whether the quality of graduate automotive teachers in Kenya, at present, meets these current demands given that the world of work has continually changed.

Technology Education Department which is charged with the responsibility of producing competent graduate TVET teachers at University of Eldoret has produced a good number of teachers since 1989. The adequacy in preparation of its graduate automotive teachers needed to be ascertained considering that the current nature of work places have changed. There was need to compare the training acquired by graduate automotive teachers from this institution with the requirements of the workplace so as to adequately prepare them for the world of work.

1.3 Purpose of the Study

The purpose of the study was to assess the adequacy in preparation of graduate automotive teachers for the world of work in Kenya with a view to suggesting appropriate strategies of enhancing its quality and relevance.

1.4 Research Objectives

The study was guided by the following objectives:

1. To investigate if the knowledge and skills graduate automotive teachers acquire during training match those required of them in the world of work.
2. To determine the availability of training facilities, equipment and materials in teacher training institutions.
3. To examine the instructional methods used to prepare graduate automotive teachers.
4. To determine the attitudes of supervisors towards the performance of graduate automotive teachers in the world of work.

1.5 Research Questions

1. Do the knowledge and skills graduate automotive teachers acquire during training match those required of them in the world of work?
2. Are the training facilities, equipment and materials available in teacher training institutions?
3. What instructional methods are used to prepare graduate automotive teachers?
4. What attitudes do supervisors have towards the performance of graduate automotive teachers in the world of work?

1.6 Significance of the Study

The study looked at the responsiveness of graduate automotive teacher training to the changing needs of the Kenyan job market due to technological changes. The issue of relevance is in line with the ILO's (2003) recommendation about the direction of reforming TVET and one of the major recommendations is improving the accessibility, relevance and effectiveness of technical and vocational training. They argue that due to relevant and effective training, trainees are better equipped to take advantage of opportunities in the labour market and to cope with changes in the world of work. These recommendations could only be achieved through promoting closer links between technical skills curricula and labour market needs. The study revealed the extent to which graduate automotive teachers were prepared for the world of work in Kenya. The recommendations will contribute towards reforming TVET teacher training in Kenya. This will benefit the nation by preparing the necessary manpower that will foster the attainment of the vision 2030. The study also lays foundation for future research in TVET teacher education and training besides adding to the body of knowledge in the area studied. The study findings will be useful to the institutions preparing graduate TVET teachers in Kenya.

1.7 Justification of the Study

In the Kenya Vision 2030, the government hopes to provide a globally competitive quality education, training and research for development (Republic of Kenya, 2007). From the kind of academic programmes offered in Kenya's public universities, it appears that the country's higher education places emphasis on employment (Riechi, 2010). To

the contrary, from government policy documents, the country is geared towards industrial competitiveness (Republic of Kenya (2005a; 2005b; 2007 Vision 2030), it was not clear whether and how public universities were responding to Kenya's future skilled manpower needs. For any sound industrialization to take place, it is important that the work force is well educated and trained (UNDP, 1999).

TVET teacher training institutions, University of Eldoret being one of them, ought to determine ways of ensuring that their programmes meet the labour market demand. Exploring alternative methods of making programmes relevant would allow TVET to reach out to many young people and adults by preparing them for the real possibilities of frequent career changes, including alternating periods of employment and unemployment (Simiyu, 2009).

It was therefore necessary to assess the relevance of graduate automotive teacher training curriculum offered in this institution with a view to influencing the implementation of the academic programme so as to ensure production of skilled manpower that would be relevant to the country's current and future development needs. A shortage of well trained graduate automotive teachers could impact on the quality and quantity of students entering automotive technician programmes. In light of this, the study was necessary to help address these concerns.

1.8 Scope of the Study

The study involved one public TVET teacher training institution, four public TVET institutions and six automotive industries in Rift Valley region. The choice of the TVET teacher training institution was because so far it the only one that has produced TVET teachers. It focused on graduate automotive teacher training programme and concentrated on the training curriculum, training facilities, equipment and materials, instructional methods and the attitudes of supervisors towards performance of graduate teachers in the world of work. The study was limited geographically to Uasin Gishu and Nandi Counties in which are the institutions where graduate automotive teachers trained and work. This area could adequately represent other regions in Kenya. The automotive industries which had previously offered attachment placements to graduate automotive teacher trainees are also in this region. The study compared the KICD syllabi for Automotive Engineering (Diploma and Craft) with the teacher training institution's Technology Education (Power Mechanics and Automotive Technology) degree programme. This was because all TVET institutions are mandated to offer craft and diploma programs. The analysis was confined to such groups of course units as: automotive technology (theory and practice), mathematics, engineering drawing and design and the sciences. Data collection took place between September and November 2012.

1.9 Limitations of the Study

The study had the following limitations:

i. The teachers' strike of September 2012 made it hard to reach all the participating graduate automotive teachers in the TVET institutions at the time. The data collection in these institutions had to commence the month of October 2012.

ii. The perceptions of the participants were a reflection of their age, maturity, and experiences and may not have wholly been representative of others not sampled.

1.10 Assumptions of the Study

The study assumed that:

i. The graduate automotive teachers were exposed to similar training curriculum in University of Eldoret.

ii. The participants were guided by utmost honesty in answering the questionnaires.

iii. All graduate automotive teachers were trained by a qualified faculty in the University.

iv. The responses of the participants were representative of those who were not sampled.

1.11 Conceptual Framework

The study was guided by a conceptual framework which presents the interaction among the variables as shown in Figure 1.1. The conceptual framework shows relationship between independent and dependent variables in the study on the preparation of graduate automotive teachers for the world of work in Kenya. The independent variables are

knowledge and skills, training facilities, equipment and materials, instructional methods and the attitudes of supervisors. Each of these variables has an influence on the dependent variable which is adequate preparation of graduate automotive teachers for the world of work in Kenya.

Independent Variables **Dependent Variable**

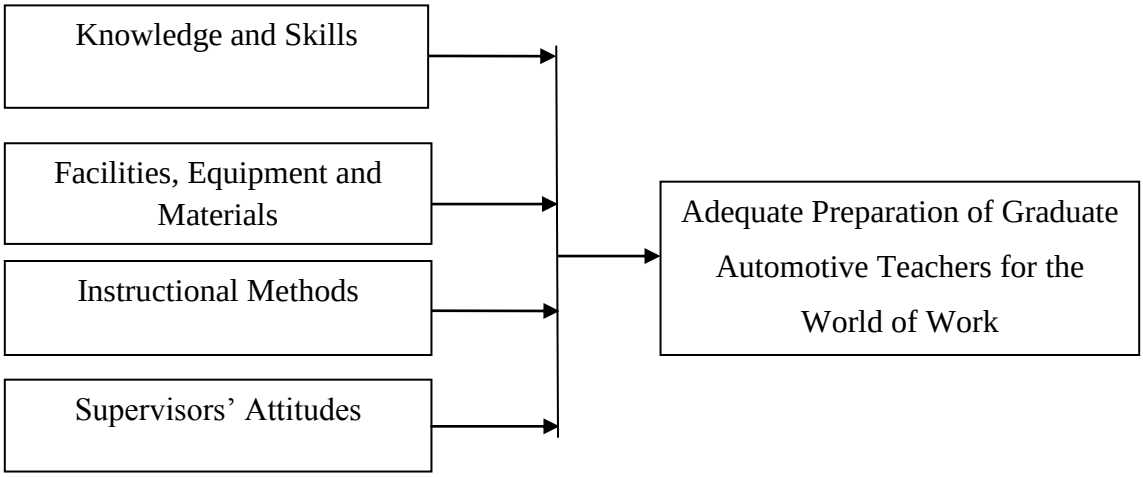

Figure 1.1: Relationship between Independent and Dependent Variables

(Source: Author, 2012)

1.12 Operational Definition of Terms

In this study, following terms are defined as follows:

Automotive Engineering: The branch of mechanical engineering concerned primarily with the special problems of land transportation by a four-wheeled, trackless, automotive vehicle.

Graduate Teachers: Refer to degree level teachers.

Performance: The accomplishment of a given task by graduate automotive teachers measured against present known standards of accuracy, completeness, cost, and speed.

Preparation: Education and training for an occupation and involves all those activities associated with the instruction and discipline as well as readiness to perform set of instructions, so as to draw in a desired manner and bring one's body and knowledge a high pitch of efficiency.

Supervisors: Are the heads of departments/sections of TVET institutions and the workshop supervisors to whom the graduate automotive teachers report.

Technical and Vocational Education and Training: The education and training to acquire the practical skills, know-how and understanding necessary for employment in a particular occupation, trade or group of occupations or trades.

Technology Education: A teacher training programme integrating technical training and pedagogy aimed at producing competent graduate teachers to teach technical subjects at secondary and post-secondary school levels.

World of Work: TVET institutions and/or automotive industry where the needs and interests of automotive teachers for employment and those of employers for automotive teachers meet.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter contains a review of related research studies. It is structured under such sections as education and training, training curriculum, skills challenge, training facilities, equipment and materials, instructional methods, financing of TVET and the link between TVET and the world of work. A brief description of the two models of TVET teacher training in Kenya in also presented. The chapter concludes with a summary of the review.

2.1 Review of Related Studies

Creswell (2003) defines the purpose of the literature review as sharing with the reader the results of other studies that are closely related to the study being reported. It provides a framework for establishing the importance of a study with other findings (Creswell, 2003). TVET teacher training is a component of Kenya's educational system and there is rich information in the literature regarding the operation of TVET in Kenya. To gain an in-depth understanding of the adequacy in preparation of graduate automotive teachers, other studies had to be reviewed.

2.1.1 Education and Training

Shiundu and Omulando (1992) define teacher education as "such institutionalized educational procedures that are aimed at the purposeful organized preparation or further

education of teachers who are engaged directly or indirectly in education activity as their life work". To train a person is to provide him or her with the know-how or the ability to perform certain actions from a variety of perspectives (Barrow and Milburn 1990; Jones and Hendry, 1994). Training as a process entails both the mastery of manual endeavors and the conception development of the mind in line with the tasks to be performed. Broadly, training is the preparation of oneself through the performance of a set of instructions, which are later recalled at the workplace.

The aim of TVET teacher education and training is to equip the teacher with the necessary knowledge and skills to guide the learning process and this involves pedagogy and discipline content. Some of the specific national goals of teacher education as outlined by the Ministry of Education (1987) include: to develop the ability to communicate effectively; to develop professional attitudes and values; to develop in teachers the ability to identify and develop the education needs of the learner; to create initiative of a sense of professional commitment and excellence in education; and to enable the teacher to adapt to the environment and society.

On the other hand, the aims of TVET as outlined in the master plan on Education and training, (Republic of Kenya, 1998, p.114) among other things include; to inculcate the vocational and entrepreneurial skills necessary for self employment; to develop the scientific, technological, practical and attitudinal skills needed for specific jobs in various trades, vocations and professions; and to provide avenues for skills improvement and further training in TVET institutions. More specifically, the general objectives of

technician training programmes are to: develop skills which will be responsive and relevant to the country's human resources required at the middle; to prepare trainees so that they can enter the world of work with confidence for either salaried employ or self-employment; and to impart adequate skills which will enable the trainees to perform middle-level supervisory functions (KIE, 2008).

The above aims and objectives of technician training can be achieved through raising the quality and relevance of TVET teacher training programs by developing relevant curricula and examinations; the provision of essential technologies and materials and the establishment of effective monitoring and management system of the TVET teacher training institutions. Despite the existence of two institutions of higher learning (Moi University and University of Eldoret) training automotive teachers in Kenya, no much progress has been made in the acquisition and effective utilization of technology towards industrial development. There is continued reliance on imported technology and equipment, and on imported technical expertise for maintenance by most industries in Kenya (Republic of Kenya, 1998). A possible explanation for this problem could be the type of training offered in these institutions. It would help identifying the flaws and seeking the opinion of current students, graduates and workplace supervisors. The study thus explored the adequacy in preparation of graduate automotive teachers for the world of work in Kenya.

2.1.2 Training Curriculum

TVET teacher and instructor training in many African countries are often seen as something that graduates will learn on the job. Yet, these aspects of training of teachers and trainers too often remain a missing link in designing innovative schemes in TVET (Grootings and Nielsen, 2005). Vocational curricula are observed to represent one of the weak points in the learning chain. Curriculum innovations require very close contacts with industry and other stakeholders, including employment services, labour market institutions and other social partners, with other technical teachers and of course with TVET trainees, for purposes of effective teaching/training, career guidance and more. In some countries, government officials with little or no exposure to the world of work still tend to prepare and set curricula (Axmann, 2004) and in most cases, previously adopted curricula are extended by incorporating new content without scrapping outdated, irrelevant material. Thus the gap between the TVET training system and employment needs and opportunities keeps widening when the question of 'what to train', is defined by closed-circuit training provider systems.

Kerre (2009) points out that a major challenge in the preparation of TVET teachers is of a curricular nature, that is, the curriculum they should impart and consequently the curriculum they should pursue. Kerre (2009) further argues that this need not be a major issue if an appropriate delineation of the concepts of TVET and technology education is carried out and agreed before curriculum development and implementation stages. Kerre (2010) laments that the TVET curricula are outdated, that the system we have has been in place for decades. He cites a case where carburetors are still taught when most vehicles on our roads are of Electronic Fuel Injection (EFI) systems. Obudho (2008) notes that

there is a shortage of highly competent indigenous teaching and support staff with sufficiently wide practical experience in industry.

Kerre (2010) argues that the TVET curriculum is expected to provide opportunities for individuals to learn practical skills that will enable them function at work place and as members of the society. Because of the inadequate preparation of the trainees for the industry, some employers retrain the trainees to make them productive in their organizations. The question remains: Does graduate automotive teacher training adequately prepare teachers for the world of work in Kenya?

According to Ntim (1993) most of the programmes in training institutions in Kenya have deficiencies which includes; grossly exposure to practical where some technicians programs graduate trainees with hardly any practical classes. They teach only "theory of practicals" but every good technician knows that there is no substitute for practical, most of the teachers of the programmes are grossly out of date on the latest developments in the field due to poor library facilities and little opportunity to travel to the developed countries, most of the teachers have never had any exposure to practical training in the industry. This possibly, could be a result of the curricula the teachers were taken through. Some studies have suggested more relevant labour market approaches that would go beyond developing pure occupational but would rely on real work and business processes as the basis for TVET learning.

It is generally intended that trainees in the technical fields acquire specialized technical skills that encompasses mastery of the theoretical knowledge as well as practical skills

acquisition, which place them in a position of advantage over unskilled and semi-skilled work force with regard to industrial market potential. To determine whether this objective is being met, there is need for an appropriate tracking system to follow up on the trainees to determine their suitability and role in industry (Atchoarena & Delluc, 2002). Kerre (2009) concludes that in the context of the curricula considerations, the TVET teacher curriculum should not only prepare an individual who has a good grasp of the TVE philosophical, sociological and psychological foundations but also acquire the necessary technological knowledge and practical skills in specific technology disciplines to prepare learners for the world of work. In view of this, there is a growing need for curriculum review in order to adequately prepare graduate teachers for the world of work.

2.1.3 The Skills Challenge

The link between theory and practice has often been identified as a possible weakness in the traditional system of TVET Teacher Training (Nielson 2002). Balancing supply of skills with demand in the labour market constitutes one of the fundamental issues in skills development policy. Historically, however, since economic and technological change worldwide accelerated in the 1980s the inability of most TVET systems to adequately respond to these challenges can mostly be seen as a major skills mismatch due to an insufficient demand orientation in TVET. This is still a challenge since the demand for skilled labour has risen significantly due to globalization, changes in technology, the organization of work, new development policies, including the transition to a low carbon economy, and the recent international financial crises and subsequent worldwide recession.

Lauglo (2009) posits that qualified TVET human resources are in chronic short supply in many countries and at the basic level is the problem of how best to institutionalize initial instructor training and how best to recruit instructor-trainees to such training. Developing countries including Kenya encounter problems in designing provisions for instructor training in the many vocational specialties in such a way that they avoid underutilization of training capacity. Large and small systems have problems ensuring that the pedagogy part of such training is sufficiently relevant for the practicalities of skills teaching in the concerned vocational specialty (Lauglo, 2009)

In the present environment, many observers contend that different individual skills sets are needed. A more complete skills mix incorporates many generic skills such as the ability to think logically, to plan precisely, to anticipate difficulties and to be innovative and creative so as develop and update the necessary capacities and skills (individuals) need to enable them to be productively employed for their personal fulfillment and the common well-being (ILO, 2008). Consequently, there is a demand for a more skilled labour force, with more autonomous, adaptable and multi-functional workers.

A more effective delivery of TVET as well as assessment of its functional outcomes through cooperation in TVET systems between enterprises and schools and with other stakeholders cannot be generally applied (Allais, Raffe & Young, 2009; Gallart, 2008). However, the sharing of responsibility with employment stakeholders, especially when it comes to certification, measuring output-orientation of learning and better recognition of

prior learning can still be much improved. In many countries, though, TVET and existing labour market policies do not always facilitate the school to work transition, thereby handicapping young people especially in obtaining a head start in working life. For TVET systems to become more flexible and responsive to new skill demands would involve employment services, a labour market institution that is a crucial link between the training provided, labour requirements and responsiveness to labour market conditions, therefore also for teachers/trainers and students in order to make informed choices in the teaching/training dynamics. The key questions accordingly are what strategies are needed to address the lack of cooperation and create greater synergies between teacher training and skills development producers, and public and private employers, in ways that render the transition from institutions to work more responsive to job market needs?

One set of responses has been provided in a recent ILO policy dialogue forum on sectoral training strategies. Examining global drivers of long-term change that bear on the provision of training and skills, a strategic framework that creates bridges between training and the world of work, and the essential building blocks of a robust training strategy, the strategy emphasizes the cornerstones of policies to expand skills and broaden access to skill formation: quality education as a foundation for future training; a close matching of skill supply to the needs of enterprises and labour markets; enabling workers and enterprises to adjust to changes in technology and markets; and anticipating and preparing for the skills of the future. The strategy insists that, when applied successfully, the approach nurtures a virtuous circle in which more and better education and training fuels innovation, investment, economic diversification and competitiveness,

as well as social and occupational mobility – and thus the creation of more but also more productive and rewarding jobs (ILO, 2010).

Skills challenge is more complex in Kenya due to such factors as: low quality of training which lays emphasis on theory and certification rather than on skills acquisition and proficiency testing, inadequate instructor training, obsolete training equipment, and lack of instructional materials. These combine to reduce the effectiveness of training in meeting the required knowledge and skills objectives. It is however, understood that low investment in skill training for teacher training institutions is key may result to the skills mismatch being witnessed. Thus, graduates from these institutions tend to get excluded from the world of work because they lack productive skills and core values and attitudes which translate into positive work ethics. The gap between the TVET teacher training institutions and the work situation is a challenge that had to be confronted and resolved. It is believed that this study addressed some of these issues. Nyerere (2009) suggested the need for a national skills inventory, backed by an efficient labour market information system to ensure that training is based on the correct demands in the wage employment sector and promotion of self-employments in consultation with industry. This involves carrying out frequent needs assessment and tailoring of TVET teacher training curriculum to meet the changing technological needs. It is important that the skills TVET institutions provide coincide with the needs and opportunities in the world of work.

2.1.4 Training Facilities, Equipment and Materials

Lyons (2012) described teaching physical facilities as those facilities that have direct bearing on the process of teaching and learning such as classrooms, workshops and the equipment in them. He documented that skills acquisition is a complex activity that supremely affect students towards motivation on physical condition of teaching resources and curriculum. He noted that there is an explicit relationship between the physical characteristics of school buildings and educational outcomes.

The inadequacy in training and workshop facilities has contributed to the diminution of the quality of the technicians in Africa. Afyenyandu, King, Mcgrath, Oketch, Rogerson, & Visser (1999) observed that institution are still not responsive enough and simply lack facilities in which training is driven by determination or realistic projections of future skill requirements. The Millennium Development Goal (2010) report indicates that inadequate, obsolete training equipment and lack of instructional materials is one of the factors that combine to reduce the effectiveness of training in meeting the required knowledge and skills in TVET. Teaching and training materials are often outdated and not relevant to what is needed for specific skills development (Johanson & Van Adams, 2004). Too often these teaching and training materials are of little relevance for what the students have to face in the world of work after they leave their refuge of (mostly) government-run technical vocational schools and institutions.

A report on The Rapid Appraisal on the Status of Technical and Vocational Education and Training (TVET) in Kenya (2003) pointed out that the quality of TVET graduates

was fast declining at all levels due to out-dated equipment, poor instruction, lack of enough teaching physical facilities and meaningful supervision. Poor quality of training resulting from lack of appropriate (qualitatively and quantitatively) tools and equipment and the poor inflexible curricular in TVET institutions, may be partly attributed to the low level of investment by governments and organizations towards the TVET sector.

Effective TVET teacher training requires use of appropriate training equipment, tools and materials. Mwiria (2002) noted that inadequate workshops and tools in universities may lead to theoretical training that produces half baked TVET teachers and may not be able to compete with well trained teachers from developed countries Kerre (2010) contends that in University of Eldoret, the current facilities and materials needed to provide relevant industrial experiences is wanting. He suggests the need for more investment in the procurement of tools and equipment to augment the practical hands-on experiences. This study was undertaken to determine the availability and adequacy of automotive training facilities, equipment and materials in the institution through assessing the preparation of graduate automotive teachers for the world of work.

2.1.5 Instructional Methods

In most developing countries, there is a strong tendency to equate teaching and training in TVET with pure lecturing. This is often the least suitable preparation for lifelong learning where new problems and as yet unknown job and skill requirements will require ongoing problem solving without external coaching, underlying again the critical role played by teamwork and self-learning capacity for present and future workplace responses. Reyes-

Guerra (1989) categorized students into three, namely: Verbalizers, Visualizers and Doers. The Verbalizes are those who learn easily if information is in written or spoken form. They benefit from lectures, tutorials and hand-outs. Visualizes learn easily when information is presented in pictorial or diagrammatic form while the doers learn more easily when information is presented by practical demonstration by the lecturers. The implication of this scenario is that only a small proportion of the trainees benefit from the pedagogical system.

The opening up of the pedagogical—method box in TVET and effective application of new teaching/learning approaches therefore could be a means of liberalizing learning for teachers and trainers. It also offers a much more relevant and effective way of acquiring competencies that is appreciated by enterprises, students, teachers and trainers and trade unions, precisely because of its relevance and validity for the transition from TVET institutions to work. The training approach follows the conventional method of transferring knowledge across through the lecturer reading out to trainees, who would then take down notes. The educational system continues to place considerable value on this transmit and receive model of training. TVE teachers in china are able to effectively use technical machines and run regular technology investigation projects with their students. This has given Chinese technicians the motivation to be innovative and this is why china in now more competitive in the global economy. Germany also has a very good TVET system as a result of implementing Parallel technical and teacher training.

Schneider (2010) indicates that to be a TVET teacher in Germany one should have acquired University studies of at least three years in a vocational major (for example, electrical engineering) and a non-vocational minor subject (for example, mathematics), as well as in pedagogy. The individual should also have obligatory 12-months' work experience in a technical industry. In addition, the person is supposed to acquire a two-year pre-service teacher training programme at a vocational education teacher training institute (VETTI) combining work as a vocational school teacher with seminars in the major and minor areas of specialization. This kind of training emphasizes project work, reflective learning, work- and business-process related learning, and development of occupational competencies.

The quality of TVE teachers is dependent on the quality of training they have received. This implies that effective TVET teachers need to be adequately prepared. Vernon & Reynold (2011) advise that the content, methods and means of technical teacher training should be based upon new approaches. New approaches that include longer industrial training and practical technology have been discovered to produce competent TVET instructors. UNESCO and ILO (2002) recommend new methods of training should be adopted together with new types of teaching materials. These new methods must also be connected with the new types of assessment and evaluation. Wadi (2000) argues that this training approach enhances the development of not only the memory but also the creativity and the capacity of doing practical work among TVET teachers. This calls for TVET teacher training programmes to include practical experience acquired in industry.

There was thus, the need to explore some of the instructional methods used in initial preparation of graduate automotive teachers.

2.1.6 The Link between TVET and the World of Work

The ultimate aim of TVET is to enable people to get a job or start an enterprise. This therefore calls for TVET programmes; including automotive teacher training to be linked to the job market so as to enhance their socio-economic relevance. The current formal TVET system has been noted to lack linkage with and, therefore, relevance to the labour market. The capacity of the system to meet the needs of the labour market is small yet employers are looking for more workers who can meet their semiskilled and skilled requirements. Modern technological innovations require very close contacts with industries, for purposes of effective training and career guidance. This gives TVET trainees opportunity to work in industries or even interact with other TVET stakeholders (UNESCO, 2005). As a result, they come in touch with the real technical world.

TVET should be relevant and demand-driven, rather than supply-driven and a stand-alone activity. To achieve this, data is required on the actual employability of TVET graduates, available job opportunities, and the evolving skills demands on the labour market. Determining the demand for skills is achievable through Labour Market Information Systems (LMIS) and other survey instruments. The ILO defines LMIS as “any information concerning the size and composition of the labour market or any part of the labour market, the way it or any part of its functions, its problems, the opportunities which may be available to it, and the employment-related intentions or aspirations of

those who are part of it". Johanson & Adams (2004) recommends the setting up of local panels of employers from the concerned industry sectors to give guidance to TVET as opposed to reliance on statistics and surveys as a main source of guidance about labour market demand.

In order to make the best use of resources and provide high quality TVET for students, it is essential that the TVET system and the market place work together clearly (Lynch, 2000 and Ryan, 2001). They assert that collaboration should include the directing of resources towards occupational and career preparation where there is the greatest need and opportunity. Callan & Ashworth (2004) posit that industry partners believes that the strength of their relationships with training institutions is central to creating skills and knowledge for solution of the problems. Training institutions can also conduct local labour market surveys in and around their localities. Information so gathered and analyzed would then serve as inputs for the development of new or revised courses and programmes, equipment and learning materials selection, instructor formation, and guidance and counselling of trainees.

Providers of TVET teacher training ought to use variety of methods including joint venture with industry and holiday courses to linking between the learning and industry. Successful partnerships between TVET providers and industry are essential to the national economy (Pagtakhan & Rock, 2002) and as Callan & Ashworth (2004) point out, the purpose of working with industry is to develop the TVET curriculum. El-Raghy (1999) also stated that a good relationship between the university and industry facilitates

the placement of students for training and provide case studies for enriching the delivery of the curriculum. Alongside these efforts, some type of industry supervision should be offered by the training place, while university staff may pay visits to follow the progress of students during their time in the industry. As Comyn (2007) found out, VET linkages with Industry can clearly involve a wide range of mechanisms and activities, from providing national policy direction and identifying skill needs, to setting skill standards and providing technical input into teaching and learning resources. However, VET policy design and delivery should be achieved through a new partnership between government, employers, professional associations, industry, and employees (UNESCO & ILO, 2002).

Lauglo (2009) concurs that a key element in TVET development is to develop feedback to TVET from the labour market, in order to adjust TVET so that it responds to market demand for skilled work. This is especially important for publicly provided pre-employment training, probably less crucial for private provisions that need to respond to demand directly in order to attract trainees, and still less crucial for on the job training which already occurs in close conjunction with employment. The Kenyan TVET teacher training system can learn from these global experiences and device effective and appropriate means of getting feedback from the job market with established linkages with the automotive industry. This may help to adjust to quantity and content and produce graduates that take account of change in the labour market.

2.1.7 Financing of TVET

The overall costs on education are on the increase. Kenya in particular was hit by the economic crisis, but still need to compete in an era of rapid economic and technical change (Bolina, 1996). TVET programs are expensive to run compared to general education, as it has been estimated that the cost of one technical school is equivalent to three schools offering general education (Kerre, 1997). Kenya is therefore getting more concerned about financing of TVET to meet the new and emerging labour markets requirements. Various financing strategies are practiced in different parts of the world, and Kenya is no exception. UNEVOC (1996) classifies some of the well known financing mechanisms which includes; Public financing, private and public sponsored financing and international donor assistance.

A study for the World Bank by Ziderman (2002) on issues affecting TVET, found out that virtually all training systems in Sub-Sahara Africa have to deal with the reality of diminishing government funding for public sector training. Funding towards TVET programs is an arbitrary; leading to year after year variations and uncertainty which has given a weak base towards equipping quality and enough teaching physical training facilities in mechanical skill in line with other fields of technology. Each year the government provides some funds to each TVET institution to meet its running costs. The government is faced with a shortage of resources and would like individuals, nongovernmental organizations (NGOs) and the general public to share the financial responsibility for communities, parents and beneficiaries of TVET to assist in raising additional funds to accelerate the expansion of training opportunities to increase access

without compromising quality and relevance (Kerre, 1997). In addition, the government charges training levy to all industries to cater for the human resource development. However the demand for funds is far beyond available government resources.

Donor support plays an important role in development of TVET systems. In many developing countries such as Kenya, the large amount of international aid has contributed to the setting up of a base of training capacity (UNEVOC, 1996). Infrastructure and facilities have been created, staff trained and instructional systems implemented through donor assistance. Most donors provide financial resources for capital costs which is limited and for short periods (Herschbach, 1993). Training institutions and the systems that support them are expensive, with the costs including the infrastructure, consumables and human resources.

In Kenya, most TVET institutions are owned by Government and they are funded by the government. However, because of the increase in the demand for Technical education and existing high decadence in the infrastructure, the effect of the increase in funding could not be noticed substantially. Table 2.1 shows the trends in the financing of technical education for 2002-2007. These are government allocations to the sub-sector mainly towards recurrent financing. The overall allocation has been increasing over the years but low despite its potential in transforming the quality of human resource for socio-economic development of the country. These have direct contribution on the production of competent teachers as facilities have not been able to keep up with changing workplace requirements in terms of equipment.

Table 2.1 Public Financing of TVET Institutions

Item/ year	01/02	02/03	03/04	04/05	05/06	06/07
Recurrent	888.33	889.94	1,171.40	1,449.38	1,865.23	2,113
Development	0.00	0.00	0.00	0.00	70.00	100.8
Total	888.34	889.94	1,171.40	1,449.38	1,935.23	2,214.39

2.1.8 TVET Teacher Training in Kenya

The training of TVET teachers for the various levels and programs have evolved as the TVET has developed in the country (Ferej et al, 2012). There are currently two key training systems in Kenya that are in place to meet the needs of the TVET institutions. These are TVET Diploma Teacher Training Programme at KTTC and Technology Education Degree Programme in University of Eldoret and Moi University. These two models are described in the following sections.

2.1.8.1 TVET Diploma Teacher Training Programme

At the time of inception of KTTC in 1978, Mechanical Engineering courses were mainly run under Technical Education department and these include: Four Years Technical Education Diploma in Automotive Engineering, Four Years Technical Education Diploma in Production Engineering and One Year Technical Teacher Education Diploma for Untrained teachers (www.kttc.ac.ke). The mechanical department which was established in 1989 also coordinated other engineering courses. The graduates of these

programmes were trained to teach in TVET institutions and in secondary schools teaching industrial education. The objectives of the Mechanical Engineering programme are: to expand training opportunities to cater for the increasing number of Kenyans seeking higher education, and to equip trainees with skills, knowledge and attitudes to enable them to be effective technical teachers or professionals in the Mechanical Engineering Industry.

Mackay Education Report of 1981 recommended the implementation of a new system of education in Kenya, which is commonly referred to as the 8-4-4. The new curriculum put a lot of emphasis on technical education. To meet the demand for more teachers to teach technical subjects in secondary schools and tertiary institutions, the Four Years and Three Years Technical Education Programmes were discontinued in 1989 in favor of the One Year Technical Teacher Education Programme. In subsequent years with the adequate supply of qualified technicians, KTTC programme has reverted to the one year pedagogical training model similar to the old Kenya Polytechnic system (Ferej et al, 2012). This is the system to date.

2.1.8.2 Technology Education Degree Programme

With the adoption of compulsory vocational education in the 8-4-4 system of education in 1985, the demand for qualified teachers to handle the courses became acute (Ferej et al, 2012). The supply of new teachers from KTTC was inadequate to meet the demand for teachers required in the thousands of secondary and primary schools in the country. As a response to this critical demand the first four year degree programme in Kenya for

Technology Education teachers was established at the Moi University in 1989. The Technology Education Degree programme is currently offered by the department of Technology Education under the School of Education in University of Eldoret and Moi University. The programme integrates vocational education and technical skills with pedagogy in development of both pre-service and in-service teachers to teach in TVET institutions in the country.

The programme is designed to produce competent graduate teachers to teach technical subjects at secondary and post-secondary school levels and because of the practical nature of the subjects, to be taught by graduates from this programme, the courses are designed to be taught with a practical 'hands on' orientation. Considerable time is, therefore, spent in workshops as part of the scheduled teaching. Project work, problem-solving approach and teaching practice in real life learning environments form important components of the programme.

The objectives of the programme are: to prepare graduate teachers who are 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; to improve the quality of teaching of the technical subjects in the Kenyan technology system of education; to prepare teachers to teach technical education for training institutions where such level of competence may be needed; and to lay a firm foundation for individuals who intend to pursue Postgraduate studies in Technology

Education. The programme admits KCSE certificate holders as well as those with recognized TVET Diplomas, all of whom must satisfy the minimum entrance requirements of the University as stipulated in the statutes.

Technology Education Degree programme is planned such that from second year, students specialize in any of the following areas of study: Power Mechanics and Automotive Technology, Electrical and Electronics Technology, Building and Civil Technology, Mechanical Engineering Technology, and Computer Studies. All students in the department take their departmental courses as well as all common courses approved for the programme. There is also an 8-week field attachment at the end of the second year and a 12-week teaching practice at the end of the third year of study. This study concentrated on the Power Mechanics and Automotive Technology specialty of this Degree Programme with a view to suggesting ways of improving its quality and relevance.

2.2 Summary of Literature Review

The empirical analyses in the past studies reviewed clearly points to the determinants of effective TVET training. It is thus recognised that the delivery of quality TVET is dependent on the competence of the teacher which is measured in terms of theoretical knowledge, technical and pedagogical skills as well as being abreast with new technologies in the workplace. In addition, training for high-quality skills is noted to require appropriate training equipment and tools, adequate supply of training materials, and practice. Other requirements include relevant textbooks and training manuals and

qualified instructors with industrial experience. Financing has been noted to play a key role in the success of any training. Scholars have argued that the delivery of quality TVET is closely linked to the building of strong, professional management and leadership capacity as well as a suitable qualifications framework and monitoring mechanism to drive the entire system. Furthermore, the employability of graduates is of importance and thus pre-service teachers should acquire employable skills that are related to the demands of the world of work. Tracer studies which track the destination of graduates in the job market have been suggested as tools to provide useful feedback for the revision of training programmes so as to enhance the employability of TVET graduates. The past studies looked at TVET without reference made to the preparation of graduate automotive teachers in Kenya. Effective and efficient TVET teachers are potent agents of transforming the country towards realization of Vision 2030 of being a middle income economy. The study focusing on the automotive component of the entire TVET teacher training was paramount.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.0 Overview

This chapter outlines the research design and methodology that was adopted in the study, the study area, target population, sampling procedure and sample size. It also covers the research instruments, validity and reliability of the instruments, data collection procedure, data analysis and ethical considerations.

3.1 Research Design

Research design is a conceptual structure within which research is conducted. It informs the arrangement of the conditions for the collections and analysis of the data in a manner that aims to combine relevance to the research purpose (Kothari, 2004). The study adopted a descriptive survey design because it enabled the study to collect data on the subject of study in its current state. Descriptive survey design was employed in the study because it enabled the researcher to receive detailed information from the graduate teachers, teacher trainees and workplace supervisors (heads of departments and workshop supervisors). These respondents were directly or indirectly involved in graduate automotive teacher training and their performances in the world of work.

According to Sproul (1995) descriptive survey is a means through which views, opinions, attitudes and suggestions for improvements regarding the phenomenon under study can be achieved. (Cohen, Manion & Morrison, 2000) argue that the intention of survey research is to gather data at a particular point in time and use it to describe the nature of

existing conditions. The study therefore considered the survey research design the most appropriate because of the economy of taking a sample from the population to generalize results to the whole population.

3.2 Research Methodology

Heuristic methodology was adopted in this study. The inquiry, a derivative of phenomenology, affirms the possibility that one can live deeply and passionately in the moment, be fully immersed in the mysteries and miracles and still be engaged in the meaningful research experience (Craig, 1978 cited in Patton, 1990). The researcher had been involved in most of the aspects of the research as a graduate teacher trainee as well as a graduate teacher and hence this methodology perfectly fitted the study. In this regard, the researcher's reflections and experiences were vital in explaining the situations particularly in the teacher training institution and TVET Institutions.

3. 3 Study Area

The study was carried out in Rift Valley region in Kenya. The study involved a graduate TVET teacher training institution, public TVET institutions and automotive industry. The only Universities preparing graduate TVET teachers in Kenya are in this region, that is, Uasin Gishu County. Established Public TVET institutions where graduate automotive teachers work, are concentrated in these two Counties. Automotive industries are also centered in Uasin Gishu County (Eldoret town) of the area and some of them had previously offered attachment to graduate automotive teacher trainees. The map of the study area is provided as appendix VIII.

3.4 Target Population

The population refers to the group of people or study subjects who are similar in one or more ways and which forms the subject of the study in a particular survey (Sproul, 1995). The study targeted graduate automotive teachers, graduate automotive teacher trainees and workplace supervisors in the study area. The study targeted 4 heads of automotive engineering departments and 65 graduate automotive teachers in public TVET institutions, 50 graduate automotive teacher trainees in a TVET teacher training institution and 15 workshop supervisors in automotive industries. This population was targeted because it had been involved in one way or another in the preparation of graduate automotive teachers. Thus, they were considered to have valuable information for the study. Table 3.1 shows the distribution of this target population.

Table 3.1: Distribution of Target Population

Respondents	**Population (N)**
Graduate Automotive Teachers	65
Graduate Automotive Teacher Trainees	50
Heads of Departments	4
Industry-based Supervisors	15
Total	**134**

3.5 Sampling Procedure and Sample Size

One graduate TVET teacher training institution was purposively sampled. Mwiria (2002) stated that Moi University is the only higher education institution training degree level industrial education teachers with the graduates also equipped to teach an additional subject outside the industrial ones. University of Eldoret (UoE) which, up to 2011, was a campus of Moi University offered the programme. This is why it was the focus of this study. Four established public TVET institutions in Uasin Gishu and Nandi Counties were part of the study. It included one national polytechnic and three technical training institutes; all offering automotive engineering at diploma and certificate levels and could represent other institutions not included in the sample. The study also involved six automotive industrial workstations in Eldoret town. They were identified through snowball method. This was done by tracing the industrial placements of 30% of the sampled GAT trainees. They were those which have previously offered attachment to graduate automotive teacher trainees.

Stratified sampling technique was used to determine the sample size. Stratified sampling involves dividing the population into homogenous groups, each group containing subjects with similar characteristics (Cohen et al, 2000). The study involved 45 participants drawn from three groups namely: 20 graduate automotive teachers who graduated from UoE and working in the four public TVET institutions, 15 fourth year graduate automotive teacher trainees in UoE who had undertaken their attachment as well as teaching practice and 10 supervisors of graduate automotive teachers. The supervisors included 4 automotive

engineering departmental heads in the TVET institutions and 6 workshop supervisors in automotive industries within Eldoret town.

Stratified random sampling was applied in selecting the GATs in the TVET institutions. The target population was stratified into four strata and random samples obtained from each of the strata. This was so because the cases were heterogeneous. GAT trainees were also selected using stratified random sampling. The two heterogeneous cases were the regular and school based trainees. The industry-based supervisors as well as the institution-based supervisors were purposively sampled. The samples agreed with Kerlinger (2003) who stated that a sample size of between 10% and 30% is a good representation of the entire population. These procedures gave a sample size of 45 participants from a target population of 134 as shown in Table 3.2.

Table 3.2: Distribution of Sample Size

Respondents	**Population (N)**	**Sample Size (n)**	**%**
Graduate Automotive Teachers	65	20	30
Graduate Automotive Teacher Trainees	50	15	30
Institution-Based Supervisors	4	4	100
Industry-Based Supervisors	15	6	30
Total	**134**	**45**	

3.6 Research Instruments

Data collection is a specific, methodical method of gathering information relevant to research purpose, or of addressing research objectives, and hypotheses (Burns & Grove, 2003).

Patton (1990) suggests that using a combination of data sources and collection methods is a validating aspect which cross-checks the data. Various instruments were used to collect data in the study, namely; questionnaires, interview schedules, observation schedule and the analysis of documents. Samples of these research instruments are shown in the appendices.

3.6.1 Questionnaire

Mugenda & Mugenda (2003) define a questionnaire as an instrument used to gather data, which allows measurement for or against a particular viewpoint. The researcher administered questionnaires to all the participants. A questionnaire was considered a convenient tool because it could collect extensive contents within a short period of time. Separate questionnaires were used for teachers, teacher trainees and the supervisors. The instruments were designed to collect data according to the study objectives.

Questionnaires used in this study pertained to adequacy in preparation of graduate automotive for the world of work in Kenya. They contained close-ended questions that were designed to elicit short and brief responses, as well as open-ended questions that gave room for greater depth of responses that were intended to reveal the participants'

view while clarifying their responses to the closed-ended questions. Different scoring formats were used depending on the nature of items on the questionnaire, some with a Likert scale for rating each statement.

3.6.2 Interview Schedule

Kalof, Dan, & Dietz (2008) argue that the goal of an in-depth interview is to learn about a research topic from an individual's own perspective, in his/her own words, and in detail. In this study, guided face-to-face interviews were conducted on all the supervisors in order to complement and cross-check data from the questionnaire. In-depth-interviews were also conducted on two GATs and two GAT trainees. The interview schedules had series of open-ended questions that were used to obtain detailed or descriptive information from the participants about the adequacy in preparation of graduate automotive teachers. Willingness to participate determined the interviewed.

3.6.3 Observation Schedule

Structured observation characterized by a careful definition of the units to be observed, the style of recording the observed information, standardized conditions of observation and the selection of pertinent data of observation is considered appropriate in descriptive studies (Kothari, 2004). The observation schedule used in the study was guided by a checklist comprising of items to be observed. The information complimented the information gathered through questionnaires and interview schedules. Observations were made on the training facilities including automotive workshop, library, laboratories and the equipment, tools and materials in them. For the purposes of real life observation, the

researcher was involved in the day to day life of the University during the study period. Observation allowed for the tapping of first-hand information on the aspects under study as it helped in identifying, explaining and describing the physical facilities, equipment and the materials.

3.6.4 Document Analysis

Burns & Grove (2003) points out that the focus of document analysis is on analyzing and interpreting recorded materials within its own context. Copies of KICD Modular syllabi in Automotive Engineering were obtained from one of the TVET institutions and these were sufficient because the training curriculum is similar in all the TVET institutions. Graduate Automotive Teacher Training syllabus was obtained from the University under study. The latest copies of the syllabi documents in these institutions were analyzed to compare the course units and contents in them in order to identify any mismatched courses and topics. Teaching textbooks recommended for use by the institutions were also analyzed to establish if it captured the course contents.

3.7 Validity and Reliability of Research Instruments

In order to reduce the risk of obtaining incorrect answers to research questions emphasis on two particular research designs were considered (Saunders, Lewis, & Thornhill, 2007). These were validity and reliability of research instruments.

3.7.1 Validity

Validity determines whether the research instrument truly measures that which it was intended to measure or how truthful the research results are Joppe (2000). To ensure content validity of the instruments the researcher sought suggestions from the supervisors and other experts in the department of Technology Education at University of Eldoret. They reviewed and analyzed the contents of the questionnaires, interview schedules and observation schedules to ascertain that the instruments were suitable for the purpose for which they were set. Revisions to the instruments were made to reflect their suggestions. In order to ensure external validity, the instruments were pilot tested in Uasin Gishu County with two GATs, two GAT trainees, one industry-based supervisor and one institution-based supervisor, all of whom were not part of the study. The pilot participants had similar features to those in the sample. This was meant to establish the validity of the instruments regarding clarity of meaning and comprehensibility of the items. Construct validity was enhanced by use of multiple sources of evidence as suggested by Yin (2003).

3.7.2 Reliability

Reliability is the extent to which results are consistent over time and an accurate representation of the total population under study Joppe (2000). The internal consistency of the questionnaire was determined from the scores obtained from a single test administered by the researcher to a sample of participants. A score obtained in one item was correlated with scores obtained from other items in the instrument. Cronbach's Coefficient Alpha was then computed to determine how items correlated among themselves. This method provides a good measure of reliability because holding other

factors constant, the more similar the test content and conditions are, the greater the internal consistency reliability (Mugenda & Mugenda, 1999). Cronbach's Alpha is a general form of the Kunder-Richardson (K-R) 20 formula. This is illustrated as follows:

$$KR_{20} = \frac{(K)(S^2 - \sum_{s^2}}{S^2\ (K-1)}$$

Where;

KR_{20} = Reliability coefficient of internal consistency;

K = Number of items used to measure the concept;

S^2 = Variance of all scores; and

s^2 = Variance of individual items

A high coefficient implies that items correlate highly among themselves. The value of Cronbach Coefficient Alpha is generally to be over 0.7. The reliability of the items on 'knowledge and skills' was 0.789 and items on 'facilities, equipment and materials' was 0.747 while items on 'instructional methods' was 0.950 and items on 'supervisors' attitudes' was 0.844. The results indicated a coefficient of over 0.7 implying that the research instruments were reliable; hence the researcher adopted it for data collection.

3.8 Data Collection Procedure

The researcher sought for a research permit from the National Commission for Science, Technology and Innovation (NACOSTI) through the University of Eldoret. Upon authorization, the researcher then reported to County Commissioners and the County Education Officers in Nandi and Uasin Gishu counties to inform them of the intended

research. They authorized the researcher to conduct the study in Uasin Gishu and Nandi Counties. The researcher sought further permission from the authorities of the institutions and organizations. The researcher visited all the study sites in the two counties and administered the questionnaire, conducted the interviews and made the observation. The training syllabi were also requested from the institutions on the days of visits. These were later returned while collecting the questionnaires.

3.9 Data Analysis

The data collected from questionnaires, interview schedules, observation schedule and document analysis were edited, coded and analyzed. The analysis was done by use of Descriptive statistics. Analysis was aided by Statistical Package for the Social Sciences (SPSS). Content analysis was applied in analyzing the syllabi used in the training institutions. The data were presented inform of tables, graphs, pie charts and discussed.

3.10 Ethical Considerations

Scientists have a moral obligation to search for truth and knowledge but not be at the expense of the rights of individuals in society (Mouton, 2001). In keeping with the accepted professional ethics of research, all the participants in the study were assured of anonymity, confidentiality and they were free to withdraw from the study at any time they wished. No names of participating institutions, industries and individuals were reflected on the questionnaires. The participants were also assured of access to research findings, once done, should they wish.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETTATION

4.0 Overview

This chapter presents the data from the field. It also consists of data analysis and interpretation. The Statistical Packages for the Social Sciences (SPSS) was used to derive the descriptive statistics relevant to this study. The data is presented beginning with the participants' demographic characteristics followed by more specific information pertinent to the research questions.

4.1 Demographic Characteristics of the Participants

This section presents the demographic characteristics of research participants as captured in the questionnaires. Demographic data may influence participants' responses. They are useful because they show a cross section of study participants.

4.1.1 GAT Trainees' Demographic Characteristics

GAT trainees were asked to indicate their gender, age and any other qualifications they may have. Analysis of the GAT trainees' questionnaires revealed the demographic data presented in table 4.1.

All the trainees were fourth year students specializing in Power Mechanics Technology and as shown table 4.1. 86.7% of the GAT trainees in this sample were male. Majority of the trainees (60.0%) were aged above 30 years, with 40.0% being between 21-30 years. A good number of them (60.0%) had Diploma qualifications and slightly more than one

third (33.3%) were from secondary schools. These findings indicate that the trainees were predominantly male aged over 30 years with diploma qualifications. This implied that the programme also admitted students with recognized TVET diplomas. They were holders of either diploma in Automotive Engineering or diploma in Agricultural Engineering, with additional qualifications of diploma in Technical Education from KTTC.

Table 4.1: GAT Trainees' Demographic Characteristics

Demographic characteristic		**Number of participants**	**Proportion of participants (%)**
Gender	Male	13	86.7
	Female	2	13.3
	Total (N=15)	**15**	
Age	21 to 30 years	6	40.0
	Above 30 years	9	60.0
	Total (N=15)	**15**	
Other qualifications	Diploma	9	60.0
	Higher National	1	6.7
	Certificate	0	0.0
	None	5	33.3
	Total (N=15)	**15**	

4.1.2 GATs' Demographic Characteristics

Graduate automotive teachers were asked to indicate their gender, age, teaching experience, positions, highest qualification and the amount of industrial work experience they had before they started teaching. These characteristics are presented in Table 4.2.

Table 4.2: GATs' Demographic Characteristics

Demographic characteristic		**Number of participants**	**Proportion of participants (%)**
Gender	Male	17	85
	Female	3	15
	Total (N=20)	**20**	
Age	26-39 years	11	55
	40- 60 years	9	45
	Total (N=20)	**20**	
Teaching experience	0-5 years	6	30
	6-10 years	9	45
	Over 10 years	5	25
	Total (N=20)	**20**	
Highest qualification	First degree	20	100
	Second degree	0	0
	Total (N=20)	**20**	
Industrial work experience before started teaching	Less than 6 months	8	40
	6 months to 1 year	7	35
	Over 1 year	5	25
	Total (N=20)	**20**	

A good number of the teachers (85%) were males and slightly more than half (55%) were aged between 26 and 39 years. A third of them had less than 5 years teaching experience, 45 % had between 6-10 years and the remainder 25 % had over 10 years of teaching experience. All the participating teachers were first degree holders with majority having up to 1 year of industrial experience before they started teaching.

This has implication on the gender parity in automotive engineering teaching service and the kinds of in service training or further education and post graduate attachment that could be organized to ensure that teachers are continually exposed to new technology, teaching strategies and industrial work experience.

Ferej et al (2012) also noted that average TVET teacher in the system is young or in mid-career with the majority being diploma holders. They found the teachers' profile one of youthfulness with good blend of maturity as 41% were reported to be in the ages between 40 and 60. They also observed a good number of them to have taken advantage of existing opportunities in the country to further their professional training, mostly at their own cost and time.

4.1.3 Supervisors' Demographic Characteristics

Supervisors were also asked to indicate their gender, age, supervision experience and their highest qualifications. The responses are presented in Table 4.3.

Table 4.3: Supervisors' Demographic Characteristics

Demographic characteristic		**Number of participants**	**Proportion of participants (%)**
Gender	Male	8	80
	Female	2	20
	Total (N=10)	**10**	
Age	26-39 years	11	55
	40- 60 years	9	45
	Total (N=10)	**10**	
Supervision	0 to 5 years	2	20
experience	6 to 10 years	6	60
	Over 10 years	2	20
	Total (N=10)	**10**	
Highest qualification	Diploma	1	10
	Higher National	3	30
	First degree	6	60
	Second Degree	0	0
	Total (N=10)	**10**	

Table 4.3 reveals that 80 % of the supervisors were males with only 20% being females. Slightly more than half (55%) of them were aged between 26 to 39 years and the rest (45%) were aged between 40 to 60 years. Most of them (60%) had supervision experience between 6 to 10 years. An equal proportion (20%) had supervision experience of either between 0 to 5 years or over 10 years. Majority of these supervisors (60%) were first degree holders while 30 % had Higher National Diploma and only 10% possessed diploma qualification. These findings indicate that the supervisors were predominantly males with a lot of supervision experience. More than half had first degree qualifications.

4.2 Comparison between the Knowledge and Skills Acquired by Graduate Automotive Teachers with those Required in the Workplace

The study sought to investigate whether there is a match between the knowledge and skills acquired during training and those required at work place. An analysis of the syllabi for training GATs and that used for automotive technician training (ATT) was done and the areas of mismatch were identified and are presented in Appendix X. The topics were quantified and tabulated. The topics missing in the GAT training syllabus but are in the ATT syllabus are labelled as ‘deficient topics’ while those present in GAT syllabus but are missing in ATT syllabus are labelled as ‘excess topics’. This is shown in Figure 4.1.

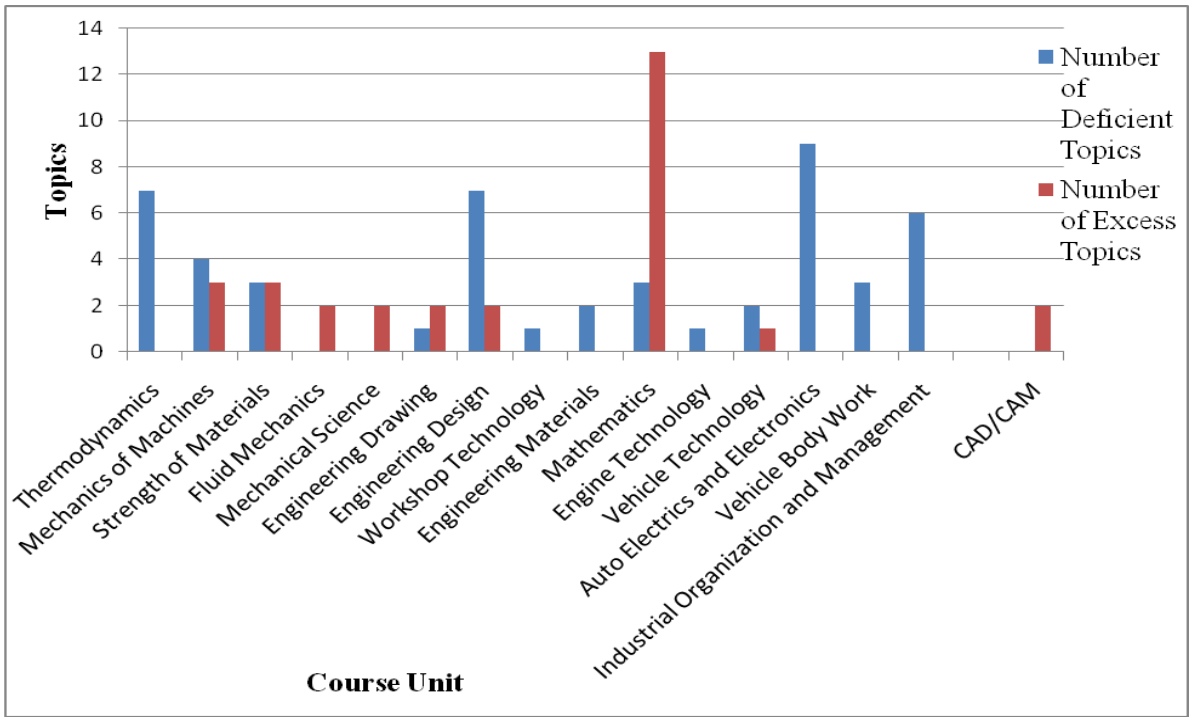

Figure 4.1: Distribution of Number of Topics of Mismatch for Various Course Units (Source: Author, 2012)

From Figure 4.1 it is evident that there exist areas of mismatch with regard to the courses and topics graduate teachers were trained on and what they are expected to deliver in their places of work. The only units with no deficient topics were fluid mechanics, mechanical science and CAD/CAM. Each of the units had 2 topics in excess. It was also revealed that the course units with deficient topics were thermodynamics (7), workshop technology (1), engineering materials (2) engine technology (1), auto electrics and electronics (9), vehicle body work (3) and industrial organization and management (6). They all did not have any excess topic and except for engine technology, the numbers of

deficient topics in all these units were also the highest. Other units with higher number of deficient topics were mechanics of machines (4) and engineering design (7). The rest of the units had 3 or less topics either in excess or in deficit. It was also noted that mathematics had the most (13) topics in excess but with 3 topics in deficit.

Graduate automotive teachers were asked to indicate from the listed course units, those they felt the training they underwent adequately prepared them for work. Table 4.4 shows their responses.

Table 4.4: GATs' Preparation in Various Course Units

Course Unit	Participants' responses (%)	
	Yes	**No**
Mathematics	90	10
Technical Drawing	80	20
Engine Technology	70	30
Vehicle Technology	55	45
Mechanics of Machines	45	55
Strength of Materials	75	25
Fluid Mechanics	90	10
Thermodynamics	40	60
Materials Technology and Metallurgy	55	45
Vehicle Body Work	10	90
Workshop Technology	45	55
Industrial Organization and management	30	70
Engineering Drawing and Design	60	40
Vehicle Electrical and Electronics systems	65	35
Mechanical Science	90	100
AUTOCAD	0	100

A graphical representation of the data in Table 4.4 is shown in Figure 4.2

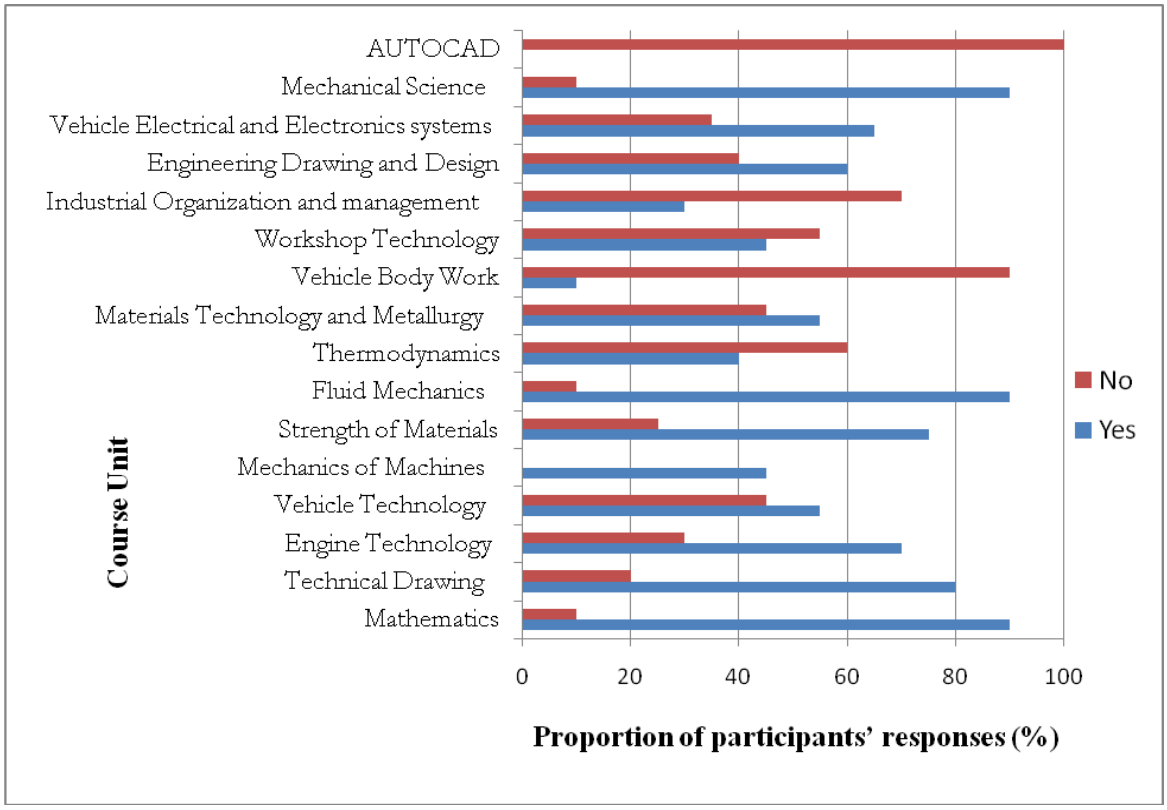

Figure 4.2: GATs' Preparation in Various Course Units

(Source: Author, 2012)

More than 50 % of the participants expressed the view that they were prepared well in the following units: mathematics, technical drawing, engine technology, vehicle technology, strength of materials, fluid mechanics, materials technology and metallurgy, engineering drawing and design, vehicle electrical and electronics and mechanical science. They expressed a contrary opinion on the remaining 6 units. It is worth noting that these findings correspond to those obtained through document analysis (Figure 4.1).

From the interviews held with two teachers, it was further noted that AutoCAD (CAD/CAM) which, according to the syllabi comparison seemed to be in excess of 2 topics, was not covered during initial teacher training. An analysis of the GAT trainees' questionnaires revealed some of the reasons for this as; not being part of the syllabus, lack of computers (with AutoCAD programme) and the absence of teacher trainers for the course unit. In addition, the interviewed teachers mentioned that they were not taught vehicle body work during their training. They pointed out that the unit was recently incorporated in the ATT modular curriculum when the curriculum review was done.

The GAT trainees were asked to indicate the area of automotive which they were comfortable teaching during their teaching practice. Figure 4.3 presents their questionnaire responses.

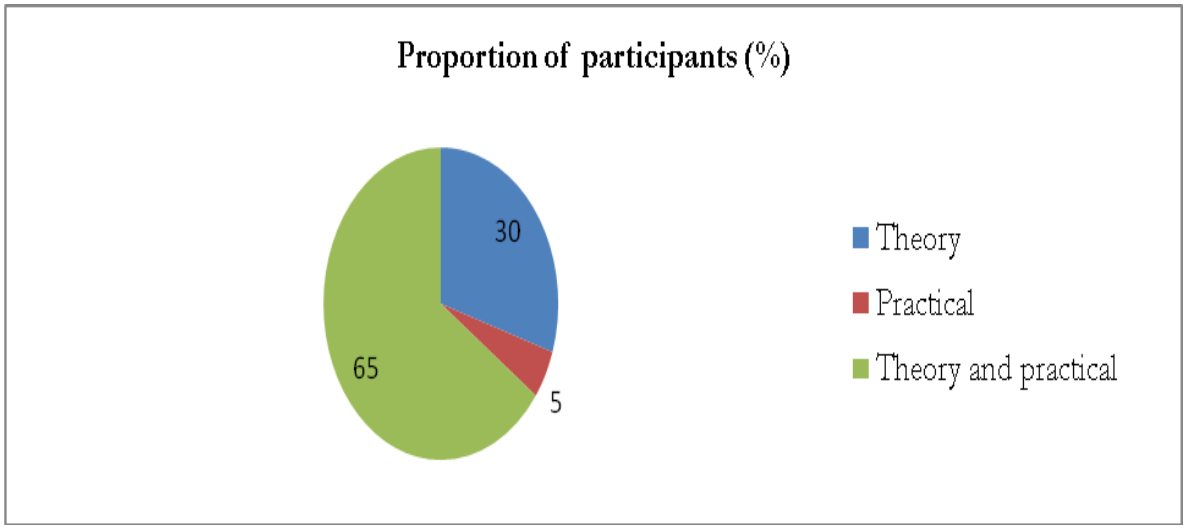

Figure 4.3: GATs' Preferential Teaching Areas

(Source: Author, 2012)

It is observed from Figure 4.3 that majority of them (65%) were comfortable teaching both theory and practical while only 5% were comfortable with only the practical. A third of them felt they could only handle the theory comfortably. The respondents who preferred teaching both theory and practical gave the reasons as: had undergone proper training in both areas during diploma, had acquired the skills during industrial attachment and personal efforts to acquire skills while teaching. Those who preferred teaching only theory cited the reasons as: adequately prepared in theory, lack of practical lessons during training, lack of exposure and confidence and inadequacy of tools and machines in the University. It was noted that the main reason for these preferences is the training they received prior to the teaching practice.

The findings relate to those of Ferej et al (2012) who established that a full two thirds of the teacher respondents indicated they felt more comfortable teaching theory than practical. They argue that this could be a reflection of inadequate industrial work experience. These findings are also in line with Kerre (2009) who pointed out that a major challenge in the preparation of TVET teachers is of a curricular nature, that is, the curriculum they should impart and consequently the curriculum they should pursue. This, he argued, need not be a major issue if an appropriate delineation of the concepts of TVET and technology education is carried out and agreed before curriculum development and implementation stages.

4.3 Availability of TrainingFacilities, Equipment and Materials

GAT trainees were asked to compare the institution that provides them with graduate automotive teacher training with their places of industrial attachment and teaching practice in relation to facilities, equipment and materials. Their responses are presented in Table 4.5.

Table 4.5.: Comparison of Training Facilities, Equipment and Materials

Statement	Response (%)	
	Yes	No
There is a difference in facilities, equipment and materials used in training and those used during industrial attachment	93.3	6.7
There is a difference in facilities, equipment and materials used in training and those used during teaching practice	83.3	16.7
Was comfortable using facilities, equipment and materials during industrial attachment	13.3	86.7
Was comfortable using facilities, equipment and materials during teaching practicing	26.7	73.3

When asked to compare the facilities, equipment and materials in their institution with those in the firms they were attached to, 93.3% of the trainees indicated that there was a

difference. Only 6.7% held a contrary opinion. 83.3% of the trainees pointed out that there was a difference with those they encountered during teaching practice in TVET institutions while 16.7% found no difference. Few trainees (13.3%) could comfortably use the equipment in the industry while 26.7% could comfortably use those in the institutions they practiced at. From the interviews, trainees cited some the reasons for their choices as lack of exposure to the appropriate tools and equipment during training prior to the attachment. Some mentioned that they were not confident in handling them unless under instruction by their supervisors. They reiterated that they were encountering most of the equipment for the first time during their attachment. Trainees who indicated they could comfortably use the facilities, equipment and materials mentioned that the diploma training they earlier underwent prepared them well.

The results obtained (Table 4.5) are similar to those of Obudho (2008) who found out that the lecturers and trainees held the same attitudes with regards to the available tools, equipment and materials for teaching and learning in TVET institutions. Both of his groups agreed that the tools and equipment were lacking and many of them (trainees) came across some tools and equipment during the attachment period and were not comfortable using them.

From the check list of items in the observation schedule, the study determined the availability and adequacy of the training facilities, equipment and materials in the teacher training institution. The results are as tabulated in Appendix XI. It is evident from this table that, of the six facilities listed, 83.33% (4) were available in the institution.

However, 33.33% (2) were adequate. It is noted that a drawing room for taking Engineering Drawing and Design units was lacking. There were adequate classrooms and library for lectures and personal study. The automotive workshop was available but not adequate in size. It was being shared with the other technology education specialties. The science laboratories available were those for the physical sciences including chemistry and physics. The laboratories for such courses as materials technology and metallurgy, kinematics and kinetics, fluid mechanics, strength of materials among others were unavailable. In addition the mechanical workshop for use in practice was squeezed and lacked some equipment and tools.

An observation on the tools and machines in the workshop revealed that 69.23% of the listed items were available. On the contrary, all the items were inadequate. The remaining 30.77% sof the items were unavailable. Key among them included equipment for Vehicle Body Work, Vehicle Technology and Auto Electrics and Electronics. While these form the main ingredients of GAT training with regard to practice, their absence could affect adequacy in preparation of the automotive teacher trainees.

While 66.67% of the listed materials were available, none were adequate. Mechanical, automotive, sciences and mathematics books and reference materials were available though not enough, especially for mechanics of machines, strength of materials, workshop organization and management and engineering drawing and design. No book was found for AutoCAD, Vehicle Body Work and Auto Electrics. AutoCAD software was also unavailable. Such engineering materials as sheet metals, metallic bars, body

fillers, welding rods, sand papers, and paints among others were not available. It was further established that they are available on order. A summary of these observations is shown in Figure 4.4.

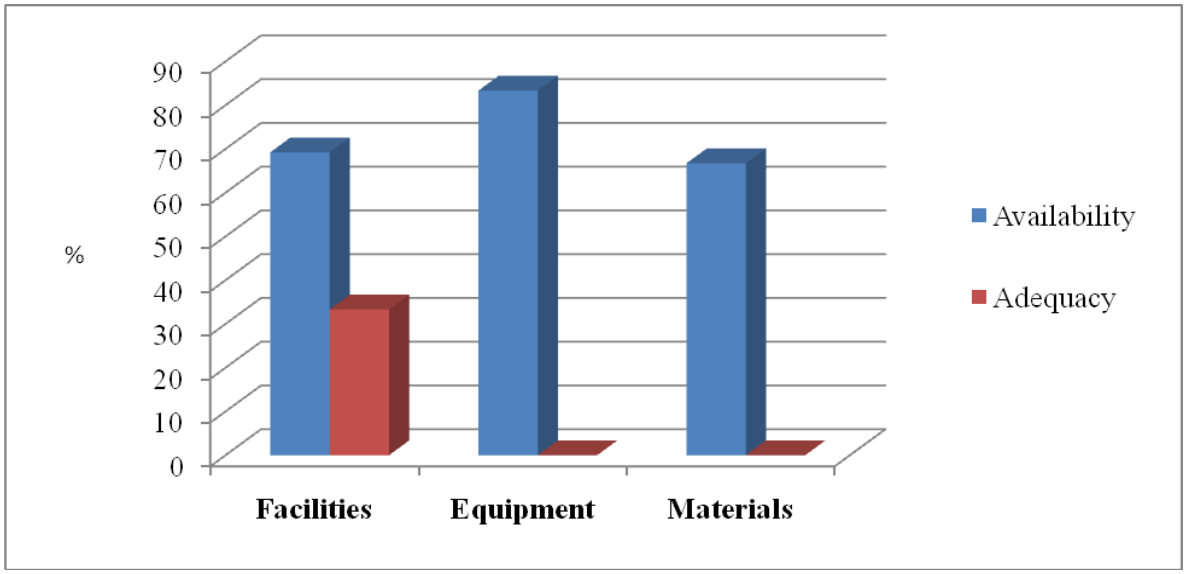

Figure 4.4: Availability of Training Facilities, Equipment and Materials

(Source: Author, 2012)

These findings support those of Kerre (2010) who indicated that the current facilities and materials needed to provide relevant industrial experiences are wanting. He expresses the need for more investment in the procurement of tools and equipment to augment the practical hands-on experiences. The inadequacy of facilities both in quality and quantity in teacher training institutions clearly manifests itself, whenever trainees go for attachment, teaching practice or get employed.

4.4 Instructional Methods used to Prepare GATs

An analysis of graduate teachers' and teacher trainees' questionnaire responses pertaining to the instructional methods used in preparation at teacher training institution revealed the data presented in Table 4.6.

Table 4.6: Instructional Methods used to Prepare GATs

Instructional method used	**Usage (%)**	
	Yes	**No**
Lecturing	100.0	0
Discussion	45.7	54.3
Illustration	31.4	68.6
Problem solving	34.3	65.7
Practical	34.3	65.7
Industrial visits	37.1	62.9
Industrial attachment	100.0	0
Teaching practice	100.0	0
Demonstration	60.0	40.0
Project	100.0	0

The data in the table above is presented in Figure 4.5

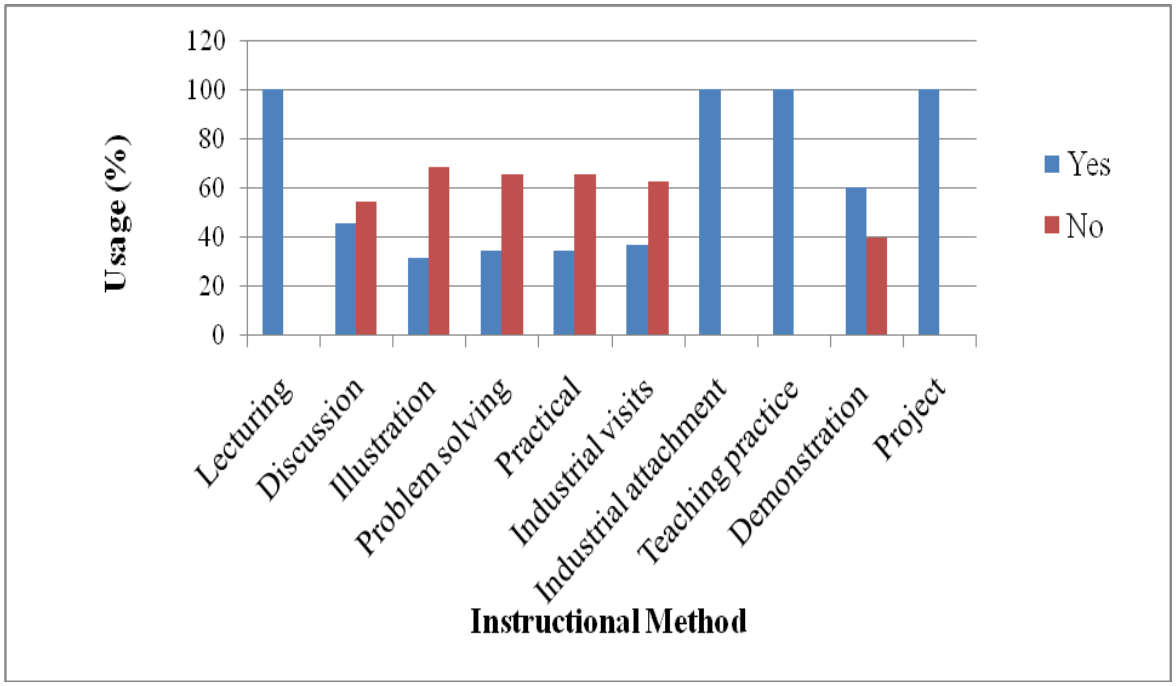

Figure 4.5: Instructional Methods used to Prepare GATs

(Source: Author, 2012)

It was found out that all the participants indicated that the instructional methods used in teacher preparation included; lecturing, industrial attachment, teaching practice and project. These methods are determined by the curriculum except for lecturing. Slightly more than a third (34.3%) responded that problem solving and practical methods were used as 65.7% of them indicated the contrary. 31.4% indicated that illustration method was used. The usage of demonstration method was indicated by 60**%** of the participants while the remaining 40% indicated that the method was not used. To understand what would influence the choice of an instructional method, the interviewed participants cited the availability of facilities, equipment and materials and training curriculum as the key

determinants. Other reasons given were the instructor's competence, preparation time, time allocated to practical lessons and facilitation funds. It was also noted that the demonstration method is best applied when resources are limited. These could explain the participants' responses given in Figure 4.5.

4.5 Attitudes of Supervisors towards the Performance of Graduate Automotive Teachers in the World of Work

The opinions of the supervisors both in TVET institutions and automotive industry were sought pertaining to the GAT trainees' skills which are demonstrated through job performance during industrial attachment and teaching practice. Their opinions were classified using the 5 point Likert scale: Very Good, Good, Average, Poor and Very Poor. This is shown in Table 4.7.

Table 4.7: Supervisors' Attitudes towards Job Performance of GATs

Trainees' Skills	**Rating (%)**				
	Very Good	**Good**	**Average**	**Poor**	**Very Poor**
Communication skills	30	70	0	0	0
Computer skills	75	20	5	0	0
Accuracy	0	50	50	0	0
Team work	30	40	30	0	0
Speed in task completion	0	40	40	20	0
Independence	10	10	70	10	0
Innovativeness	0	30	60	20	0
Interpersonal relations	20	70	10	0	0
Machine operation skills	0	30	40	30	0
Use of tools and materials	10	20	40	30	0

A graphical representation of these responses is shown in Figure 4.6

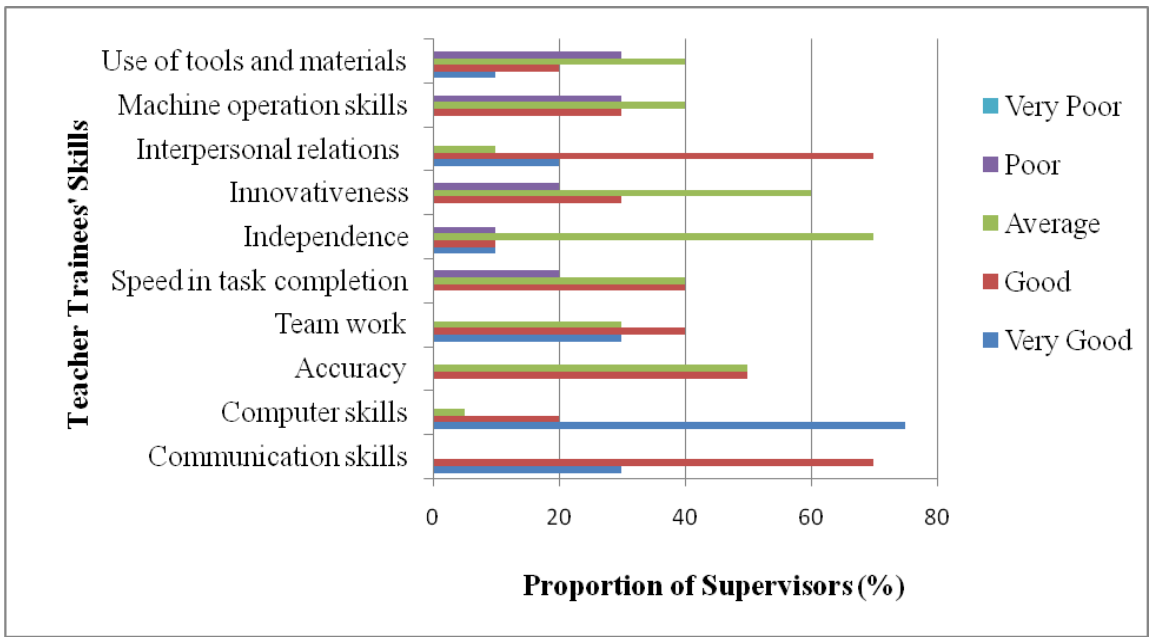

Figure 4.6: Attitudes of Supervisors towards Job Performance of GATs

(Source: Author, 2012)

Figure 4.6 reveals that many supervisors (75%) rated the teacher trainees as very good in computer skills while 20% rated them as good. Only 5% felt the trainees were average. More than two-third (70%) of the supervisors rated the trainees as being good in communication skills and interpersonal relations. An equal proportion of supervisors rated the trainees as either average or good on accuracy skills. Skills on the use of tools and materials, machine operation and speed in task completion were rated average by 40 % of the supervisors. Trainees were averagely rated on accuracy, independence and innovativeness. A third (30%) rated the trainees as good in computer skills and the use of materials. A third of the supervisors felt that teacher trainees were either average or very

good on team work while 40 % rated them as good. Not more than 30% of the supervisors rated the trainees as poor in use of materials, machine operation skills, innovativeness, independence and speed in task completion. It is noted that no supervisors perceived these teacher trainees as very poor in any of the aspects of job performance.

These findings compare to a large extent with those of Obudho (2008) who found out that both the lecturers and industry supervisors have similar opinions with regard to the technicians' performance at workplace. He established that 73.34% of lecturers and supervisors responded in affirmative that technicians were unable to perform as expected the tasks required of them.

Martin, Maytham, Case, & Fraser (2004) observed the importance of technical skills as a basis of engineering practice, as well as the need for communication, team-work and interpersonal skills in the workplace. They point to the complex interactions between these different skills, specifically that the non-technical skills area built on a technical basis, and therefore that a lack of confidence in the technical arena would hamper abilities in these other areas. The implications for curriculum development are that the non-technical skills cannot be taught in isolation from the technical context in which they will be used, and that integrated projects are a crucial tool for achieving such ends.

4.6 The Link between Teacher Training Institution and the World of Work

The supervisors were asked to describe the strength of the link between the teacher training institution with formal industry, informal sector (Jua Kali) and TVET institutions. The responses are as shown in Table 4.8.

Table 4.8: The Link between Teacher Training Institution and the World of Work

	Description (%)				
	Very strong	**Strong**	**Weak**	**Very weak**	**Non existent**
Industry	10	30	40	20	0
Informal Sector	10	20	50	10	10
TVET institutions	40	30	20	10	0

This tabulation is presented graphically in figure 4.7.

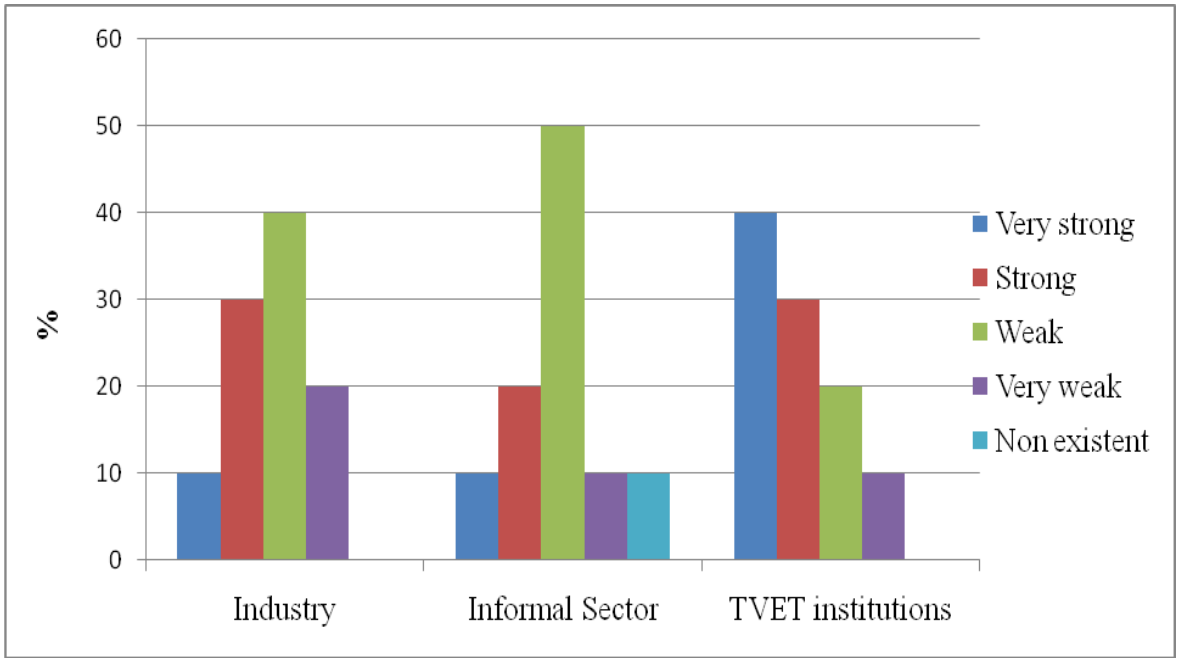

Figure 4.7: The Link between Teacher Training Institution and the World of work (Source: Author, 2012)

It is clear from Figure 4.7 that the link between the teacher training institution and the industry is generally weak with 40% of the participants indicating this. One third of them described the link as strong while a further 20% felt that the link is very weak. Only 10% felt there is a very strong link between the two. A half of them felt that the link with informal sector is weak and only 10% of the respondents felt that the link with both formal industry and the informal sector is very strong. However, the link with TVET institutions was described as very strong by 40% of the respondents while 30% described it as strong. This implies that the link between the teacher training institution and the world of work exists though the strength varies considerably depending on the type of the

work place. It was noted to be generally strong with the TVET institutions but weak with the automotive industry.

According to the study by Ferej et al (2012), most teachers desire establishing active links between training institutions and the labour market to ensure the relevance of their training programmes. They reported that the same teachers pointed at weak links currently existed between their institutions and the labour market. Efforts need to be put to achieve the desired collaborative linkages between teacher training institutions and the job market. The institutions should reach out to industry or the labour market.

From the open-ended questions in the questionnaires and further from the interviews conducted, some suggestions were made on how to improve the institution's relation with the TVET institutions. These were as follows; first, liaising with industry to be able to design programmes on areas where teachers need training especially on the current automotive technologies like computerized systems. They urged the institution to take a leading role in offering short courses on such areas as VVTI, EFI, Onboard diagnostics, AutoCAD among others. Second, liaising with KNEC and other TVET examining bodies to streamline their content and be able to prepare teachers who can adequately prepare technicians for their examinations and the industry. Third, organizing for practical sessions in the TVET institutions with established automotive workshops while themselves meeting the material costs and paying small fee. This, they clarified, will complement the inadequacies in its training facilities and equipment.

Regarding the relation with the industry, the participants suggested the following to improve the relation; first, making regular visits to relevant industries to familiarize with the current technologies and get to know their skills requirements. Second, organizing short courses for 'Jua Kali' artisans such as vehicle body work repair, painting among others which are competency based. This way, they say will get in touch with the informal sector and the industry at large. They also encouraged their trainees to seek attachment in these establishments so as to develop the 'hands-on' experiences. Third, organize for in-service training for lecturers to improve on their skills by getting acquainted with the emerging technologies. Fourth, extend the period of industrial attachment for their trainees to enable acquisition of practical skills. Finally, the need to involve industry in designing and reviewing of curriculum was emphasized.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.0 Overview

This chapter presents a summary of the findings in the preceding chapter in relation to the research objectives. It also includes the conclusions drawn and the recommendations made from them. It concludes by making suggestions for further research.

5.1 Summary of the Findings

The findings of this study have been derived from the objectives and answers to the research questions. The study sought to answer the following research questions:

1. Do the knowledge and skills graduate automotive teachers acquire during training match those required of them in the world of work?
2. Are the training facilities, equipment and materials available in teacher training institutions?
3. What instructional methods are used to prepare graduate automotive teachers?
4. What attitudes do supervisors have towards the performance of graduate automotive teachers in the world of work?

The answers to these questions are summarized as follows:

5.1.1 Comparison between Acquired and Required Knowledge and Skills

The findings of the study reveal that mismatch exists with regard to the courses and topics graduate teachers were trained on and what they are expected to deliver in the workplace. Some course units like AutoCAD and Vehicle Body Work are not covered in teacher training yet are part of what the graduate teachers are expected to teach. While the CAD/CAM unit seems to match in the table, it was noted that it was never taught as the graduate teachers were being trained. Research participants attributed this to its exclusion from the syllabus, lack of computers (with AutoCAD programme) and the absence of teacher trainers for the course unit. In addition, the Vehicle Body Works which is still new in Modular curricula has not been included in the teacher training curriculum. Teachers were well prepared in mathematics, mechanical science and fluid mechanics. Their preparation in mechanics of machines, strength of materials and technical drawing was satisfactory but they were ill prepared in thermodynamics, engineering design, auto electrics and electronics, and industrial organization and management.

Over half of the graduate automotive teacher trainees were comfortable teaching both theory and practical while only 5% were comfortable with only the practical. A third of them were comfortable with theory only. This reflects on their level of preparation in the area prior to teaching practice. The implication is that the practical content area needs emphasis in teacher preparation to enable trainees to perform to expectations in their work places upon employment. Graduate automotive teachers must be imparted with both

technical skills and pedagogical skill to effectively prepare trainees in the TVET institutions they work.

5.1.2 Availability of Training Facilities, Equipment and Materials

With regard to the training facilities, equipment and materials the researcher used an observation schedule to find out their availability and adequacy. The study revealed that most of the equipment needed in training graduate automotive teachers were lacking. Among those unavailable were; vehicle body work tools and equipment, life vehicles, most of the models of vehicle systems, engine dynamometer, and car lift among others.

The auto workshop was ill equipped on modern training equipment. It was also observed to be small in size. However, the institution had a well equipped and spacious library. There were varieties of reading materials on automotive technology, mathematics and sciences. However, books on technical drawing were limited. The other consumable materials were available but did not include vehicle body repair materials. The AutoCAD software was not available either.

The availability and adequacy of training facilities, equipment and materials in an institution has a great influence on the adequacy in preparation of trainees. Efforts are needed to avail them in sufficient quantities in the teacher training institution. The available facilities need to be well equipped with more tools, machines, equipment and materials to facilitate effective learning. Most trainees indicated that they were not comfortable using these equipment. The study established that the facilities and

equipment in the teacher training institution are wanting as far as graduate automotive teacher training is concerned, that a disharmony exists between the facilities in the university and those in the places of work. Eventually, the graduates are expected to use them when they get employed. This, consequently may impact on the job performance of graduate automotive teachers. UNESCO (2003) advised that there is a strong need to improve the quality and increase the quantity of mechanical training facilities, equipment and other materials in TVET institutions in Kenya.

5.1.3. Instructional Methods used to Prepare GATs

With regard to the instructional methods used in training, the study found out that the commonly used methods were; lecturing, projects, industrial attachments and teaching practice. It was found out that all the participants indicated that the instructional methods used during training include lecturing, industrial attachment, teaching practice and project. Except for the lecturing method, these methods are components of the training curriculum. Close to a third of the participants agreed that problem solving, illustration, industrial visits and practice methods were used. While the GAT training programme is designed to include considerable time in the workshop for practical and engaging in problems solving, the teacher trainers mainly used the lecture method in favor of these other approaches. This method only imparts the teacher trainees with theoretical knowledge while limiting them on the acquisition and the practice of the required practical knowledge and skill which are necessary in the workplace. The demonstration methods used seemed to be complimenting the practical method. This could be attributed

to the limitation of the available facilities, equipment and materials in the institution. To adequately prepare the GATs these methods ought to be used appropriately.

5.1.4. Attitudes of Supervisors towards Job Performance of GATs

Trainees were rated as very good in computer skills. They were also noted to be good in interpersonal relations and communication skills and were rated as average in accuracy, independence and innovativeness. In addition, they were found to be average on the use of tools and materials, machine operation skills and speed in task completion. They were generally good on team work. These skills are considered as important aspects of job performance which teacher trainees need to acquire during initial teacher training. Efforts should thus be made to impart and develop them in the teacher trainees. The attitude of supervisors could be attributed to the changing work environment where new technologies and work organization demand new skills and also that the teacher training programme has not innovated to accommodate such changes.

Kerre (1995) observed that in the current state of changing needs of societies and the work place, new knowledge and technologies are altering the skill requirement for production and maintenance. He therefore suggests that quality assurance be sought by both trainees and employers to ensure that the current mismatch between trainees and employment opportunities is arrested, if this is done, it will improve their job performance at work place.

Going forward, the following were proposed as strategies that could improve on the quality and relevance of graduate automotive teacher training programme:

1. Building and strengthening collaborative links with the automotive industries and other relevant bodies;
2. Regular review of the curriculum to match the changing trends in the automotive workplaces;
3. Regular monitoring of students on attachment at least one day per student and per industry;
4. Increasing the period of industrial attachment for automotive trainees;
5. Regular industrial visits to be up to date with trends;
6. Equipping the automotive workshop with necessary tools and equipment that match the industry;
7. Engaging trainees in more practical lessons to reinforce the theory learned;
8. Organizing exchange programmes for both trainers and trainees to expose them to new skills;
9. Encouraging public-private partnership in training to impart the practical skills to trainees; and
10. Seeking alternative funding sources towards meeting the cost of quality training.

Participants generally emphasized the need for the teacher training institution to be linked with the world of work in order to monitor their graduates and keep abreast with any changes that need be effected in the curriculum regarding the competencies being imparted on trainees.

5.2 Conclusions

The following conclusions were drawn from the findings of this study:

First, the current graduate automotive teacher training syllabus was observed, as not offering some of the knowledge and skills required by the TVET institutions and the automotive industry. A mismatch thus exists between the knowledge and skills graduate automotive teachers acquire during training and those required of them in the world of work. Much is required of them than what they learnt. This puts the teachers at a disadvantaged position as they have to learn on the job which subsequently may render them ineffective. Graduate teachers are adequately prepared in course units such as mathematics, fluid mechanics and mechanical science and could confidently teach them.

Secondly, the TVET teacher training institution lacks adequate and appropriate training facilities and equipment to effectively prepare graduate automotive teacher for the world of work. Graduate teachers subsequently lack the pre-requisite experience and technical competence to prepare automotive technicians for the modern industry. Teachers in the field will therefore have to learn on the job, be retrained or go for post graduate attachments to be able to deliver effectively.

In addition, teacher trainees go for industrial attachment and teaching practice as part of their training. They also work on final year projects before they graduate. These enable them apply and acquire more skills. The commonly used instructional methods are lecturing and demonstration while such methods as practical, industrial visits and

problem solving among others are seldom applied. These teaching methods should be used appropriately to ensure effective teacher preparation.

Finally, supervisors expressed almost similar opinions on the performance of graduate automotive teacher trainees. They rated them from average to good in most of the skills they exhibit during job performance. Teachers were rated as very good on computer skills. The lowly rated skills include the use of tools and materials, machine operating skills, innovativeness and speed in task completion. Graduate automotive teachers and trainees are not well exposed to these skills yet they are vital for job performance in the automotive field.

In conclusion, the training curriculum, inadequacy and/ or unavailability of training facilities, equipment and materials in the teacher training institution have hindered adequate preparation of graduate automotive teachers. This has impacted on the knowledge and skills imparted, instructional methods used and consequently the job performance of graduate automotive teachers in the world of work. The existence of a match between what the graduate automotive teachers learnt in University of Eldoret and what is required of them at the work place is a good indication that not everything learnt was irrelevant, though much can still be done to strengthen this relationship. Provision of a better TVET infrastructure through the necessary training facilities and equipment complemented with a suitable and updated curriculum and set of effective methodologies focusing on the competency based, lifelong skills development and enhancement may ensure adequate preparation of the graduate teachers for the world of work.

5.3 Recommendations

In view of the foregoing research findings and conclusions, the following recommendations are made;

It is recommended that the course units in the syllabus should be streamlined so as to meet the automotive institutions and industry needs. An evaluation and revision of the syllabus is necessary to accommodate the additional courses and content in KICD modular syllabus. The curriculum should include such course units as Vehicle Body Work, AutoCAD, Control Systems and Instrumentation and Industrial Organization and Management. The emerging technologies such as on-board vehicle diagnostics should be infused into the curriculum. The review should be done regularly to reflect the technological changes experienced in the world of work.

Secondly, the facilities, equipment and materials for teacher training should be as close and similar to those found at the workplace. Training for high-quality automotive skills requires appropriate training equipment and tools, adequate supply of training materials, and practice by the learners. The teacher training institution should strive to be model work place so that the teacher trainees are exposed to variety of specialized tools and equipment. This will help in promoting the teacher trainees' confidence at work. Relevant textbooks and training manuals should also be availed in sufficient quantity.

Furthermore, the instructional methods used in teacher training institution should be improved. The duration for industrial attachment should be increased from the current

two months to at least six months. The university should continue assisting trainees secure the most relevant industrial places. This will give trainees adequate exposure and practice thus overcoming the challenges of inadequacy of facilities and equipment in the institution. Project works should be done on yearly basis as opposed to final year only. This will enable trainees sharpen their skills continuously. Regular practice and industrial visits should also be encouraged. Teacher trainers should dedicate same teaching vigour to both theory and practical lessons and use variety of teaching methods instead of concentrating on lecturing.

In addition, the link between the teacher training institution and the world of work should be strengthened and be of mutual benefit. The automotive industry as well as the Kenya Institute of Curriculum Development (KICD) should be involved in designing and reviewing the training curriculum. The University should ensure that changes in the work place are taken care of in the planning and delivery of the program. It needs to constantly engage in periodic market research to get feedback on the market needs. The link may also be enhanced through seminars, workshops, industrial visits, attachments, and exhibitions. This will go a long way in fostering a healthy relationship between the University and the world of work besides preparing teachers with the competencies that are responsive to labour market needs.

There is also a need for greatly improved funding for teacher training programmes. Technical education is expensive and quality comes at a price. There is no substitute for adequate funding when it comes to delivering quality graduate automotive teacher

training. In this regard, government through the university should allocate adequate funds to equip the teaching and learning facilities. Training fund can also be established to support TVET from payroll levies on employers. Kenya can borrow the practice from such African countries as Cote d'Ivoire, Mauritius, Mali, South Africa, and Tanzania. Public private partnership should also be promoted to support the training systems.

Finally, comprehensive and systematic transformation of TVET teacher education and training programs must occur if they are to serve as leaders in addressing the challenges of preparing well-qualified individuals for the nation's workforce. The high performance workplaces of Kenyan TVET institutions and industry will require workers that have the skills, knowledge, and values necessary for success in ever changing, diverse, technological and competitive global markets.

5.4 Suggestions for Further Research

With the current trend in the world of work backed by the findings of this study, it is suggested that the following studies be done:

i. A study to investigate the effectiveness in preparation of graduate TVET teachers in Kenya
ii. A study to find out the challenges faced by Kenyan graduate TVET teachers at workplace

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APPENDICES

APPENDIX I

QUESTIONNAIRE FOR TEACHER TRAINEES

INTRODUCTION

The purpose of this questionnaire is to seek and identify your opinions regarding the Preparation of Graduate Automotive Teachers for the World of Work in Kenya.

You are among the chosen teacher trainees to participate in the study and therefore requested to give your views freely. The information you will provide will only be used for research purposes and will be kept strictly confidential.

Respond by ticking in the boxes provided and briefly writing the required information in the spaces as appropriate.

Kindly do this as honestly as you can.

1. Indicate your gender

   Female ☐ Male ☐

2. Indicate your age (*in years*)

   21-30 ☐ Above 30 ☐

3. Which is your year of study?

   First ☐ Third ☐

   Second ☐ Fourth ☐

4. Which is your area of technical specialization?

   Mechanical Technology ☐ Power Mechanics Technology ☐

5. Which other technical qualification (s) do you hold? (*tick all that apply*)

   Certificate *(please specify)* ☐ _____

   Diploma *(please specify)* ☐ _____

   Higher National Diploma *(please specify)* ☐ _____

   None ☐

6. Do you learn/use Computer Aided Design programs in your training?

   Yes ☐ *(please specify)* _____

   No ☐ *(kindly give a reason)*_____

7. Have you gone on teaching practice on your study in this institution?

   Yes ☐ ☐

8. At which level were you taking your teaching practice?

   Tertiary ☐ Secondary ☐

9. Did you find any difference in the automotive tools, machines, equipment and materials in your institution and those in the institution you were practicing at?

   Yes ☐ No ☐

10. Were you comfortable using the automotive tools, machines, equipment and materials in the institution you were practicing at?

    Yes ☐ No ☐

11. Which courses did you prefer teaching during your teaching practice? (*tick all that apply*)

Engineering Mathematics	☐	Strength of Materials	☐
Vehicle Body Work	☐	Technical Drawing	☐
Fluid Mechanics	☐	Engine Technology	☐
Thermodynamics	☐	Vehicle Technology	☐
Engineering Design	☐	Workshop Technology	☐
Industrial Organization and Management	☐	Mechanics of Machines	☐
		Materials Technology and Metallurgy	☐

Kindly give reason (s) for your preference

_____

_____

12. Which area of automotive were you most comfortable teaching? (*tick one*)

Theory ☐ Theory and Practice ☐

Practice ☐

Kindly give reason (s) for your choice

_____

_____

13. Have you gone on industrial attachment on your study in this institution?

Yes ☐ No ☐

14. How long was the industrial attachment you took while in this institution? (*in months*)

Less than 3 months ☐ 3-6 months ☐

Over 6 months ☐

15. Did you find any difference in the automotive tools, machines, equipment and materials in your institution and those in the firm you were attached to?

    Yes ☐ No ☐

16. Were you comfortable using the automotive tools, machines, equipment and materials in the firm you were attached to?

    Yes ☐ No ☐

Kindly comment on your response

_____

17. Which methods of instruction do your lecturers use as they train you?

Lecturing	☐	Discussion	☐
Illustration	☐	Practice	☐
Problem solving	☐	Industrial visits	☐
Industrial Attachment	☐	Demonstration	☐
Teaching Practice	☐	Project	☐

18. What would you like improved in your institution to prepare you adequately for work?

_____

_____

_____

_____

_____

END OF QUESTIONNAIRE

Thank you very much for taking your time to fill this questionnaire

APPENDIX II

QUESTIONNAIRE FOR TEACHERS

INTRODUCTION

The purpose of this questionnaire is to seek and identify your opinions regarding the Preparation of Graduate Automotive Teachers for the World of Work in Kenya.

You are among the chosen teachers to participate in the study and therefore requested to give your views freely. The information you will provide will only be used for research purposes and will be kept strictly confidential.

Respond by ticking in the boxes provide and briefly writing the required information in the spaces as appropriate.

Kindly do this as honestly as you can.

1. Indicate your gender

   Female ☐ Male ☐

2. Indicate your age *(in years)*

   26-39 ☐ 40-60 ☐

3. Which is your area of technical specialization?

   Production ☐ Automotive ☐ Plant ☐

4. The highest qualification you hold is a:

   First Degree *(please specify)* ☐ _____

   Second Degree (*please specify*) ☐ _____

5. Which other technical qualification (s) do you hold? (*tick all that apply*)

   Certificate *(please specify)* ☐ _____

   Diploma *(please specify)* ☐ _____

   Higher National Diploma *(please specify)* ☐ _____

   None ☐

6. How long have you been an automotive teacher?

   0-5 years ☐ 6-10 years ☐ Over 10 years ☐

7. How much industrial work experience did you have before you started teaching?

   Less than 6 months ☐ 6 months to 1 year ☐

   Over 1 year ☐

8. How would you relate the knowledge and skills you acquired during graduate automotive teacher training with those required in your work place?

   Quite Related ☐ Not sure ☐

   Somehow Related ☐ Not Related ☐

9. Which subjects do you feel the graduate teacher training you underwent adequately prepared you for work? (*tick all that apply*).

10. Mathematics ☐ Thermodynamics ☐

    Technical Drawing ☐ Vehicle Body Work ☐

    Engine Technology ☐ Workshop Technology ☐

    Vehicle Technology ☐ Engineering Drawing and Design ☐

    Mechanics of Machines ☐ Mechanical Science ☐

    Strength of Materials ☐ Vehicle Electrical and Electronics ☐

    Fluid Mechanics ☐ AUTOCAD ☐

Materials Technology and Metallurgy	☐	Industrial Organization and Management	☐

11. Which methods of instruction did your lecturers use during your graduate teacher training?

Lecturing	☐	Discussion	☐
Illustration	☐	Practice	☐
Problem solving	☐	Industrial visits	☐
Attachment	☐	Demonstration	☐
Teaching Practice	☐	Project	☐

11. In your opinion how could teacher training institutions improve their relationship with TVET institutions such as yours?

_____

_____

_____

_____

12. From your experience indicate how teacher training institutions could ensure adequate preparation of their graduate automotive teachers for the world of work.

_____

_____

_____

_____

END OF QUESTIONNAIRE

Thank you very much for taking your time to fill this questionnaire

APPENDIX III

QUESTIONNAIRE FOR HEADS OF DEPARTMENT

The purpose of this questionnaire is to seek and identify your opinions regarding the Preparation of Graduate Automotive Teachers for the World of Work in Kenya.

You are among the chosen participants in the study and therefore requested to give your views freely. The information you will provide will only be used for research purposes and will be kept strictly confidential.

Respond by ticking in the boxes provide and briefly writing the required information in the spaces as appropriate.

Kindly do this as honestly as you can.

1. Indicate your gender

   Female ☐ Male ☐

2. Indicate your age (*in yrs*)

   25-39 ☐ 40-60 ☐

3. How long have you been a HoD/HoS?

   0-5 years ☐ 6-10 years ☐ Over 10 years ☐

4. What is your highest qualification?

   Diploma ☐ First Degree ☐

   Higher National Diploma ☐ Second Degree ☐

5. How would you rate the performance of automotive teacher trainees from University of Eldoret in your institution with regard to the following aspects of job performance?

Aspect of Job Performance	Very Good	Good	Average	Poor	Very Poor
Accuracy					
Speed in task completion					
Independence					
Innovativeness					
Interpersonal relations (Ability to work with others)					
Machine operation skills					
Use of materials					

6. How would you describe the link between University of Eldoret and your institution?

Very strong ☐ ☐ Very weak

Strong ☐ ☐ Non existent

Weak ☐

7. In your opinion how could University of Eldoret improve its relation with TVET institutions such as yours?

_____

_____

_____

_____

8. In your opinion how could University of Eldoret improve its relation with the automotive industry?

_____

_____

_____

_____

9. From your experience indicate how University of Eldoret could ensure adequate preparation of its graduate automotive teachers for the world of work?

_____

_____

_____

_____

_____

END OF QUESTIONNAIRE

Thank you very much for taking your time to fill this questionnaire.

APPENDIX IV

QUESTIONNAIRE FOR INDUSTRY-BASED SUPERVISORS

The purpose of this questionnaire is to seek and identify your opinions regarding the Preparation of Graduate Automotive Teachers for the World of Work in Kenya.

You are among the chosen participants in the study and therefore requested to give your views freely. The information you will provide will only be used for research purposes and will be kept strictly confidential.

Respond by ticking in the boxes provide and briefly writing the required information in the spaces as appropriate.

Kindly do this as honestly as you can.

1. Indicate your gender

   Female ☐ Male ☐

2. Indicate your age (*in yrs*)

   25-39 ☐ 40-60 ☐

3. How long have you been a supervisor/head of your section?

   0-5 years ☐ 6-10 years ☐ Over 10 years ☐

4. What is your highest qualification?

   Diploma ☐ First Degree ☐

   Higher National Diploma ☐ Second Degree ☐

5. How would you rate the performance of automotive teacher trainees from University of Eldoret in your firm/institution with regard to the following aspects of job performance?

Aspect of Job Performance	Very Good	Good	Average	Poor	Very Poor
Accuracy					
Speed in task completion					
Independence					
Innovativeness					
Interpersonal relations (Ability to work with others)					
Machine operation skills					
Use of materials					

6. How would you describe the link between University of Eldoret and your firm?

Very strong ☐ ☐ Very weak

Strong ☐ ☐ Non existent

Weak ☐

7. In your opinion how could University of Eldoret improve its relation with the automotive industry?

_____

_____

_____

_____

_____

8. From your experience indicate how University of Eldoret could ensure adequate preparation of its graduate automotive teachers for the world of work?

_____

_____

_____

_____

_____

_____

END OF QUESTIONNAIRE

Thank you very much for taking your time to fill this questionnaire.

APPENDIX V

INTERVIEW GUIDE FOR HEADS OF DEPARTMENT

1. Could you kindly give a brief description of your department?
2. Do you receive students on teaching practice from University of Eldoret?
3. How many teachers are graduates of UoE in your department?
4. How do you find supervising student-teachers from UoE?
5. What module units do student-teachers from UoE prefer teaching when they come on teaching practice?
6. Do the student-teachers generally prefer teaching theory or practice while on teaching practice?
7. What are the desirable competencies of an effective automotive teacher?
8. Which skills do the student-teachers from UoE need to improve on?
9. What would you recommend as the best approach in preparing an automotive teacher?
10. What are the key determinants of quality and relevance of an educational programme such as automotive teacher training?
11. Does your institution have any link with UoE? If yes, in what ways do you collaborate?
12. What needs to be done to strengthen the linkage between TVET teacher training institutions such as UoE and TVET institutions like yours?
13. What changes do you propose to be made in University of Eldoret so that their graduates fit to the work of work?

THANK YOU VERY MUCH FOR YOUR TIME

APPENDIX VI

INTERVIEW GUIDE FOR INDUSTRY-BASED SUPERVISORS

1. Could you kindly give a brief description of your firm?
2. Do you receive students on attachment from University of Eldoret?
3. How many employees are graduates of UoE in your firm?
4. What level of employment would you place the automotive graduates of UoE?
5. How do you find supervising trainees from UoE attached in your firm?
6. What types of tasks do trainees from UoE prefer handling when they come on attachment?
7. What are the desirable competencies of an effective automotive employee in your firm?
8. Which skills do the automotive trainees from UoE need to improve on?
9. What would you recommend as the best approach in preparing an automotive workforce?
10. What are the key determinants of quality and relevance of an educational programme such as automotive training?
11. Does your firm have any link with UoE? If yes, in what ways do you collaborate?
12. What needs to be done to strengthen the linkage between training institutions such as UoE and automotive firms like yours?
13. What changes do you propose to be made in University of Eldoret so that their graduates fit to the work of work?

THANK YOU VERY MUCH FOR YOUR TIME

APPENDIX VII

OBSERVATION GUIDE

S/No.	ITEM	AVAILABLE	ADEQUATE
	Facility		
1.	Automotive Workshop		
2.	Computer Laboratory		
3.	Science Laboratories		
4.	Drawing Room		
5.	Library		
6.	Lecture Rooms		
	Equipment		
7.	Vehicle (e.g Life Vehicle, Model Vehicle)		
8.	Life Engines (Petrol and Diesel Engines)		
9.	Models of Vehicle Systems (e.g Gearbox, Braking, Electrical, Engine, Injector Pump, Carburetor)		
10.	Vehicle Body Equipment and Tools (e.g Hydraulic Body Jack, Chassis Aligner, Paint Dryer, Head Lamp Aligner)		
11.	Wheel and Tire Tools and Equipment (Wheel Balancer, Tire Changer, Puncture Basin)		
12.	Exhaust Fume Analyzer		
13.	Lathe Machine		

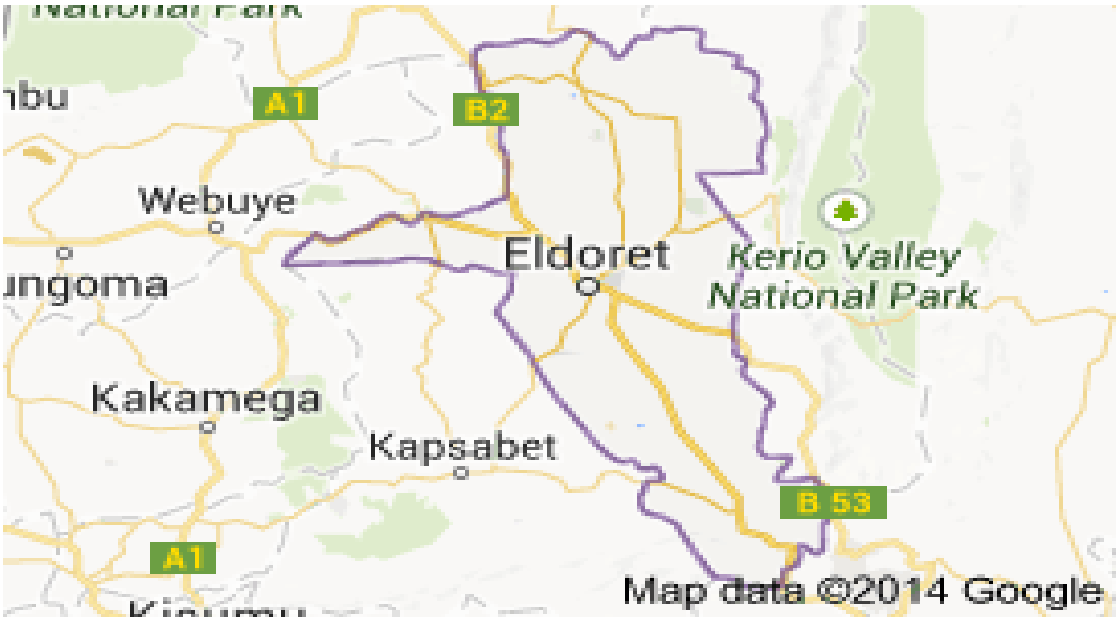
14.	Presses (Arbor and Hydraulic)		
15.	Drilling Machine		
16.	Grinders (e.g Valve Seat Grinder)		
17.	Shearing Machines (e.g Bench Shear)		
18.	Lubrication Equipment (e.g Grease Gun)		
19.	Car Lifting Equipment (e.g Lift and Hydraulic Jacks)		
20.	Air Compressor		
21.	Welding Equipment and Tools(e.g Arc Welding and Gas Welding)		
22.	Bench Vices		
23.	Hoist		
24.	Testers (e.g Spark and Compression ignition, Coolant)		
25.	Stands (e.g Engine Stand and Safety Stands)		
26.	Car Washing Machine		
27.	Fire Extinguishers		
28.	Screw Drivers		
29.	Hammers		
30.	Spanners		
31.	Measuring tools		
32.	Gauges		
Material			
33.	Relevant Textbooks and Reference		

	Materials		
34.	AutoCAD Software		
35.	Engineering Materials (e.g Sheet Metals, Metallic Bars, Body Fillers, Welding Rods, Paints, Fuels, Oils)		

APPENDIX VIII

MAPS OF UASIN GISHU AND NANDI COUNTIES

MAP OF UASIN GISHU COUNTY



MAP OF NANDI COUNTY

(Source: Google Maps, 2014)

APPENDIX IX

RESEARCH AUTHORIZATION

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telephone: 254-020-2213471,2241349
254-020-310571,2213123, 2219420
Fax: 254-020-318245,318249
when replying please quote
secretary@ncst.go.ke

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref: NCST/RCD/14/012/1247

Date: 6th September 2012

Jonah Kipyegon Ronoh
Chepkoilel University College
P.O.Box 1125-30100
Eldoret.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "***Preparation of graduate automotive teachers for the world of work in Kenya,***" I am pleased to inform you that you have been authorized to undertake research in **Nandi South and Uasin Gishu Districts** for a period ending **30th November, *2012.***

You are advised to report to **the District Commissioners and the District Education Officers, Nandi South and Uasin Gishu Districts** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

SAID HUSSEIN
FOR: SECRETARY/CEO

Copy to:

The District Commissioners
The District Education Officers
NandiSouth District
Uasin Gishu District.

"The National Council for Science and Technology is Committed to the Promotion of Science and Technology for National Development".

APPENDIX X

AREAS OF MISMATCH FOR VARIOUS COURSE UNITS

S/No.	COURSE UNIT	AREA OF MISMATCH	
		Deficiency	**Excess**
1	Thermodynamics	Ideal gas cycles, Fuels and combustion, Air compressors, Gas turbines, Internal Combustion engines and engine trials and Nozzles	None
2	Mechanics of Machines	Mass moments of inertia, Area moments of inertia, Dynamics of rigid body in translation (Hoists), Dynamics of rigid body in plane (Vehicle dynamics)	Gyroscopes, Kinematics of mechanisms, Friction and lubrication
3	Strength of Materials	Thin cylinders and shells, Strain energy and Springs (except close-coiled helical spring)	One and two dimensional analysis of stress and strain, Struts and Theories of failure
4	Fluid Mechanics	None	Flow through Orifices, Weirs and notches
5	Mechanical science	None	All topics are covered in Applied mathematics

			and Physics
6	Engineering Drawing	Lines in space	Electrical drawings, Building drawings
7	Engineering Design	Gears, Screw threads, Cams, Bearings, Limits and Fits, Design of Jigs and fixtures, Geometrical tolerance	Legal factors, Value engineering
8	Workshop Technology	Metal joining (MIG and TIG)	None
9	Engineering Materials	Production of Iron, Steel and Cast iron and Bearing materials	None
10	Mathematics	Loci, Hyperbolic functions and inverse functions	Boolean algebra and algebraic structures, Error analysis, Iterative methods for finding roots of polynomials and transcendental equations, Aivy's equations, Legendaries equations, generalized power series, Bessel functions, wave equations, heat,

			conduction and diffusion equations, solution in polar, cylindrical and spherical coordinates.
11	Engine Technology	Special engines (striving engine, Hybrid engine and Solar engine)	None
12	Vehicle Technology	Wheels and tires, Driving	Vehicle emission systems
13	Auto Electrics and Electronics	Heating and ventilation, Air conditioning, windscreen wipers, Window systems and doors mirrors, Central door locking system, Compression ignition fuel system Electronic diesel control (EDC), Engine mapping, Clutch electronic control, Manual gear box electronic control	None
14	Vehicle Body Work	Panel beating, Spray painting and Vehicle upholstery	None

15	Industrial Organization and Management	Plant maintenance, Work study, Human resource management, Economics, Office administration and Estimating and costing	None
16	CAD/CAM	AUTO CAD	Computer Aided Design in various disciplines, PLC interfaces
17	Trade Project	None	None

APPENDIX XI

AVAILABILITY OF FACILITIES, EQUIPMENT AND MATERIALS IN TEACHER TRAINING INSTITUTION

S/No.	ITEM	AVAILABLE	ADEQUATE
	Facility		
1.	Automotive Workshop	√	×
2.	Computer Laboratory	√	×
3.	Science Laboratories	√	×
4.	Drawing Room	×	×
5.	Library	√	√
6.	Lecture Rooms	√	√
	Equipment		
7.	Vehicle (e.g Life Vehicle, Model Vehicle)	√	×
8.	Life Engines (Petrol and Diesel Engines)	√	×
9.	Models of Vehicle Systems (e.g Gearbox, Braking, Electrical, Engine, Injector Pump, Carburetor)	√	×
10.	Vehicle Body Equipment and Tools (e.g Hydraulic Body Jack, Chassis Aligner, Paint Dryer, Head Lamp Aligner)	×	×
11.	Wheel and Tire Tools and Equipment (Wheel Balancer, Tire Changer, Puncture Basin)	√	×
12.	Exhaust Fume Analyzer	×	×

13.	Lathe Machine	√	×
14.	Presses (Arbor and Hydraulic)	×	×
15.	Drilling Machine	√	×
16.	Grinders (e.g Valve Seat Grinder)	√	×
17.	Shearing Machines (e.g Bench Shear)	√	×
18.	Lubrication Equipment (e.g Grease Gun)	×	×
19.	Car Lifting Equipment (e.g Lift and Hydraulic Jacks)	√	×
20.	Air Compressor	×	×
21.	Welding Equipment and Tools(e.g Arc Welding and Gas Welding)	√	×
22.	Bench Vices	√	×
23.	Hoist	×	×
24.	Testers (e.g Spark and Compression ignition, Coolant)	×	×
25.	Stands (e.g Engine Stand and Safety Stands)	√	×
26.	Car Washing Machine	×	×
27.	Fire Extinguishers	√	×
28.	Screw Drivers	√	×
29.	Hammers	√	×
30.	Spanners	√	×
31.	Measuring tools	√	×
32.	Gauges	√	×

Material			
33.	Relevant Textbooks and Reference Materials	√	×
34.	AutoCAD Software	×	×
35.	Engineering Materials (e.g Sheet Metals, Metallic Bars, Body Fillers, Welding Rods, Paints, Fuels, Oils)	√	×