

APPLIED EDUCATION IN THE CENTRAL PROVINCE OF KENYA:
A Survey of the Adequacy of Facilities and Teacher Characteristics

By

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ABSTRACT

This survey study identified the extent of the availability of resources related to the teaching and learning of seven out of fourteen applied education subjects offered in 125 secondary schools in the Central Province of Kenya. Data were collected through complimentary teacher and headteacher questionnaires completed by one applied education teacher from each school and the headteacher of that school.

Factors studied were physical facilities, instructional materials, teacher characteristics, and pedagogical areas offered among the schools.

The results showed that the quantity and quality of most of the available resources were, to say the least, unsatisfactory. Furthermore, the level of adequacy varied considerably from one school to the other, irrespective of whether the schools in question offered the same or different subject areas. Similarly, the diversity of subject areas offered among these schools was limited.

Eight recommendations were made for improving student accessibility to adequate applied education resources.

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CHAPTER ONE: BACKGROUND AND PROBLEM ANALYSIS

1.1.0 Introduction

This chapter explains the rationale for introducing applied education into the Kenya Secondary Schools and its relevance to the secondary school leavers. A brief discussion on the need for all students to have access to comparable applied education resources is given and five factors identified as the general problem area for this study. Specific research questions and the significance of this study are also stated at the end of the chapter.

1.2.0 Rationale for Introducing Applied Education

Up to the end of 1984, Kenya's system of education over-emphasized intellectual pursuits at the expense of the needed economic and cultural talents, and responsible citizenship (Report of the Presidential Committee on Unemployment [Unemployment], 1982/83). Since the early 1970s, this system of education was blamed for raising unemployment of the youth among other problems. Consequently, it was reformed in 1986 to include practical skills that school leavers could use for self-reliance.

At a Conference of Commonwealth Education Ministers, held in Nairobi in 1987, the education opportunity index for secondary and university education in Kenya was reported as 35% and 15% respectively (Commonwealth Secretariat, 1987). That is, available secondary schools were expected to provide

spaces for 35% of those students who enrolled in Standard One while the universities will absorb 15% of the same enrolment. One of the important objectives of the 8:4:4¹ education reform was to prepare those students who were not able to attend secondary or post-secondary schooling for the life they are likely to lead after their formal schooling is over. To achieve that objective, the new system required practical subjects to be taught to the entire student population in primary and secondary schools. The secondary school component of practical subjects was called applied education. Its short-term objective was to teach students specific practical skills, knowledge, and attitudes which would enable them to earn their livelihood by making or providing marketable goods or services. Because of its emphasis on skill development, the innovation required adequate educational resources, for example, physical facilities, instructional materials, and qualified personnel.

Curriculum diversification was justified on a perceived need to improve the "quality of education" to make it more responsive to the needs of the individual and the country (Report of the Presidential Working Party on Education and Manpower Training for the Next Decade and Beyond [Working Party], 1988, p. 2). There is no single definition for

¹Kenya's present system of education comprising eight years of primary education, four years of secondary education, and four years of minimum university education.

"quality education" but most educators agree on some of its dimensions (Gibson, 1970; British Columbia Royal Commission on Education [BCRCE], 1988, Pt. 5). The set of criteria used by BCRCE (1988) to assess the quality of educational programs were relevance, equity of access, response to diversity, academic achievement of students, ethics, political involvement of public, and accountability. Relevance and equitable access to educational resources are discussed next because they are the two criteria that are closely related to the implementation of applied education in Kenya.

1.2.1 Relevance

According to Ross (1988, p. 1), educational relevance of a program is commonly justified in terms of its instrumental value or the psychological importance such a program holds for the learner. One aspect of this instrumental view was described as:

... the extent to which school programs prepare students for the world of work, and aid in the development of marketable skills and talents which will benefit the individual and the society (p. 3).

This particular instrumental value strikes at the heart of the applied education objective. The major driving force behind the introduction of applied education innovation was rising unemployment of the youth. However, it is important to note that applied education was taught within a broad academic curriculum (KNEC, 1987). Therefore, what Coombs (1988, p. 5)

calls "plurality of education purposes" of responsible citizenship, productive contribution to the economy and culture, intellectual pursuits, and cultural traditions were not compromised. Indeed, the 8:4:4 reform highlighted the citizenship purpose by making social education and ethics, and history and government separate educational goals (KNEC, 1987).

While the short-term aim of the program was to provide secondary school leavers with practical skills for self-reliance, the long-term objective was to encourage them to utilize job opportunities available in the rural areas. Realization of either the short-term or the long-term goal was expected to bring economic and social benefits to both the individual and the society.

Besides reducing unemployment, working in the rural areas was expected to help check rural-urban migration and promote more efficient use of local human and material resources. In the process of solving technical problems unique to rural environments, indigenous technologies were expected to be developed to support hoped for industrialization. However, the expected benefits were based on the assumption that applied education program would be successfully implemented. Availability of adequate educational resources is particularly important for the attainment of applied education objectives because it is a skill development program and these skills can only be acquired through practice. The Working Party (1988,

p. 4) reiterated that "the process of bringing equity in social and economic development through education was [and still is] an important objective of education and training". Therefore, the issue of equitable access to educational resources (though by no means the only issue) must be satisfactorily resolved.

1.2.2 Accessibility to Educational Resources

Before applied education was made part of general education, secondary schools in Kenya were categorized² (in order of government funding priority) as National, Maintained, Assisted, Harambee, and Private. Each category received varying amounts of government aid according to a funding formula which gave National schools the most and Private schools the least assistance respectively. Other schools received aid commensurate with their assigned status. The assistance was in the form of cash, personnel, instructional materials, and physical facilities. Almost all of the educational requirements by National Schools were financed by the public while the Private Schools received minimal funding usually in the form of policy documents and supervisory and advisory services when educational related problems arose in

²As the parents assumed more and more responsibility for the education of their children, the mode of selection and admission of students became a more common criteria than financing as a method for categorizing secondary schools. (Working Party (1988), Chap. VI; *Information Handbook*, Ministry of Education (1987), p. 35-37).

individual schools. The financial difference between the individual school requirements and the government aid was met in varying degrees of success through arrangements like Harambee³ and various kinds of school fees like tuition, building, and recreational. Consequently, different schools acquired educational resources of varying quality and quantity. For example, all the former industrial education schools had their applied education programs fully equipped by Swedish International Development Authority (SIDA) long before applied education was mandated for all schools. They were supplied with hand tools, machines, equipment, and special rooms (Lauglo, 1985, p. 134).

When applied education was made part of general education in 1986, the responsibility for providing the innovation's resources was shared among the government, parents, and the community served by individual schools. Until recently, parental and community involvement in education funding was mainly through voluntary contributions to finance Harambee schools or subsidize government funding for other categories of schools. By 1988, it seemed a matter of time before that

³Literally means 'pulling together'. It referred to a mode of financing the cost of applied education with voluntary contributions (cash and kind) from parents, communities, sponsors, individuals, and private organizations to supplement government effort.

form of involvement was formalized in a Cost-Sharing Policy.⁴ The following excerpt from the Working Party (1988) supported such a policy:

The vocationalization of education under the 8:4:4 system of education has created a great demand for the supply of educational [physical] facilities, tools, and equipment and hence increasing expenditure on facilities and equipment. In the light of government financial constraint, it is the view of the Working Party that the Cost-Sharing strategy applicable to the provision of physical facilities and some equipment by communities and parents in primary schools should be extended to secondary schools. The government should, however, continue to provide specialized equipment in order to maintain quality and relevance of teaching subjects such as sciences and vocational education. Parents should supply text books and supplementary readers, stationery, and consumable items for practical subjects [applied education]. (p. 119)

Thus, the Cost-Sharing Policy would hold parents and communities formally responsible for providing substantial amounts of school inputs required for successful implementation of applied education. In December 1984, the Ministry of Education estimated the financial cost for providing buildings, hand tools, and equipment for Agriculture and Typing and Office Practice at KSh 210,000 and KSh

⁴This government policy (currently under formulation) is expected to review and formalize responsibilities for funding public education -- including applied education. School trustees (particularly parents) would be required to provide physical facilities, text books, reference materials, stationery, and consumable items for applied education.

1,100,000 respectively (see Appendix G). The cost of the other twelve applied education subjects were between these two estimates. Thus, applied education was an expensive program, particularly because the cost estimates were based on a class size of 20 students. Furthermore, the government made its intention clear to introduce the program about two years before the expected date for implementation. Under such conditions, it was inevitable that some schools would experience problems in securing the necessary educational resources. Depending on the history of individual schools (including their previous classification), and the economic/social status of school trustees (Board of Governors, individual parents, sponsors, etc.), the quantity and quality of school inputs could vary greatly even among neighbouring schools. Financially rich and influential school trustees were more likely to succeed in securing educational resources for their schools through personal donations, Harambee, and lobbying officials who allocate aid from government and private donors to schools.

The high financial cost and massive positive publicity that applied education was given during its initial stages raised hopes and expectations for the innovation among students, parents, communities, and sponsors. The aspects of the program that appealed the most to these curriculum stakeholders were the improved social and economic status that its proponents promised to those who learned the skills that

it offered. Consequently, these curriculum stakeholders provided the material support they could afford to start the program in their schools. The educational resources available to an individual student would translate into material and social benefits for that individual because educational achievements are used as major determinants of who would be awarded the available opportunities for employment, further training or education. In turn, educational achievement is a function of the available educational resources. It was, therefore, imperative that the quality and quantity of resources available to individual secondary schools for the teaching and learning of applied education be determined in order to identify the strengths and weaknesses of the innovation.

1.3.0 General Problem

This survey study identified the extent of the availability of resources related to the teaching and learning of applied education in 125 secondary schools in Central Province of Kenya. The factors considered were: physical facilities, instructional materials, teacher characteristics, and subjects offered among the schools.

1.4.0 Research Questions

Answers to the following questions were sought:

1. How adequate (quantity and quality) are the available physical facilities and instructional materials for the

teaching and learning of each of the 14 applied education subjects? What new or expanded facilities were planned for and, if so, when would they be available for use?

2. What are the teachers' characteristics?
3. Which applied education subjects were offered in the schools and on what basis did school trustees make decisions about which subjects their school offered to individual Form One students? What was the student enrolment per subject and anticipated changes, if any, in subjects offered by 1991?

1.5.0 Significance of the Study

It was hoped that findings from the study would be useful to individuals and private or public organizations interested in successful implementation of applied education.

1. Findings on physical facilities, and instructional materials could influence Harambee efforts to raise funds for applied education.
2. The Inspectorate Section of the Ministry of Education could use information obtained to ensure that all students had access to comparable educational resources for applied education.
3. Findings regarding teacher characteristics would be useful in improving the recruitment, training and deployment of applied education teachers.

4. Information obtained would help predict the quality and diversity of practical skills expected among secondary school-leavers.
5. A provincial overview of applied education would provide school trustees and staff with comparative information on the adequacy of their school's educational resources.
6. Findings would provide direction for further research in applied education.

1.6.0 Definition of Terms

Practical Subjects: A component of general education (Primary and Secondary) intended to provide students with specific practical skills and knowledge through the use of equipment, tools, and materials to make or provide marketable goods or services to customers or clientele.

Applied Education: The secondary school phase of practical subjects. It was a collective term for the following individual subjects: Home Science, [Clothing & Textiles and Food & Nutrition], Art and Design, Agriculture, Electricity, Power Mechanics, Woodwork, Metalwork, Building construction, Drawing and Design, Accounting, Commerce, Economics, Typing and Office Practice, and Music.

Physical Facilities: Educational resources like special rooms (workshops, home science laboratories, classrooms, special equipment, benches, furniture, storage spaces, etc.),

necessary for effective teaching and learning of applied education.

Instructional Material: Referred to educational resources like textbooks, reference materials, consumable materials, and teaching aids.

Adequacy: How sufficient the quantity and quality of available educational resources are.

Curriculum Stakeholders: Those individuals or groups in society who have direct or indirect right to be involved in educational decision-making. These include primary stakeholders such as students, teachers, education administrators, parents, and school trustees as well as secondary stakeholders including taxpayers, politicians, employers, and others.

Innovation: Refers to a project or programme that requires a change in teaching methodologies, use of new resources, or different use of old resources.

Implementation: Implementation is the process of putting an innovation into *actual* use. It comprise the teaching and learning activities used by the teacher and the students concerned.

CHAPTER TWO: LITERATURE REVIEW

2.1.0 Introduction

This chapter comprises a review of literature in two areas. The first area examines constraints in implementing vocationally-oriented education with a particular focus on the international context; the second area consists of a history of applied education in Kenya. The purpose of the first section is to provide comparative information on the status of vocationally-oriented education in some developing countries with respect to the implementation factors considered in this study. The latter section provides the context within which previous Industrial and Business Education subjects, Agriculture, Home Science, Art and Design, and Music evolved into Applied Education.

2.2.0 Section A: Constraints in Implementing Vocationally-Oriented Education -- A Review of Experiences in Some Developing Countries Within the Commonwealth

The introduction of applied education in Kenyan Secondary Schools was part of a policy of diversifying school curricula in a practical or vocational direction in developing countries within the Commonwealth (Commonwealth Secretariat, 1987). Justification for this policy was based on the view that school knowledge should relate as directly as possible to current and future real-life situations that the learner would most likely face.

Due to high youth unemployment among many developing countries, there was an expectation that a practical component in the school curriculum could give school leavers an advantage in obtaining a livelihood either through salaried or self-employment. The degree of hope or reality of that premise would vary from one country to another. However, according to Lauglo (1985) many critics of curriculum diversification have emphasized the point that schools cannot solve labour market problems.

In July, 1987, the Tenth Conference of Commonwealth Education Ministers [Commonwealth Secretariat, 1987] was held in Nairobi, Kenya. Papers from at least twenty-three countries on vocationally-oriented education were presented. Each paper addressed issues related to the objectives, patterns of provision, implementation, new initiatives, and international cooperation as they pertained to the vocational education programs in their country. Among these issues, implementation was the most relevant for this study. Factors discussed under the topic of implementation were achievements, plans, constraints, curriculum, staffing, and cost effectiveness. Table 1 shows selected constraints and their frequencies of occurrence.

Table 1

SOME CONSTRAINTS IN IMPLEMENTING VOCATIONALLY-ORIENTED EDUCATION

CONSTRAINT	PERCENT
1. Teacher Inadequacy ⁵	74
2. Tools & Equipment	69
3. Instructional Materials	65
4. Attitudes, Perceptions, Beliefs	61
5. Physical Facilities	26

Each of the constraints in Table 1 are discussed in more detail below.

2.2.1 Teacher Inadequacy

Reported teacher-related problems clustered around the problems of shortage; attrition; incompetence; low academic, technical, and professional qualifications; vague or unrealistic program goals; and poor planning.

Teacher shortage referred to the unavailability of academically, technically and professionally trained teachers in individual countries. It was attributed to rising student population and inadequate training capacity, for example, physical facilities, appropriate training tools and equipment, and teacher trainers. Lack of applicants for the available teacher training opportunities and discontinuation of trainees due to unsatisfactory progress also worsened the teacher shortage.

⁵Insufficient in quantity and quality.

Unattractive terms and conditions of service resulted in a high attrition rate. The well qualified teachers, especially those with industrial/commercial experience, were reportedly lured into the private sector by better material and social benefits. Related to this problem was a claim that promotion prospects for good teachers was poor. Consequently, teachers quit their jobs due to under employment and frustration. Even where the prospects for upward mobility was high and there were incentives for teachers to stay on, inadequate staff-development programs made it difficult for the teachers to take advantage of such incentives.

One of the indicators of teacher incompetence was the lack of teacher commitment to their job. Considering the implications of the constraints blamed for slowing down the implementation of vocationally-oriented education (Fig. 2.1), lack of teacher commitment was not a surprise. In a study on the teachers' role in school improvement, Crandall et al. (1983 p. 6) found that teacher commitment was greatly increased by clear and direct positive involvement of school administration [Headmaster], supervisory and advisory staff [e.g. School Inspectors], training/in-service by a credible person [e.g. a colleague] in the use of proven practice, and continued support and availability of equipment, instructional materials, etc.). Those findings are complementary to conventional wisdom that teacher commitment can be developed

by involving them in the development of the formal curriculum, new instructional materials, teaching methodologies, etc.

Teachers were reported as having low academic, technical, and professional qualifications. Rapid increase in population and resultant decrease in job opportunities resulted in emphasis on training for salaried or self-employment beside further education or training. Teachers were inadequate for such tasks because they lacked work experience. Furthermore, rising student population and teacher shortage forced teacher recruitment agencies to employ teachers with low academic, technical, and professional qualifications.

The fifth factor attributed to teacher inadequacy was poor planning. Programs were mandated before adequate support could be made available to teachers in form of sufficient learning and teaching materials (e.g. books, consumable materials, tools, etc.) and advisory staff. Other more general issues related to educational planning concerned the imbalance between manpower demands and supply for different sectors of the economy. Likewise, inefficient monitoring mechanisms for responding quickly to changing demands in education and underfunding due to financial restraint were attributed to poor planning of vocationally-oriented education.

The depth, scope and purpose of vocational competence that the school system strove to achieve were unclear or unrealistic. Objectives in school syllabuses were broad and

very general while the content was made up of specific knowledge, attitudes, and skills. For such broad and general goals to be achieved, teacher trainees required adequate time for skill development and work experience. Time allocated for vocational education and resources available to schools did not allow for such an industrial/commercial attachment for student teachers. Furthermore, when students got opportunities for further training or education, their past knowledge of vocational education did not give them any advantage over their competitors who did not have such knowledge.

2.2.2 Tools and Equipment

Most countries imported the tools and equipment they required or the raw materials needed to manufacture them. In that respect, education competed with business for the available foreign exchange. When the choice was between keeping job creating and sustaining businesses in operation or a "non-profitable" social service like education, business won. It was not surprising, therefore, that educational tools and equipment was reported to be in short supply. In addition, valuable time for teaching and learning was lost in the time-consuming process of importation.

Obsolete tools and equipment was widely reported. Their continued use facilitated the teaching and learning of inefficient and obsolete technologies. However, some papers

argued that an alternative to using modern equipment can be achieved through the development of local technologies, innovative repairs, maintenance, and new designs.

2.2.3 Instructional Materials

To successfully implement a vocational program, text and reference books, consumable materials, teaching aids, and stationery are essential inputs. Each of these educational inputs were reported scarce. Because of their great importance in the teaching-learning process, textbooks, reference books, and consumable materials are discussed in more detail below.

Technical books were more difficult to obtain than academic books. When available, they were more expensive and not adapted to syllabuses of the importing countries. Inadequacy of technical books was attributed to lack of local authors and capital to invest in publishing for a small market.

Consumable materials were reportedly obtained free from the environment or bought (Mwamba, 1983, p. 36). "Freely" obtained materials included waste and scrap from commercial enterprises, and natural resources within institutions' jurisdiction. Efficient utilization of such materials required imaginative teachers with positive attitudes about unconventional sources of schools' consumable materials. At best, most teacher training programs did not prepare teachers

to use such materials. Most programs relied on purchased materials as the only source of their consumable materials.

2.2.4 Attitudes, Perceptions, Beliefs

Most vocational subjects were associated with manual skills. Individuals who earned their livelihood from manual skills were regarded as incapable of pursuing academic subjects like liberal arts and sciences. Academic education was perceived by parents, students, and the public to provide a route to better jobs, prestige and incomes than vocational education. That perception was reinforced by disproportionate social and material rewards given to individuals serving in jobs that required high academic qualifications. Parents and students felt that rather than providing manual skills within an academic core curriculum, skill training should be done through full-time apprenticeship training.

2.2.5 Physical Facilities

Surprisingly, only 26% of the countries reported having problems in providing adequate physical facilities. It was surprising because most countries were in the process of expanding their technical education programs or diversifying their school curricula to include practical or vocational component. In general, the financial implications of either option leads one to suspect that provision of physical facilities was a wider problem. The degree of seriousness of the problem would, however, vary from country to country

depending on many factors, for example, the amount and quality of available resources, degree of commitment to the problem, and perceptions about the need for such a program.

2.3.0 Relevance of the Preceding Literature to the Current Study

The preceding literature review show that most countries which implemented vocationally-oriented education experienced problems in obtaining adequate supply of one or more of the five resources considered in this study. The current study sought to identify the extent to which the availability of each of those resources affected the implementation of applied education in Central Province of Kenya in general and the schools studied in particular.

The following section on literature review outlines the history of applied education in Kenya.

2.4.0 Section B: History of Applied Education in Kenya

Kenya has always had a centralized education system. Despite the District Focus for Rural Development Policy⁶, centralized educational practices, for example, curriculum; examinations; personnel recruitment, training, and deployment continue to exert a powerful centralizing effect on the education system. Therefore, to understand some of the factors that have influenced the current status of applied

⁶This policy allows administrative districts limited powers to determine and implement their development priorities.

education in the 125 schools studied in this report, it is useful to trace the history of this education component at the national level.

"Applied Education" as a collective name for fourteen pedagogical areas was first used during the formative years when the 8-4-4⁷ system of education was established. The history of applied education is the history of its constituent subjects either individually or as former subject clusters like industrial education and business education. Further, it is difficult to separate the history of applied education from that of vocational education because the former is an expansion of the latter. According to the Working Party, (1988) applied education is now considered school-based vocational training. The history of vocational education in Kenya is described below.

2.4.1 Pre-Independence

During pre-colonial era, applied education was a major component of an individual's education and training. It was taught and learnt through apprenticeship but its content and pedagogy evolved over time in response to the perceived needs of different times.

Applied education preceded academic education in public schools during the colonial era. Until early 1909, African

⁷Eight years of primary education, four years of secondary education and four years of minimum education.

education was provided by missionaries. Three major government reports called for relevance in education for the African, his/her environment, and occupation preparation. The Fraser Report (1909) recommended technical [applied] education because the skills it was to provide were needed by Kenya's economy at that time. The Phelps-Stokes Report (1924) called for cooperation between the government and the missionaries in adopting education to the needs of the community, preserve the best of traditions, and prepare students for the world of work. In its 1925 education policy on African education, the government of the day stressed the need for more government assisted technical education. During the same year, the first technical school was built. The Beecher Report of 1949 called for future-oriented education with emphasis on agriculture because it was the main stay of the country's economy. It also recommended that vocational education be used to instill the dignity of manual labour.

The arguments used to support applied education were not very different from those given in the above colonial reports. However, the colonial recommendations were rejected by the African because of the low economic and social rewards attached to manual skills at that time. Despite the rejection and protests from the Africans, the recommendations were implemented (Sifuna, 1976).

2.4.2 Post-Independence

The attainment of independence in 1963 opened many opportunities in all sectors of the fast expanding economy. There was urgent need to fill jobs left vacant by departing foreigners in the private and public sectors. There was an upsurge in the demand for general academic education because it was seen as the right kind of education to prepare individuals for financially and socially prestigious jobs. Consequently, applied education was dropped from the school curriculum except in a few secondary schools (Lauglo 1985).

By early 1970s, unemployment rose as a result of the high enrolment of the 1960s and high completion rate of secondary education. An International Labour Organization Study (ILO, 1972) reported that the majority of school leavers in Kenya could not be gainfully employed because they had neither self reliance nor employable skills. In its 1970 - 74 Development Plan, the government committed itself to providing more school-leavers with practical skills by expanding applied education program.⁸ The plan stated one of the program's objectives as

... to instill in the learner an appreciation for skilled manual work, and provide some of the basic skills required in a broad range of occupations. (p. 460)

⁸ Industrial Education was introduced or strengthened in 35 secondary school.

The theme of orienting the school curriculum towards a more practical direction was continued in the Gachathi Report (1976) which recommended that

... the education system be vocationalized in order to remove the demarcation between secondary academic and Secondary technical education and make secondary education increasingly scientific, prevocational and craft-oriented. (p. 65)

The demarcation referred to in the above quotation had already been minimized in the former technical schools (they are now post-secondary technical institutes). For the first time (1972) technical schools offered a full school certificate program (Kenya Certificate of Education [KCE]) consisting of both academic and applied education. Most academic secondary schools did not have an applied education program at that time, therefore, the demarcation continued in those schools.

According to the Report of the Presidential Committee on Unemployment [Unemployment, 1982/83]⁹, unemployment continued to rise. The 1979-83 Development Plan focused on applied education as a means of fighting this problem. The plan stated that

It is a matter of high priority to institute curriculum changes that will prepare students realistically for the employment situation that faces them on

⁹This report claimed open unemployment in Kenya to be 7.1 percent in 1976, 10.5 percent in 1981, and 10.8 percent in 1982. Yambo (1986) estimated it at 11.5 percent in 1986.

leaving school ... there is a shortage of trained Kenyans in many technical and vocational areas. The curriculum must, therefore, increase its emphasis on science, technical subjects, agriculture, and training that leads to vocational skills (p. 47).

The Report of the Presidential Working Party on the Second University (Second University, 1981) provided the final impetus that propelled applied education into the prominent position it has occupied on the curriculum from 1986. Beside the structural changes of the whole education system, the report called for improvement in curriculum content by emphasizing technical education. It also recommended diversification of criteria for evaluation in order to shift the focus on education from being examination centred.

The blame on education for unemployment was focused on content, teaching methodologies, or evaluation procedures. Unemployment (1982/83) blamed it on an education system biased towards academic education. It observed that:

Subjects taught at Primary and Secondary levels are heavily biased towards intellectualization and very little is being done to develop skills that can lead to self-employment for the majority of school leavers (p. 49).

Thus the need for offering applied education shifted from educating the learner to appreciate skilled manual work (during the 1970s) to training them in specific skills for self-reliance once the students left school. According to the

Working Party (1988), the vocational-orientation of primary school curriculum was [satisfactory] in late 1980s but it needed to be strengthened in the Secondary School Curriculum:

Its [Primary School Curriculum] vocational orientation and practical approach are meant to develop skills for self-reliance ... The Working Party would like to see adequate preparation and development of skills at this [Secondary school] level and also to strengthen career orientation (p. 23; p. 31).

From the preceding historical account, it is evident that unemployment greatly influenced the changes that applied education went through during the 1970s and the 1980s. The changes remained relatively gradual and moderate as long as the majority of the school leavers got opportunities for further education, employment or training. As those opportunities dwindled, pressure to find alternative ways of absorbing school leavers mounted. The perceived solution was found in a diversified general education. The resultant rapid expansion of applied education during the early 1980s and its heavy financial implications made it inevitable that implementation problems would arise. This study sought to assess the extent of those problems in physical facilities, instructional materials, teacher characteristics, and the variety of the subjects offered within and among schools.

The following chapter discusses the design and methodology used for data collection in this study.

CHAPTER THREE: DESIGN AND METHODOLOGY

3.1.0 Introduction

This chapter begins with a description of the population of schools from which the schools under study were selected and the instruments used for data collection. Procedures followed in sample selection, data collection, and analysis are then described in turn. Results of a preliminary analysis of the data are presented as a rationale for excluding some pedagogical areas from further analysis.

3.2.0 Population of Schools

The population of schools comprised all 535 secondary schools in Central Province of Kenya. Table 2 shows their classification and distribution across the five administrative districts of Kiambu, Muranga, Nyeri, Nyandarua, and Kirinyaga in 1988.

Table 2
DISTRIBUTION AND CATEGORIES OF SECONDARY SCHOOLS BY DISTRICT

DISTRICT	CATEGORIES (ROW PERCENT)			ROW
	National/ Maintained	Harambee/ Assisted	Private	TOTAL
				(N)
Muranga	24.2	74.5	1.3	153
Kiambu	21.9	62.1	10.3	145
Nyeri	24.0	68.2	7.8	129
Nyandarua	16.9	69.5	13.6	59
Kirinyaga	32.7	63.3	4.1	49
ALL DISTRICTS	(N)	25.0	68.0	7.0
				535

Note: Adapted from *Teachers Service Commission Teacher Payroll (1988)* and *Education in Kenya* (p. 122) by Ministry of Education, 1984, Nairobi: Jomo Kenyatta Foundation.

National/Maintained schools are generally funded by the public through the government or local authorities. In contrast, private schools are assisted by the government with policy documents like syllabuses, regulations, advice and supervision of the quality of education that they offer. In addition to the assistance given to private schools by the government, Harambee/Assisted schools receive varying amounts of aid in the form of personnel, material, or cash. The difference between expenses of individual schools and the assistance from the public is raised through various kinds of fees and donations through Harambee. Consequently, the quality and quantity of educational resources vary from one

category of schools to the other and from school to school within these categories.

No information was available on the distribution of individual applied education subjects among the population, presumably because this program was relatively new (mandated in 1986).

Some individual schools had been in existence for over 50 years (for example, Alliance Boys), while others had not yet celebrated their second anniversary (Kabonge Secondary). Beginning in 1986, each school was required to offer at least one applied education subject. A few schools had on-going applied education programs for over 15 years (e.g., Endarasha Secondary), yet others implemented their applied education program in May, 1988 (for example, Ngethu Secondary). Their locations varied from easily accessible urban centres to remote rural settings with difficult means of communications. Furthermore, the population comprised sex-segregated and mixed schools of varying student enrolments.

3.3.0 Instrumentation

Complementary teacher and headteacher questionnaires were used to collect the data. The following is a description of how the instruments were developed.

3.3.1 Development of the Questionnaires

A set of questions was formulated and discussed with the chairman of the researcher's thesis advisory committee.

Suggested changes were then made to each item in the questionnaire. New questions were added to the previous inventory and the resultant set of questions discussed again with the thesis chairman. The process was repeated until sufficient questions were generated to enquire into all aspects of applied education identified for this study (see Table 3).

The first draft of the complete questionnaire was circulated to all members of the thesis advisory committee for comment. Their suggestions were incorporated into a second draft of each questionnaire which was then recirculated to the committee members for further comments. This process continued until no more improvements for the questionnaires were suggested.

3.3.2 Description of the Questionnaires

Both the teacher and the headteacher questionnaires were complementary and self-administered. Each was designed to collect data on any one or more of the 14 applied education subjects studied (see Table 5). Collectively, they measured the level of adequacy of physical facilities, teacher characteristics, instructional materials, and various aspects of subjects offered.

All questions had either alternative responses, or a blank. The respondent was asked to tick the alternative that best corresponded to his/her answer to the question asked or

to fill in the blank with the appropriate answer. Alternative responses for most questions about physical facilities and instructional materials comprised a five point scale: excellent, good, satisfactory, fair, and poor. Because the questionnaire was generic, some questions about these three educational resources did not apply to all pedagogical areas. For example, item number 1g on number of power tools or equipment (Appendix A) did not apply to Art & Design. For this reason a "Not Applicable" alternative was included. In addition, a "Do Not Have" alternative was provided for teachers who felt they required a resource but did not have access to it.

To ease data collection, the teacher questionnaire was organized into the following sections: Physical Facilities, Instructional Materials, Teacher Qualifications, Teaching Applied Education Subjects, and Background & General Information. The headteacher questionnaire did not have different sections but all the questions in it enquired about the administration of applied education at the school level, for example, staffing, student enrolment, financing, and variety of subjects offered as criteria for decision-making. Table 3 shows the factors and the number of aspects enquired into in each factor. Copies of each questionnaire are provided in Appendix A.

Table 3
FACTORS AND NUMBER OF ASPECTS OF APPLIED EDUCATION ENQUIRED INTO

FACTOR	QUESTIONNAIRE		ROW TOTAL
	TEACHER (n)	HEAD TEACHER (n)	
Physical Facilities	23	2	25
Instructional Materials	10	1	11
Teacher Characteristics	113	0	113
Subjects Offered	0	66	66
COLUMN TOTAL (N)	146	69	215

The first page on each instrument provided information about the purpose of the study, general instructions on how to respond to each question, and an assurance of strict confidentiality for the respondent and the institution. Specific instructions on how to respond to each item were contained in individual questions. Both instruments ended with an invitation for additional comments about the applied education subject for which the questionnaires were completed.

3.4.0 Pilot Study

During the month of April 1988, the teacher questionnaire was pilot tested with 70 applied education teachers, college lecturers, curriculum developers, and school inspectors. These educators were attending book writing workshops at Kenya

Technical Teachers College [KTTC] and Kenya Institute of Education [KIE].

Specialists in each of the 14 applied education subjects composed a subject panel. Subject panels for the following pedagogical areas were located at KTTC: Accounts, Economics, Commerce, Metalwork, Woodwork, Electricity, and Building Construction. KIE hosted subject panels for Music, Power Mechanics, and Drawing & Design. Subject panels for Agriculture, Typing & Office Practice, Home Science, and Art & Design were not contacted for pilot testing, either because they were not holding writing sessions at the time the pilot study was conducted, or their working venues were located too far away to be reached.

Each workshop participant was given a teacher questionnaire and asked to assess its clarity of the intent of each question. One week was allowed for this work. During the next one week, the researcher met separately with each subject panel to discuss the responses of its members.

Although its intent was clear, the instructions on how to respond to the set of items in Question Number 14 (see Appendix A) was reported by the respondents to be unclear. In that question, a numeric number between 1 and 6 was given beside a response box provided to the right of each item. These numeric numbers were intended to be a scale on which the respondents were asked to rate their belief in each of six given purposes of teaching applied education in Kenya high

schools. Some teachers interpreted the scale to mean sequential numbers for each given purpose of applied education. Consequently, they responded to each item by writing a numeric number between 1 and 6 instead of a letter between *a* and *f* in each response box. No change to the wording of the question was found necessary because the responses were interpreted correctly without any problems. Furthermore, the teachers were satisfied with the range of the aspects of applied education that the questionnaire enquired into. This finding was used to interpret responses to that question in the main study.

The headteacher questionnaire was pilot tested with four headteachers of neighbouring Harambee/Assisted schools. They were given the questionnaire and asked to study, for two weeks, the clarity of the intent of each question and the extent to which it covered the administrative aspects of applied education at the school level. After two weeks, the researcher met separately with each headteacher to discuss his responses. The four respondents were satisfied with the aspects of the questionnaire that they were asked to assess. Consequently, no changes were made to the headteacher questionnaire.

3.4.1 Sample Selection

A list of all secondary schools in each of the five administrative districts in Central Province was obtained from

the Teachers' Service Commission [TSC]. A coding number was then assigned to each school and a random table used to select a proportional random sample of 197 (36.8%) schools stratified by district. School category was not included as a stratification variable. The sample sizes given on Table 4 were obtained. (Table 4 also contains the responses before and after collapsing pedagogical areas. These responses will be referred to when describing the obtained sample on p. 38.)

For a sample of 197 schools selected from a population of 535 schools, the error of estimation was less than 6 percent (Sheaffer, Mendenhall, and Ott, 1986, equation 4.17¹⁰). In other words, estimates of proportions based on a sample of this size is expected to be within 6 percent of the "true" population proportions 19 times out of 20.

The specific teachers who filled out the questionnaires and the pedagogical area for which they completed those questionnaires were selected by the school staff. The headteacher for each randomly selected school automatically became the respondent for the headteacher questionnaire.

10

$$B = 2 \sqrt{\frac{PS}{n-1} \left(\frac{N-n}{N} \right)}$$

Where B = bound error of estimation
 S = sample percentage
 n = sample size
 N = population size

Table 4

SAMPLE SIZE AND RESPONSE RATE PER DISTRICT

DISTRICT	NO. OF SCHOOLS PER DISTRICT		NO. OF SCHOOLS SELECTED		RESPONSES			
					BEFORE COLLAPSING		AFTER COLLAPSING	
	N	%	N	%	N	%	N	%
Muranga	153	28.6	57	28.9	37	27.8	36	28.8
Kiambu	145	27.1	54	27.4	35	26.3	32	25.6
Nyeri	129	24.1	46	23.4	32	24.1	30	24.0
Nyandarua	59	11.0	22	11.2	18	13.5	18	14.4
Kirinyaga	49	9.2	18	9.1	11	8.3	9	7.2
Column (N) Total	535		197		133		125	

3.5.0 Data Collection

One teacher questionnaire and one headteacher questionnaire were mailed to each of the sampled schools in early May, 1988. Both instruments collected data on the same pedagogical area which the teacher and the school headteacher selected.

To improve the response rate, the following were mailed to each school along with the questionnaire: a covering letter explaining the purpose of the study (Appendix C); photostat copies of the research clearance permit issued by the Kenya Government (Appendix D); an endorsement letter from

the Permanent Secretary, Ministry of Education (Appendix E); and a self-addressed and stamped envelope.

A follow-up letter (Appendix F) was sent out to schools whose responses had not been received after four weeks. By the end of August, 1988, a total of 134 responses had been received.

3.6.0 Description of Obtained Sample

The 134 responses received represented a 68.0% response rate. One response (KBU 126) was returned unfilled because the respondents felt the applied education program in their school was too new to offer credible data (it was started during the May-July 1988 academic term). As shown on Table 4, the remaining 133 responses were proportionately distributed among the five administrative districts. However, in the final sample that was analyzed (responses after collapsing-- see p. 38 to 40), Nyandarua was slightly overrepresented while Kiambu and Kirinyaga were slightly underrepresented.

3.7.0 Data Entry

The data were coded and entered on Fortran Coding Forms [FCF]. After completing each record, one of the eight column numbers on that record was randomly selected and all entries between that number and the end of the record were verified against the corresponding questionnaire. The data on FCF were then entered, with 100% verification, into a computer file by the data entry services staff at the University of British

Columbia. Data entries for thirty-three randomly selected questionnaires (representing 25% of total respondents) were verified 100% against data in corresponding questionnaires. Sixty-seven errors (0.68% error rate) were detected.

3.8.0 Statistical Analysis

SPSS:X program was used for the preliminary and the main analysis on the Michigan Terminal System (MTS) at the University of British Columbia.

3.8.1 Preliminary Analysis

A preliminary analysis was conducted to determine the frequency with which each subject area was selected by both the teacher and the headteacher. Results of this analysis are shown on Table 5.

Table 5

FREQUENCY OF SUBJECTS SELECTED BY TEACHERS AND HEADTEACHERS

PEDAGOGICAL AREA	FREQUENCY	
	N	%
Agriculture	49	36.8
Commerce	32	24.1
Home Science	25	18.8
Woodwork	8	6.0
Economics	7	5.3
Drawing & Design	4	3.0
Accounts	2	1.5
Building Construction	2	1.5
Art & Design	2	1.5
Electricity	1	0.8
Typing & Office Practice	1	0.8
Metalwork	0	0.0
Music	0	0.0
Power Mechanics	0	0.0
<hr/>		
COLUMN TOTAL	(N)	133

Agriculture, Commerce, and Home Science were the most commonly selected pedagogical areas by teachers and headteachers who responded to the questionnaires. Drawing & Design, Art & Design, Electricity, and Typing & Office Practice combined were selected by only 6.1% of the respondents. No respondent chose to give data on metalwork, music, or power mechanics.

To minimize data loss and improve the validity of results, pedagogical areas selected by 10% or less of the respondents were either combined with a similar subject or dropped from further analysis. The decision to combine

different subjects for further analysis was based on two criteria. First, both pedagogical areas required similar resources to implement. By this criterion, Woodwork and Building Construction required similar physical facilities, tools, equipment, instructional, and consumable materials. Likewise, Accounting and Economics required all the above inputs except tools. Obviously, the type of resources required by the latter category are different from those required by the former category, for example, design of working spaces and consumable materials. The second criterion required that the resultant category be selected by at least 5% of the total respondents. This requirement minimized the probability that the number of responses in the resultant category were obtained by chance. Both Woodwork & Building Construction and Economics & Accounts categories satisfied the two criteria.

Consequently, Art & Design, Electricity, Drawing & Design, and Typing & Office Practice were dropped from further analysis in addition to Metalwork, Music, and Power Mechanics.

Table 6 compares the frequency of selection of each pedagogical area across districts and subject areas.

TABLE 6

DISTRIBUTION OF SELECTED SUBJECTS BY DISTRICT

SUBJECT	DISTRICT (COLUMN PERCENTAGES)					ALL DISTRICTS (N)
	Muranga	Kiambu	Nyeri	Nyandarua	Kirinyaga	
Agriculture	38.9	43.8	30.0	38.9	55.6	39.2
Commerce	27.8	12.5	36.7	38.9	-	25.6
Home Science	27.8	28.1	10.0	5.6	22.2	20.0
Woodwork & Bldg. Const.	-	3.1	20.0	11.1	11.1	8.0
Econ. & Accounts	5.6	12.5	3.3	5.6	11.1	7.2
Column Total (N)	36	32	30	18	9	125

Respondents from three out of the five districts chose Agriculture more frequently than any other pedagogical area. Proportions of these respondents were almost the same in the three districts. In Nyandarua, Agriculture and Commerce were the most frequently selected subjects while in Nyeri Agriculture occupied a second place behind Commerce.

Surprisingly, no respondent from Kirinyaga provided data on Commerce. It was surprising because overall, Commerce was the second most selected pedagogical area. Likewise, no respondent selected Woodwork or Building Construction from Muranga despite the relatively large proportion of respondents from that district. Kiambu had the highest proportions of

selection of Home Science and Economics & Accounts. Beside these two exceptions, responses in each pedagogical area were well distributed among all districts.

3.8.2 Main Analysis

CROSSTABULATION and FREQUENCIES in the SPSS:X program were used for this analysis. The following chapter presents results of analysis of responses to questions about physical facilities and instructional materials.

CHAPTER FOUR: RESULTS FOR PHYSICAL FACILITIES AND INSTRUCTIONAL MATERIALS

4.1.0 Introduction

This chapter presents results of the analysis of the questionnaire items which assessed the level of adequacy of physical facilities and instructional materials for each of the applied education subjects. This was the first research question being addressed by this study. Beside showing the level of adequacy of the physical facility or instructional material under analysis, the results obtained from responses to each questionnaire item reveal the variation of the quality and quantity of educational resource under analysis within schools offering the same subject. The results also provide comparative information on the level of adequacy of the same resource among schools offering different subjects.

Results of analysis are presented in tables with supplementary texts. Similar results on teacher characteristics and applied education subjects offered are presented in Chapter Five.

But before presenting the results of analysis, the relatively large number of "Not Applicable" responses in most tables in Chapter Four need to be interpreted. These responses suggest one of three interpretations.

First, they could mean that most teachers might have misunderstood most of the questions on physical facilities and instructional materials. While there may have been some

teachers who did not understand some questions, such a widespread misunderstanding of the questions is unlikely because both the teacher and the headteacher questionnaires were pilot-tested for clarity of intent with 70 senior teachers and headteachers among other educators (see Chapter Three). The results of that pilot study showed all questions about physical facilities and instructional materials (see Appendix A) were clear and their intent worthwhile. It is, therefore, unlikely that the same questions could have been misunderstood by so many teachers as suggested by results on most tables in Chapter Four.

Second, the responses could mean the questions were not relevant to the subject areas (particularly Commerce, Economics, and Accounts) for which the questionnaires were completed. Except in the question on work benches/counters, this proposition, too, is untenable. The Syllabuses Content (KNEC, 1987) for Commerce, Economics, and Accounts require students who are studying these subjects to learn how to use, repair, and maintain office equipment like typewriters and adding machines. This requirement entails the physical facilities and instructional materials enquired into in Chapter Four. Therefore, like their colleagues in Agriculture, Home Science, Woodwork, and Building Construction, teachers in Commerce, Economics, and Accounts could not have meant questions about working and storage

spaces, tools, equipment, consumable materials, or teaching aids did not apply to their subjects.

The third interpretation of the "Not Applicable" responses in Chapter Four is that the teachers who gave those responses did not have the resource in question. A study of the number of "Not Applicable" responses in individual tables in Chapter Four shows most of these responses are in answer to questions about working or storage spaces, and tools or equipment. Working or storage spaces can only be available after special rooms are built but results in Table 20 indicate the majority (79.2%) of the teachers did not have a special room. Similarly, most tools or equipment for applied education require a special room. It is unlikely that such tools or equipment were procured before facilities required to store and use these tools or equipment were made available to teachers. The argument being made here is that the teachers understood the questions they were asked and their "Not Applicable" responses to those questions meant the teachers did not have the educational resource in question. This is the interpretation used for the purpose of this study.

4.2.0 Section A: Physical Facilities

4.2.1 Working Space in Special Rooms

Teachers were asked in Question 1a how adequate the working space in their special rooms were. Their responses to this question were crosstabulated with the subject that each respondent taught. The results are shown in Table 7.

Table 7

WORKING SPACE BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	2	1	3	-	-	5.4
Fair	1	1	1	3	-	5.4
Satisfactory	1	1	2	1	-	4.5
Good	-	2	3	2	1	7.1
Excellent	-	-	1	1	-	1.8
<hr/>						
Do not have	33	6	9	3	1	46.4
Not Applicable	6	19	1	-	7	29.5
<hr/>						
COLUMN TOTAL %	38.4	26.8	17.9	8.9	8.0	100.0

N = 112

The most notable category of respondents are the 33 (76.7%) Agriculture teachers who said they had no working space. In contrast, only 1 (2.3%) of their colleagues had satisfactory working space. Similar results are found in Home Science, and Woodwork & Building Construction.

All the five subject categories require a working space, therefore, in choosing "Not Applicable" or "Do Not Have" alternatives, 85 (75.9%) respondents indicated they did not have this resource, while an additional 12 (10.8%) rated their working space as fair at best. Consequently, only 15 (13.3%)

of the total respondents had satisfactory or better working space.

4.2.2 Classroom Space

Teachers were asked in Question 1b how adequate their classroom space was. Table 8 shows the results of crosstabulating the teachers' responses to this question and the subject they taught.

Table 8
CLASSROOM SPACE BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	-	-	1	-	-	0.9
Fair	12	2	5	1	2	19.5
Satisfactory	12	3	4	2	2	20.4
Good	14	17	10	2	3	40.7
Excellent	5	6	4	1	1	15.0
Do not have	2	-	-	1	-	2.7
Not Applicable	-	1	-	-	-	0.9
COLUMN TOTAL %	39.6	25.7	21.2	6.2	7.1	100.0

N = 113

We can see from Table 8 that a large majority of the respondents in each subject category (at least 80%) rated the suitability of their classroom space to be satisfactory or

better. The only subject area which appeared to be a possible exception to this trend was Agriculture where about 30% of the respondents rated their classroom space as only fair or indicated they did not have it.

4.2.3 Classroom Desks

When asked in Question 1c how adequate the desks available for use in their applied education class were, 111 teachers responded. Their responses were crosstabulated with the subject taught by each teacher. The results of this analysis are shown in Table 9.

Table 9

CLASSROOM DESKS BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	1	1	-	1	-	2.7
Fair	8	4	5	1	3	18.9
Satisfactory	16	5	6	2	2	27.9
Good	15	12	8	1	2	34.2
Excellent	2	5	1	1	1	9.0
<hr/>						
Do not have	2	-	3	1	-	5.4
Not Applicable	-	2	-	-	-	1.8
<hr/>						
COLUMN TOTAL %	39.6	26.1	20.7	6.3	7.2	100.0

N = 111

Overall, the classroom desks available to 71.1% of the respondents were of satisfactory or better quality and quantity and an additional 18.9% respondents rated their desks as fairly adequate. It seems, therefore, that the problem of classroom desks was not very serious. However, the remaining 10.0% of respondents who had poor or no desks are a source of concern.

4.2.4 Work Benches/Counters

Teachers were asked in Question 1d how adequate their work benches/counters were. Results of crosstabulating the obtained responses and the subject each respondent taught are shown on Table 10.

Table 10

WORK BENCHES/COUNTERS BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	3	-	-	2	-	4.4
Fair	1	-	5	2	-	7.0
Satisfactory	1	-	3	2	-	5.3
Good	-	-	3	1	-	3.5
Excellent	-	-	1	-	-	0.9

Do not have	26	24	2	3	2	38.6
Not Applicable	13	6	7	-	7	40.4

COLUMN TOTAL %	38.6	26.3	18.4	8.8	7.9	100.0

N = 114

There was a clear split among Agriculture teachers over whether they required work benches to teach their subject or not. In choosing the "Not Applicable" alternative, 13

respondents in this subject implied they did not require work benches to teach Agriculture.

In choosing "Do Not Have" or "Not Applicable" alternatives, 51 (68.0%) respondents in Agriculture, Home Science, and Woodwork & Building Construction suggested they did not have work benches. An additional 13 (17.3%) indicated the work benches they had were, at best, fairly adequate. In contrast, only 11 (14.7%) teachers reported having work benches of satisfactory or better quality and quantity.

4.2.5 Hand (Manual) And Power Tools or Equipment

Table 11 shows results of crosstabulating teachers' responses to Question 1e about the number of hand (manual) tools or equipment that each respondent had and the pedagogical area that they taught.

Table 11

NUMBER OF HAND (MANUAL) TOOLS OR EQUIPMENT BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	12	1	2	2	-	14.8
Fair	8	-	5	3	-	13.9
Satisfactory	1	-	2	2	-	4.3
Good	1	-	3	1	-	4.3
Excellent	-	-	1	-	-	0.9
<hr/>						
Do not have	19	5	5	2	2	28.7
Not Applicable	4	23	4	-	7	33.0
<hr/>						
COLUMN TOTAL %	39.1	25.2	19.1	8.7	7.8	100.0

N = 115

Hand tools or equipment are more closely associated with tedious manual skills in Agriculture, Woodwork, Building Construction, and Home Science than in Commerce, Economics, or Accounts.

This perception among many people probably explains why almost 80% of the respondents in the later group of subjects said in Table 11 that hand tools or equipment did not apply to their subjects despite the requirement of these subjects' syllabuses that students learn how to use, repair, and

maintain office equipment like typewriters and adding machines (KNEC, 1987).

Only 12 out of the 117 respondents to Question 1e suggested the number of hand tools or equipment that they had was sufficient while an additional 34 teachers indicated they had some hand tools or equipment but they were insufficient in number.

Responses to Question 1f which enquired about the quality of hand tools were very similar to those in Table 11, therefore, they are not reproduced here.

Results of crosstabulation teachers' responses to Question 1g which enquired about the available number of power tools or equipment showed that only 12 out of 117 teachers (8 in Home Science, 3 in Agriculture, and 1 in Woodwork & Building Construction) had any power tools or equipment. Eight of these twelve teachers rated the number of their power tools or equipment as fair at best. The vast majority (89.8%) either said the question did not apply to their subject or they did not have any power tools or equipment. This finding was consistent with the philosophy of applied education that wherever possible, it should be taught using basic hand tools or equipment so that the knowledge or skills learned can be transferred to real-life situations where basic hand tools and equipment are easier to obtain than powered ones.

Results of analysis of responses to Questions 1e, 1f, and 1g stated above indicated the number and quality of hand

(manual) and power tools or equipments was considered inadequate by the vast majority of the teachers. Widespread insufficiency of such essential resources raise serious questions about the effectiveness of teaching applied education.

4.2.6 Storage Space

Teachers were asked in Questions 1k, 1l, and 1m how adequate their storage spaces for consumable materials, students' projects, and tools & equipment respectively were. The question about storage space on tools & equipment (Question 1m) was directed at all respondents but the questions on storage spaces for students' projects and consumable materials were intended for teachers in Agriculture, Home Science, and Woodwork & Building Construction. Practical skills that students in these three subject categories were required to learn entailed physical projects and bulky consumable materials which would presumably require storage spaces. Tables 12, 13 and 14 show results of crosstabulating the teachers' responses to these three questions respectively and the subject each respondent taught.

Table 12

PROJECTS STORAGE SPACE BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	8	-	3	2	-	11.6
Fair	5	-	3	2	1	9.8
Satisfactory	2	1	3	1	-	6.3
Good	1	-	2	1	-	3.6
Excellent	1	-	-	-	-	0.9
<hr/>						
Do not have	18	5	8	4	1	32.1
Not Applicable	8	23	2	-	7	35.7
<hr/>						
COLUMN TOTAL %	38.4	25.9	18.8	8.9	8.0	100.0

N = 112

Table 13

CONSUMABLE MATERIAL STORAGE SPACE BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	14	1	3	3	-	18.1
Fair	7	-	5	2	1	12.9
Satisfactory	2	-	3	-	-	4.3
Good	1	-	3	2	-	5.3
Excellent	1	-	1	-	-	1.7
<hr/>						
Do not have	14	5	6	2	1	24.1
Not Applicable	7	23	1	1	7	33.6
<hr/>						
COLUMN TOTAL %	39.7	25.0	19.0	8.6	7.8	100.0

N = 116

Table 14

STORAGE SPACE FOR TOOLS & EQUIPMENT BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	13	2	2	1	-	15.9
Fair	6	3	5	-	1	13.3
Satisfactory	2	1	1	3	-	6.2
Good	1	-	2	3	-	5.3
Excellent	1	-	2	-	-	2.7
<hr/>						
Do not have	16	4	6	2	1	25.7
Not Applicable	5	19	3	1	7	31.0
<hr/>						
COLUMN TOTAL %	38.9	25.7	18.6	8.8	8.0	100.0

N = 112

Results in Tables 12, 13, and 14 show only a small proportion of all respondents perceived of the three types of storage spaces as satisfactory or better. Even in Home Science where teachers reported the most adequate storage spaces, only 7 (31.8%) of them indicated storage space for consumable materials was satisfactory or better while 5 (23.8%) of them gave the same level of adequacy for their storage spaces for students' projects and tools & equipment.

4.2.7 Availability of Water

Teachers were asked in Question 1n how adequate their water supply was. Table 15 shows the results of crosstabulating the teachers' responses to this question and the subject they taught.

Table 15

AVAILABILITY OF WATER BY PEDAGOGICAL AREA

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	4	1	2	1	-	8.3
Fair	3	-	3	-	1	7.3
Satisfactory	4	-	1	1	-	6.3
Good	2	-	3	-	-	5.2
Excellent	1	-	-	-	-	1.0
<hr/>						
Do not have	20	7	10	7	1	46.9
Not Applicable	7	9	3	-	5	25.0
<hr/>						
COLUMN TOTAL %	42.7	17.7	22.9	9.4	7.3	100.0

N = 96

This question was directed at teachers in Agriculture, Home Science, and Woodwork & Building Construction because water is necessary for teaching those subjects. Table 15

shows only 12 (16.7%) of the 72 respondents in these three subject categories reported having at least satisfactory water supply.

4.2.8 Amount of Blackboard Space

Teachers were asked in Question 1p how adequate their blackboard space was. Table 16 shows the results of crosstabulating the responses to this question and the subject the teachers taught. Data in Table 16 revealed no serious

Table 16

AMOUNTS OF BLACKBOARD SPACE BY PEDAGOGICAL AREA

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	-	-	1	-	-	0.9
Fair	4	1	1	-	1	6.1
Satisfactory	9	4	6	4	-	20.0
Good	20	17	12	5	2	48.7
Excellent	8	5	4	1	3	18.3
Do not have	3	1	-	-	-	4.3
Not Applicable	1	1	-	-	-	1.7
COLUMN TOTAL %	39.1	25.2	20.9	8.7	6.1	100.0

N = 115

problem with the adequacy of blackboard space available to teachers in each subject category.

4.2.9 Overall Quality of Applied Education Building

Teachers were asked in Question 2 "How do you rate the overall quality of the applied education building for your subject?" Teachers' responses to this question were crosstabulated with the subject the respondents taught as shown on Table 17.

Table 17

QUALITY OF BUILDING USED FOR TEACHING APPLIED EDUCATION BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRICULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	24	2	7	3	1	31.6
Fair	10	5	7	3	2	23.1
Satisfactory	5	8	3	3	1	17.1
Good	2	9	6	1	3	17.9
Excellent	-	3	1	-	2	5.1
<hr/>						
No building	4	2	-	-	-	5.1
<hr/>						
COLUMN TOTAL %	38.5	24.8	20.5	8.5	7.7	100.0

N = 117

We can see from Table 17 that although a large majority (94.9%) of teachers reported having access¹¹ to buildings in which to teach their applied education subject, the quality of those buildings varied within schools offering the same or different subjects. For example, 2 Commerce teachers said the building in which they taught their subject was of poor quality while 3 of their colleagues indicated the building they used was of excellent quality.

In a related question (Question 3) teachers were asked whether the building in which they taught their applied education subject was permanent or temporary. 73.1% said they taught their applied education subject in a permanent building while 17.6% of them used temporary buildings. In contrast, the remaining 9.2% indicated they had no buildings in which to teach their applied education subject. The preceeding results of Questions 2 and 3 suggest that the buildings used by the majority of applied education teachers are of permanent construction but needed repair and maintenance.

4.2.10 Use of Working Space

Teachers were asked in Question 4b to rate how appropriately their working space was utilized, for example, whether it was used for storing broken desks. The responses

¹¹Projected dates that headteachers expected most applied education special rooms to be completed (Table 20) suggest most buildings currently used for teaching and learning applied education are improvised.

obtained were crosstabulated with the subjects taught by individual respondents. The results are shown on Table 18.

Results in Table 18 suggests that beside teaching applied education, the working space available to 43.8% of all respondents was used for other purposes, for example, storing of broken desks. The seriousness of this problem varied from one school to the other but it was most prevalent among

Table 18

USE OF WORKING SPACE BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	11	4	2	2	-	18.1
Fair	13	3	5	4	2	25.7
Satisfactory	6	5	7	4	1	21.9
Good	9	8	8	-	3	26.7
Excellent	-	5	1	-	2	7.6
COLUMN TOTAL %	37.1	23.8	21.9	9.5	7.6	100.0

N = 105

schools offering Agriculture, and Woodwork & Building Construction.

4.2.11 Suitability of Demonstration & Planning Spaces

Teachers were asked in Question 1j to rate the suitability of their demonstration and planning spaces. Table 19 shows results of crosstabulating the responses to this question and the subject taught by each respondent.

Table 19

SUITABILITY OF DEMONSTRATION AND PLANNING SPACES BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	14	2	6	-	-	20.2
Fair	13	11	6	4	2	33.0
Satisfactory	5	3	6	3	-	15.6
Good	3	5	3	-	-	10.1
Excellent	1	-	1	1	-	2.8

Do not have	8	1	-	-	1	10.1
Not Applicable	3	3	1	1	2	8.3

COLUMN TOTAL %	43.1	22.9	21.1	8.3	4.6	100.0

N = 109

With only 28.8% of the respondents indicating they had satisfactory or better demonstration and planning spaces, availability of these physical facilities seemed to be a

problem for most teachers. Even in Home Science where 22 (95.7%) respondents reported having demonstration and planning spaces, only 43.5% of them said these resources were satisfactory or better.

4.2.12 Anticipated Completion Dates for Special Rooms

Headteachers were asked in Question viii "What was/will be the date for the completion of applied education facility needed to teach the subject for which you are filling-out this questionnaire?" Responses to this question were crosstabulated with the subject for which the questionnaire was filled out. Results are shown on Table 20.

Table 20

COMPLETION DATES FOR SPECIAL ROOMS BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Before 1987	1	1	1	3	-	5.7
Between 1987 - 1988	5	2	7	2	-	15.1
Between 1989 - 1990	20	12	10	2	2	43.4
After 1990	18	9	5	2	4	35.8
COLUMN TOTAL %	41.5	22.6	21.7	8.5	5.7	100.0

N = 106

Results in Table 20 suggest that only 6 (5.7%) schools which responded to the questionnaire had special rooms for their applied education subjects by the end of the first year that the program was implemented. This proportion rose to 22 schools (20.8%) by the end of the third year (1988). If projections by headteachers were correct, an additional 46 (53.4%) schools will have special rooms by the end of 1990 while the remaining 38 (35.8%) schools were expected to have this physical facility after that year.

4.3.0 Section B: Instructional Materials

4.3.1 Availability of Suitable Class Textbooks

Teachers were asked in Question 5d to rate the availability of suitable class textbooks for their applied education subject. Table 21 shows the results of crosstabulating the obtained responses to this question and the subject each respondent taught.

Table 21

AVAILABILITY OF SUITABLE CLASS TEXTBOOKS BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	17	7	5	4	3	30.5
Fair	15	11	9	3	3	34.7
Satisfactory	7	4	4	-	1	13.6
Good	4	7	5	1	-	14.4
Excellent	1	-	-	-	-	0.8

Do not have	3	-	1	1	1	5.1
Not Applicable	-	1	-	-	-	0.8

COLUMN TOTAL %	39.8	25.4	20.3	7.6	6.8	100.0

N = 118

Availability of suitable class textbooks were rated as unsatisfactory by the majority of respondents in each subject area.

4.3.2 Adequacy of Reference Materials

One hundred and twenty teachers responded to Question 5e about the adequacy of reference books and other resource

materials. The responses to this question were crosstabulated with the subject each respondent taught as shown on Table 22.

Table 22

ADEQUACY OF REFERENCE MATERIALS BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	19	8	6	5	2	33.3
Fair	14	11	10	2	4	34.2
Satisfactory	6	5	5	-	-	13.3
Good	5	5	1	2	1	11.7
Excellent	-	1	2	-	-	2.5
<hr/>						
Do not have	3	-	-	1	1	4.2
Not Applicable	-	1	-	-	-	0.8
<hr/>						
COLUMN TOTAL %	39.2	25.8	20.0	8.3	6.7	100.0

N = 120

A large majority of teachers in each subject category indicated they had class textbooks, but between 61.3% and 75.0% of them indicated the level of adequacy for their reference books and other resource materials was unsatisfactory.

4.3.3 Availability of Teaching Aids

Question 5c asked teachers to rate availability of teaching aids for their applied education subject, for example, models, charts, overhead projectors, etc. Table 23 shows results of crosstabulating teachers responses to this question and the subject each respondent taught.

Table 23

AVAILABILITY OF TEACHING AIDS BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	18	9	4	2	1	30.4
Fair	6	5	5	2	1	17.0
Satisfactory	2	2	2	1	-	6.3
Good	1	3	1	-	-	4.5
Excellent	-	-	2	-	-	1.8
<hr/>						
Do not have	19	6	9	5	2	36.6
Not Applicable	1	1	1	-	1	3.6
<hr/>						
COLUMN TOTAL %	42.0	23.2	21.4	8.9	4.5	100.0

N = 112

Availability of teaching aids for applied education was rated as satisfactory or better by 12.6% (14 out of 112) of

the respondents. This apparent problem seemed to be most acute in Economics & Accounts and Agriculture. But even in Home Science where availability of teaching aids was reportedly least acute, only 20.8% of the respondents in that subject category rated it as satisfactory or better.

4.3.4 Adequacy and Availability of Consumable Materials

Teachers were asked in Question 5a to rate the adequacy and availability of consumable materials needed to teach their applied education subject. Responses to this question were crosstabulated with the subject each respondent taught. Results of this analysis are shown on Table 24.

Table 24

ADEQUACY OF CONSUMABLE MATERIALS BY SUBJECT

LEVEL OF ADEQUACY	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Poor	18	8	4	2	1	28.0
Fair	8	4	4	-	1	14.4
Satisfactory	4	1	5	3	-	11.0
Good	2	5	5	2	-	11.9
Excellent	3	-	1	1	2	5.9
<hr/>						
Do not have	8	3	4	2	1	15.3
Not Applicable	4	8	-	-	4	13.6
<hr/>						
COLUMN TOTAL %	39.8	24.6	19.5	8.5	7.6	100.0

N = 118

Except in Woodwork & Building Construction, the majority of respondents in each subject category were apparently dissatisfied with the adequacy of consumable materials for their subject. Even in Woodwork & Building Construction, 4 (40%) of the respondents either rated the quantity and quality of their consumable materials as poor or implied they did not have this resource.

In another related question (Question 6) teachers were asked, "Apart from minor changes, how often have you had to adapt your teaching plans this year because of difficulty in obtaining the necessary consumable materials?" Table 25 shows results of crosstabulating responses to this question and the subject each respondent taught.

Table 25

AVAILABILITY OF CONSUMABLE MATERIALS BY SUBJECT

FREQUENCY OF PROBLEMS	SUBJECT					ROW TOTAL
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
						(%)
None	8	6	4	2	1	24.7
1 to 3 times	18	8	4	2	1	38.8
4 to 5 times	8	4	5	-	1	21.2
At least 6 times	4	1	5	3	-	15.3
COLUMN TOTAL %	44.7	22.4	21.2	8.2	3.5	100.0

N = 85

The frequency of difficulties encountered in obtaining necessary consumable materials for teaching applied education varied from one school to the other. For example, eight (21.1%) headteachers of schools offering Agriculture indicated they had no problem obtaining such resources. In contrast, four (10.5%) of their colleagues indicated they encountered such difficulties at least six times within the same period of time.

A third question on consumable materials (Question vii) asked headteachers, "In your school, what is the estimated cost of consumable materials for one student per year in Kenya Shillings?" An accompanying note to the question emphasized that the requested cost estimate was for the SPECIFIC subject for which the TEACHER QUESTIONNAIRE was completed. Table 26 shows results of crosstabulating responses to this question and the subject categories of each respondent.

Table 26

ANNUAL COST ESTIMATE OF CONSUMABLE MATERIALS PER STUDENT

COST IN KENYA SHILLINGS (KSh.)	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Up to 100	15	4	2	1	1	25.6
101 to 200	9	7	3	1	-	22.2
201 to 300	6	7	7	2	-	24.4
301 to 400	-	-	2	1	1	4.4
401 to 500	3	1	2	1	-	4.4
Over 600	5	-	3	1	2	12.2
COLUMN TOTAL %	42.2	21.1	23.3	8.9	4.4	100.0

N = 90

Table 26 indicates the estimated annual cost of consumable materials per student for the same subject category varied from one school to the other. Similarly, varying proportions of headteachers of schools offering Agriculture (78.9%), Commerce (94.6%), and Home Science (57.1%) estimated the annual cost of consumable materials required by one student in those subjects to be KSh. 300 or less.

Estimated cost of consumable materials seemed to affect the quantity and quality of the level of adequacy of those

materials obtained for each subject category. For example, 94.6%, 78.9%, and 57.1% of headteachers of schools offering Commerce, Agriculture, and Home Science respectively estimated the annual cost of consumable materials per student as KSh. 300. Corresponding proportions of the same headteachers who indicated the adequacy of the consumable materials they obtained for their schools was satisfactory or better was 20.6%, 19.2%, and 47.7% respectively. Furthermore, the estimated cost did not seem to minimize problems encountered while obtaining those materials (see Table 25).

CHAPTER FIVE: TEACHER CHARACTERISTICS AND PEDAGOGICAL AREAS OFFERED

5.1.0 Introduction

This chapter comprise results of analysis of responses to questions concerning teacher characteristics and the subject offered in the schools. The section on teacher characteristics addresses research question number two in this study. It presents data on teachers' age, sex, qualifications, belief in six purposes of applied education in Kenya high schools, and their (teachers') interest and demands of teaching applied education. Research question number three is answered in the section on subjects offered in the schools. This section comprise data on student enrolment, subject diversity, basis and criteria for subject selection, and anticipated subject changes.

5.2.0 Section A: Teacher Characteristics

5.2.1 Age And Sex of Applied Education Teachers

In Questions 18 and 20, teachers were asked to state their age and sex. Table 27 shows the distribution of these two characteristics of teachers by subject category.

Table 27

DISTRIBUTION OF TEACHERS' AGE AND SEX BY SUBJECT CATEGORY

AGE AND SEX	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
AGE						
Under 25 years	6	3	8	1	1	15.7
25 to 29 years	27	16	10	7	6	54.5
30 to 34 years	6	7	1	1	1	13.2
35 to 39 years	3	3	4	-	1	9.1
40 to 44 years	4	2	-	1	-	5.8
Over 44 years	1	-	1	-	-	1.7
SEX						
Male	41	28	2	9	7	70.7
Female	7	4	22	1	2	29.3

Except in Home Science, the vast majority of teachers in each subject category were males. Because teachers also serve as role models to their students, teaching of one or more subjects by a large number of teachers of the same sex is likely to bias students' choice in those subjects. But, student enrolment shown in Table 38 suggests this is not a serious problem in applied education.

Most teachers were remarkably young in age. Over 70% of them were under 30 years of age and an additional 13.2% of

them were between 30 and 34 years old. Results of crosstabulating teachers age and sex showed age was similarly distributed among males and females.

5.3.0 Academic, Technical, and Professional Qualifications of Teachers

5.3.1 Academic and Professional Qualifications

Question 15 asked teachers to state the names of the highest certificate they held in their major academic and professional areas. Table 28 shows results of crosstabulating responses to this question and the subject taught by each respondent.

A notable thing on Table 28 is the high number (63) of untrained teachers, particularly the 40 (32.8%) teachers with A-Level (Advanced High School Level) Certificate.

Table 28

ACADEMIC AND PROFESSIONAL QUALIFICATION OF TEACHERS BY SUBJECT

LEVEL OF QUALIFICATION	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Trained Graduate/ Approved Teacher	9	5	5	-	-	15.6
Untrained Graduate	2	3	-	-	-	4.2
Diplomate or Sl	14	12	6	5	3	32.7
Untrained A-Level	17	11	7	-	5	32.8
Untrained Craftsman	4	1	5	5	1	13.1
Untrained Others	1	-	1	-	-	1.6
COLUMN TOTAL %	38.5	26.5	19.7	8.2	7.4	100.0

N = 122

Crosstabulations of the institutions where teachers studied the applied education subject they taught (Question 22) and the teachers' academic and professional qualification (Question 12) showed those 40 (32.8%) untrained A-Level teachers attended academic high schools. In addition to training them in pedagogical skills, these teachers' competence in practical skills in their subject areas should, therefore, be monitored to ensure they (the teachers) are effective in teaching the skills required by the syllabus of

their subject. For the same reason, teacher education should be extended to the other 23 (18.9%) untrained teachers shown on Table 28.

5.3.2 Institution Attended for Pre-service (Technical) Training

In Question 22, teachers were asked, "Where did you study the applied education subject you are teaching?" Table 29 shows distribution of teachers by institution attended and academic level studied.

Table 29

DISTRIBUTION OF APPLIED EDUCATION TEACHERS BY INSTITUTION ATTENDED AND LEVEL STUDIED

INSTITUTION ATTENDED	LEVEL STUDIED		ROW TOTAL %
	Major	Minor	
Harambee Institute of Science and Technology -----	17	-	13.6
Technical School -----	2	3	4.0
Academic High School -----	28	23	40.8
Craft Training Centre -----	1	1	1.6
Government Diploma College -----	24	2	20.8
National Polytechnic -----	2	2	3.3
University -----	17	3	16.0
COLUMN TOTAL (%)	72.8	27.2	100.0

Not only did 51 (40.8%) of the 125 teachers in Table 29 study their applied education subject at an academic high school, but 23 out of these 51 teachers studied it as a minor subject. Results of crosstabulating responses to this question and the subject categories revealed 37 of them were

either in Agriculture or Commerce. Surprisingly, only 4.0% of all the 125 teachers attended technical high schools. One would have expected a larger proportion of untrained teachers to have been recruited from technical school leavers because they are presumed to have more theoretical and practical knowledge of their applied education subjects than their colleagues from academic high schools.

5.3.3 In-Service Training

In Question 14, teachers were given a list of five forms of in-service training and a five-point ordinal scale beside each form of training. They were then asked to indicate, on that list, the forms of in-service training they had attended and rate the level of usefulness for each of those five forms of training on the scale provided. The results are shown on Table 30.

Table 30

DISTRIBUTION OF TEACHER ATTENDANCE AND PERCEIVED LEVEL OF USEFULNESS OF FIVE FORMS OF IN-SERVICE TRAINING

FORM OF IN-SERVICE TRAINING	NUMBER OF TEACHERS WHO ATTENDED	LEVEL OF USEFULNESS				
		MOST USEFUL		LEAST USEFUL		
		5	4	3	2	1
	(N)					
Informal meetings with other applied education teachers	59	25	16	10	6	13
Workshops presented by other applied education teachers	5	14	17	2	2	3
Workshops presented by Ministry of Education officials	32	16	9	10	6	6
Formal courses in subject content	10	26	15	11	4	2
Formal courses in method- ologies of teaching applied education	8	30	14	8	-	2

Results in Table 30 show a majority of teachers who rated the level of usefulness of each form of in-service training indicated they could benefit from attending any one of the five forms of in-service training. When the number of teachers who rated the level of usefulness of each form on in-service training as 4 and 5 are added together, informal teacher meetings, formal subject content, and formal courses in

teaching methodologies were perceived by the majority of respondents as the most useful form of in-service training. Workshops by Ministry of Education Officials appeared to be the most common formally organized form of in-servicing applied education teachers but relatively fewer of the teachers indicated they benefited or would benefit from that form of inservice training. Similarly, few teachers perceived workshops presented by their colleagues as a helpful form of in-service training.

Given the large number of untrained teachers with an A-Level Certificate (see Table 28), the apparently inadequate in-service training for teachers is a serious concern for implementation of applied education. Similarly, lack of interest in in-service training indicated by the relatively poor attendance and few responses about perceived level of usefulness of each form in-service training is a serious concern.

5.3.4 Teaching Experience

In Question 13, teachers were asked, "Including this year (1988), for how long have you taught?" Distribution of the teachers according to the number of years taught is shown in Table 31.

Table 31

DISTRIBUTION OF TEACHERS ACCORDING TO NUMBER OF YEARS TAUGHT

NUMBER OF YEARS TAUGHT	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
2 or less	29	11	15	6	4	52.8
3 to 5	9	13	4	2	3	25.2
6 to 8	4	2	-	-	1	5.7
9 to 11	1	3	-	1	1	4.9
12 to 14	2	1	3	-	-	4.9
Over 14	3	2	2	1	-	6.5
COLUMN TOTAL %	39.0	26.0	19.5	8.1	7.3	100.0

N = 123

About 53% of the teachers had taught for two years or less. This proportion reflected the large number of new teachers recruited to teach applied education when it was started in all secondary schools in 1986. It is also noteworthy that a vast majority (78%) of the teachers had taught for 5 years or less. These relatively few years of teaching experience were consistent with the young age of the majority of teachers reported in Table 27.

5.4.0 Demands of Applied Education on Teachers

5.4.1 Class Size

Teachers were asked in Question 20, "How many students are in your largest applied education class this term?" Results of crosstabulating responses to this question and the subject each respondent taught are shown in Table 32.

Table 32

CLASS SIZE BY SUBJECT CATEGORY

NUMBER OF STUDENTS	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
20 or less	15	8	2	1	1	22.1
21 to 24	1	2	1	3	1	6.6
25 to 28	3	4	-	1	2	8.2
29 to 32	5	4	4	1	2	13.1
33 to 36	5	4	-	2	-	9.0
Over 36	18	10	17	2	3	41.0
COLUMN TOTAL %	38.5	26.2	19.7	8.2	7.1	100.0

N = 122

Table 32 shows that class sizes in the same subject category varied from one school to the other. For example, 15 Home Science teachers indicated their classes had up to 20 students while 18 of their colleagues in other schools had over 36 students in their classes. Different class sizes

imply varying amounts of work load for the teachers. The heavier the load, the higher the chances that the teacher would be less effective in teaching.

Another interesting finding to note in Table 32 is the concentration of students in Agriculture and Commerce into small (20 students or less) and large (over 36 students) classes. This concentration was more likely to compound the problem of ensuring that all students received the same quality of education.

In the past, class size in most applied education subjects was usually 20 students or less. This relatively small class size enabled the teacher to monitor the safety of people, materials, equipment and skill development of the students during applied education class sessions. The effect, if any, of large class sizes (e.g., over 36 students) on these two aspects of applied education should be studied.

5.4.2 Perceived Time Inadequacy

When asked whether they had enough time to cover "this year's part of applied education syllabus for their subject," (Question 21), 80 out of 121 respondents said time was "definitely not enough". An additional 39 indicated the officially allocated time was "just enough" while the remaining 2 respondents (in Commerce) said time was "more than enough".

Responses to Question 21 were crosstabulated with the teachers responses to the question about their applied education class size (Question 20). Results are shown in Table 33.

Table 33

LEVEL OF ADEQUACY OF OFFICIALLY-ALLOCATED TIME BY APPLIED EDUCATION CLASS SIZE

TIME ADEQUACY	NUMBER OF STUDENTS PER CLASS				ROW TOTAL (%)
	20 OR LESS	21 TO 28	29 TO 36	OVER 36	
More Than Enough	1	1	-	-	1.6
Just Enough	9	6	9	18	32.8
Definitely Not Enough	16	13	18	38	65.9
COLUMN TOTAL %	20.2	15.6	20.9	43.4	100.0

N = 129

The interesting thing to note in Table 33 is that 16 out of 26 (61.5%) teachers with small classes agreed with 38 out of their 56 (67.9%) colleagues who had class sizes of over 36 students that officially allocated time was definitely not enough. This agreement suggests that the syllabus content was more than what most (65.9%) teachers could effectively teach within the time allocated. Furthermore, the majority of

teachers in each class size category said officially allocated time was definitely not enough.

5.4.3 Weekly Teaching Load

Teachers were asked in Question 18 and 19 to state how many 40 minute periods they taught per week and how many of those weekly lessons were on applied education. Analysis of responses to these two questions are shown in Table 34.

Table 34

NUMBER OF TOTAL AND APPLIED EDUCATION LESSONS TAUGHT PER WEEK

TYPE OF WEEKLY LOAD	NUMBER OF LESSONS PER WEEK							ROW TOTAL
	0 to 6	7 to 13	14 to 20	21 to 27	28 to 34	35 to 41	Over 41	
Total Load	10	8	29	59	14	1	6	127
Applied Education	42	39	21	12	4	5	4	127

We see in Table 34 that at least 83.5% of the teachers had less than the recommended teacher load of 30 lessons per week. A lighter load probably helped them cope with the many demands associated with implementing a new program but as noted in section 5.7 that help was not good enough to off-set problems created by time inadequacy. It should be noted that at the time this study was conducted (1988) the schools did not have a Form Four (senior most high school) class because

of the change from the 7-4-2-3¹² to the 8-4-4 system of education. Normal enrolment was expected to resume in January, 1989. Beginning in 1989, the teaching load of teachers must have risen higher than the one shown in Table 34.

Another interesting observation in Table 34 was that while 88 (69.3%) of the teachers indicated their total weekly load was between 14 and 27 lessons per week, 81(63.8%) of them said they taught up to 13 lessons of applied education per week. These figures suggest that applied education teachers taught other subjects as well.

5.5.0 Perceived Teachers' Ability to Cope with Demands of Implementing Applied Education

Teachers were asked in Question 8 how they felt about the demands made on them in implementing the applied education syllabus for their subject. Table 35 shows results of analysis of responses to this question.

¹²This system of education comprised seven years of primary education, four years of secondary education, two years of higher secondary education, and three years of minimum university education.

Table 35

TEACHERS' ABILITY TO COPE WITH DEMANDS OF IMPLEMENTING APPLIED EDUCATION

LEVEL OF TEACHERS' ABILITY TO COPE	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Cannot Cope	3	-	-	-	-	2.5
Sometimes Too Demanding	31	17	17	2	6	60.8
Generally Can Cope	11	10	6	5	3	29.2
Demands Not A Problem	2	4	1	2	-	7.5
COLUMN TOTAL %	39.2	25.8	20.0	7.5	7.5	100.0

N = 120

Results in Table 35 indicate that 90% of the teachers felt they could, albeit with difficulties, cope with demands of implementing their applied education syllabus. The only exceptional feelings were expressed by 7.8% of the teachers in Woodwork & Building Construction who either said they could generally cope or that such demands posed no special problems to them.

5.6.0 Teacher Interest in Teaching Applied Education

Question 7 asked teachers, "If you had a choice, would you avoid teaching applied education altogether?". Responses

to this question were crosstabulated with subject categories as shown in Table 36.

Table 36

TEACHER INTEREST IN TEACHING APPLIED EDUCATION BY SUBJECT CATEGORY

TEACHER INTEREST	SUBJECT					ROW TOTAL (%)
	AGRIC- ULTURE	COMMERCE	HOME SCIENCE	WOODW & BLDG CONS	ECON & ACCOUNT	
Would Avoid Given Choice	10	8	2	1	2	18.9
Undecided Whether Would Avoid	5	4	2	1	1	10.7
Would Not Avoid Given Choice	33	19	20	8	6	70.5
COLUMN % TOTAL	39.3	25.4	19.7	8.1	7.4	100.0

N = 122

It was a welcome surprise to note in Table 36 that, despite heavy demands of the syllabuses on the teachers (see Table 35), 70.5% of them said they would continue teaching applied education even if they had other (presumably better) choices. Home Science, and Woodwork & Building Construction had particularly high proportions (83.3% and 80.0% respectively) of teachers interested in teaching applied education. However, the 18.9% of the teachers who suggested they taught applied education because they lacked alternative

choices should be a source of concern because dissatisfaction with any aspect of their subject is likely to minimize their effectiveness in teaching that subject.

5.7.0 Levels of Schooling that Teachers Preferred to Teach Applied Education

Question 9 asked teachers "If you had a choice, at which level of schooling would you prefer to teach applied education?". Responses to this question were crosstabulated with responses to Question 12(a) which enquired about the teacher's highest level of academic qualification. Results of this analysis are shown on Table 37.

Table 37

LEVEL OF SCHOOLING THAT TEACHERS PREFERRED TO TEACH BY HIGHEST LEVEL OF ACADEMIC QUALIFICATION ATTAINED

LEVEL OF SCHOOLING	CERTIFICATE				ROW TOTAL %
	Graduate/ Approved Teacher	Diploma/ Sl	Craft	A-Level	
Primary	4	1	-	1	5.1
Form One	3	4	-	1	6.8
Form Two	4	4	2	12	18.6
Form Three	3	5	1	11	16.9
Form Four	7	11	4	11	28.0
Post Secondary	2	4	3	1	8.5
Any Level	-	12	4	3	16.1

N=118

The results in Table 37 show an interesting pattern of teachers' choice of the level of schooling they preferred to teach. Contrary to what one might expect, almost half of the graduated/approved teachers (11 out of 23) preferred to teach at primary school or junior secondary level (Forms One and Two) compared to the 2 graduate/approved teachers who said they would have liked to teach at the post-secondary level. Unlike any other category of teachers, all graduate/approved teachers had their preferences about the level of schooling they liked to teach.

In contrast, 26 (65%) untrained (see Table 27) teachers with A-Level certificate indicated they liked to teach at the Senior Secondary (Forms Three and Four) level. Similarly high proportions of teachers with Diploma/Sl (48.8%), and Craft (57.1%) certificates preferred to teach at the senior secondary level. Apparently, teachers with high academic qualifications preferred to teach at the lower levels of schooling and vice versa. The cause of this apparent lack of aspiration by graduate/Approved teachers to teach at upper levels of schooling should be investigated.

5.9.0 Teacher Beliefs in The Purposes of Applied Education in Kenya High Schools

In Question 11(a) to (f), teachers were asked to rate, on a scale of 1 to 6, their belief in each of six given purposes of applied education in Kenya high schools. The data from

this Question were combined in order to collapse the strength of a teacher's belief in each purpose of applied education into three categories. The results are shown in Table 38.

Table 38

PURPOSES OF APPLIED EDUCATION BY STRENGTH OF TEACHERS BELIEF IN EACH PURPOSE

PURPOSE	LEVEL OF STRENGTH OF TEACHER'S BELIEF		
	Most Important	Important	Least Important
Provide technical knowledge and related occupational information to be used for leisure or personal odd jobs	23	20	39
Provide occupational exploration to aid students in selecting a career	30	35	16
Develop manipulative skills necessary for securing self- or salaried-employment	82	12	5
Prepare for a vocational institution, such as a Harambee Institute of Science and Technology, National Polytechnic, etc.	27	29	22
Develop personal and social traits essential to hold a job	21	23	32
Enrich general education	14	30	35

The most notable result in Table 38 was the high number of teachers who indicated they believed the most important purpose for teaching applied education in Kenya high schools

was to enable the students to become self-reliant after leaving school. As argued in Chapter One, this was the main purpose for which applied education was mandated as part of general education in Kenya. The apparent agreement between the official and the teachers' personal belief in the most important purpose of applied education is likely to enhance the implementation of the innovation.

Results of crosstabulating responses about each purpose of applied education and the subject taught by each respondent showed teacher belief in self-reliance as the most important purpose of applied education was roughly uniformly spread among all subject categories. This suggests that a majority of teachers in each subject category believe students could earn their livelihood from the manipulative skills they (the students) learn in any of the studied applied education subjects.

5.10.0 Section B: Pedagogical Areas Offered

5.10.1 Student Enrolment Per Subject Area

Headteachers were asked in Question ii(a) to fill out the number of boys and girls enrolled in Form Three in each applied education subject offered in their school. Table 39 shows the sum of each sex for the 125 schools studied.

Table 39

STUDENT ENROLMENT BY SUBJECT AREAS

SUBJECT AREA	ENROLMENT		ROW
	BOYS	GIRLS	TOTAL
Agriculture _____	3803	2881	6684
Economics _____	2910	2401	5311
Home science _____	1185	1483	2668
Commerce _____	861	787	1648
Accounts _____	548	656	1204
Drawing and design _____	537	360	879
Music _____	15	354	368
Typing and Office Practice _____	0	328	328
Woodwork _____	139	130	269
Art and Design _____	74	89	163
Electricity _____	40	21	61
Building construction _____	45	0	45
Power mechanics _____	0	0	0
Metalwork _____	0	0	0

Compared with the average class size of 33 to 36 students reported by teachers in Table 30, the large enrolment in Table 39 seems to include all the students enrolled in each subject area rather than Form Threes only as the question had asked. Nonetheless, these results show the schools offered a wide

variety of applied education subjects (and presumably practical skills). The number of students enrolled in each subject area varied from 0 in Metalwork and Power Mechanics to 6684 in Agriculture. Thus the distribution of practical skills by subject areas seemed unbalanced.

Most subject areas with the least number of students, for example, Power Mechanics, Metalwork and Electricity, would normally require special physical facilities like tools and equipment, working space, etc. In contrast, the subjects with the highest enrolments, for example, Agriculture and Economics, usually require relatively fewer or more easily obtainable physical facilities.

It is also noteworthy that while all the students in some subject areas were of the same sex, there were large proportions of both boys and girls in traditionally sex-segregated subjects like Home Science and Woodwork.

5.10.2 Curriculum Stakeholders Who Actually Chose the Subjects Offered in The Schools

In Question (iii), headteachers were asked to select, among six given alternatives, the curriculum stakeholder who actually chose the applied education subject(s) offered in his or her school. Results are shown in Table 40.

Table 40

DISTRIBUTION OF CURRICULUM STAKEHOLDERS WHO ACTUALLY CHOSE THE SUBJECTS OFFERED IN THE SCHOOLS STUDIED

ACTUAL CHOOSERS OF SUBJECT OFFERED	FREQUENCY	
	N	%
School Staff _____	62	50.8
Parents/Teachers Association _____	25	20.5
Students _____	12	9.8
Ministry of Education _____	12	9.8
Board of Governors _____	10	8.3
Unknown to Headteacher _____	1	0.8

Results in Table 40 suggest the school staff alone made about half of the decisions about the applied education subjects schools offered and an additional 20.5% of those decisions were made by teachers and parents. Thus, while the teachers were involved in choosing the applied education subjects offered in a majority of the schools, parental involvement in the same decisions was not commensurate with the heavy responsibility placed on them by the Cost Sharing Policy (see p. 7). Crosstabulation of responses to Question (iii) and (i) showed that in all the four school categories, school staff chose the subjects offered in their school more often than any other group of curriculum stakeholders.

5.10.3 Main Reason For Choosing Applied Education Subjects Offered in Schools

Headteachers were asked in Question (iv) what they thought was the main reason for choosing the applied education subject offered in their school. Instead of providing one main reason as their response, a majority (31.7%) of headteachers gave alternatives (a), (c) and (d) in Table 40 as their response. Consequently, these three alternatives were collectively renamed "Any combination of alternatives (a), (c), and (d) during analysis." Distribution of headteachers according to the main reason they gave for choosing the applied education subject taught at their school is shown in Table 41.

Table 41

DISTRIBUTION OF HEADTEACHERS ACCORDING TO THE MAIN REASON FOR CHOOSING APPLIED EDUCATION SUBJECT TAUGHT AT THEIR SCHOOL

MAIN REASON	FREQUENCY	
	N	%
a) Least expensive to run _____	24	20.5
b) Skills taught are useful to the community served by the school _____	29	24.8
c) Physical facilities required were readily available _____	13	11.1
d) Lack of qualified teachers in other applied education subjects of interest _____	12	10.3
e) To enrich academic subjects _____	2	1.7
f) Any combination of alternatives (a), (c) and (d) _____	37	31.7

The results in Table 41 suggest that a majority of the curriculum stakeholders who made the actual choice about the applied education subject taught at individual schools mainly considered the running cost of the subject, availability of physical facilities and qualified teachers. When the proportion of the headteachers who identified each of these three factors separately are added to those headteachers who identified the same factors collectively, the results show 73.6% of the headteachers indicated that the decision about the applied education subject their schools offered was based on its perceived running cost, availability of physical facilities, availability of qualified teachers, or a

combination of two or three of these factors. In addition, almost one-quarter of the headteachers cited the perceived usefulness of the skills taught as the main reason for choosing the applied education subject taught at their school.

5.10.4 Anticipated Subject Changes

On a list of 14 applied education subjects, headteachers were asked in Question (v) to indicate the subjects their school intended to add or drop from their school curriculum and, if applicable, the year in which they planned to effect those changes. Distribution of the changes that headteachers anticipated are shown in Table 42.

Table 42

ANTICIPATED SUBJECT CHANGES BY TIME

SUBJECT	1988/89		1990/91		TO BE ADDED WHEN TEACHER AND FACILITIES BECOME AVAILABLE
	Add	Drop	Add	Drop	
Home Science ____	10	3	15	-	9
Art & Design ____	1	-	1	-	6
Agriculture _____	3	-	-	-	2
Electricity _____	-	-	-	1	-
Power Mechanics _	-	-	1	-	1
Woodwork _____	3	-	9	-	8
Metalwork _____	-	-	4	-	5
Building construction ____	2	-	-	-	3
Drawing & Design _____	2	-	1	-	3
Music _____	5	-	2	-	3
Accounts _____	2	1	8	-	3
Commerce _____	2	-	-	-	2
Economics _____	7	1	4	-	1
Typing & Office Practice _____	1	-	-	-	5

We see in Table 42 that almost all anticipated subject changes are expected to be additions of subjects to the present curriculum. Some of these changes are expected to be effected by 1991 while others will depend on how soon the

necessary educational resources become available to individual schools.

More specifically, 83 headteachers said their schools planned to add one or more applied education subjects on their curriculum by 1991 and an additional 51 headteachers indicated their schools will do the same when a qualified teacher and facilities become available. Giving students a wider choice of applied education subjects was given by 23 out of 45 (51.1%) headteachers as the main reason why their schools intended to add more subjects to their present curriculum. Thirteen (28.9%) more headteachers said their schools intended to add more subjects because they had the facilities required to teach those subjects and the skills the students would learn were expected to be more useful to the students.

In contrast, only 5 headteachers said their schools intended to drop subjects they taught. Lack of a qualified teacher (2 schools), lack of physical facilities (2 schools), and high running cost (1 school) were cited as the reasons why those five schools intended to drop some subjects.

5.10.5 Criteria Schools Used to Assign Applied Education Subjects to Individual Form One Students

Headteachers were asked in Question (ix) to choose among seven given alternatives, the criterion their schools used to decide on which applied education subject(s) individual students would study in Form One. Distribution of frequencies of responses to this question are shown in Table 43.

Table 43

CRITERIA FOR ASSIGNING APPLIED EDUCATION SUBJECTS TO INDIVIDUAL STUDENTS IN FORM ONE

CRITERIA	FREQUENCY	
	N	%
Subjects are randomly assigned to students by the school before students arrive at the school _____	25	21.7
Students make their subject choices after a short exposure to all applied education subjects offered by the school _____	7	6.1
Students are exposed to all applied education subjects offered by the school, then subjects assigned by the school on the basis of student performance in each applied education subject _____	31	27.0
Subjects are assigned to students on the basis of their KCPE performance _____	1	0.9
No specific criterion is used _____	20	17.4
More than one criterion is used _____	5	4.3
Students are assigned all applied education subjects offered by the school _____	26	22.6

An important point to note in Table 43 is the varying criteria schools used to assign applied education subjects to individual students in Form One. The clustering of headteacher responses into four criteria suggest schools in each group operated under conditions which predisposed them to use the same criterion.

A majority (31) of the schools considered talents of individual students in assigning them applied education subject

but only 12 schools gave their students an opportunity to choose the subjects they liked. Giving students an opportunity to choose (when there are choices to be made) the subject that most interest them would enhance their performance in that subject and failure to do so is likely to have the opposite effect.

CHAPTER SIX: CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS

6.1.0 Introduction

This chapter begins with the conclusions of this study which comprise a brief review of the three research questions addressed in this study and their answers. Then important issues raised by the results of the study are discussed and the chapter ends with recommendations for improving the level of adequacy of physical facilities, instructional materials, and teachers.

6.2.0 Conclusions of the Study

The general purpose of this study was to identify the quantity and quality of educational resources available for teaching and learning each of fourteen applied education subjects in the Central Province of Kenya. Three specific problems were addressed in this study. First, an attempt was made to assess the level of adequacy of physical facilities and instructional materials. Second, the study sought to identify teachers' characteristics while the third problem concerned subjects offered among the schools. These concerns included student enrolment per subject, diversity of subjects offered, and the criteria used by curriculum stakeholders for subject selection.

As described in Chapter Three, a proportional random sample of 197 (36.8%) secondary schools stratified by

administrative districts was used in collecting the data. Complementary teacher and headteacher questionnaires were developed, pilot tested, and used to collect data on any one of fourteen applied education subjects. The specific subject for which a questionnaire was completed and the teachers who filled out that questionnaire were selected by the school staff. However, the respondent was required to have been teaching the subject for which he or she completed the questionnaire. The headteacher for each selected school automatically became the respondent for the headteacher questionnaire. Data analysis was done using crosstabulations and frequencies.

In general, the results of this analysis suggest that the quantity and quality of available physical facilities, instructional materials, and teacher characteristics are inadequate for effective teaching and learning of applied education. In addition, the level of adequacy for these resources varied from one school to the other irrespective of whether those schools offered the same or different subject areas. More specifically, these results led to the following conclusions as expressed by the majority of teachers or headteachers as the case may be:

6.2.1 Physical Facilities

1. Specially built rooms or buildings were not available to most teachers and, according to headteacher projections,

they will be ready by 1990 or later. Furthermore, a large proportion (35.8%) of teachers indicated no set date in which they expect to have their special room built. However, most indicated that they have access to a building that they use for teaching their applied education subject but the level of adequacy of these improvised buildings is less than satisfactory.

2. Most schools have neither special working spaces for the students or the teacher nor storage spaces for tools/equipment, students' class projects, and consumable materials. The few working or storage spaces available are less than satisfactory in quality and quantity. Proportionately, Agriculture had the poorest facilities while Home Science had the best.
3. Amount of classroom space available was satisfactory for the majority of teachers in all subject areas. But one cannot conclude that new classrooms have been built for applied education because, unlike practical work, theory can be taught in existing classrooms.
4. Similarly, class desks were available in sufficient numbers and quality in all subject areas.
5. The majority of teachers in Home Science had enough counters but their colleagues in Woodwork and Building Construction indicated the work benches they had were insufficient in numbers and quality. The majority or all

teachers in Commerce, Accounts, and Economics suggested they did not have work benches or counters.

6. The majority of applied education teacher either had no hand tools or equipment (61.7%) or the number and the quality of the ones they had was less than satisfactory (28.7%). Teachers without equipment were mainly in Commerce, Accounts, and Economics while the rest had power tools or equipment but the quality and quantity was less than satisfactory. In general, there were more teachers with hand tools or equipment than power operated ones.

6.2.2 Instructional Materials

1. Class textbooks and reference materials were available to most teachers but in insufficient numbers and quality. While the book writing workshops conducted by the Ministry of Education in 1988 might ease the problem of numbers, their quality is yet to be determined.
2. Teaching aids were either unavailable or insufficient in number. This problem was most acute in Economics, Accounts, and Agriculture.
3. About two-thirds of the teachers have consumable materials but, like other instructional materials, they are insufficient in quality and quantity. Furthermore, the majority of teachers have problems procuring those

materials although they cost KSh 300 or less per student per year.

6.2.3 Teacher Characteristics

1. About 55% of the teachers are between 25 and 29 years old and over 83% of them were below 35 years old. This age span is uniformly distributed in all subject areas.
2. Overall, males make up about 70% of all applied education teachers. Except in Home Science, they are a majority in all subject areas.
3. Most teachers require more academic, technical, and pedagogical training to be fully qualified for teaching Applied education. About 50% of them have no pedagogical training and are either A-Level graduates with an academic background (32.7%), university graduates, (4.2%), or craftsmen (14.7%). Furthermore, they have taught for two years or less.
4. Teaching applied education appears to place great demands on the majority of teachers but they cope with those demands albeit with great difficulties. It is speculated that factors which contribute to those demands include inadequate time to cover prescribed syllabus content; inadequate physical facilities and instructional materials; poor academic, technical and professional training; large class sizes; and too high expectations from parents, communities, and the government.

5. The majority of teachers have a lighter teaching load than the prescribed 30 lessons per week. Their average weekly teaching load is 23 lessons which includes 9 applied education lessons. This load is likely to increase beginning in January, 1989 when full enrolments occur after the transition from the old (7-4-2-3) to the new (8-4-4) system of education is completed at the secondary school level.
6. Teacher interest in continuing to teach applied education is high. While a significant proportion (16.1%) of them have no preference for teaching at any particular academic level, the majority prefer to teach forms three, four, or post-secondary. Surprisingly, graduate teachers tend to prefer teaching at lower academic levels than other less qualified teachers.
7. Teacher beliefs about the main purpose of applied education are similar to those on which the program was founded: that practical skills learned in applied education can be used by the students for self-employment, salaried-employment, or further training.

6.2.4 Applied Education Subjects Offered

1. Twelve subject areas are offered among the schools but three out of every four students enrolled in applied education are studying either Agriculture, Economics, or Home Science. Agriculture alone accounts for about 1/3

of the total student enrolment. This concentration of students into few applied education subject areas indicate the diversity of practical skills that the school leavers are acquiring at school are limited and therefore the school leavers will be competing for the same applied education opportunities after they leave school.

2. Almost the same number of boys as girls were enroled in traditionally sex-segregated subject areas like Home Science and Woodwork but sex-stereotypes seem to be still prevalent in Music, Typing & Office Practice, and Building Construction.
3. Decisions about the applied education subjects that schools offer are made by the headteachers and their staff members. Parental and community involvement in making those decisions were minimal compared to the financial responsibilities entailed in such decisions which parents and communities are expected to meet.
4. Although usefulness of the skills learned was cited as an important reason for choosing the applied education subject offered by individual schools, availability of physical facilities, instructional materials, qualified teachers, and running cost were the main reasons cited for the choices made. Thus, the choice of subject areas to be offered is made on the basis of available resources rather than program objectives.

5. Criteria used in the schools to decide on the applied education subject that each student in Form One will take include: students exposure to all subjects offered followed by subject assignment to students by the school on the basis of student performance, assignment of all subjects offered in the school due to lack of subject choice, and random assignment. Kenya Certificate of Primary Education (KCPE) results are not considered when assigning subjects to Form One students and only a small proportion (6.1%) of the schools give these students the freedom to choose the subjects they like.

6.3.0 Limitations of the Conclusions

As stated in Chapter Three, participating schools were randomly selected, and the collapsed responses (see Table 4) were proportionately distributed among the five administrative districts of Kiambu, Kirinyaga, Muranga, Nyandarua, and Nyeri. However, the freedom given to school staff to choose the subject areas for which they responded to the questionnaires meant that pedagogical areas were not randomly selected. In addition, crosstabulations of some variables yielded contingency tables with some cells having less than five counts. The approximation of chi-square for such tables was therefore inadequate. Consequently, results of the analysis and conclusions drawn from these results are not generalized beyond participating schools.

Moreover, the entire educational system is going through major changes. The quantity and quality of physical facilities, instructional materials, and teachers available for the teaching and learning of applied education is probably changing too. This possible change of available educational resources complicates the process of generalizing the results and conclusions of this study.

However, the relatively high return rate (68.0%), representative distribution of responses across the five administrative districts covered in the study, and the high (94.0%) proportion of students enrolled in the subject areas studies raise serious questions about the quality of applied education offered in the schools.

6.4.0 Discussion Of Results

The following discussion arises from interesting issues arising from the results presented in chapters four and five.

6.4.1 Contributing Factors to Inadequacy of Physical Facilities/ Instructional Materials

Results in Chapter Four indicate that physical facilities and instructional materials are not available in sufficient quantities and quality. For example, headteacher projections of the dates their schools were expected to complete their special rooms (Table 20) show that at least 35.8% of the schools will remain without a special room for an indefinite period of time into the 1990s. A review of the literature

suggests that three factors may have contributed and continue to contribute to this inadequacy of physical facilities and instructional materials.

The first one is a public attitude that practical skills entail tedious manual labour only fit for people who are incapable of pursuing academic subjects like liberal arts, sciences, etc. Emphasis by the program developers on the use of hand (manual) tools or equipment, and local materials might have given credence to this attitude. Additionally, the relatively high social and material rewards usually given to people with high academic qualifications and serving in white collar jobs, can only reinforce such an attitude among the public. If the parents and communities served by individual schools perceive applied education as leading their children into careers they consider to be of low social or economic status, they could consciously or unconsciously withhold their financial and material support for the program (see p. 7).

Doubt about the school leavers' chances of becoming self-reliant through practical skills learned in applied education may be yet another contributing factor to inadequacy in physical facilities and instructional materials. A study on Practical Subjects in Kenya Secondary Schools by Lauglo (1985) concluded that only about 20% of school leavers with such skills succeeded in finding salaried-employment and a negligible number of them became self-employed. A similar study by Yambo (1986) on employment patterns of leavers of

Youth Polytechnics (YPs) and Harambee Institutes of Technology (HITs) also found that unemployment among graduates of these two institutions has been increasing since 1973 and worsened between 1980 and 1986. Through casual observations of employment patterns among these leavers, parents and communities might have become aware about this rising unemployment even among people with far more advanced practical skills than those learned through applied education. Their observation may have caused doubts about whether proficiency in technical skills per se can guarantee school leavers employment to justify the heavy financial cost (see Appendix G) they are required to meet by the Cost Sharing Policy (see p. 7).

Huge capital and running costs might be the biggest contributing factor to the widespread inadequacy of physical facilities and instructional materials. Appendix G shows the most conservative cost estimate for constructing a basic special room for 20 students or a classroom for 40 students in 1984 was KSh 200,000. Furniture and textbooks for one classroom was expected to cost KSh 80,000 per year. While the cost of tools and equipment varied from one subject to the other, it tends to be considerably higher than that of regular classrooms. But the cost of providing physical facilities and instructional materials for teaching and learning each subject area in this comparatively cheaper cluster of subjects is still high. The burden of meeting this cost is made heavier

by the fact that the same communities who are expected to pay for it were, between 1983 and 1984, also responsible for providing similar resources for the primary component of practical subjects.

To help ease this cost burden on the parents and communities, in 1988 the government organized book writing workshops by selected subject specialists including teachers, school inspectors, curriculum developers, and college lecturers. However, while these textbooks might be affordable in price and available in sufficient quantities, it is necessary to ensure that their content is relevant to the objectives of applied education with regard to technical knowledge and skills as well as the attitudes embedded in that technical content. This is because studies on the use of textbooks (Cronbach, 1980) show the majority of teachers rely almost exclusively on the prescribed textbook in their teaching and, therefore, it becomes the syllabus. This is likely to be particularly true for applied education teachers who are inadequate in academic, technical, and professional training (see Tables 28, 29 and 30). Additionally, these teachers lack sufficient quantities and quality of physical facilities, tools and equipment, teaching aids, and consumable materials (see Section A in Chapter Four). Beside technical knowledge and skills, the content in applied education textbooks should include attributes like ingenuity, entrepreneurship, honesty, safety awareness, and cooperation,

since these values are central to success as a self-employed individual in the informal sector.

6.4.2 Teacher Qualifications, Orientations, and Perceived Effectiveness

Results on academic and professional qualifications (Table 28), forms of in-service training attended by teachers (Table 30), institutions teachers attended for their (technical) pre-service training (Table 29), and their teaching experience (Table 31) suggest most teachers may require further technical or pedagogical training.

Currently, applied education skills are widely and successfully used by *jua kali* artisans in the rural and urban areas to provide a wide range of satisfactory goods and services at very competitive prices. It is these artisans that graduates of applied education are expected to compete with for salaried- or self-employment. Sometimes the job of these artisans entail working under very difficult conditions to provide unconventional but functional solutions to technical problems using whatever tools or equipment are available to them. In addition, most *jua kali* businesses depend on industrial waste and scraps for their raw materials.

All these demands suggest that an effective applied education teacher would be required to teach their students not only theoretical knowledge and practical skills, but also realistic attitudes towards the working conditions, consumable materials, tools and equipment that his or her students are

likely to work with after leaving school. As alluded to in the previous section, teaching methodologies should also focus on traits like initiative, creativity, honesty, safety consciousness cooperation and entrepreneurship. Thus the depth and scope of change required of teachers by the applied education program is too complex for the majority of teachers to teach effectively without further training.

According to Werner (1988) teachers' beliefs about the worth of what they are teaching greatly influences their teaching effectiveness. If this claim that teachers often interpret and judge new programs from their beliefs about those programs is correct, it is important to know the views that applied education teachers hold about their respective subjects areas.

Results in Table 38 show the majority of teachers (82 out of 125) agreed with the program initiators views that the practical skills learned in applied education can be used by school leavers to earn a livelihood. Thus, there is an apparent congruence between the beliefs held by the teachers about applied education objectives and the beliefs on which the program objectives were based. It is not surprising, therefore, that despite widespread inadequacy of physical facilities and instructional materials (see Section A in Chapter Four), low academic, technical, and professional qualifications among the teachers, the majority of teachers would not avoid teaching applied education (Table 36).

Nonetheless, current emphasis on examinations which are meant to certify a candidate's "fitness" to continue with education, further training, or employment in the formal sector of the economy pose serious problems to achieving the objectives of applied education. Examination results are assumed not only to evaluate the abilities of individual students, but are also used as strong indicators of a teacher's performance and school accountability to its financial sponsors. Due to these external pressures on the teacher, it is most likely that subject content seen by teachers as likely to come in the final examinations will be emphasized in the classroom whether (in teacher's view) that content enhances a student's chances of becoming self-reliant after school or not.

6.4.3 Time Inadequacy

Results in Table 33 show the majority of teachers thought the amount of officially-allocated time for their subject area was not enough. For the teacher, indicators of official time like amount of time per class lesson, number of lessons per week, academic term, year, etc., provide a benchmark for judging how much subject content *should* be covered by a given time to ensure the whole syllabus will be covered by the end of a student's fourth year in high school.

Curriculum developers for applied education made certain assumptions when deciding about the amount of subject content

to be included in each syllabus. For example, they expected adequate physical facilities, teachers, and instructional materials to be provided on time for the program to start in every school in 1986. However, results in Chapters Four and Five suggest these assumptions were incorrect. As a result of the widespread unavailability of these essential resources, most teachers found the officially-allocated time for their subjects inadequate as shown in Table 33. The discrepancy between how much content teachers are required to cover (as indicated by the amount of content in the syllabus) and what they are actually able to cover inevitably creates frustration within individual teachers. There are various ways of coping with the effects of frustration due to lack of sufficient time to cover syllabus content.

First, a teacher can seek out-of-class time. While this alternative may not be a serious problem for teachers because of their relatively light teaching load¹³ (see Table 34), it is definitely a big problem for the students. At the end of their four years of secondary schooling, the students are examined in ten or eleven subject areas (KNEC, 1987) and the results of these examinations collectively determine whether a student would continue with education, training, or work.

¹³At the time this study was conducted, Kenya high schools did not have Form Four classes because they were in the process of changing from the old (7-4-2-3) to the new (8-4-4) system of education. Therefore, this teaching load is expected to increase beginning January 1989 when schools attain their full enrolment.

This is a very heavy load for students. Besides, they cannot afford to spend more time on one subject area at the expense of another.

Second, seeking extra time is often accompanied by modifications of a program to fit better with the constraints of an individual teacher's classroom, perceived student characteristics, parents and community expectations, a teacher's preferred teaching styles, and beliefs about the content being taught. Teachers prioritize syllabus topics and their teaching activities to help them select the content to be taught in the available time. In addressing the problem of time inadequacy, teachers who modify program content in order to deal with time inadequacy run the risk of changing a program's content beyond recognition.

Third, teachers can teach whatever content they can teach within the officially-allocated time in the hope that in "future" more time will be available to enable them cover the remaining content before students sit for their Kenya Certificate of Secondary Examination (KCSE).

Lastly, through discussion with colleagues who have experienced problems with time, individual teachers feel comforted in knowing they are not the only ones who have found their subject content too much for the officially-allocated time. This may explain why "informal meetings with other applied education teachers" (Table 30) are found to be more

useful by the majority of the teachers in the absence of other more helpful forms of in-servicing.

According to Werner (1988), when teachers are required to cover more subject content than the fixed-time can realistically allow, teaching is directed by the amount of official time available rather than the objectives of the program. This is a very important point to consider because unless applied education can achieve its stated goal of making school leavers self-reliant, it would be difficult to justify the heavy cost it involves (see Appendix G).

6.5.0 Recommendations

Based upon the discussion of results and conclusions of this study, the following recommendations for improving student accessibility to adequate applied educational resources are proposed. Suggestions on how these recommendations can be put into practice in Kenya are constructed from information contained in implementation literature and the researchers knowledge of the Kenyan context.

6.5.1 Pool and share educational resources by creating neighbourhood applied education schools

Instead of parents and communities of every school struggling to provide their own classrooms and special rooms, tools and equipment, instructional materials (and at times teachers and support staff), they should join parents and communities of neighbouring schools in order to provide common

but adequate educational resources at a convenient location for the schools involved. Such a project should take into account ease of student access to these facilities, schedule for use of the various resources, and the aims and objectives of applied education in order to ensure that the resources provided to the students will enable them to acquire technical knowledge, skills, and attitudes that will help them realize those objectives.

It is suggested that buildings, tools, and equipment should be simple in design, construction, and use like those used by most entrepreneurs in the informal sector, for example, improved *Jua Kali* sheds. But an educational resource to be provided for applied education should be based on its appropriateness for achieving the program's objectives rather than simplicity per se. This criteria provides a good chance of forestalling potential status problems for the program associated with manual tools, equipment and skills. Additionally, use of appropriate resources in training for the informal sector would be of greater benefit to those school leavers (for whom the program is intended) who will inevitably join the informal sector either as a matter of choice, or after they fail to get a place for further education, training, or salaried-employment.

6.5.2 Improve the quantity and quality of tools, equipment, and teaching aids by building non-profit making production units to manufacture and distribute these resources

The mandate for such a production unit should be to supply schools with adequate and affordable tools, equipment, and teaching aids as well as their spare parts for repair and maintenance. Such a unit can be modelled along the Science Equipment Production Unit (SEPU) at the Kenya Science Teachers College (KSTC). Reduction of cost and ease of transportation of its products to the schools should be major considerations when determining the location of such a production unit. However, Kenya Technical Teachers College, and Harambee Institutes of Science and Technology should be considered first as appropriate locations.

6.5.3 Improve the relevance, quantity, and quality of textbooks and reference materials

The books writing workshops conducted by the Ministry of Education in 1988 was a good start in providing relevant, affordable, and adequate textbooks and reference materials for applied education to schools. However, these essential resources should not be a compilation of content from other books based on resources, technologies, and ideas unavailable or unworkable in Kenya's informal sector. Rather, their content should be based on the knowledge, tools, equipment, materials, and material processing techniques/procedures proved to be successful in providing marketable goods or services in this informal sector. To produce such books for

various applied education areas, it is suggested that, in addition to a panel of subject specialists, the team should also include an artificer and a consultant who should be a successful self-employed person in the respective applied education area (for example, metalwork, commerce, etc.) in the informal sector. The role of the artificer would be to sketch and refine into printable form actual tools, equipment, material processing techniques and procedures, products, etc., used or made in the informal sector while that of the consultant would be to provide or help the panel obtain information about any aspect of his or her area of specialization, for example issues related to consumable materials, marketing of their goods or services, labour, business organization, etc.

6.5.4 Increase the number and quality of applied education teachers through selective recruitment

Teacher trainees of applied education should be recruited from graduates of HITs, Technical Institutes (TIs), and practitioners of applied education skills in the informal sector. In addition to pedagogical training, trainees recruited from HITs and TIs should gain work experience in the informal sector through work attachment to a relevant business in that sector. In order for students to benefit from the valuable expertise of practitioners of applied education who may not possess the academic qualifications required of high school teachers, it would be necessary to waive such

qualifications for this category of teachers (as a temporary measure) but have them teach only practical skills and not theory or any other academic work. This category of teacher trainees should be taught basic teaching skills to help them transfer their knowledge to their students. This recommendation entails extensive revision of current teacher training programs to incorporate the all-important skills and knowledge widely used in the informal sector.

6.5.5 Improve the quality of applied education teachers who are already teaching

This study concluded that the majority of teachers (particularly those with only an A-Level qualification) do not possess sufficient academic, technical, and pedagogical training to enable them to teach applied education effectively. It is suggested that their additional training needs be determined with teachers' full involvement and that these needs be used as the focus for the teachers' inservice training programs. The following activities would be central in making such a program effective:

- Skill and knowledge specific instructions through workshops and seminars.
- Attachment of teachers to a relevant business in the informal sector to learn about tools, equipment, materials, technical skills and knowledge from practitioners of applied education skills, and gain work experience.

- Teacher visits to effective schools using comparable (to their own) educational resources to learn and later adapt or adopt the successful practices of a colleague whom the teacher judges to be successful and effective.
- Formal or informal teacher meetings to learn from each other's experiences by sharing their problems and successes.
- Formal instructions on appropriate strategies for teaching and assessing theory and practice of applied education.

6.5.6 Increase officially allocated time for applied education to ensure effective coverage of syllabuses content

In order for the current content in applied education subject to be covered in depth, the amount of time allocated at the moment should at least be doubled. The additional time can be obtained by reducing the number of examinable subjects in the school curriculum (there are currently 10 or 11 examinable subjects).

6.5.7 Diversify the number of subjects taught in individual schools to ensure school leavers as a whole acquire different practical skills

Headteacher projections regarding the subject changes that they intend to make in their schools indicate most schools want to diversify their applied education subjects but lack the necessary resources. The suggestions made in recommendations 1 to 5 to improve the quality and quantity of physical facilities, instructional materials, and teacher

effectiveness would also enable schools to offer a wider range of applied education subjects.

6.5.8 Conduct more detailed further research into areas identified in this study as implementation problems for applied education.

The following suggestions are made to help make such a study effective and comprehensive: first, rather than use a generic questionnaire, like the one used in this study, questions should be adapted to specific subject areas. Second, sample selection of both the schools and respondents should be random. Third, methods of data collection should be diversified to include interviews, and on site inspection in addition to questionnaires. Fourth, respondents should include parents, teachers, community leaders, students, and education administrators. The study should identify specific contributing factors to the widespread inadequacy of applied education resources and suggest feasible ways of improving the availability of these resources to all students.

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APPENDIX A
TEACHER QUESTIONNAIRE

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SCHOOL CODE

DO NOT IDENTIFY YOURSELF ANYWHERE IN THIS QUESTIONNAIRE

Strict Confidentiality Will Be Maintained

ASSESSMENT OF THE STATUS OF APPLIED EDUCATION
IN CENTRAL PROVINCE OF KENYA

A TEACHER QUESTIONNAIRE

The purpose of this questionnaire is to collect data to be used in a study meant to assess the present status of applied education in Central Province of Kenya. The questions cover physical facilities, instructional materials, teacher characteristics, and applied education subjects offered by individual secondary schools.

It is appreciated that some of the questions posed in this instrument may not fit the applied education subject that you teach. Where there is a lack of "fit" between the question asked and your applied education subject, please specify and comment. Use the last page for more detailed comments. In general, you are asked to respond as fully as you can.

How to Respond

Please tick or fill the blanks with the appropriate response for each item. For some items, more than one choice may be marked. Stems of multiple response items will be followed by "(Tick All That Apply)". All other items are to be responded to only once.

Important

Below are 14 applied education subjects offered in Kenya Secondary Schools. Please tick ONE subject you are teaching this term and respond to the questionnaire with this one subject in mind even though you may also be teaching other subjects.

Home Science -----	1	<input type="checkbox"/>	Music -----	10	<input type="checkbox"/>
Art and Design -----	2	<input type="checkbox"/>	Accounts -----	11	<input type="checkbox"/>
Agriculture -----	3	<input type="checkbox"/>	Commerce -----	12	<input type="checkbox"/>
Electricity -----	4	<input type="checkbox"/>	Economics -----	13	<input type="checkbox"/>
Power Mechanics -----	5	<input type="checkbox"/>	Typing and Office		
Woodwork -----	6	<input type="checkbox"/>	Practice -----	14	<input type="checkbox"/>
Metalwork -----	7	<input type="checkbox"/>			
Building Construction --	8	<input type="checkbox"/>			
Drawing and Design -----	9	<input type="checkbox"/>			

PHYSICAL FACILITIES

1. How adequate are the following physical facilities for teaching your applied education subject? (Tick All That Apply.)

		LEVEL OF ADEQUACY							
		EXCELLENT	GOOD	SATIS- FACTORY	FAIR	POOR		DO NOT HAVE	NOT APPLICABLE
a)	working space -----								
b)	class space -----								
c)	class desks -----								
d)	work benches or counters --								
e)	number of hand tools or equipment -----								
f)	quality of hand tools or equipment -----								
g)	number of power tools or equipment -----								
h)	condition of power tools or equipment -----								
i)	individual instruction space -----								
j)	suitability of demonstration and planning areas -----								
	storage spaces for:								
k)	projects -----								
l)	consumable materials----								
m)	tools and equipment ----								
n)	availability of water -----								
o)	suitability and use of doors (Safety & Security) -								
p)	blackboard space -----								

2. How do you rate the overall quality of the applied education building for your subject?

- | | | |
|----|--------------------|--------------------------|
| a) | excellent ----- | <input type="checkbox"/> |
| b) | good ----- | <input type="checkbox"/> |
| c) | satisfactory ----- | <input type="checkbox"/> |
| d) | fair ----- | <input type="checkbox"/> |
| e) | poor ----- | <input type="checkbox"/> |

3. Is the building in which you teach your applied education subject permanent or temporary?

- | | | |
|----|----------------|--------------------------|
| a) | permanent----- | <input type="checkbox"/> |
| b) | temporary----- | <input type="checkbox"/> |

4. Please rate each of the following physical characteristics in your applied education facility. (Tick All That Apply.)

		LEVEL OF ADEQUACY				
		Excel- lent	Good	Satis- factory	Fair	Poor
a)	suitability of over- all space, e.g., well adopted to activity, easy access, etc.					
b)	utilization of space, e.g. not used to store broken desks, etc.					
c)	maintenance of walls, floor, and ceiling					

INSTRUCTIONAL MATERIALS

5. How do you rate the quality and quantity for each of the following instructional materials available for your class? (Tick All That Apply.)

		LEVEL OF ADEQUACY						
		EXCEL- LENT	GOOD	SATIS- FACTORY	FAIR	POOR	DO NOT HAVE	NOT AP- PLICABLE
a)	adequacy of consumable materials							
b)	adequacy of overcoats/aprons ---							
c)	Availability of teaching aids, e.g., charts, models, overhead projectors, etc. -----							
d)	availability of suitable class text books available for your class -----							
e)	adequacy of reference books and other resource materials -----							

6. Apart from minor changes, how often have you had to adapt your teaching plans this year because of difficulty in obtaining the necessary consumable materials?

- | | | |
|----|-----------------------|--------------------------|
| a) | never ----- | <input type="checkbox"/> |
| b) | 1 - 3 times ----- | <input type="checkbox"/> |
| c) | 4 - 5 times ----- | <input type="checkbox"/> |
| d) | 6 times or more ----- | <input type="checkbox"/> |

TEACHING APPLIED EDUCATION SUBJECTS

7. If you had a choice, would you avoid teaching applied education altogether?

- a) yes ----- ☐
- b) undecided ----- ☐
- c) no ----- ☐

8. How do you feel about the demands made on you in implementing the applied education syllabus for your subject?

- a) I can't cope with it ----- ☐
- b) sometimes I find it too demanding ☐
- c) generally I can cope ----- ☐
- d) no problems in this area ----- ☐

9. If you had a choice, at which level would you prefer to teach applied education?

- a) primary ----- ☐
- b) form one ----- ☐
- c) form two ----- ☐
- d) from three ----- ☐
- e) form four ----- ☐
- f) other (specify) _____

10. How often this year have you used each of the following methods of teaching in your applied education class?

Estimated Number of Times			
Never	1-2	3-4	More than 5
a) go on a field trip -----			
b) have guest speaker -----			
c) go to another school with better facilities -			

- d) other (specify) _____

11. On a scale of 1 - 6, rate your belief in each of the following purposes of applied education in Kenya high schools.

- | | | | |
|---|---|--------------------------|-----------------|
| a) provide technical knowledge and related occupational information to be used for leisure or personal odd jobs | 1 | <input type="checkbox"/> | most important |
| b) provide occupational exploration to aid students in selecting a career | 2 | <input type="checkbox"/> | |
| c) develop manipulative skills necessary for securing self- or salaried employment | 3 | <input type="checkbox"/> | |
| d) prepare for a vocational institution, such as a Harambee Institute of Science and Technology, National Polytechnic, etc. | 4 | <input type="checkbox"/> | |
| e) develop personal and social traits essential to hold a job | 5 | <input type="checkbox"/> | |
| f) enrich general education | 6 | <input type="checkbox"/> | least important |

g) other (specify) _____

TEACHER QUALIFICATIONS

12. What is the name of the highest certificate that you hold in each of the following areas?

- a) academic: _____
- b) professional: _____

13. Including this year, for how long have you taught?

- | | |
|----------------------------|--------------------------|
| a) 2 years or less ----- | <input type="checkbox"/> |
| b) 3 - 5 years ----- | <input type="checkbox"/> |
| c) 6 - 8 years ----- | <input type="checkbox"/> |
| d) 9 - 11 years ----- | <input type="checkbox"/> |
| e) 12 - 14 years ----- | <input type="checkbox"/> |
| f) 15 years and over ----- | <input type="checkbox"/> |

14. Which of the following forms of in-service training have you had? Please rate the usefulness of each of these forms of training on the five-point scale provided.

		Level of Usefulness				
Attended						
		Most Useful		Least Useful		
YES	NO	5	4	3	2	1
a)	informal meetings with other applied education teachers -----					
b)	workshops presented by other applied education teachers -----					
c)	workshops presented by Ministry of Education officials -----					
d)	formal courses in subject content -----					
e)	formal courses in methodologies of teaching applied education -----					
f)	other (specify) _____					

BACKGROUND AND GENERAL INFORMATION

15. Are you male or female?

a) male --- ☐

b) female - ☐

16. When did you join your present school?

a) before January 1988 ----- ☐

b) January 1988 - April 1988 ----- ☐

c) May 1988 ----- ☐

d) June 1988 ----- ☐

f) after June 1988 ----- ☐

17. How old are you?

a) under 20 years ☐

b) 25 - 29 ----- ☐

c) 30 - 34 ----- ☐

d) 35 - 39 ----- ☐

e) 40 - 44 ----- ☐

f) 45 and over - ☐

18. How many 40 minute periods per week are you time-tabled to teach this term?
- a) 0 - 6 -----
- b) 7 - 13 -----
- c) 14 - 20 -----
- d) 21 - 27 -----
- e) 28 - 34 -----
- f) 35 - 41 -----
- g) 42 and over -
19. How many 40 minute periods per week do you teach applied education this term?
- a) 0 - 6 -----
- b) 7 - 13 -----
- c) 14 - 20 -----
- d) 21 - 27 -----
- e) 28 - 34 -----
- f) 35 - 41 -----
- g) 42 and over -
20. How many students are in your largest applied education class this term?
- a) 20 or less --
- b) 21 - 24 -----
- c) 25 - 28 -----
- d) 29 - 33 -----
- e) 33 - 36 -----
- f) over 36 -----
21. Do you have enough time to cover this year's part of the applied education syllabus for your subject?
- a) more than enough -----
- b) just enough -----
- c) definitely not enough -----
- d) other (specify) _____
22. Where did you study the applied education subject you are teaching?
- | Level Studied | |
|----------------------|----------------------|
| Major | Minor |
| <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> |
| <input type="text"/> | <input type="text"/> |
- a) harambee institute of science and technology ---
- b) technical school -----
- c) academic high school -----
- d) craft training centre -----
- e) government diploma college -----
- f) national polytechnic -----
- g) university -----
- h) other (specify) _____

COMMENTS

Please use this page for more detailed comments.

THANK YOU FOR YOUR TIME AND COOPERATION

APPENDIX B
HEADTEACHER QUESTIONNAIRE

--	--	--	--	--	--

SCHOOL CODE

DO NOT IDENTIFY YOURSELF ANYWHERE IN THIS QUESTIONNAIRE

Strict Confidentiality Will Be Maintained

ASSESSMENT OF THE STATUS OF APPLIED EDUCATION
IN CENTRAL PROVINCE OF KENYA

A HEADTEACHER QUESTIONNAIRE

This instrument is one part of a larger questionnaire developed to collect data to be used in a study meant to assess the present status of applied education in Central Province of Kenya. The other part is titled "A TEACHER QUESTIONNAIRE". Together, both instruments cover physical facilities, safety, teachers, instructional materials and other provisions, and the applied education subjects offered by individual secondary schools.

It is appreciated that some of the questions posed in this questionnaire may not fit the aspects of your school for which the questions are intended. Where there is a lack of "fit" between the question asked and your school, please specify and comment. Use the last page for more detailed comments. In general, you are asked to respond as fully as you can.

How to Respond

Please tick or fill the blanks with the appropriate response for each item. For some items, more than one interest choice may be marked. Stems of multiple response items will be followed by "(Tick All That Apply)". All other items are to be responded to only once.

i) What accreditation and type is your school?

- a) grade A -----
- b) grade B -----
- c) grade C -----
- d) grade D or E -----

Type		
Boys Only	Girls Only	Mixed

ii) Fill out the number of boys and girls enrolled in Form III in each of the applied education subjects offered in your school.

- a) Home Science -----
- b) Art and Design -----
- c) Agriculture -----
- d) Electricity -----
- e) Power Mechanics -----
- f) Woodwork -----
- g) Metalwork -----
- h) Building Construction -----
- i) Drawing and Design -----
- j) Music -----
- k) Accounts -----
- l) Commerce -----
- m) Economics -----
- n) Typing and Office Practice -----

Number of	
Boys	Girls

iii) Who, among the following, made the actual choice of the applied education subjects offered in your school?

- a) parents/teachers association -----
- b) board of governors -----
- c) ministry of education personnel --
- d) students -----
- e) I do not know -----
- f) other (specify) _____

- iv) What do you think was the main reason for the choice made? If reasons varied either by subjects or otherwise, please specify.

- a) least expensive to run ----- ☐
- b) skills taught are useful to the community served by the school --- ☐
- c) physical facilities required were readily available ----- ☐
- d) lack of qualified teachers in other applied education subjects of interest ----- ☐
- e) to enrich academic subjects ----- ☐
- f) I do not know ----- ☐
- g) other (specify) _____

- v) Which of the following applied education subjects does your school intend to add to or drop from the school timetable and when does it intend to do so? (Tick All That Apply.)

Intend To			
Add	Year	Drop	Year

- a) No change of subjects is anticipated ☐

- b) Home Science -----
- c) Art and Design -----
- d) Agriculture -----
- e) Electricity -----
- f) Power Mechanics -----
- g) Woodwork -----
- h) Metalwork -----
- i) Building Construction -----
- j) Drawing and Design -----
- k) Music -----
- l) Accounts -----
- m) Commerce -----
- n) Economics -----
- o) Typing and Office Practice -----

- vi) If your school plans to add to or drop some applied education subjects from the school timetable, please state reasons for the anticipated change.

- vii) In your school, what is the estimated cost of consumable materials for one student per year in Kenya shillings (Ksh)? (This estimate refers to the SPECIFIC subject for which the accompanying "A TEACHER QUESTIONNAIRE" is filled out.

Ksh. _____

- viii) What was/will be the date for the completion of the applied education facility needed to teach the subject referred to in question vii) above?

- | | |
|----------------------------|--------------------------|
| a) before 1986 ----- | <input type="checkbox"/> |
| b) between 1987 - 1988 --- | <input type="checkbox"/> |
| c) between 1989 - 1990 --- | <input type="checkbox"/> |
| d) after 1990 ----- | <input type="checkbox"/> |

- ix) What criterion does your school use to decide on what applied education subject(s) Form One students will study in Forms I and II?

- | | |
|---|--------------------------|
| a) subjects are randomly assigned to students by the school before students arrive at the school ----- | <input type="checkbox"/> |
| b) students make their subject choices after a short exposure to all applied education subjects offered by the school ----- | <input type="checkbox"/> |
| c) students are exposed to all applied education subjects offered by the school, then subjects assigned by the school on the basis of student performance in each applied education subject ----- | <input type="checkbox"/> |
| d) subjects are assigned to students on the basis of their KCPE performance ----- | <input type="checkbox"/> |
| e) no specific criterion is used ----- | <input type="checkbox"/> |
| f) other (specify) _____ | |

- x) How were students in Form III this year selected to take the applied education subject(s) they are studying?

- | | |
|---|--------------------------|
| a) students chose the subjects themselves ----- | <input type="checkbox"/> |
| b) students were selected by the school on the basis of performance in those subjects ----- | <input type="checkbox"/> |
| c) students were selected on the recommendations of their parents ----- | <input type="checkbox"/> |
| d) students were selected randomly ----- | <input type="checkbox"/> |
| e) no specific criterion was followed ----- | <input type="checkbox"/> |
| f) other (specify) _____ | |

ix) Has your school had theft cases of applied education property since 1986?

Yes

☐

No

☐

If yes, state the year, name and estimated cost of the property stolen. (Please use the Comments space.)

COMMENTS

Please use this page for more detailed comments.

THANK YOU FOR YOUR TIME AND COOPERATION

APPENDIX C

COVERING LETTER TO TEACHER AND HEADTEACHER QUESTIONNAIRES

Kenya Technical Teachers College
P.O. Box 44600
NAIROBI

May 10, 1988

All Headteachers
Selected Secondary Schools
CENTRAL PROVINCE

Dear Sir/Madam,

RE: ASSESSMENT OF THE PRESENT STATUS OF APPLIED EDUCATION
IN CENTRAL PROVINCE OF KENYA:

Enclosed please find one copy of each of the following:

- (a) Teacher Questionnaire
- (b) Headteacher Questionnaire
- (c) Self addressed and stamped envelope
- (d) Research clearance permit No. O.P./13/001/18 C 79.
- (e) An endorsement letter from the Permanent Secretary, Ministry of Education.

Your school has been randomly selected to take part in a study on the above subject. Although this education research was originally proposed as an academic exercise, Kenya Institute of Education (K.I.E.) and the Inspectorate Section of the Ministry of Education has shown great interest in its findings. Teachers Service Commission (TSC), Kenya National Examinations Council (KNEC), and the five District Development Committees (DDCs) in Central Province are also expected to find the results of this study useful in their effort to improve the quality of applied education in Central Province.

The research findings will be made public through the National Council for Science and Technology (NCST); Directorate of Personnel Management (DPM); Inspectorate, Ministry of Education; and Kenya Institute of Education (K.I.E.).

You are requested to give vital assistance in this exercise by ensuring that the two enclosed questionnaires are filled out and mailed back to the undersigned by June 15, 1988. This deadline is suggested because of the pressure of time within which this research must be completed.

Hoping for your cooperation on this exercise, sincerely,

JAMES NGUGI MUKORA
Lecturer - Kenya Technical Teachers College/
Graduate Student, University of British Columbia

APPENDIX D
RESEARCH CLEARANCE PERMIT

APPENDIX E
ENDORSEMENT LETTER

APPENDIX F
FOLLOW-UP LETTER

Kenya Technical Teachers College
P.O. Box 44600
NAIROBI

May 10, 1988

All Headteachers
Selected Secondary Schools
CENTRAL PROVINCE

Dear Sir/Madam,

RE: ASSESSMENT OF THE PRESENT STATUS OF APPLIED EDUCATION
IN CENTRAL PROVINCE OF KENYA:

About four weeks ago, a teacher and a headteacher questionnaire on the above subject were mailed to your school. Both questionnaires are intended to collect data to be used in a study on the present status of applied education in Central Province.

Your institution is among a few schools randomly selected to participate in this study. Your response is therefore vital in making valid inferences about the status of applied education in your province.

To date, I have not received your completed questionnaires. If you have already mailed them, ignore this follow-up letter, but if you have not, please return them as soon as possible in the self-addressed and stamped envelope previously mailed to you.

Sincerely,

JAMES NGUGI MUKORA
Lecturer, Kenya Technical Teachers College/
Graduate Student, University of British Columbia

APPENDIX G
DEVELOPMENT COST ESTIMATES

COMPARATIVE DEVELOPMENT COSTS FOR SOME APPLIED EDUCATION SUBJECTS
AT 1984 PRICES IN K SHS. (1,000S)

SUBJECT	BUILDING COSTS FOR A 20 STUDENT SPECIAL ROOM	HAND TOOLS & EQUIPMENT COSTS FOR 20 STUDENTS	TOTAL COST
Agriculture	160	50	210
Economics } Accounts } Commerce }	200	240	440
Home Science (Food & Nutrition)	500	500	1,000
Drawing & Design	300	70	370
Typing & Office Practice	400	700	1,100
Woodwork	300	200	500
Electricity	350	500	850
Building Construction	300	150	450
Power Mechanics	400	300	700
Metalwork	350	200	550
Classroom (40 students)	200	24	224

Note: Adapted from Pre-Investment Cost Estimates for Applied Education by the Ministry of Education, 1984.
Nairobi: Government Printer

APPENDIX H

LIST OF SCHOOLS THAT RESPONDED TO THE QUESTIONNAIRES

SCHOOLS WHICH RESPONDED TO THE QUESTIONNAIRES

Kiambu District

1. St. Joseph's Sec.
2. Komothai Sec.
3. Kirangari Sec.
4. Alliance Girls
5. Munyu Mixed
6. Ituru Sec.
7. Karuri High
8. Githiga High
9. Karai Mixed
10. Gathiruini Sec.
11. Kikuyu Day
12. Gichuru Sec.
13. Ex-Senior Chief Koinange
14. Gacharage Sec.
15. Icacira Sec.
16. Tingana Sec.
17. Mirithu Sec.
18. Rungiri Sec.
19. Kamahindu Sec.
20. Kiriko Sec.
21. Kamburu Sec.
22. Muthurwa Sec.
23. Musa Gitau Sec.
24. Murera Sec.
25. Thiririka Sec.
26. Gikanga Kagece Sec.
27. Juja Sec.
28. Mbau-Ini Sec.
29. Muongoiya High
30. Renguti Sec.
31. Manguo Sec.
32. Kiangunu Sec.
33. Ndundu Sec.
34. Mbichi Sec.
35. Karinga Girls Sec.

Muranga District

1. Nginda Girls
2. Mbugiti Day Sec.
3. Kianderi Sec.
4. Giture Sec.
5. Makuyu Day
6. Mugoiri Boys
7. Kiriani Girls
8. Muthithi Sec.

9. Mumbi Sec.
10. Marugua Sec.
11. Kibage Sec.
12. Mununga Sec.
13. Githunguri Mixed
14. Dr. Kiano Girls
15. Kahatia Sec.
16. Kaganda Sec.
17. Giachuki Sec.
18. Mariira Sec.
19. Kiaguthu Sec.
20. Chomo Sec.
21. Gatura Sec.
22. Tuthu Sec.
23. Gathera Sec.
24. Punda Milia
25. Kiawambogo Sec.
26. Gitige Sec.
27. Marigi Sec.
28. Gakurari Sec.
29. Nguthuru Sec.
30. Kiunyu Sec.
31. Gikindu Sec.
32. Kangui Sec.
33. Maganjo Sec.
34. Nginda Boys Sec.
35. Kariti Sec.
36. Nguku Sec. Sch
37. Wamahiga Sec. Sch

Nyeri District

1. Giakanja Sec.
2. Kirimara Sec.
3. Ruthagati Sec.
4. Tumutumu Sec.
5. Endarasha Sec.
6. Kenyatta Mahiga
7. Kiandu Sec.
8. Kabiruini Sec.
9. Kiangoma Sec.
10. Gatondo Har.
11. Magutu Har.
12. Kianguthu Har.
13. Giakabii Sec.
14. General China Sec.
15. Ngaini Sec.
16. Karindi Sec.
17. Ichuga Sec.

Nyeri District (cont'd)

18. Kairuthi Sec.
19. Muhoini Sec.
20. Itundu Sec.
21. Ithekahumo Sec.
22. Miiri Sec.
23. Kanyama Sec.
24. Muthuaini Sec.
25. Ngorano Sec.
26. Charity Sec.
27. Karuthi Sec.
28. Kaigonde Sec.
29. Kahiga Sec.
30. Muhoya High
31. Naromoru Boys
32. Munyu Sec.

17. Ndemi Sec.
18. Githunguchu Sec.

Kirinyaga District

1. Mutige Sec.
2. Baricho Sec.
3. Njega Sec.
4. Tebere Sec.
5. Kiaragana Sec.
6. Kiine Sec.
7. Kutus Har. Sec.
8. Kibirigwi Sec.
9. Kiamwathi Sec.
10. Thumaita Sec.
11. Kabonge Sec.

Nyandarua District

1. Kangui Sec.
2. Pasenga Sec.
3. Wanjohi Mixed
4. Miharate Sec.
5. Ndururi Sec.
6. Leshau Day
7. Bongo Har. Sec.
8. Matindiri Sec.
9. Ragia Girls Sec.
10. Karati Sec.
11. Gathanji Sec.
12. Salient Sec.
13. Murichu Sec.
14. Karago-ini Sec.
15. Kagondo Sec.
16. Mukoe Sec.

APPENDIX J

LIST OF SCHOOLS WHICH DID NOT RESPOND TO THE QUESTIONNAIRES

SECONDARY SCHOOLS WHICH DID NOT RESPOND
TO THE QUESTIONNAIRES

Kiambu District

1. St. Joseph's
2. Lari High
3. Kihara Secondary
4. Kiairia Secondary
5. Gatitu Girls
6. St. Joseph The Worker Secondary
7. Kinale Secondary
8. Mununga Secondary
9. Gakge High
10. Wangunyu Secondary
11. Mataara Secondary School
12. Nyamweru High
13. Mutuma Secondary School
14. Gitare Secondary School
15. Kihara Secondary School
16. Mbari Ya Ruga Secondary
17. Ngethue Secondary School
18. Muthiga Secondary School
19. Kanjuku Secondary School

Muranga District

1. Ichagaki Secondary
2. Kirwara Secondary
3. Githunguri Girls
4. Mirichu Secondary
5. Kamacharia Secondary
6. Kairi Secondary
7. Miricho Secondary
8. Ngutu Secondary
9. Watuha Secondary
10. Mwarano Secondary
11. Gatanga C.C.M.
12. Nyamangara Secondary
13. Githembe Secondary
14. Gacharaigu Secondary
15. Runyeki Secondary
16. Manada Secondary
17. Kamune Secondary
18. Rarwaka Secondary
19. Wangai Secondary
20. Gacharage Secondary

Nyeri District

1. Nyeri Secondary
2. Kagumo Secondary
3. Kangubiri Secondary
4. Gachatha Secondary

5. Naromoru Girls
6. Mwangathia Har.
7. Muruguru Secondary
8. St. Pauls Githakwa
9. Hiriga Secondary
10. Muruguru Mixed
11. Kihome Secondary
12. Mwega Har. Secondary
13. Ruringo Girls
14. Dr. Kamundia High
15. Munyaka Secondary

Kirinyaga District

1. Kianyaga Secondary
2. Kabare Girls
3. Karumandi Secondary
4. Mukangu Secondary
5. Kagio Secondary
6. Kiaragana Girls
7. Nguguini Secondary

Nyandarua District

1. Magumu Secondary
2. Malewa Secondary
3. Kinangop Girls Secondary
4. Geta Secondary