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Technical Secondary Schools in Kenya

An Assessment



by Jon Lauglo



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PREFACE

In the 1960s and the beginning of the 1970s, all economic trends pointed upwards. Optimism was great in the developed as well as in the less developed world. The less developed countries should replicate the development in the developed world and the gap should thereby rapidly decrease.

Investment projects were conceived in all areas and supported by the donors. Education was one of the most important areas for such investment. An important factor for development was to educate the people to read and write. In order to be able to modernize the economy, 'practical' subjects should be taught at all levels. 'Diversification' of secondary as well as primary education was an important measure.

Kenya was one of the many countries that implemented such diversification programmes. Part of this programme, 'Technical Education', received Swedish support from 1975 to 1985.

Since the diversification programmes were started, the development optimism has changed towards a greater degree of pessimism or 'realism'. Trends do not anymore point upwards. Development funds are scarce; and funds for the running of existing programmes do not suffice. 'Diversification' of schools has become, relatively speaking, too expensive; and a number of cost-benefit studies have thrown doubt on the relevance of such projects, at least as they were conceived in the early 1970s.

Another part of the diversification programme, promotion of Industrial Education, received Swedish support from 1969 to 1982. SIDA engaged the University of London, Institute of Education, to make an in-depth evaluation of the Swedish-supported 'Industrial Education project' during the years 1983 och 1984. When SIDA has fulfilled their obligations in 1985 in connection with the 'Technical Education Project' the University of London, Institute of Education was asked to make an assessment of the support to the 'Technical Education Project'. The result of this assessment has given SIDA important feedback on a number of issues. I am convinced that many others - responsible authorities in developing countries as well as donor agencies - can make use of the conclusions and recommendations of this assessment.

Lennart Wohlgemuth
Stockholm 7 january 1986

PREFACE

This consultancy report is the result of three weeks fieldwork in Kenya in March-April 1985. The occasion was to collect background information for SIDA's project completion report about its aid to the technical secondary schools in Kenya.

Discussions were held with central officials who have responsibility for these schools - in the Inspectorate, the Maintenance Unit at Kabete, the Kenya-SIDA Technical Education Project, and other Ministry officials. Further, eight schools were visited by a team consisting of Mr Wickmann (SIDA Stockholm), Mr Karanja (Ministry of Education, Science and Technology), Mr Närman (University of Gothenburg), and Mr Lauglo (University of London). These schools were visited: Kabete, Kisumu Tech, Kitale, Machakos, Mawego, Nakuru High School, Rift Valley, and Sigalagala.

At the schools we interviewed the headmaster, administered a brief questionnaire to all teachers and to students in form 4, held group interviews with teachers of technical subjects, and collected statistical information about students and examination results.

The team greatly appreciated the valuable assistance that was rendered during the collection of information.

The interpretations and recommendations which are made in this report are those of the author. They are not necessarily the views of SIDA, of those Kenyan officials who were consulted, or of other members of the team that visited the schools.

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SUMMARY

The Aim and Scope of this Report

1. The aim is to assess the technical secondary schools in Kenya at a time when Swedish assistance to these schools is being completed. The report discusses the aims and structure of the schools; characteristics of syllabuses; equipment and maintenance conditions; characteristics of the teaching force; teaching materials; the system of student assessment and the patterns of examination achievement in different subjects; the status of the schools; the destination of students; the cost of technical education; and current Kenyan policies for the future of these institutions.

Findings

2. The official aim of the schools has been to provide a broad foundation of practical/technical skill and related theory, within the context of a predominantly 'academic' lower secondary course, as a preparation for more specialised training. The students receive a mainly 'academic' education in terms of their weekly timetable and examinations at the end of the course. They specialise to a modest extent in one area of technology but without forfeiting the possibility of continuing to academic upper secondary courses. The technical schools have been intended as preparation for craft/technical apprenticeships administered by the Directorate of Industrial Training (DIT), and also for trainee programmes in Ministries, para-statal firms, and major private industries. The 15 Government maintained technical secondary schools constitute a very small part of the Kenyan system of secondary education in terms of enrolments.

3. There is at present (1985) a shift of policy: Within the new structure of education in Kenya (8 years primary education, 4 years secondary education, and 4 years higher education - known as the "8-4-4" system), the courses offered in these schools are to be overwhelmingly technical in order to give students greater depth of skill.

4. Given the pre-1986 curriculum, there is little dissatisfaction among teachers with the syllabuses in technical subjects. But they point to the need for syllabus renewal because of the coming structural reforms. As of April 1985, work on the new syllabuses was in progress in the central agencies concerned. Serving school administrators were involved in that work; but ordinary teachers had not yet been informed about the new courses which they will have to mount in May 1986. The reorientation of teaching in these schools - which are to be renamed "technical training schools" - occurs under severe shortage of time.

5. The buildings and equipment provided by SIDA seemed adequate for teaching the technical syllabuses. But in one specialty - Electrical Technology - the match was less than adequate, at least in some schools. Whether the persons responsible had a future syllabus in mind for equipment lists - rather than the existing one - is not clear. Maintenance of equipment remains a major problem.

6. Turnover, in the sense of teachers leaving for other work, is not a problem at the moment. About half of the teachers in technical subjects had prior work experience in occupations related to their teaching subject. The average length of such experience is three years. The technical teachers would like better opportunities for in-service training. About 30% of them took part in SIDA-supported in-service course activity in 1984. We were not able to appraise the teaching skills of school staffs.

7. Textbooks and reference books for 'technology theory' are in very short supply in the schools. Textbooks are not always provided. Two or three students usually share when books are available. In these circumstances, teachers tend to become the sole repository of knowledge using the blackboard as their main teaching aid.

8. Practical skills in the technology subjects are examined by a series of phased test tasks. These 'phased tests' have remained the same for many years. In practice, they constitute the practical syllabus in form 4 (the final year) - and in some specialties also in form 3. The emphasis in these phased tests is on precise execution of tasks that are specified in great detail. Problem solving skills do not seem to be emphasized in these tests.

9. In the exams at the end of their course, students do markedly better in the practical application exam than in the exam on related theory. It is also a distinctive feature of these schools that students obtain better results in Maths than in English. At one school (Kabete), the inter-correlations of results in different subjects were analysed, showing extremely weak association between students' grades in practical skill and the grade in related technology theory. It is reasonable to conclude that 'theory' and 'practice' are not taught in such a way that they mutually reinforce each other in these purportedly closely related subjects.

10. These schools have a very high status in the hierarchy of Kenyan secondary schools both in terms of primary school grades of the annual intake, and grades obtained in academic subjects in the lower secondary Kenya Certificate of Education (KCE) examination. Nearly all students claim that they had a technical secondary school as their first choice after primary school. They aspire to practical/technical occupations but would still in the great majority of cases also like to continue to further education or training after the end of the course. Good trend data are lacking, but it seems likely that the schools gained in status from becoming preparatory for 'O'Level exams (first exam in 1974) on line with academic secondary schools, and that their status has not changed much since the late 1970's. However, the 1984 form 1 intake was strikingly inferior to earlier intakes in terms of primary school credentials - no doubt because of a far more forceful policy of geographical (district) quotas at intake to all schools with a national catchment area - including the technical schools.

11. Data on student destinations after the course are very limited. But the impression is that only a rather small minority succeed in gaining entry to apprenticeships. The great majority either go on to further education of an 'academic' kind (form 5); or they look for employment without further training. Thus, it seems that technical secondary education does not serve as pre-vocational education for further vocational training in the same specialty, for most students.

12. Some data are provided on capital costs and recurrent costs. As a whole, with both its 'technical' and 'academic' subjects, technical secondary education is considerably more expensive than academic secondary schooling but not as costly as the more technically specialised courses provided in Harambee Institutes of Technology.

Comments

13. International experience shows that it is difficult to develop school-based technical/practical education as an adequately successful pedagogic system. Very often, such education suffers from lack of qualified teachers, lack of client interests - and generally lack of status, lack of equipment and consumable teaching material for the practical training aspect, problems related to the maintenance of equipment, and great expense. A number of these problems seem to have been overcome in Kenya - though also the Kenyan experience shows that technical education is more expensive and has more complicated logistics and establishment requirements than general education.

14. In particular: there is no 'status problem' or lack of student interest. Clearly, there is no internationally valid 'iron law' by which vocationally orientated secondary education is doomed to inferior status. In the case of the Kenyan schools, their status has probably been buttressed by these conditions: They do not foreclose opportunity for further mainstream academic education. Labour market opportunities for school leavers from academic schools are severely limited; and there is the hope - realistic or not - that 'applied education' will give a labour market advantage. The schools are national catchment schools, like those academic schools which enjoy top status. The assistance from SIDA has also no doubt boosted the status - along with Canadian assistance to the teacher training for technical subjects.

15. The teachers of technical subjects are 'qualified' and do not tend to leave teaching for other work - in the present labour market in Kenya. The workshops are adequately operational for teaching purposes. Indeed, it is the practical application subjects rather than the 'technology theory' subjects which in these schools seem more successfully implemented - although one might argue that it should be easier to establish 'theory' subjects than practical workshop subjects as viable pedagogic systems.

16. The development of such institutions requires concentration of resources and sustained effort over a fairly long period. The small number of schools (15) has eased the concentration of resources in the Kenyan case. SIDA's assistance over some 10 years has accorded with the requirement of sustained development effort. Yet, further assistance would be very desirable with in-service courses for teachers; the supply and development of textbooks and reference books in the technical subjects; and in maintenance and repair of equipment. The capacity of the Maintenance Unit at Kabete needs to be strengthened along with the maintenance and repair capacity in the schools themselves.

17. We were not able to assess the internal effectiveness of the schools in terms of the quality of what is learned in the practical subjects - let alone its usefulness to the students in their future. The stress in the workshop subjects seemed to be on precision in the use of techniques. Such skills are no doubt valuable if students later have the occasion to use them in well-defined occupational tasks. But there was little or no evidence of any emphasis on practical problem solving skills. Such skills are not easily taught. But they are likely to be of great importance in any future work situation when former students face practical tasks of a non-routine type, tasks which are not defined in precise terms for them by superiors. Further, there is reason to doubt whether the 'theory' and 'practice' aspects of the technical subjects are now taught in such a way that they mutually reinforce each other.

18. Internationally, a common problem in school-based vocational education is that students often fail to enter the type of work for which they have been trained. This problem also exists in Kenya. There is a case in any country for following up those receiving vocational or pre-vocational education in order to ascertain their destination in the labour market and what further training they obtain. In Kenya, educational planning could be usefully informed by follow-up studies of graduates from the technical secondary schools under the present (1985) system, and of graduates from the "technical training schools" which are to take their place with the first intake in 1986. The latter graduates will receive greater depth of technical skills training. It is likely that the unit cost (per student year) of such more technical and more workshop-based training will be higher than in the present course (in which academic class periods prevail). The hope is that such greater depth of skill will make students more employable and even provide skills for self-employment. Will they in fact be more successful in using their technical skills to earn a living? Or will they be at a disadvantage because - compared to present graduates - their more specialised training will qualify them for a narrower range of post-school opportunities which may be in short supply within their specialty? On the other hand, even if they must look for work outside their specialty, does a training in greater depth instil valuable traits which are transferable (such as 'better' work habits and attitudes)?

19. There is also a case for examining patterns of primary school grades at intake (and 'first' vs. 'second' choice of type of school among those admitted) in order to gauge the effects of curriculum change on the attractiveness of these schools to primary school leavers. Will the attractiveness of the schools suffer when students no longer can hope to qualify for further theoretical study outside their vocational specialty? Or will the promise of greater vocational skill offset such a possible loss?

20. The present policy of curriculum change is quite clear in Kenya. But because the curriculum change that is planned for these schools is quite radical, there is a case for research on the very process of curriculum implementation itself to guide policy implementation in the short term and policy formulation in the longer term.

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1 THE TECHNICAL SECONDARY SCHOOLS WITHIN THE KENYAN EDUCATION SYSTEM

The structure of the Kenyan system of formal education up to 1986, when it is being reorganised, is illustrated in Appendix 1 and Appendix 2.

The 15 Government-maintained technical secondary schools enrolled about 8,500 students in 1984. For comparison, already by 1980, total secondary school enrolments in the country exceeded 400,000 with most students attending local self-help Harambee schools rather than Government-maintained or assisted institutions. As of 1979, there were 1737 secondary schools in the country. Of these, 418 were fully Government maintained, 393 were Government assisted; with few exceptions the remainder (926) were low-cost Harambee schools. Clearly, within the secondary system, which in 1982 was entered by about 35% of pupils completing primary education, the technical secondary schools constitute a very minor part. Very few secondary schools offer any kind of practical education in a workshop setting. As of 1982, less than 3% of the secondary schools did so. Apart from the technical secondary schools, there were also 35 academic secondary schools teaching the 'Industrial Education' subjects of Wood Technology and Metal Technology (25 schools); and Power Mechanics and Electrical Technology (10 schools). The Industrial Education subjects have been examined in a recent evaluation study (Lauglo, 1985). In a background paper for that Evaluation, Davies (1984) has compared the depth of skills training received by students in technical secondary schools with that received by students taking Industrial Education subjects (IE). The former receive a technical training in much greater depth and breadth. Whilst IE is officially viewed as part of general education - though still widely perceived as 'pre-vocational', the programme of instruction in the technical secondary schools is clearly defined as pre-vocational, i.e. as preparatory for further training in the students' specialties.

The diagramme in Appendix 2 shows the officially intended routes to further technical training for students from the completed lower secondary stage, under the pre-1986 system. In actual fact, the overlap between the two types of secondary school is greater than in the diagramme, in that graduates from academic secondary schools also find their way to apprenticeship schemes administered by the Directorate of Industrial Training, and to training schools within private industry. Appendix 10 shows the system of education which is now being developed. The technical training schools are now to take on a dual post-primary and post-secondary role with a very predominantly technical-skills oriented curriculum at both levels.

Appendix 3 shows the location of the Government-maintained technical secondary schools. In addition to these 15, there is also Kinyanjui Tech (Nairobi) and Masai Tech (Kajiado) plus two Government-assisted schools: Sagana Tech (Sagana) and Starehe Boys Centre (Nairobi). Some of the schools offer vocational specialisation in one of the basic engineering trades (Mechanical, Electrical, Automotive) with some additional specialties. These schools are: Kinyanjui Tech, Nairobi Tech High,

Machakos Tech, Thika Tech (also agric. mech.), Kitale (also agric. mech.), Nyeri Tech (also welding and fabrication, business subjects, fashion & tailoring), Kaiboi Tech, and Kisumu Tech. Others offer specialisation in a basic building trade (Carpentry & Joinery, Plumbing, Masonry): Meru Tech, Sigalagala Tech, Mawego Tech (not Plumbing), Technical High Mombasa, and Masai Tech (not Plumbing but Water Engineering). Kabete stands out as the only school offering both basic engineering trades and building trades. Starehe and Sagana offer subjects from both types but not the usual full range within each type. All schools offer technical drawing, either Building Drawing or Engineering Drawing. Cf. Appendix 4 for timetable details.

Kitale Tech has been entirely built and equipped by Swedish aid. Twelve other maintained schools have been assisted. The aid programme has included workshop construction or renovation and provision of equipment. Certain other facilities have also been provided in the schools. SIDA has also helped develop the Maintenance Unit at Kabete to assist these and other institutions requiring parts and technical maintenance. SIDA has also helped finance in-service training for teachers of technical subjects. The period of Swedish assistance extended from 1975 to 1985. A total of SKr 83 Million was budgeted for the aid programme under two Agreements (equivalent to about 7.5 Million Pound Sterling).

2 AIMS AND CURRICULUM STRUCTURE

The regulations and syllabuses for technical subjects state the aims in very brief terms:

..the syllabuses which include technology and a practical training programme have been prepared to assist in the establishment of courses providing a wide basis of knowledge and skill for students proceeding subsequently to specialised trade practice courses (p.1)

In effect, the technical secondary school curriculum is pre-vocational, by intent: a form of school-based incomplete vocational training that needs to be supplemented by related employment-based further training. Thus, the viability of the concept depends crucially on (a) sufficient availability of such further training opportunities for technical secondary school graduates, and (b) interest among the graduates in making use of such opportunities. It will be shown later that there is no shortage of interest but that the training opportunities are quite scarce.

This concept of school-based technical education is in Kenya traceable back to a report in 1947 from a Mission appointed on behalf of the colonial East African governments to examine technical and vocational training (Sifuna, 1982: 29). The declared aim was already then to establish a lower secondary school as a foundation for apprenticeship. But the trade schools which were opened in the 1950s were in fact much more 'vocational' than the technical secondary schools as of 1985. Some 80% of the curriculum was then spent on practical activities. King notes (1977:28) the main criticism against this curriculum: Students

found themselves locked into the artisan grade and were denied opportunities for further mainstream educational promotion. This demand for better equivalence with academic secondary schools has been a continued pressure on education policy leading to the prevailingly 'academic' curriculum in the present (1985) technical secondary schools. In the early 1970s, academic upgrading of the then trade schools and technical schools was intended to improve the general employment prospects of their students in the competition with those graduating from purely academic form 4s. Thus, it was decided that the technical schools should also provide a full 4-year course leading to 'O'Level examinations.

In forms 1 and 2, only 20% of the timetable is devoted to practical subjects (Cf. Appendix 4). If Technical Drawing is also included, the share would be 29%. In forms 3 and 4, the time devoted to practical subjects rises to 38% (48% if Technical Drawing is included). It is only in form 4 that students within each type of technical school specialise in their practical examination subject.

Normally, a technical school student will sit for 8 KCE ('O'Level) examinations. Only three of these are related to the declared 'technical' character of the school: Technical Drawing, a theory paper (Technology) related to the trade in which the student specialises, and an assessment of the practical skills in the trade concerned. Thus, only 1 out of the 8 'O'Level exams purports to measure the practical trade skills. Clearly, academic subjects dominate; and within the practical part of the curriculum specialisation is quite modest.

Increasingly in recent years, Kenyan policy makers have come to believe that technical secondary education falls between two chairs: that it is insufficiently deep training for those who enter the labour market directly, and that it is an expensive supplement to general education of doubtful relevance for future work for those who succeed in gaining admission to further academic education. Those who realize the intent of their schooling by gaining access to further related technical training are likely to be a minority. In Section 12 the issue of present policy will be examined again.

During the visits to the schools for this report, it was found that both headmasters and technical teachers typically argued that the technical training is too superficial; and that greater emphasis should be given to technical subjects and to specialisation within a single trade. This view accords with present Government policy. But at the same time, headmasters and teachers also called for better educational opportunities for their students after 'O'Levels. Hardly anyone saw a dilemma here - and that dilemma probably exists: that if trained in greater practical depth, students will unavoidably suffer a constriction of the range of further courses for which they may qualify at the end of their training.

3 SYLLABUSES

The present (pre 1986) syllabuses for the technical subjects have their historical origin in the British City and Guilds crafts examination. They have remained nearly unchanged since the early 1970s. These syllabuses are not very detailed. Such lack of detailed elaboration is surprising given the prevalence of great syllabus specificity in other Kenyan secondary school subjects and one might expect teachers to wish to know as precisely as possible what their students may be held accountable for in the final examination. Further, great syllabus specificity might be expected because the aim of the technical subjects, on the practical application side, is to teach techniques rather than any emphasis on more open-ended 'problem solution' processes.

During discussions with headmasters and teachers (Cf. Appendix 3 for list of schools visited; and Appendix 5 for an outline of the discussion agenda), little dissatisfaction with the existing syllabuses was discerned. Most complaints were rather isolated by content. But a number of people thought that a syllabus review was long overdue. Naturally, they were keen to ascertain their future task within the new 8-4-4 system of education, especially since structural change was expected to affect their curriculum already with the incoming class in the spring of 1986 - one year from the time of the school visits. So far (April 1985), the schools had not yet been informed. In general, the impression from the school visits is that there is on a regular basis very little contact between them and the Kenya Institute of Education - the agency responsible for curriculum development.

4 EQUIPMENT AND MAINTENANCE

The main thrust of Swedish Aid has been buildings and equipment. Another aspect has been the development of the Maintenance Unit to support the schools in respect of maintenance, repairs and certain supplies. The teachers and headmasters deeply appreciate this assistance. Apart from the case of one Building Trades school where a good deal of equipment was yet to be provided, they were generally satisfied with the equipment. An exception was Electrical Technology workshops in which there seemed to be some mismatch between syllabuses and the equipment provided. Also, in the Mechanical Engineering workshops, a very expensive milling machine did not seem to be used much. Otherwise the impression was one of equipment well adapted to the (pre-1986) syllabuses. However, we did not try to assess the relevance of the equipment for the students' future uses of their acquired skills.

Maintenance of equipment is clearly a major problem. Teachers and headmasters vary in their assessment of the quality of work done by staff from the Maintenance Unit, but they concur that these repairs take too long. Some blame the Unit for this deficiency. Others think that the Unit does its best but lacks spare parts and finance. Spokesmen for the Unit claim that teachers and workshop technicians pay insufficient attention to routine maintenance, and that schools too often call on the Unit for repairs which teachers ought to be able to diagnose and fix themselves - e.g., changing a fuse!

The whole system of maintenance and repair needs improvement - both within the schools as well as the external support rendered by the Maintenance Unit. Otherwise the expensively provided equipment will have an unnecessarily shortened life; and teaching will increasingly be adversely affected by lack of operational equipment. The existence of this problem seems to be widely recognised. Remedies should be given high priority in initial teacher training, in-service courses for teachers, and in planning the future work of the Maintenance Unit. The planned implementation of the 8-4-4 system of education would greatly add to the demand for the Unit's services because it implies great expansion of practical subjects in the schools. If the demand is increased without improvement in the effectiveness of the Unit, the schools already catered for will be at risk - let alone schools added to the Unit's range of responsibility. Even with the present scope of the Unit's responsibility, the demands on its services are likely to rise as the new SIDA-provided equipment gradually wears out.

A similarly serious maintenance and repair problem exists in the Industrial Education subjects which are taught in 35 academic secondary schools. This problem is documented in greater detail and is discussed in the General Report from the Evaluation of those subjects (Lauglo, 1985, Ch. 10.).

5 THE TECHNICAL TEACHERS

Information was collected by means of a questionnaire (Appendix 6) about the qualifications, background and teaching load of the technical and academic teachers at the schools visited. This survey was conducted at Sigalagala, Kitale, Rift Valley, Nakuru High School, Machakos and Kisumu Tech. Overall, a 75% response was obtained. The response was higher for teachers of technical subjects. Completed questionnaires were received from 61 technical and 64 academic teachers.

The academic teachers have a slightly higher median age (33) than the technical ones (30). About 1/3 of the academic teachers are women; but there were no female technical teachers. There was no difference between the academic and the technical teachers as to length of service at their present school. 55% had joined their present school in 1983 or more recently. If Kitale (newly established) is excluded, the percentages are 51 for technical and 49 for academic teachers.

73% of the technical teachers started their teaching career in 1979 or more recently. Thus, only 27% have 5 years or more teaching experience. For comparison, 44% of the academic teachers have taught at least 5 years. Clearly, both groups are young in the profession. One reason why technical teachers have a shorter teaching experience is that they more often than their academic colleagues have experience from paid work other than teaching. Only 4 academic teachers (6%) reported any such experience. But fully 32 (52%) of the technical teachers reported some experience, usually from practical or technical work in industry. The average length of such work experience was 3 1/2 years (median: 3 years) among those who reported any such experience at all. In only three cases was the reported work experience less than one year. Thus, when it occurs, the technical/practical work experience of technical teachers is not merely of an episodic character.

61% of the technical teachers had been trained at Kenya Technical Teachers College. 15% (9 cases) had received their teacher training at a polytechnic, and 8% (5 teachers) at Kenya Science Teachers College. 24 (39%) teachers reported that they had received craft or technical training - usually at a polytechnic - before training as a teacher. Very few expatriate teachers now work in the technical schools.

Some 87% of the academic and technical teachers are in their first school of appointment. From discussions at the schools, the consistent impression is that it is now rare for technical teachers to leave their profession to take up work in industry. But it was claimed that such turn-over was a problem in the late 1970s, when the labour market gave better alternative opportunities. Research in progress by Anders Närman of the University of Gothenburg may shed further light on this question.

Officially the normal period allocation for a teacher is 30 weekly teaching periods. At the time of the survey, the schools had no students in form 1 because of the extension of primary school from 7 to 8 grades. Therefore, one cannot draw any firm inferences from the survey data about the normal teaching load of the teachers. But allowing for the absence of one form during the teaching year in question, the median teaching load seems to be a bit less than what is implied by the official period allocation. For both technical and academic teachers there is considerable variation in the weekly teaching load. Possibly, some of this variation may be because some teachers are employed only part-time in the school. On the other hand, it is internationally common that specialist subject teachers are not allocated to schools in such a way that optimal period allocation is achieved.

No attempt was made to rate teachers' competence or professional morale in this survey, but it might be noted that in the Evaluation of Industrial Education (Lauglo, 1985), the rated competence and morale of teachers in the kindred IE subjects were found to be no lower than for academic colleagues. The technical teachers clearly perceive a need for further training. Both headmasters and teachers pointed especially to the need for further training related to the new task that technical teachers will face under the 8-4-4 system, and training related to maintenance and minor repair of workshop equipment. At the same time, some teachers claimed that previous in-service courses in technical subjects had been too basic.

Fully 30% of the technical teachers said that they had taken part in the in-service courses which in 1984 had been run with financial support from SIDA. Very few reported any earlier attendance at in-service courses. The academic teachers rarely reported any experience of in-service courses at all and tended to see the technical teachers as unduly favoured in terms of such opportunities.

6 THE NEED FOR BOOKS IN TECHNICAL SUBJECTS

Ideally, theory and practice should go hand in hand in technical subjects. Students require textbooks; and both teachers and students require reference books. Officially, it is the schools which should provide the textbooks out of their grant for recurrent expenditures. The schools are financially stretched. The grant has hardly increased at all over the years. From 1984 to 1985 it increased but then only by 4% - not taking account of inflation. The amount which is officially earmarked for school equipment and supplies has remained the same since 1976! The real value of this earmarked amount must have diminished drastically over these 9 years.

Textbooks in technical subjects pose special problems. They are much less in demand than books in academic subjects. They are therefore more difficult to obtain, more expensive, and - in Kenya - they all need to be imported at the moment. The books obtainable do not always fit the Kenyan syllabuses well. It is not surprising that the technical teachers felt that lack of textbooks and reference books was a main problem in their teaching, and that this deficiency was much worse in technical than in academic subjects. Textbooks were not always provided by the school. When they were, 2 or 3 students usually would share the same book. In these circumstances, some parents who afford it will buy textbooks for their child if the books are obtainable. Poor students are thereby put at a disadvantage. The teachers claim that the school libraries hardly have any books at all on technical subjects. In these circumstances, the teacher can often become the sole repository of knowledge. Using old notes that often date from his own days at training college, and with the blackboard as his only teaching aid, he goes through the 'theory' content which students then copy into their notebooks.

Section 8 will show that students do not perform well in Technology Theory. This holds true as an average for all technical schools with only isolated exceptions. Further, Table 1 (Section 8) shows that there is only a very low positive correlation between student achievement in Technology Theory and achievement in application of practical skill (Technology Application). 'Theory' and 'practice' are not mutually reinforcing learning processes in these schools. Inadequate teaching material in 'theory' could be an important reason for this as one constraint on the contents and styles of teaching.

In terms of cost and logistics, it is the hardware side of technical subjects which is most difficult to develop adequately. The Swedish assistance project seems to have coped with the hardware requirements quite successfully - apart from the lingering maintenance problem. It is therefore very regrettable that the more easily soluble problem of teaching materials has been neglected in the support to technical subjects. In view of this, aid to textbooks and reference books is an appropriate area for another technical cooperation project. New teaching materials will in any case be needed for the implementation of new syllabuses for these schools under the 8-4-4 system of education.

It is not satisfactory to depend on imported textbooks which may not be well adapted to Kenyan syllabuses and which require scarce international currency. Yet the skills required for competent development of teaching materials in technical subjects are scarce internationally and in Kenya too. The system of modularised skill leaflets developed by ILO may meet some needs for skill teaching at the most basic level, but other approaches may be more suitable for training in greater depth. In any event there is an international need for strengthening in-country capacity for the production of teaching materials in technical subjects. Aid agencies can usefully take an initiative in this difficult area, in collaboration with training institutions, publishers, and groups of countries facing similar needs.

7 THE ASSESSMENT OF PRACTICAL SKILLS

The students are assessed on practical skills in only one out of typically eight examination subjects. The expensive workshops and equipment are intended to serve the teaching of these skills. The mode of assessment adopted therefore merits particular attention. Assessment is by practical phased tests administered in the schools but moderated by external examiners in order to calibrate standards of marking.

These phased tests begin in form 3 or 4 depending on type of school. Since the tests are the sole basis for marking in Technology Application, they have in practice become the practical syllabus for all workshop training in form 4 - in 'engineering' schools also in form 3. The tests stress precision in executing a specified technique. They do not seem to involve skills in problem solving - skills which could arguably be of great importance in many work situations. The phased tests have remained identical over a number of years. This has a certain convenience: The task to be faced is known so that materials can be ordered well in advance; and the required pattern of machine utilisation can be set up as an established routine. For examiners, the repetition is of obvious convenience. But is this fixity pedagogically desirable?

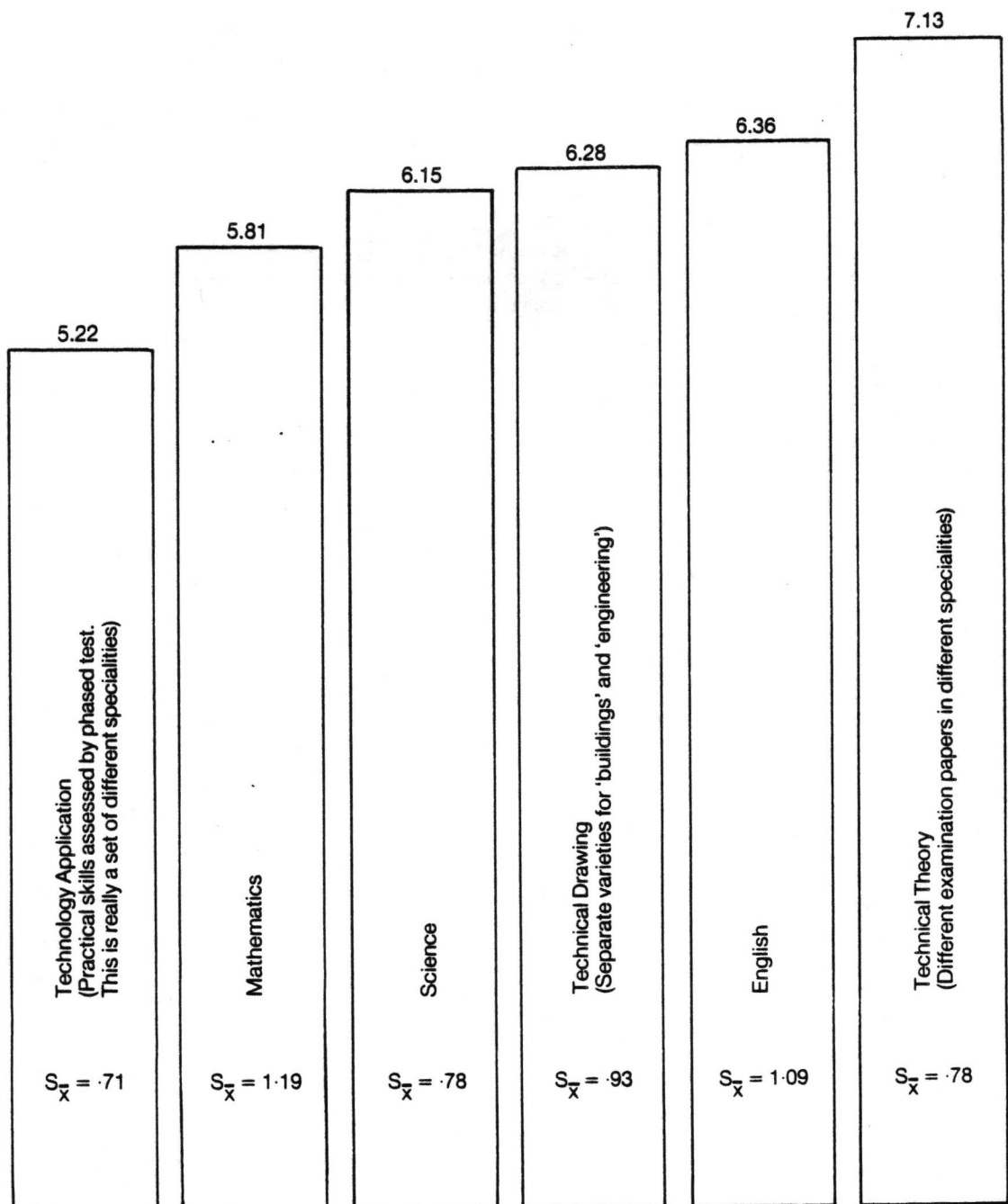
The complete predictability of the tests is a restriction on the teachers professional development. This must not have prepared them well for the change in course structure and syllabuses which they will face in 1986. When the issue was raised in discussions with technical teachers, they agreed that the phased tests should change from year to year; though their initial reaction had been one of 'no complaints'. The importance of the 'O'Level grades for selection purposes in Kenyan education no doubt exercises a powerful standardising force upon the mode of assessment. It has probably also served to justify the fixity of the phased tests from year to year. Yet, in Kenya as in other countries, it is a challenge to those responsible for the examination to devise practical tasks which call for some problem solving ingenuity at the same time as they can be reliably and not too expensively assessed. Examination reform can be a lever for effecting reform in what schools in fact teach and to provide incentives for pedagogic renewal so that teachers consciously seek to improve upon their teaching. The nature of the phased tests and their fixity do not seem to have encouraged such traits.

8 EXAMINATION RESULTS - ACHIEVEMENT IN DIFFERENT SUBJECTS

What subjects do students perform well in at the Kenya Certificate of Education (KCE) examination and in which subjects do they perform relatively poorly? There are naturally differences among individuals and among schools, but there is a clear overall profile of achievement as shown in Figure 1.

FIGURE 1. Average Grade in Subjects Taken By All Technical School Students at 13 Schools. 1984 KCE Results.

The Schools are: Kaiboi, Kabete, Kisumu, Machakos, Masai, Mawego, Meru, Nakuru High, Nyeri, Rift Valley, Sagana, Sigalagala, Thika Tech.



The average grade is stated at the top of the bar diagramme. Good results = numerically low grades on a scale from 1 to 9. The standard deviation of the mean grade among these 13 schools is listed for each subject at the bottom of the diagramme to indicate the extent of variation among the schools. Clearly, students tend to do best in practical skills and worst in the theory examination that is related to these skills. Among the academic subjects, they do best in Mathematics and worst in English. If the profile for each of these 13 schools is examined, one finds in general the same pattern: Mathematics and Technology Application are the 'best' subjects, and English and Technology Theory are the 'worst' ones.

Possibly, the good results in Technology Application may in part be ascribed to the mode of assessment in that subject: students having the chance to work on each phased test over a long period until they show signs of mastery, teachers giving more help to those in trouble etc. The poor results in Technology Theory have already been commented on in Section 6. The contrast between English and Maths results seems to be a characteristic of the technical secondary schools (Cf. Figure 2 in Section 9). There appears to be an affinity between Mathematics and practical subjects in terms of achievement. Also in the case of Industrial Education schools (Lauglo, 1985, Ch. 8, Section 4) the students who after form 2 were selected to do Industrial Education as an option for the KCE exam, were at nearly all schools better in Maths than other students, but no such difference existed in their English results. Figure 1 shows that technical school students also do better in Maths than in English.

In discussions with headmasters about how students were selected to technical schools, there was no mention of any special priority to Mathematics achievement. Therefore, the observed Maths bias is unlikely to be due to selection, though there could be some self-selection to these schools of students who are good in Maths. Mathematics may also be stressed more by the schools themselves, and students aspiring to further education in technical subjects may view Maths as especially important. Thus, 'engineering' is a very common declared aspiration.

Given this Maths bias, it is of interest to ascertain how Maths - as compared with other academic subjects - is related to achievement in the technical subjects at the individual level. Is Mathematics proficiency an especially good predictor of achievement in technical subjects? To examine this question, the examination results at the largest school, Kabete, were analysed further. Table 1 shows the product moment correlations for all the interrelationships among exam results in compulsory KCE subjects. These correlations measure the degree of linear association among each pair of variables. A correlation of +1 would be a perfectly linear positive association, -1 is a perfectly negative linear association, whilst values close to zero indicate no linear association tendency at all.

After initial inspection, the variables in Table 1 have been so arrayed as to reflect the relative 'closeness' or 'distance' between them, as suggested by the pattern of correlations. We find English at one extreme and Technology Application at the other. These two variables are not associated at all. All others are positively associated to varying degrees, reflecting the usual pattern in school achievement that

TABLE 1. CORRELATION MATRIX. EXAMINATION RESULTS IN VARIOUS SUBJECTS
KENYA CERTIFICATE OF EDUCATION. KABETE TECH. SEC. SCHOOL 1984

For each correlation, the number of observations is about 244.

	1	2	3	4	5**	6*	7*
	English	Geograph	Scien.	Maths	Tech. Drawing	Tech. Theory	Tech Applic.
1 English		.40	.36	.35	.25	.35	.04
2 Geography	.40		.70	.62	.49	.40	.23
3 Science	.36	.70		.87	.64	.47	.23
4 Maths.	.35	.62	.87		.69	.44	.28
5 Tech Draw.	.25	.49	.64	.69		.54	.42
6 Tech Theo.	.35	.40	.47	.44	.54		.30
7 Tech Appl.	.04	.23	.23	.28	.42	.30	
Average correlation	.29	.47	.55	.54	.51	.41	.25
Mean grade	6.2	6.0	5.5	5.7	6.0	7.2	4.1
Standard deviation	2.0	2.1	2.2	2.6	2.3	1.8	1.8

*The technology subjects (theory and application) consisted of these specialties: Carpentry & Joinery, Plumbing, Masonry, Mechanical Engineering, Electrical Engineering, Automotive Engineering, Welding & Fabrication. Each student took only one specialty for the theory and application exams.

**Technical drawing consisted of two versions: Engineering Drawing and Building Drawing.

students doing well in one subject also tend to do relatively well in others. But the degree of association between achievement in different subjects varies greatly. The correlations that stand out as especially high are: Maths and Science, then Geography and Science, Maths and Technical Drawing, Technical Drawing and Science, and Mathematics and Geography. The subjects of Mathematics, Science, and Technical Drawing may be described as a core of strongly mutually interrelated subjects in terms of student achievement, with each variable 'explaining' more than 40% of the variation in each of the other two.

If theory and practice were taught and acquired in close tandem, with proficiency in one aspect reinforcing the other, one would expect to find a strongly positive correlation between Technology Theory and Technology Application. This is not at all the case in actual fact. The correlation is only .30 - which means that each variable 'explains' only 9% of the variation in the other. Indeed, the lowest correlation that Technology Theory has with any variable in the Table is its correlation with Technology Application. The inter-correlations among the different academic subjects (variables 1,2,3,4) are uniformly higher than .30. Interestingly, it is with Technical Drawing - which also requires spatial perception and psychomotor skills - that Technology Theory and Technology Application each has its strongest association.

These findings clearly bear out the contrast between Maths and English as to their respective degree of affinity with both the theoretical and the practical side of the technology subjects. Science also shows much the same profile as Maths in this respect. The kind of skill which is measured by the exam in Technical Application is clearly set apart from skill in the other subjects. It is hoped to collect data from a greater number of technical schools for a future report that may examine these questions in greater depth. Thus, it would be interesting to see if there are differences among the schools as to how strongly 'theory' and 'practice' in technology subjects are related in the exam. There could also be interesting differences among different technology specialties suggesting that theory and practice are more successfully interrelated in some specialties. There seems however to be no reason to expect that Kabete - which is among the top schools in terms of reputation and exam results - should be any less successful than other schools in relating theory to practice. Thus, the data strongly suggest that technology theory, as taught at present and given the scarcity of textbooks, is of doubtful direct value for the application of practical skills.

9 THE STATUS OF TECHNICAL SECONDARY SCHOOLS

Kenyan observers proclaim the high status of technical secondary schools. They often argue that the very fact that the technical schools are 'national schools' - that is, schools with a national rather than a local catchment area - will buttress their status in the eyes of parents and the general public. But in international debate about the condition of practical subjects and vocational schools, it is often claimed that such education will invariably suffer from inferior status as compared to purely academic secondary schools. It is therefore important to examine the status of these schools in Kenya.

There is clearly very keen competition for a place in a technical secondary school. This condition is not novel. Already in 1973 there were some 30,000 applicants for the 670 places then available. Still, it might be argued that the demand for secondary school places is in general so much in excess of supply in Kenya that a 'technical' place becomes attractive only as a second choice to a purely academic school.

Is a place in a technical school merely an acceptable 'second choice' or is it the first choice for the applicants? For nearly all technical school students it is in fact their first choice. At the eight schools visited, we conducted a survey that included nearly all students in form 4 as of April 1985. Appendix 7 shows the brief questionnaire that was used. Mr Narman administered these questionnaires and tabulated the results which are presented here. Students were asked:

What was your first choice of secondary education: a technical secondary school or an academic secondary school?

Out of the 987 students surveyed, fully 96% claimed that they wanted a technical secondary school as their first choice. This accords very much with the assessment made by the headmasters of these schools.

When the form 4 students were asked about their occupational aspirations, they showed strong attraction to practical/technical occupations. They were asked:

If you could choose freely, what occupation (kind of work) would you like to get?

Ninety-four percent of them mentioned some kind of practical or technical occupation. This percentage is no doubt much higher than among students in purely academic secondary schools. It is certainly higher than among those academic secondary school students who take Industrial Education as one of their 'O'Level subjects (Narman, 1984). But this almost uniformly strong interest in practical/technical occupations does not imply that the students wish to enter the labour market directly after 'O'Levels. They were asked:

In the short run, what do you think you are most likely to do after form 4?

Eighty-four percent of them mentioned some form of education or training. Of these, not quite half indicated 'A'Levels (form 5). Technical subjects are not offered in form 5. But there are a range of technical occupations which require post 'A'Levels professional training. Those who did not mention form 5, often mentioned some type of technical or practical training, e.g. at a Harambee institute of technology. One might suspect that the findings are subject to some bias in that students seek to give a 'favourable impression' in their answers. Many of them showed in their comments to the questionnaire that they thought or hoped the survey might be used to select candidates for employment or further training. But even so, the type of responses obtained would still indicate strong interest in practical or technical training and work. In general, the findings show that technical secondary schools and the kind of occupations for which they are purportedly 'pre-vocational' training are highly attractive to students.

The quality of intake from primary school is another measure of school status. In selection to secondary school, candidates are given points in three subject areas: Mathematics, English, and General Knowledge. The maximum possible number of points in each subject is 12. The maximum combined total is 36. Figure 2 shows the average Certificate of Primary Education (CPE) points in 1982 for eight technical secondary schools. These averages are based on data collected in the student survey (Appendix 7). For some schools these averages were also checked against school records; and it was found that the students had reported their CPE points with very great accuracy. In Figure 2, the section to the left, the CPE average points for 1980 are also shown for a number of academic secondary schools. These schools are either schools teaching Industrial Education subjects (15 schools) or other academic schools (4 schools) which were surveyed as a rough control group for the Evaluation of Industrial Education (Narman *et al*, 1984). It has been shown (Lauglo, 1985, Ch 6) that the academic schools that offer Industrial Education subjects happen to be disproportionately among the high status schools in Kenya in terms of overall examination results.

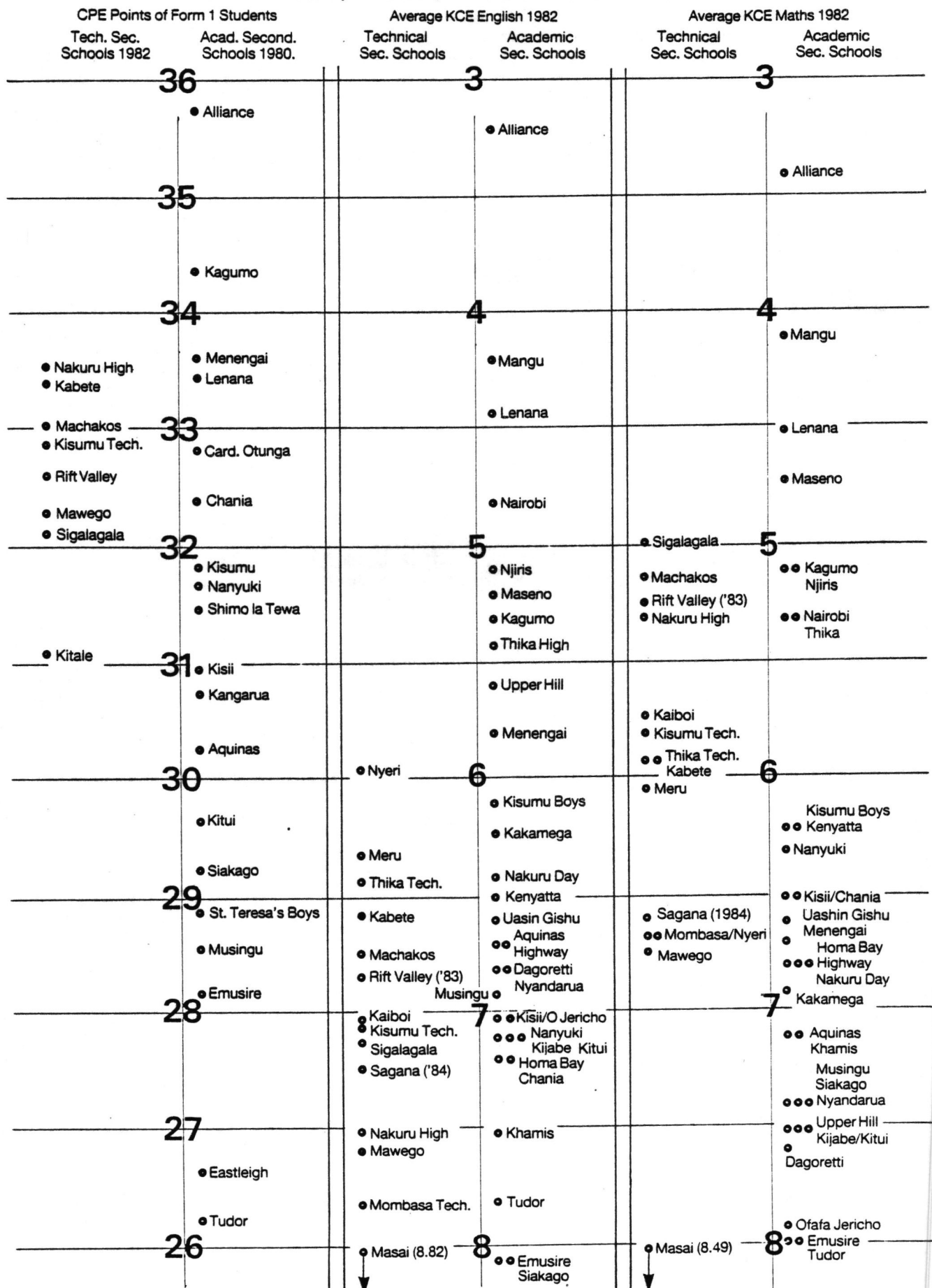
Figure 2 (to the left) shows that the technical schools compare very favourably with this relative elite group of academic schools, in terms of their CPE intake. Our present technical school sample may well be a bit biased towards the top end of the distribution of all technical schools in terms of school quality. Thus, in terms of overall 1982 KCE results, the rank ordering among 12 technical schools was the following [those in our sample of eight are underlined]: Machakos, Sigalagala, Rift Valley, Kabete, Meru, Thika Tech, Kisumu Tech, Mawego, Nyeri, Kaiboi, Sagana, and Masai. But even so, the technical secondary schools would still be more select than Government maintained secondary schools in general. A CPE point average of 31 (Kitale, 1982) is a very good primary school result, e.g, two B+ grades and one A-. It would be near the median of the unusually select set of academic secondary schools with which the technical schools are compared in Figure 2.

The middle and right-hand sections of Figure 2 compare the technical schools with a larger sample of academic schools teaching Industrial Education, in terms of KCE examination results in two key academic subjects: English and Mathematics. These comparisons include a representative and larger sample of technical schools. In terms of KCE grades, a numerically low average means a good result (on a scale from 1 to 9). In Mathematics, the technical schools are on the average marginally better than this highly select set of academic schools (Cf. the right-hand section). But this is not the case in English (middle section). The contrast between English and Mathematics results is a characteristic of the technical schools. Thus, in the academic schools the English results are in fact marginally better, on the average, than the Maths results.

It should be emphasized that there is a good deal of fluctuation from year to year in the exam results at individual schools. But the comparison between these two groups of schools is likely to be quite stable.

Headmasters and Kenyan officials responsible for technical secondary schools often say that the schools' standing has improved considerably since the early 1970s. They frequently argue that the status was

FIGURE 2. Technical and Academic Secondary Schools Compared. CPE Points and KCE Results.



boosted when in 1974 these schools began preparing for 'O'Level exams. The support from the SIDA project may also have made these schools more attractive. The Kenya Government has for some time publicly been promoting the importance of technology and practical subjects - policies strongly evinced in the present '8-4-4' reform. Technical subjects may have gained attraction in the eyes of parents because of this publicity. Changes in the articulation between secondary schools and the labour market and opportunities for further schooling, may well have been even more important. With an economy in recession and increases in the cohorts going through lower secondary education, the worsening labour market prospects for those obtaining 'O'Levels have very probably made young people and their parents increasingly interested in all kinds of purportedly 'applied' education. This is seemingly an international tendency - also true in industrialised countries. The fact that technical secondary schools also prepare for further academic schooling reduces the opportunity cost involved in choosing it. Students can still hope to qualify for further schooling of an academic kind whilst they pursue pre-vocational subjects. When headmasters and teachers were asked about changes over time in the status of technical schools, they often thought that about 1980 the more educated parents began to become interested in technical schools as a first choice for their sons.

Do the trends in KCE examination results, and in intake from primary school, suggest any improvement over a 10-year period in the status of the technical secondary schools? Data are available only for a few subjects, for four schools combined. One notes that English and Technology Theory have remained weak subjects throughout this period and that Mathematics and Technology Application have been 'strong' subjects; further, that Science has improved its relative standing among these subjects. In these four schools, there was improvement between 1974 and 1978 but not in any consistent way. Mathematics has improved, and Science seems to have improved dramatically between 1978 and 1980. Technology Theory stands out as the only subject in which there has been some deterioration since 1980. Sections 6 and 8, above, have already discussed the present weakness of this subject. Apparently, its condition has worsened.

Figure 4 shows results at each school in the form of 'an average of averages' in the three core academic subjects of Maths, English and Science. The schools included are Kabete, Kisumu Tech, Machakos, Sigalagala, and (4 years only) Rift Valley. In the long run, there has definitely been an improvement in academic results at four of these schools, but the trends are not entirely consistent from year to year. At Rift Valley, results have deteriorated a bit since 1975 but there is a tantalising lack of data for the period 1977-82.

The interpretation of such trends is fraught with certain difficulties. One lacks data for other Government maintained schools. With the growth in the 1970s of Harambee schools there may have been a growing pressure to give more generous grades in these subjects, since the Harambee schools are generally of inferior quality. During the days of the East African Certificate of Education exam, the deteriorating conditions of Ugandan schools, which entered for the same examination, may have exerted a similar pressure. Perhaps the most we can conclude on the basis of these sparse data is the following: There may have been

FIGURE 3. Trends over time in selected subjects at KCE exam. Kisumu, Machakos, Kabete and Sigalagala combined.

Average grades.

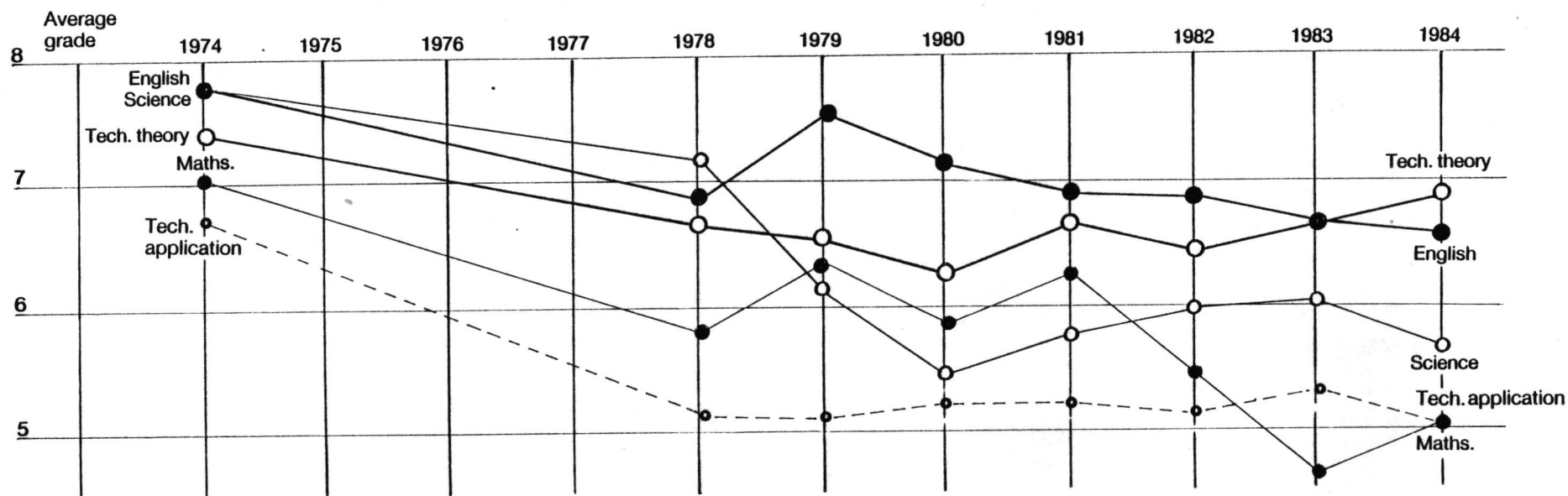


FIGURE 4. Trends over time in Academic Examination Results at the KCE Examination

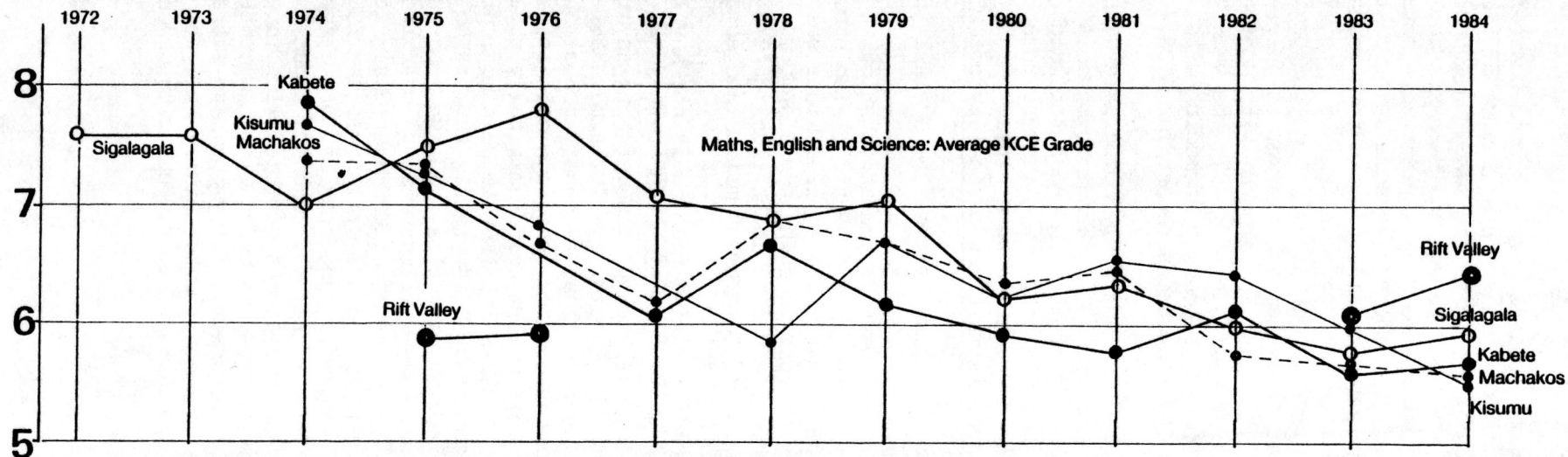
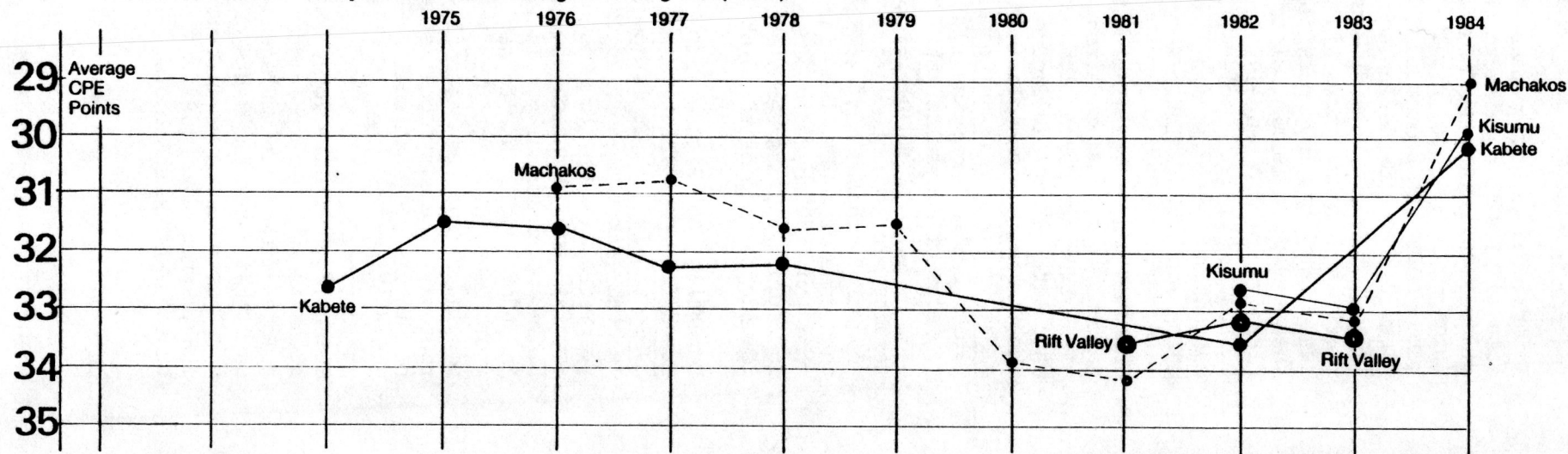


FIGURE 5. Certificate of Primary Education 'Points': Average of Incoming Class (Form 1).



improvement in academic performance in the technical schools during the four years following their upgrading to 'O'Level schools. But there is no sign of any dramatic improvement since 1980.

Information about primary school points at intake is scarcer, though some data were obtained directly from the schools (Figure 5). Mr Narman did the computation of these averages, which are based on school records (High points = good results). Only for Kabete and Machakos could a long term trend be computed. Data for some recent years were obtained for Rift Valley and Kisumu Tech. At Kabete there is some deterioration from 1974 to 1975, then slow improvement until 1982, and then no data until 1984. Machakos shows, in the main, improvement from 1976 to 1983. But regardless of any possible 'improvement trend' up to the beginning of the 1980s, it is also clear that these two schools were highly selective already in the mid-1970s. This is in accord with Godfredsen and Godfrey's (1979, Table III.1) comparison in 1979 between technical secondary schools and some other secondary schools with national catchment areas. Table 2 is copied from their report for SIDA.

The CPE marks in Table 2 are not directly comparable with the CPE selection points referred to earlier. The 'academic schools' included are with two exceptions also different from those for which 1979 CPE data are shown in Figure 2. But the impression is very much the same. The technical schools in the late seventies were already highly select, close to academic national schools in terms of quality of CPE intake. Table 2 also shows the 1978 East African Certificate of Education (KCE's predecessor) results at these schools, using the overall 'division' grading rather than results in individual subjects. These overall results in the technical schools were somewhat inferior to those in academic schools in 1978 - as Figure 2, mid-section, also showed to be the case for English in 1982. Nevertheless, if a wider selection of good quality academic secondary schools were included for comparison (as in Figure 2), the technical schools would no doubt also in 1978 be found towards the top of the distribution of Government maintained schools.

Returning to Figure 5: The most striking finding is not any long term trend in CPE intake, but a dramatic deterioration very recently: from 1983 to 1984. It is however unlikely that this reflects any reduction in the attraction that technical schools have for students. For some years, admission to the 'elite' national secondary schools has given special consideration to applicants from geographical areas that lag behind educationally. In 1984 this policy was dramatically strengthened in that the intake to national schools was then to be numerically equal from each district in the country. This greatly favours both thinly populated and educationally lagging districts. Whilst such quotas are rooted in equity considerations, they will inevitably lower the quality of intake to national schools in terms of CPE averages. It will be interesting to see if this change at intake will lower the KCE results at national schools. Will academic subjects be more affected than Technology Application? Some headmasters and teachers argue that those students who in previous years have been admitted with inferior CPE points from disadvantaged areas, often catch up with the others. They say that such students often have great ability but have suffered from very poor quality instruction in the primary stage. Will the class of 1988, when the 1984 intake graduates, catch up with preceding KCE classes at these schools?

TABLE 2. CPE MARKS OF 1979 ENTRANTS TO FORM 1, AND 1978 EAST AFRICAN CERTIFICATE OF EDUCATION RESULTS, FOR SELECTED NATIONAL SECOND. SCHOOLS

	CPE mean marks of 1979 entrants	Total No. of cands.		<u>EACE</u>	<u>Results</u>	<u>in</u>	<u>1978</u>	
			Div	Div	Div	Div	% achieving	Fail
			1	2	3	4		
<u>Academic schools</u>								
Alliance	261	100	83	14	3	0		0
Lenana	251	138	55	31	12	1		1
Mangu	254	84	43	31	14	10		2
Maseno	250	88	39	32	22	2		5
Nairobi	237	160	35	36	23	4		2
Total for these schools	<u>251</u>	<u>570</u>	<u>50</u>	<u>30</u>	<u>12</u>	<u>3</u>		<u>2</u>
<u>Technical schools</u>								
Kabete	242	213	17	25	32	20		6
Kaiboi	236	70	4	34	40	19		3
Mawego	233	60	10	25	30	30		5
Machakos	241	108	15	20	26	26		13
Sigalagala	234	93	8	28	30	22		13
Nakuru Tech High	227	135	29	29	26	8		8
Starehe	244	167	47	34	14	5		1
Total for these tech. sec. schls.	<u>237</u>	<u>846</u>	<u>22</u>	<u>28</u>	<u>27</u>	<u>17</u>		<u>7</u>

Source: Godfredsen and Godfrey (1979)

It may well be that interest in technical and practical has increased since 1980, as a result of disillusionment with what a purely academic secondary education can do for a young person in today's depressed labour market. One notes that the training in practical skill provided by the National Youth Service has over the years increasingly come to cater for secondary school leavers, although this programme was devised to cater for primary school leavers (Davies, 1984). There is certainly today no reason to think of technical schools as a 'second choice' opportunity that is only taken up with some regret by its clientele. The same was shown to be true for Industrial Education subjects taught in the academic secondary schools (Lauglo, 1985). The problem is rather that students may hold exaggerated hopes about what labour market advantage that such education may confer. This is certainly true for Industrial Education students and their parents/guardians. It is likely to also be true for technical secondary school students. It remains to be seen how the status of these schools will be affected when they now are to become far more clearly vocational training institutions rather than a type of school in which students can hedge their bets on further academic schooling by also acquiring some basic but incomplete vocational training.

10 WHAT HAPPENS TO STUDENTS AFTER FORM 4?

There is no reliable answer to this question. Two tracer studies of technical secondary school graduates have been attempted in the past, but both have suffered from low response rates.

In 1975 and 1976 the Technical Education section of the Ministry of Education attempted to follow up technical school leavers of the previous year to find out what had happened to them. These studies are discussed in Godfredsen and Godfrey (1979) which is the source for the present report. The two surveys obtained response rates of 42% and 51% respectively. Only a short time had elapsed since the graduates left school when the surveys were conducted. But the graduates were traced after the Directorate of Industrial Training had completed its annual recruitment of craft apprentices. This is important because the technical schools were supposed to be especially geared to preparation for these DIT apprenticeship programmes. Table 3, which is copied from the report by Godfredsen and Godfrey, shows the status of the technical school leavers at the time of contact. Godfredsen and Godfrey significantly note:

The DIT apprenticeship programme, to which the technical schools are supposed to be geared, took only a small proportion of school leavers in both years, leaving the majority to find their own way in the job market.

Presumably, those who succeeded in obtaining an apprenticeship would be categorised as 'working & going to school' in Table 3. In both years about 30% of the ex-students who could be traced, had this status. The other percentages are hard to interpret since school leavers often spend several months waiting for their examination results before deciding on their best strategy in looking for work. Further, the percentage having 'student' status (4% and 8% respectively for the two years) will not include the percentage who later in the year succeeded in continuing to some form of further full-time education.

A second tracer study was conducted by Sifuna (1982) in 1981 of those who took their 'O'Levels in 1980. A sample of 726 students were selected from Kabete, Technical High School Nairobi, Thika Tech, Machakos, Masai, Nyeri, Meru, Mawego, Kisumu Tech, Nakuru High, and Sigalagala. These students completed a questionnaire while still in form 4. Then, a follow-up of these students was attempted some time after they had left form 4. The report does not specify the time lapsed until the follow-up was conducted.

In Sifuna's survey of students still in school, certain findings are strikingly similar to those obtained in our survey (1985) of form 4 students at eight schools. He also found that the vast majority (about 3/4) of them said they aspired to a practical or technical occupation. Of these, about 60% mentioned 'engineer' or 'engineering'; the others mentioned work which can be more clearly specified as artisan level. In our survey, an even greater proportion (94%) mentioned some form of practical or technical work. The surveys are not sufficiently comparable to warrant a firm conclusion, but it is possible that the comparison shows an increase since 1980 in interest in such work.

TABLE 3. TECHNICAL SECONDARY SCHOOL GRADUATES' STATUS AFTER D.I.T. INTAKE, 1974 AND 1975. PERCENTAGES*

AREA OF TECHNICAL SPECIALIZATION	STUDENT		WORKING & GOING TO SCHOOL		MILITARY		EMPLOYED OR SELF- EMPLOYED		LOOKING FOR WORK		OTHER		TOTAL	
	1974	1975	1974	1975	1974	1975	1974	1975	1974	1975	1974	1975	1974	1975
MECHANICAL	8	10	39	38	2	-	10	19	39	28	2	5	100	100
ELECTRICAL	15	14	18	16	-	-	2	8	63	57	2	4	100	100
MOTOR VEHICLE/ AGR. MECH.	-	5	38	31	4	-	9	8	48	51	2	5	100	100
BUILDING	-	4	22	43	-	-	2	8	74	41	2	2	100	100
TOTAL	<u>4</u>	<u>8</u>	<u>28</u>	<u>33</u>	<u>2</u>	<u>-</u>	<u>6</u>	<u>11</u>	<u>58</u>	<u>43</u>	<u>2</u>	<u>4</u>	<u>100</u>	<u>100</u>

*For each year: horizontal percentages. Source: Ministry of Education Survey, quoted in Godfredson and Godfrey (1979).

Sifuna's 1980 survey showed that 37% of the students' fathers had no formal education. In our 1984 survey this is only 25%. Further, Sifuna found that only 13 % of the fathers had at least some secondary education. In our 1985 survey the proportion is 30%. Again, this may show that more recent technical students come from educated backgrounds, but it could also reflect differences in the sampling frames and random variation.

There is however a difference between both of these samples, on the one hand, and other 'high status' secondary schools. In the academic secondary schools which happen to teach Industrial Education subjects (Cf Figure 2) (and which also are schools of relatively high status), students have better educated fathers: 40-45% of the fathers had at least some secondary education. This is substantially higher than for the technical schools. Further, the technical schools recruit more students from peasant/farming backgrounds. In Sifuna's 1980 survey, 53% of the fathers were in agriculture. In our 1985 survey the percentage was 41. But in the 'Industrial Education schools' (Närman et al, 1984, Appendix B2.1 and B2.3) about 35% of the fathers worked in agriculture. It is likely that it is less educated parents who themselves are in practical work, who are most keen to send their child to a technical school so that the son can learn something which seems more tangibly employment relevant than what a purely academic secondary education seems to be. For such parents, putting their child through lower secondary education will often be their maximum possible financial sacrifice. In such circumstances an academic education that also carries a 'vocational' label - as something to 'fall back on' - will seem particularly attractive.

In Sifuna's tracer study, information was obtained for only 38% of students about what happened to them after their 'O'Level examination. About 3/4 of those successfully traced had continued their studies in form 5. Evidently, those entering the labour market were harder to trace. Time and resources did not in this case enable the follow-up to be carried out sufficiently completely to show how students fared in the labour market.

During our visits to the schools, we found that some schools had attempted to find out what had happened to former students. The information is fragmentary. The figures no doubt understate the proportion of ex-students in any given 'after school' status. The most easily obtained information appears to be the number continuing their academic secondary schooling (to form 5). Figures obtained from Mawego for the proportion going to form 5 were as follows: 1981: 11%; 1982: 24%; 1983: 19%, and 1984: 15%. The real percentages are undoubtedly higher. Thus, at Mawego in 1984, fully 47% obtained a Division 1 or 2 in the KCE examination. This would clearly qualify for form 5 admission. From Machakos we obtained - as computed by Närman on the basis of school records: 1982: 19%; 1983: 43%, and 1984: 29%. The variation from year to year is too great for the 'low' figures to be plausible. The most complete records were found at Sigalagala, especially for 1979, 1980 and 1981. Table 4 shows the series.

TABLE 4. THE STATUS OF FORMER STUDENTS AT SIGALAGALA
TECHNICAL SECONDARY SCHOOL. PERCENTAGES

Year of 'O'lvls	No. of students	% to form 5	% to other educ/train.	% working	% unempl. or no information	Total%
1984	124	25%			75%	100%
1983	100	35			65	100
1982	82	33			67	100
1981	93	35	14%	6%	44	99
1980	85	25	26	4	46	101
1979	85	19	40	3	37	99

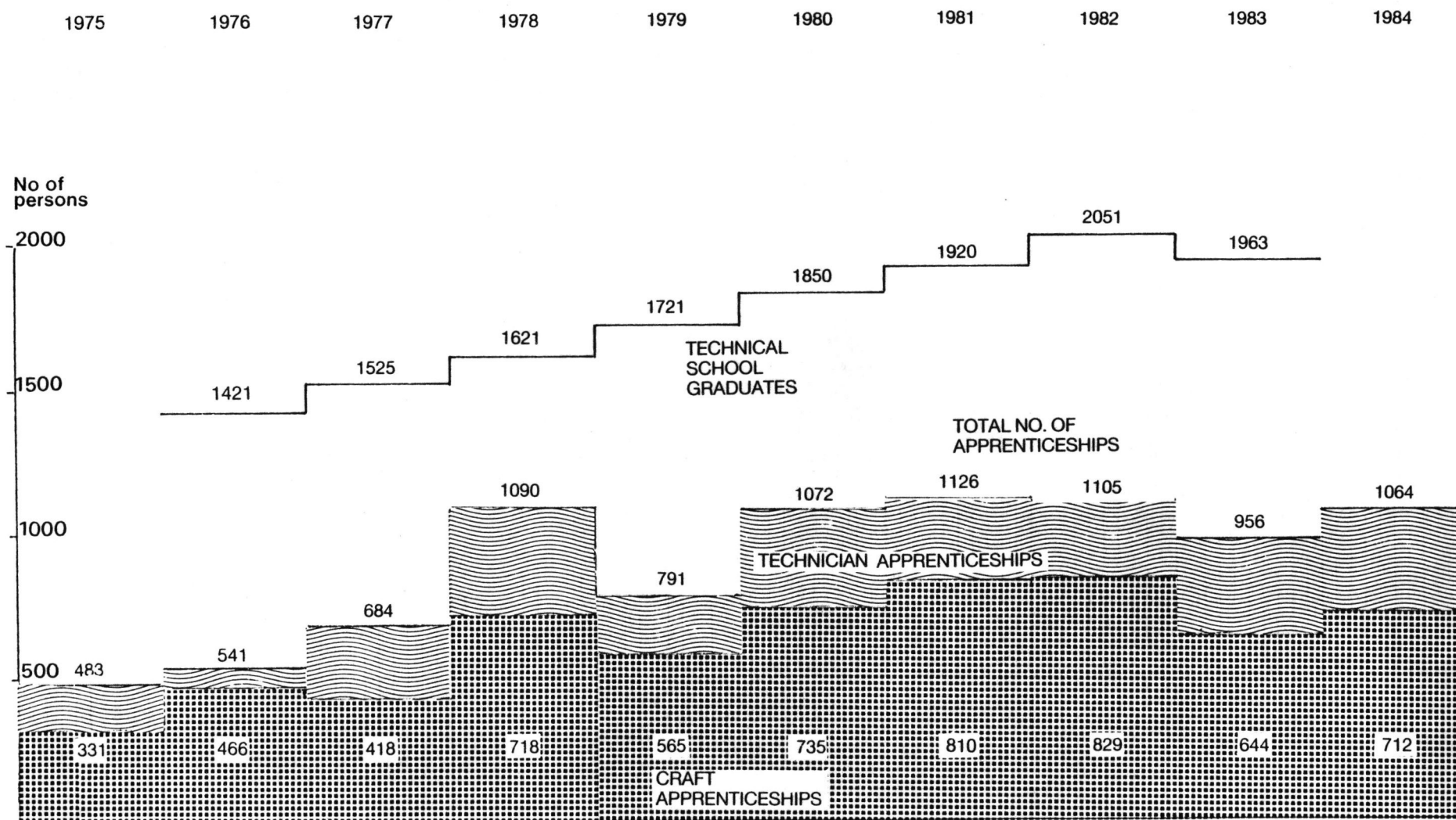
Considering the very high percentage for whom no information is obtained, it is probable that - since 1981 at least - the percentage who in the end succeed in entering form 5, for further academic education, is close to 40. This would be the same impressively high figure as that obtained for the 1983 KCE candidates at academic secondary schools teaching Industrial Education. (Närman, 1985). There seems to be little reason to believe that technical secondary education in fact is 'terminal' for a much larger proportion of students than what the case is for academic secondary education - notwithstanding the purportedly greater direct labour market relevance of the former. But further research is needed - in Kenya as in other countries - to shed more light on this important question.

The broad pre-vocational training at the technical secondary schools was originally conceived mainly as preparation for craft and technician apprenticeships administered by the Directorate of Industrial Training (DIT). How many former students gain access to such further vocational training? Figure 6 shows both the number of technical school graduates per year from 1976 to 1983, and the number of DIT apprenticeship places available each year from 1975 to 1984. There is a sub-division in the chart for technician apprenticeships and craft apprenticeships.

One can readily see that even if all apprenticeships were given to technical school graduates, the annual 'output' of technical school graduates by far exceeds the number of such apprenticeship openings available. Over the 1976-83 period as a whole, the ratio of apprenticeship openings to technical school output is about 50%. There is good reason to believe that many apprenticeships are given to persons with an academic secondary school background. There is no official preference for technical school graduates in the selection. The technician apprenticeships require 'O'Levels for admission (not necessarily in a technical subject); the craft apprenticeships only require successful completion of two years of secondary school.

In spite of the fact that technical school graduates follow a shorter courses of training at the DIT training centres for apprentices, no reliable data were made available for estimating the proportion of apprenticeships taken up by technical school graduates. But the proportion has probably decreased over the years because most DIT apprentices are now - unlike some years ago - nominated by the firms rather than by the DIT itself.

FIGURE 6. Technical School Graduates and Recruitment Figures for D.I.T. Registered Apprenticeships. Trend Data



* Source: Kenya - SIDA Technical Education Project. Project Status Reports 1983 and 1984. ** Source: Dir. of Industrial Training

Headmasters and technical teachers claim that firms now seem less interested in recruiting students from technical schools. We were repeatedly told that some firms used to visit the school in order to recruit trainees and that "now they don't do that any more" because of the depressed labour market. In such a situation, it is plausible that personal connections gain importance at the expense of formal qualifications as recruiting criteria. One notes that in the Evaluation of Industrial Education subjects (Lauglo, 1985, Ch 11), students with generally better 'O'Level results fared no better in their quest for jobs during the first year after school, than those with poorer credentials. Further, Kenyan employers in the private sector are reportedly often sceptical of the value of school-based technical training as preparation for practical or technical jobs, preferring instead more cheaply employed persons who have been fully trained on the job. In such circumstances, personal connections are likely to be of great importance in access to training opportunities for DIT apprentices nominated by the firms themselves.

In view of the considerations above, it is plausible that no more than some 30% of the craft apprenticeships and some 40% of the technician apprenticeships are now going to graduates from technical secondary schools. But even if as many as 50% of the places were taken by such graduates, the implication would still be that in 1983 only about 1/4 of these graduates succeeded in obtaining a DIT apprenticeship. If another 40% gain admission to form 5, it would follow that more than 1/3 of the graduates faced unemployment for some time or found other work or training opportunities. Clearly a professionally conducted tracer study of technical school graduates is now long overdue. Such a study could also provide a useful base line for assessing the effects of making the technical school courses more vocationally oriented, if the graduates from the new courses also were traced when their first labour market entry occurs. In the absence of more reliable data, it seems at present safe to conclude that whilst technical secondary schools are intended to serve as a basis for further technical and vocational training, they fail to do so for a very substantial proportion of their graduates.

11 THE COST OF TECHNICAL EDUCATION

As Cumming (1985) noted in his analysis of cost for the Evaluation of Industrial Education subjects, the higher the level of the educational institution and the more technological the institution is, the higher is the cost per person educated/trained. Appendices 8 and 9 show Cumming's figures on recurrent cost and development cost for technical secondary schools as of 1983/84. Combining these figures with data for other Kenyan schools offering technical and vocational programmes, Cumming arrived at the unit cost estimates which are shown in Table 5.

The village polytechnics are the cheapest of these institutions, followed by academic secondary schools offering Industrial Education subjects (only 11% of the teaching timetable). If two high cost boarding schools were omitted from the range of IE figures, the recurrent cost of IE schools would range between K Pounds 137 and 210, giving an overall unit cost of K Pounds 188-362 in these overwhelmingly

TABLE 5. RELATIVE RECURRENT AND CAPITAL COSTS OF INSTITUTIONS OFFERING TECHNICAL AND VOCATIONAL PROGRAMMES. K Pounds 1983/84 prices.

Institution	Recurrent cost per student 1983/84 (1)	Estimated capital cost per student per year		Overall unit costs (1) + (2) + (3)
		<u>Building</u> (2)	<u>Equipment</u> (3)	
Acad. sec. school with Ind. Ed. subjects	137-333*	21-87**	30-65**	188-485
Technical sec. schools	242-259	200	18	460-477
Harambee institutes of technology	500	n. a.	37	537
Village polys.	180	13		193

* Taken from Table 5 in Cumming's report

** The estimates of capital invested in IE schools pertains solely to the capital additions made in the SIDA Technical and Industrial Education project. The figures are from Table 7A in Cumming's report. Buildings are assumed a life of 20 years, equipment: 10 years.

'academic' schools. Clearly the technical secondary schools are considerably more expensive than these IE schools. Harambee institutes of technology are even more expensive.

If within each of these institutions one were to analyse subject costs, the technical subjects would invariably be more costly than the academic ones simply because of the differences in the size of groups taught, let alone greater expense of equipment and supplies. Thus, in the technical schools, the workshops are built to accommodate only 18 students as compared to twice that number in a classroom for teaching academic subjects. Appendix 8 shows that teachers' salaries run to about 45% of total gross recurrent expenditure in the technical schools. But one should bear in mind that only about 1/3 of the students' timetable for a 4-year technical school courses consists of 'technology subjects'. Because of this great expense of technical subjects as compared with academic ones, it is especially important to ascertain - as argued in Section 10 - how far the skills acquired are later put to use in further training and in work.

12 THE FUTURE OF THE TECHNICAL SECONDARY SCHOOLS

The new 8-4-4 system of education in Kenya (8 years primary, 4 years secondary, and 4 years higher education) aims to lay special emphasis on technical and vocational training both after the 8-year primary school and after the 4-year secondary stage. It also aims to introduce an element of practical subjects in all primary and secondary schools in order to teach some basic practical skills within the context of general education. The justification for this practical and technical emphasis is that such an emphasis will promote employment and even self-employment among young people:

The education system hitherto followed by the country did not cater for the greater number of pupils enrolled. There is a need therefore to provide practically oriented curriculum that will offer a wider range of employment opportunities.

and:

The 8-4-4 system, with its emphasis on technical and vocational education, will ensure that the students graduating at every level have some scientific and practical knowledge that can be utilized for either self-employment, salaried employment or for further training. (Min. of Ed, Science and Tech., 1984: p.11)

Whilst policy makers in many countries, both industrialised countries and developing countries, tend to look to practical and technical education as a remedy for youth unemployment, it is difficult to see how such education could - at least in the short run - provide a lead for the regeneration of depressed economies and depressed labour markets. The utilisation rate of expensively taught practical and technical skills is likely to depend on whether economic growth improves. A fast growing economy does require skilled manpower - but this is not tantamount to saying that skill training can induce economic growth. There is therefore no guarantee in any country, that a costly and logistically complicated programme of large-scale practical and technical training will be wise use of scarce resources, provided the finance can be raised.

Similarly, providing training in greater depth at the technical secondary schools is unlikely to increase the scale of opportunity in the occupations for which students are prepared - though it may give them greater skill and a competitive advantage in the quest for the scarce opportunities that exist. On the other hand, it could also be that a more vocationally specialised and deeper training will be a disadvantage when students seek to enter occupations for which they have not been specifically trained - unless their deeper training will give them work habits and attitudes (e.g., pride in workmanship) which are also valuable in other occupations. At the end of the day, the wisdom of such policies will depend on whether economic growth, with its increased demand for skilled labour, will be generated.

Under the 8-4-4 system of education, the technical secondary schools will be relabelled technical training colleges and will have a dual post-primary and post-secondary role. A policy statement published in December 1985 states that one policy is to:

convert and restructure the present 15 Government technical secondary schools into post-school technical colleges in order to increase the number of training opportunities for the school leavers (p. 17)

The type of programme that the colleges would mount are described as:

Diploma programmes. The diploma programmes are meant to provide middle-level manpower. Secondary school leavers and holders of craftsman's certificate training programmes at the junior level will be eligible for these courses. The programmes will take two to three years. The curriculum will be 60 per cent practical and 40 per cent theoretical work. These programmes will be offered in agricultural colleges, technical colleges and Government training schools (p.20)

Since that document was prepared, it has been decided that the new name for the technical secondary schools should be Technical Training Schools - rather than colleges. This is in keeping with the decision that the schools should have a dual post-primary and post-secondary function, and that initially the schools should concentrate on two types of post-primary courses: artisan courses and craftsman courses. The artisan courses will comprise 90 percent practical skill training and lead to an artisan certificate. It is intended that the general education component in these courses will include Mathematics, Science, Applied Geometry, and General Studies. These overwhelmingly practical courses would be of varying duration from 6 months to 1 or 2 years. Especially some of the longer artisan courses will be located at the technical training schools.

The craft courses are intended to last between 3 and 4 years and will also recruit from primary school leavers. These courses will consist of 80% practical work and 20% of such subjects as Vocational Theory, Mathematics, Science, Technical Drawing, Kiswahili, English, Government, Social Education and Ethics, and General Studies.

The immediate task facing the technical training schools is to develop the artisan and craft courses. Post-secondary Diploma courses need to be developed at a later stage, when the first output from the reorganised academic secondary schools occurs. The curriculum structure in these new technical school courses, whilst providing vocational and technical training in greater depth, will inevitably constrict the role of these schools in qualifying for non-technical post-secondary education and training. In the words of one high official:

The technical schools drifted towards the academic. Now we go back to the original objectives of training manpower.

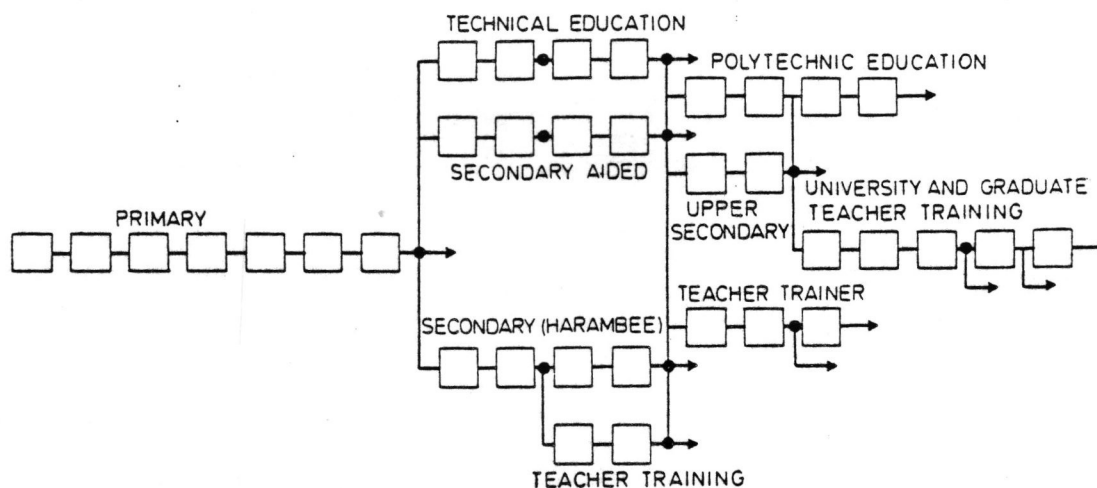
Clearly, from the point of view of students, opportunities for further education and training are bound to be a problem. The Government intends to create such opportunities but only with areas of technology that relate to the student's training in the new technical schools. Thus, those with good results from artisan courses would be able to go on to craftsman courses; and the best students in the craftsman courses would be able to continue to Diploma courses after appropriate work experience. Further opportunities for the best of the Diploma students

are intended in the form of Higher Diploma programmes which would have a predominantly 'theoretical' curriculum (up to 70%). The technical education ladder may culminate in technologist education (90% theory) which would, in part at least, recruit from the Higher Diploma holders.

The manpower aim is to move towards a situation whereby the ratio of 'technologists' to 'technicians' to 'craftsmen/artisans' would be:
1 : 10 : 30 by year 2000. The considerations which lie behind this manpower-mix target are not entirely clear. On a sceptical note, one might point out that long-term quantitative projections of manpower requirements have internationally proven notoriously inaccurate.

The diagramme in Appendix 10 summarises the intended articulation of the technical training schools with other types of education and training. The radical reorientation of their teaching programme will pose some difficult problems because these schools are now overwhelmingly 'academic' and theoretical by curriculum contents. The curricular reorientation will imply a need to redeploy many teachers of academic subjects to other types of school. A much greater number of teachers will be needed in technical subjects. There will be an excess of 'academic' classroom space and a shortage of workshop facilities. The teaching of practical skill - now at least in form 4 rather ossified around the teaching of phased test tasks - will need reorientation. In general, the technical schools are seemingly in for more radical change than are other institutions under the new 8-4-4 system. This is a great challenge to curriculum development and implementation, and to plan the best use of the resources available. In such circumstances, there seems to be a strong case for formative evaluation research in order to closely monitor these changes so that further policy making and decisions about implementation can be informed by the experience gained.

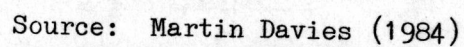
APPENDIX 1. THE SYSTEM OF FORMAL EDUCATION IN KENYA AS OF 1985



The 'dots' in the diagramme indicate points at which examinations are taken.

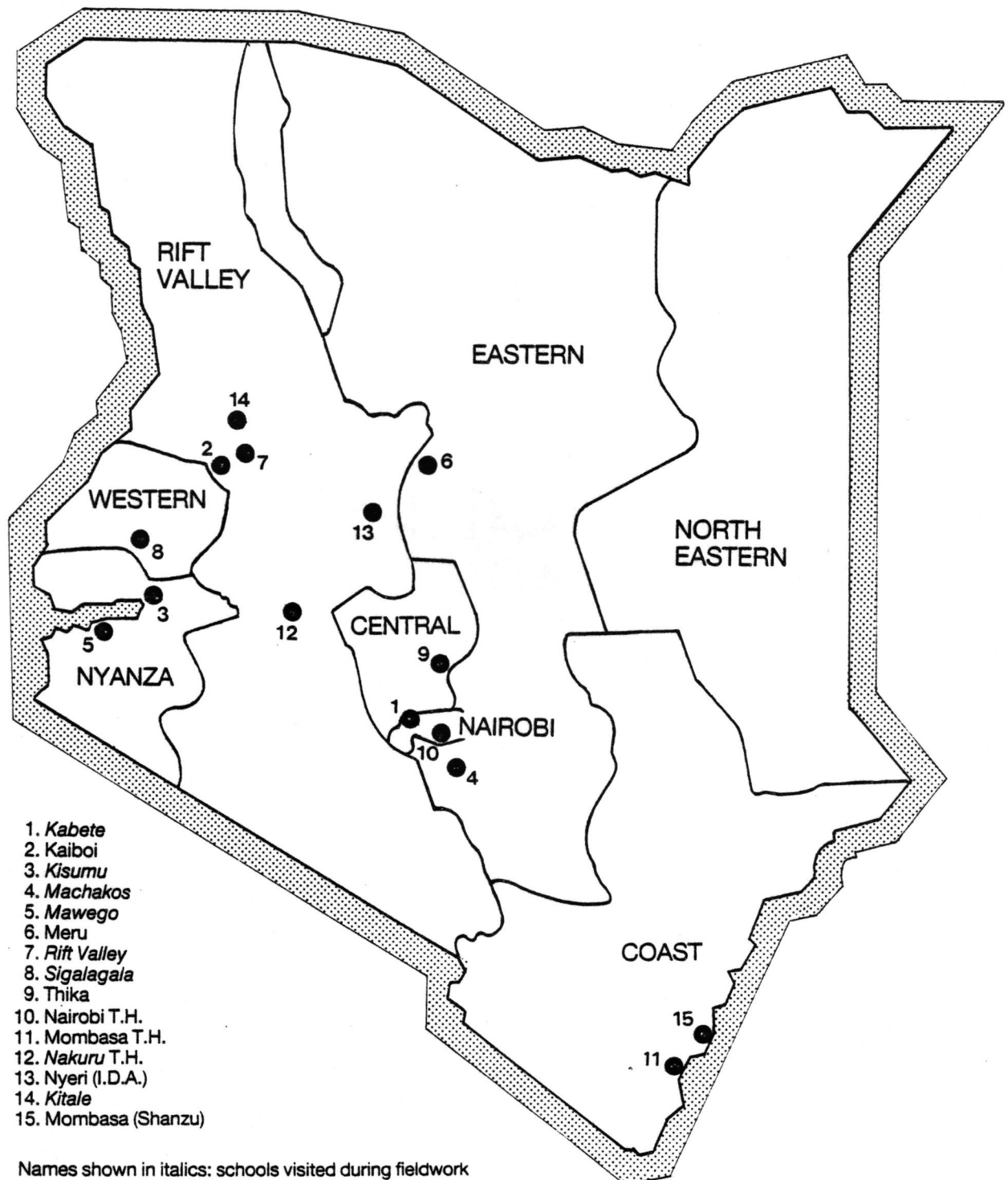
As of 1979/80, about 95% of all children aged 6-12 were enrolled in primary school. Among those who complete the primary school course, it is estimated (1982) that about 12% enter Government maintained or assisted schools ('technical education' and 'secondary aided' in the diagramme), about 24% enter Harambee (local self-help) and other private schools; the remainder either repeat grade 7 or leave school.

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APPENDIX 3

LOCATION OF TECHNICAL SCHOOLS



APPENDIX 4. THE CURRICULUM OF TECHNICAL SECONDARY SCHOOLS 1984
WEEKLY PERIODS

BASIC BUILDING TRADES

FORMS 1 AND 2		FORM 3		FORM 4	
Woodwork	5	Carpentry and joinery	7	Carp. & join.	17
Metalwork	5	Plumbing	5	OR Plumbing	17
Techn. drawing	3	Masonry	5	OR Masonry	17
		Building drawing	5	OR Surveying	17
				Build. drawing	5

BASIC ENGINEERING TRADES

FORMS 1 AND 2		FORM 3		FORM 4	
Woodwork	5	Mechanical	8	Mechanical	17
Metalwork	5	Electrical	5	OR Electrical	17
Techn. drawing	3	Automotive	4	OR Automotive	17
		Engineering drawing	5	OR Welding & fabrication	17
				OR Agric. mech.	17
				Eng. drawing	5

TOTAL CURRICULUM AND PERIOD ALLOCATION

SUBJECT	FORMS 1 & 2	FORM 3	FORM 4
Mathematics	7	6	6
English	8	8	8
Physical science	6	6	6
Kiswahili	5	-	-
History	3	-	-
Geography	3	3	3
Technical drawing	3	5	5
Woodwork	5	-	-
Metalwork	5	-	-
Basic Building courses (cf above)-		17	17
OR Basic Engineering courses	-	17	17
TOTAL No. OF WEEKLY PERIODS	45	45	45

APPENDIX 5 OUTLINE FOR INTERVIEWS WITH HEADMASTERS, AND FOR
GROUP INTERVIEWS WITH TEACHERS OF TECHNICAL SUBJECTS

The outline was only loosely adhered to and not completely covered in all cases. One aim was to find out what headmasters and teachers themselves thought were the most important issues concerning their schools and the role played by Swedish assistance.

Kenya-Sida Technical and Industrial Education Project

TOPICS FOR DISCUSSION - teachers and headmasters

1. Strengths and weaknesses in technical secondary schools: What comes to mind?
2. SIDA's support for technical secondary schools. What has been most valuable? What could have been done better?
3. Is the level of equipment in the workshops adequate in order to teach according to the syllabuses? What equipment is used most often? What is used least often? What could you even manage without?
4. What are the strengths and weaknesses of services rendered by the Maintenance Unit?
5. Is the money earmarked for workshop materials too generous? about right? not enough? Does it depend on type of technical subject?
6. What are your views of the syllabuses?
7. What are your views of the mode of assessment in technical subjects?
8. How much contact do you have with the KIE and the Inspectorate?
9. Student interest in technical subjects. Has it changed over time? How strong is it now? Are students on the whole more interested in certain subjects than in others?
10. What happens to students after 'O'Levels?
11. What the most difficult tasks:
 - (a) in running a technical secondary school? (for headmasters)
 - (b) in being a technical teacher?

APPENDIX 6. QUESTIONNAIRE ADMINISTERED TO TECHNICAL AND
TO ACADEMIC TEACHERS

Kenya-SIDA Technical and Industrial Education Project
QUESTIONS FOR TEACHERS

1. Name _____
2. School _____
3. Age _____
4. Male _____ Female _____
5. What is your home district? _____
6. At which school did you take your OLevels? _____
7. If you took ALevels, at which school was it? _____
8. What is your post-secondary education and training?

Institution	Type of qualification	Dates
_____	_____	_____
_____	_____	_____
_____	_____	_____
9. At which schools have you been teaching?

Name of school (Present school) _____	Dates
_____	_____
_____	_____
10. What other kind of paid work experience have you had?

Type of work	Dates
_____	_____
_____	_____
11. What subjects do you teach this year and how many periods per week?

Subjects	Periods per week
_____	_____
_____	_____
12. Are there subjects which you are qualified to teach to OLevel, but which you are not teaching this year? Which subject(s) are these?

13. Have you as a teacher participated in any in-service courses?

Type of course	Dates
_____	_____
_____	_____
14. Feel free to offer any comments you may wish to make about technical secondary schools or about SIDA's role in supporting these schools, below and on the back page.

APPENDIX 7. QUESTIONNAIRE ADMINISTERED TO STUDENTS IN
FORM 4.

Kenya-SIDA Technical and Industrial Education Project

QUESTIONS FOR STUDENTS

1. What is your name? _____
2. Yours school? _____
3. If we wished to contact you in 1986-87, what address should we write to? _____
4. Which 'O'Level subjects are you taking? _____

5. What was your first choice of secondary education: a technical secondary school or an academic secondary school?
6. What was the reason for your preference of type of school? _____

7. How many CPE points did you have? _____
8. What is your home district? _____
9. What is your vernacular? _____
10. State your father's highest level of education _____

11. What kind of work does your father do? _____

12. If you could choose freely, what occupation (kind of work) would you like to get? _____
13. In the short run, what do you think you are most likely to do after Form IV? _____

14. Are you male or female? Male Female
15. We would welcome any further comments from you, in the space below, about your education, your hopes and expectations for your future, or anything else you wish to say. There is more space on the back of the sheet.

APPENDIX 8. UNIT RECURRENT EXPENDITURES FOR FOUR TECHNICAL SECONDARY SCHOOLS IN 1983 AND 1984.

Expenditure items	Schools			
	Kabete 1983 K Pounds	Machakos 1983 K Pounds	Rift Valley 1984 K Pounds	Sigalagala 1984 K Pounds
Teachers' salaries and allowances	107.6	115.3	128.9	106.2
Other emoluments	42.7	49.3	44.6	57.0
Tuition expenses (equipm. & supplies)	18.1	18.2	18.3	18.2
Boarding expenses	40	40	40	40
All non-teacher items	135.3	133.7	128.7	152.4
TOTAL GROSS EXPENDIT.	242.8	249.0	257.6	258.6
NET EXPENDITURE	160.6	177.8	187.8	186.8

- Sources:
1. Teachers salaries are estimated from the mean on-cost of a teacher of K Pound 1980 per annum together with the establishment figure for each school.
 2. Allowances are added at 6% gross salaries
 3. For all other items the source is the Final Estimates of Expenditure Part B: Financial Summary.
 4. Enrolments are the official Ministry figures.

Note: Grants and salary scales have not altered since 1980.

The table above is copied from C E Cumming, An Evaluation of Industrial Education in Kenya: The Contribution of Cost Studies. Report of a short consultancy August 14th - September 5th 1984 [SIDA consultancy report], p 54.

APPENDIX 9. ESTIMATED DEVELOPMENT COSTS IN TECHNICAL SCHOOLS IN 1984

1. Expenditure on building, furniture, professional services at Kitale Technical School as at July 31st, 1984. Source: Kitale Technical School SIDA Project Account. Trial Balance. Ksh. 46,128,000
2. Expenditure on equipment at Kitale Technical School as at July 31st 1984. Source as for item 1. Ksh. 2,096,000

The cost per place in Kitale Technical School has to relate to a planned enrolment of 576.

Therefore, Cost of building, etc = Ksh. 80,100 per student place.
and, Cost of equipping = Ksh. 3,640 per student place
(More equipment was yet to come at the time these figures were obtained)

Commitments at July 31st 1984 show a figure of Ksh. 2,385,000. Assuming some 2 million Ksh. are for equipment, a more realistic estimate of the equipping cost is double that shown, say, Ksh. 7,300.

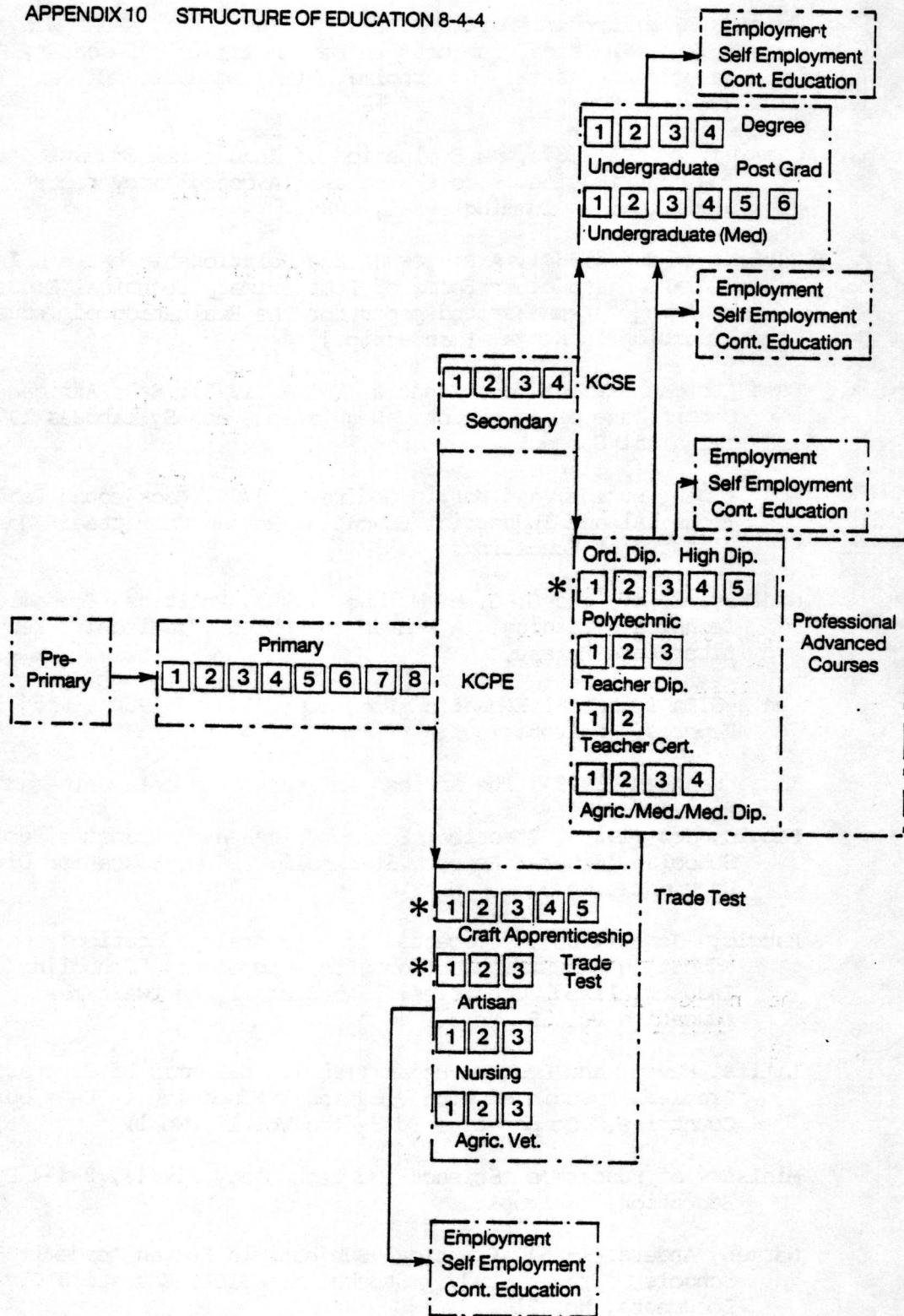
Assuming a life time of 20 years for the buildings and 10 years for the equipment, it follows that:

Building cost per student place per year = K Pounds 200
Equipping cost per student place per year = K Pounds 18

These costs are used as imputed capital figures for the technical schools generally since no other data exists for fresh development of technical schools.

The notes and figures above are copied from C E Cumming, An Evaluation of Industrial Education in Kenya: The Contribution of Cost Studies, p.55.

APPENDIX 10 STRUCTURE OF EDUCATION 8-4-4



* Types of Education to be located in the technical training schools.

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