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FINAL REPORT

COMPARABILITY OF EDUCATION LEVELS  
IN NINE SOUTHERN AFRICA COUNTRIES:  
FEASIBILITY STUDY COVERING EDUCATIONAL EQUIVALENCIES

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## FOREWARD

It is important at the outset to identify what this study purports to do, and what it does not. The study attempts to present appropriate information about the respective education systems in the SADCC countries in order to ascertain equivalencies among and between levels and credentials in the post secondary educational systems of the region. This information will in turn be used to inform decisions regarding cooperation in the optimal use of the education and training facilities across the region.

It was not possible in the time available to assess the content and quality of educational programs in the nine countries. Thus, one cannot conclude, for example, that identical entry and exit characteristics between Angola and another country represent comparable levels of educational quality. Rather, what we are able to show is a best comparability among levels through a series of indicators. These indicators are then summarized into two indexes which will help decision makers place participants: the UNESCO code and the ILO occupation code. This seemed to be the only readily accessible way to sort out the differences not only among the English-speaking countries and those whose official language is Portuguese, but also the considerable differences among the Commonwealth group.

This report is the product of the time and cooperation of many people in the countries visited. The consultants would like to thank all members of SADCC's Regional Training Council, the staff of the Manpower Development Secretariat in Swaziland, and officers in the member governments for their time, patience and assistance. Thanks also goes to the U.S. Agency for International Development, its SADCC region mission staffs, and the Ministry of External Affairs of the Government of Portugal for its support of our Portuguese colleagues and the hospitality for the team in Lisbon. Finally, we should like to thank the prime contractor, Action Programs International, for excellent professional support. In particular we are grateful to the late George Blackmon for his tireless efforts on behalf of this project. We note with sadness the untimely death of a colleague who combined professionalism with a genuine commitment to the improvement of the life chances of people in the countries in which he worked.

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## I INTRODUCTION

The SADCC Council of Ministers in its 1981 Blantyre meeting concluded that:

"Regional cooperation in the context of manpower development and training is aimed at basically developing cooperation in the various economic areas" (SADCC Record of the Council of Ministers - Blantyre, Republic of Malawi, 18 November 1981, pg. 58).

A fundamental assumption underlying the intent of furthering regional cooperation in the area of manpower training is the existence within the member nations of education and training institutions capable of providing needed services to citizens from the entire SADCC region. Although not all regional training and education services are institutionally and spatially fixed, most are; therefore, this study, of necessity, must provide SADCC with relevant institutional data.

It is important to note at the outset of this chapter that this study is not primarily concerned with training and/or educational institutions, but rather with the role that the selected institutions can play in furthering SADCC goals of improving member state manpower capabilities in identified high priority areas. The institutions included for detailed analysis are, therefore, grouped not by country or location but rather by SADCC priority development sector. Nor does this study purport to be a comprehensive inventory of training/educational institutions in the member SADCC states. If SADCC or its Regional Training Council requires such data, reference can be made to "An Inventory of South and Central African Educational Facilities," compiled by Professor Maliyamkono of the faculty of education, University of Dar es Salaam.

If this work is not a comprehensive inventory it follows that certain criteria were employed to select those institutions treated in detail herein.

The objective of this study is to document certification standards and entry requirements of the education systems of the SADCC member states in order to determine the comparability of the different national systems.

At its second Council of Ministers meeting SADCC identified manpower development as one of ten major strategies to be pursued: "The first steps toward regional coordination are seen ... as building up an inventory of existing national institutions and facilitating places of students from countries without particular training facilities with institutions of other member countries."  
-- SADCC 2 Maputo, 27-28 Nov. 1980

Manpower development, as a major SADCC concern, cuts across and impacts upon every priority area, e.g., transportation and communication, agriculture, energy, trade, industrial development, etc.

Successful coordination in each of these priority areas is critically dependent upon the availability of adequately trained personnel.

At the recommendation of its Council of Ministers, SADCC, in 1981, established a Regional Training Council (RTC) charged with responsibility for planning and coordination of manpower development. The following areas were identified as susceptible to regional cooperation: agriculture; animal science; transportation and communication; teacher education in science, mathematics and technical subjects; health; engineering (mining and construction); and public management and accountancy, which affect all sectors. The RTC subsequently identified six areas wherein consulting services were needed: 1) training for the sugar industry; 2) technical training for the mining sector; 3) regional cooperation in health training; 4) training of teacher educators in SADCC countries; 5) comparability of educational levels in SADCC countries; and 6) regional manpower information.

This report is the product of the study number 5 -- "Comparability of Educational Levels, SADCC Countries." Four of the six studies are complete and have proven valuable to this study. By its very nature this report overlaps somewhat the more detailed manpower training studies carried out in such specific areas as agriculture and teacher education. However, every effort has been made to focus the data in this study on the central question of comparability of systems generally and particularly within the SADCC priority development sectors.

Sensitive to the limitations of time and resources the consulting team, with important inputs from earlier studies and from SADCC spokespersons from Swaziland and from other member states, focused its activities essentially on four major topics that have not to date received adequate attention:

1. Comparability and Compatibility of Entry Standards with respect to:

a) Eligibility of students from country A desiring to study in country B; and b) the entry requirements of likely host education and training institutions. With respect to the eligibility of students from country A wishing to study in country B it was necessary to survey the entire post secondary education system of each member state, and then to analyze and arrange the data in such a fashion as to enable rapid and accurate determination of the existence or absence of compatibility of levels of entry between a given student-exporting and student-importing member state.

The second level of analysis, is that of identifying entry requirements of institutions with potential for providing significant regional service. This required more comprehensive analysis, since these selected institutions were thought likely to be the recipients of the greater part of any movement of students within the SADCC region.

2. Educational/Training Programs: The second major area of study involved the collection and analysis of information about the programs of study in the various post secondary programs and institutions identified as likely providers of region-wide manpower training services. Because of the discrepancy between the educational system of country A and of country B, to whom it wishes to send students, it was necessary, where possible, to relate the training and/or the education provided to a standard measure. For this purpose we have, where possible, made use of the UNESCO International Standard Classification of Education. Because this study focuses on SADCC manpower training priorities and is limited essentially to post secondary manpower training and education, the above-referenced classification is limited to those fields corresponding to SADCC priority areas. To the extent it has been possible to relate levels of education and training to the UNESCO classification, a potential student-exporting SADCC state can ascertain quickly the nature and level of sophistication of the relevant program being offered, by field of study, in a sister SADCC state.

The consulting team sought not only to systematically collect program prospectuses and syllabi of potential region-wide institutions, but where possible, visited selected institutions to ascertain, on site, whether the resources, including staff and requisite equipment and services, were of appropriate standard.

3. Levels of Compatibility: As nearly all post secondary education and training institutions in the SADCC region prepare students primarily for positions in the public sector, it was necessary that the team address the issue of comparability and compatibility of course/program completion to the anticipated or desired work station in the respective SADCC member government or parastatal organization. Here, too, considerable variation in "establishment register" or "scheme of service" policies and practices exists. Therefore, to enhance the likelihood of meaningful comparison, and to enable, for example, country A -- a potential exporter of trainees to country B in a given training area -- to ascertain whether upon successful completion of the course of study the participant will qualify for job entry in the designated work position in country A's establishment, it was necessary to equate the work skills for which the program prepared the trainee with a universal classification of occupations. For this purpose the International Labour Organization's (ILO) major-minor and unit group classification of occupations was employed. In this fashion Country A will be able to compare its own occupational manpower requirements to the appropriate ILO unit and thereby ascertain whether successful completion of a course of study in country B would in fact qualify the student to enter into the appropriate work position in the home country.

Criteria Employed in Selecting Regionally Relevant Training Institutions

1. The first criterion employed was that the institution provide training and/or education services in the areas of priority determined by SADCC. These priorities have been put forward by SADCC in a number of documents and essentially include:
  - a. Agriculture (including veterinary medicine)
  - b. Engineering (construction, mining, and technology)
  - c. Health
  - d. Teacher Training - science, mathematics and technical subjects
  - e. Transportation and communications

As SADCC has already commissioned and accepted a comprehensive study of health manpower needs and regional training capabilities, that priority area is not included in this study. (See Regional Cooperation in Health Training -- SADCC.)
2. The second criterion employed in the selection of region-wide institutional capability is the incidence of respective manpower needs in the member states. Data for operationalizing implementation of this criterion was drawn largely from the SADCC Regional Manpower Training Council Study Number 6 on Manpower Needs. Most manpower needs are of basic-skills and high-incidence nature and are best accommodated in training and educational institutions within each nation state. Institutions are included herein only when the incidence of the specific manpower need is sufficiently low (and/or highly specialized) as to render training and education within each state financially prohibitive and/or inefficient.
3. A third criterion employed to determine which institutions should be included for extensive description is the extent to which a given institution already provides education and training services to member state students throughout the region in a particular SADCC priority area, or is deemed capable of providing it, either because of the recognized excellence or uniqueness of its program.
4. A fourth criterion employed involves identification of the existence, within the high priority sectors, of under-utilized faculties or other resources.
5. Also taken into consideration was the structure of institutional governance. Few private or industry-owned institutions were included because of the perceived difficulty of making such facilities available to SADCC member states and/or a likely disinclination to accommodate other than their own employees.

6. A final criterion employed to determine inclusion was the adequacy of facilities, staff, library, and relevant support services and infrastructure. It should be added, however, that rather than exclude what were otherwise adequate institutions for these reasons the study is more inclined to include such institutions and to draw attention to their specific shortcomings, the remedies of which are prerequisite to the provision of valuable region-wide education and training services.

#### Institutional Information Requirements

If SADCC member states' education and manpower decision-makers are to have recourse to the resources represented by the selected institutions, it is imperative that relevant data be readily available. Therefore, this study, wherever possible, seeks to include data about the following:

1. General description and history.
2. Capacity to enroll additional students from other SADCC countries.
3. Entry requirements, including the provision, when possible, of UNESCO standardized equivalents.
4. Program details drawn from prospectuses, syllabi, and visitations and observations.
5. Duration of Program.
6. Relevant certification, documentation, licensing, etc.
7. Levels of job-skill required and, where possible, the ILO standardized equivalents.
8. Governance.
9. Tuition and Fees.
10. Institutional facilities and support services including library, residence, communications, transportation and equipment.

Equally detailed information on each of these dimensions for each institution was not readily obtainable so each entry is not as complete as we would like.

The consulting team concluded from its assigned scope of work that it was necessary to collect more extensive data for selected region-wide institutions. The following institutions are identified for this level of analysis:

Agriculture and Veterinary Science

Malawi College of Forestry  
 University of Swaziland, Faculty of Agriculture  
 Mananga Agricultural Management Centre (Swaziland)\*  
 Kunduchi Fisheries Institute (Tanzania)  
 College of African Wildlife Management (Tanzania)  
 National Resources Development College (Zambia)  
 University of Zambia, School of Veterinary Medicine

Engineering, Construction, Mining, and Technology

Malawi Polytechnic, University of Malawi  
 Swaziland College of Technology  
 University of Zambia, School of Mines  
 Zambia Institute of Technology  
 Technical College of Bulawayo (Zimbabwe)  
Instituto Industrial de Maputo, Mozambique

Teacher Training

Luanshya Technical and Vocational Teachers College (Zambia)  
 Copperbelt Secondary Teachers College (Zambia)  
 Belvedere Teacher College (Zimbabwe)  
 Zimbabwe Secondary School Science Unit

Transportation and Communications

Multi-country Posts and Telecommunications Training Center (Malawi)\*  
 Marine Training College (Malawi)\*  
 Zambian Air Services Training Institute  
 National Railways of Zimbabwe Training Centre\*  
Escola Nautica do Maputo, Mozambique

Management and Accountancy

Institute of Development Management (Botswana, Lesotho and Swaziland)  
 East and Southern African Management Institute (Tanzania)  
 Centre for Accountancy Studies (Lesotho)\*  
Instituto Comercial do Maputo, Mozambique

\*These six institutions of the twenty-three identified as regionally significant are so specialized or unique that they have not been included on the charts of national education systems (Figures 1-9).

Aware that the SADCC Regional Training Council Secretariat in Swaziland is in the process of distributing a questionnaire to such institutions to elicit considerable information, the team limited its inquiries to data not likely to be adequately obtained by such a questionnaire.

The final section of this report contains subjective observations describing some possible strategies that are thought capable of furthering the expeditious movement of students within the SADCC region.

## II NATIONAL SYSTEMS OF EDUCATION

Each of the nine SADCC countries has developed its own educational system. Because of former colonial rule by Great Britain, the educational systems of the seven English-speaking countries (Botswana, Lesotho, Malawi, Swaziland, Tanzania, Zambia, and Zimbabwe) share some common traits. The same is true of the educational systems of the two Portuguese-speaking countries (Angola and Mozambique).

### Review of Educational System

In this section of the report the educational system of each country is reviewed. Then the areas of similarity and difference between countries are identified. Finally, there is a review of the parts of each educational system which relate to the priority concerns of SADCC (that is, agriculture and veterinary science, engineering mining and technology, teacher training, transportation and communications, and management and accountancy).

### How to Use the Figures with the Text

Figures 1 through 9 represent, by country, the system of education and the credentials awarded at each level. Minimum entry and time requirements for the respective programs are read each across country figure. The letter code identifying the type of credential awarded is arrayed vertically along the left margin.

The rectangles in the figures are drawn to scale, with each section representing one year of study. All programs represent full-time enrollment unless otherwise indicated.

It should be noted that these figures do not represent a complete inventory of the educational programs offered in any country. Most programs at the secondary and post secondary levels in fields of study such as business, health, nursing, and secretarial studies were omitted, since they do not relate to the primary focus of this report.\*

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\*Health is a SADCC/RTC priority, but the sector is the subject of a recent excellent study by SADCC which already covers the training infrastructure.

## Country Charts

1. Angola - See Figure 1 (Pg. 15) The educational system of Angola is based on eight years of ensino de base (basic education), two years of ensino pre universitario (pre-university education) [or four years of ensino medio (intermediate education)], three years of university work leading to a bacharelato (baccalaureate), and two years of additional university work leading to a licenciatura (licentiate) [or five years of university work leading to a licenciatura]. The ensino de base and ensino pre universitario sequence (10 years of study) seems to be comparable to the ensino primario and ensino secundario geral sequence in Mozambique, and to the O-level primary/secondary sequence in each of the English-speaking countries. The ensino de base and ensino medio sequence (12 years of study) is comparable to the ensino primario/ensino secundario geral/ensino medio tecnico [N] sequence in Mozambique. It is higher than the A-level primary/secondary/upper secondary sequence in the English-speaking countries.
 

The bacharelato is comparable to the bacharelato in Mozambique. It is slightly lower than the bachelor's degree in the English-speaking countries. The licenciatura is comparable to the licenciatura in Mozambique. It is also comparable to the professional bachelor's degree in the English-speaking countries (in fields such as engineering), and to the honors bachelor's degrees in arts and science fields.
2. Botswana - See Figure 2 (Pg. 16) The educational system of Botswana is based on seven years of primary school, five years of secondary school leading to an O-level School Certificate, and four years of university work leading to a bachelor's degree in arts, commerce, education, or science.
3. Lesotho - See Figure 3 (Pg. 17) The educational system of Lesotho is based on seven years of primary school, five years of secondary school leading to an O-level School Certificate, and four years of university work leading to a bachelor's degree in arts, arts with education, arts in law, commerce, sciences, or science education.
4. Malawi - See Figure 4 (Pg. 18) The educational system of Malawi is based on eight years of primary school, four years of secondary school leading to an O-level Malawi School Certificate or Malawi General Certificate of Education, and four years of university work leading to a bachelor's degree in art, science, or social science. Bachelors'degrees in agriculture, commerce, education, and technical education require five years of university work (with a diploma awarded after the third year). The bachelor's degree in engineering requires six years of university work (with a diploma awarded after the third year).

5. Mozambique - See Figure 5 (Pg. 19) The educational system of Mozambique is based on four years of ensino primario (primary education), seven years of ensino secundario geral (general secondary education), three years of university work leading to a bacharelato (baccalaureate), and one year of additional university work leading to a licenciatura (licentiate) [or four years of university work leading to a licenciatura].

The ensino primario/ensino secundario geral sequence seems to be comparable to the ensino de base/ensino pre universitario sequence (11 years of study) in Angola, and to the O-level primary/secondary sequence in each of the English-speaking countries.

The bacharelato is comparable to the bacharelato in Angola. It is slightly lower than the bachelor's degree in the English-speaking countries. The licenciatura is comparable to the licenciatura in Angola. It is comparable to the professional bachelor's degree in the English-speaking countries (in fields such as engineering) and to the honors bachelor's in arts and sciences.

6. Swaziland - See Figure 6 (Pg. 20) The educational system of Swaziland is based on seven years of primary school, five years of secondary school leading to an O-level School Certificate, and four years of university work leading to a bachelor's degree in agriculture, agricultural education, arts, arts (law), commerce, education, or science.
7. Tanzania - See Figure 7 (Pg. 21) The educational system of Tanzania is based on seven years of primary school, four years of lower secondary school leading to an O-level National Form IV Certificate, two years of upper secondary school leading to an A-level National Form VI Certificate, and three years of university work leading to a bachelor's degree in agriculture, arts, commerce, forestry, law, pharmacy, or science. Bachelor's degree programs in engineering and veterinary science require four years of university study.
8. Zambia - See Figure 8 (Pg. 22) The educational system of Zambia is based on seven years of primary school, five years of secondary school leading to an O-level School Certificate, and four years of university work leading to a bachelor's degree in accounting and finance, arts, business administration, education, human biology, law, library studies, science, or social work. Bachelor's degree programs in agriculture, engineering, and mining science require five years of university study.
9. Zimbabwe - See Figure 9 (Pg. 23) The educational system of Zimbabwe is based on seven years of primary school, four years of lower secondary school leading to an O-level School Certificate or General Certificate of Education, two years of upper secondary

school leading to an A-level Higher School Certificate or General Certificate of Education, and three years of university work leading to a bachelor's degree in accountancy, agriculture, arts, business studies, law (B.L.), pharmacy, or science. Special honors bachelors' degrees in accountancy, arts, education, or science require four years of university work, as does a bachelor's degree in adult education or laws (LL.B), and a bachelor of science (engineering) honors degree.

### Similarities and Differences

#### 1. English-speaking countries:

- a. Primary School Certificates. Primary education varies in curriculum and duration from country to country. There are also variations within countries, especially between urban and rural areas. Since there are no common examination standards at the primary level, it is not possible to compare the various primary school certificates with each other.
- b. Junior or Lower Secondary Certificates. Junior or lower secondary education varies in curriculum and duration from country to country. In Botswana and Zimbabwe, the dividing line between junior and senior secondary education is being lowered. Since there are no common examination standards at the junior or lower secondary level, it is not possible to compare the various junior or lower secondary school certificates with each other.
- c. O-level Certificates. It should be noted that many educators in the seven English-speaking countries, and many post secondary and university calendars, prospectuses, and reports, refer to the Cambridge Overseas School Certificate (COSC) as a generic term for the document which is received upon completion of an academic secondary school program, and thus as the educational qualification required for admission to many post secondary or upper secondary and university programs. This generic term is inaccurate for several reasons:
  - 1) The original name was the Cambridge Oversea (not Overseas) School Certificate.
  - 2) The Cambridge Oversea School Certificate was replaced more than fifteen years ago by the School Certificate, awarded by the University of Cambridge Local Examinations Council. All students in Botswana, Lesotho, and Swaziland, and some students in Zimbabwe receive this School Certificate.
  - 3) Some students in Zimbabwe receive a General Certificate of Education, Ordinary Level, awarded by the Associated Examining Board (England).

- 4) Students in Malawi receive a Malawi School Certificate or a Malawi General Certificate of Education, awarded by Malawi authorities.
- 5) Students in Tanzania receive a National Form IV Certificate, awarded by Tanzanian authorities.
- 6) Students in Zambia receive a School Certificate, awarded by Zambian authorities.

All of these documents have several things in common:

- o They all represent completion of at least eleven years of primary/secondary education (twelve years in Botswana, Lesotho, Malawi, Swaziland, and Zambia).
- o Those that are not actually awarded by an examining board in England, i.e., the Associate Examining Board or the University of Cambridge Local Examinations Syndicate, are based on examinations developed with the assistance of an examining board in England (usually the University of Cambridge Local Examinations Syndicate).
- o The examination standard currently used in England is the General Certificate of Education, Ordinary Level (GCE-O, or O-level), awarded at the end of eleven years of primary/secondary education, i.e., six primary "standards" and five secondary "forms," followed by the General Certificate of Education, Advanced Level (GCE-A, or A-level) awarded at the end of two years of additional secondary education, i.e., lower Form VI and upper Form VI.

The document awarded by the University of Cambridge Local Examinations Syndicate in Botswana, Lesotho, Swaziland, and Zimbabwe, is based on the O-level examination standard, as is the document awarded by the Associated Examining Board in Zimbabwe. The documents awarded in Malawi are officially recognized in England as representing the equivalent of the O-level standard. The document awarded in Tanzania, i.e., the National Form IV Certificate, is based on examinations patterned after those formerly administered at the O-level by the East African Examinations Council (which were officially recognized in England as representing the equivalent of the O-level standard). The School Certificate awarded in Zambia is based on examinations at the O-level standard which were developed with the assistance of the University of Cambridge Local Examinations Syndicate.

All documents received by students who satisfactorily complete the primary/secondary educational program in each of the seven English-speaking countries can be considered to represent completion of the same level of education. The best generic description of this level of education is "O-level."

At present the O-level certificate will be accepted as a little lower than the pre-universitario in Mozambique which is intentionally designed for university entrance.

- d. A-level Certificates. Only two of the English-speaking countries (Tanzania and Zimbabwe) require an upper secondary, i.e., A-level, program as an intermediate stage between completion of the primary/secondary, i.e., O-level, sequence and university admission. Students in Tanzania receive a National Form VI Certificate which is based on examinations patterned after those formerly administered at the A-level by the East African Examinations Council (which were officially recognized in England as representing the equivalent of the A-level standard). Students in Zimbabwe receive a Higher School Certificate, awarded by the University of Cambridge Local Examinations Syndicate (which is at A-level standard) or a General Certificate of Education, Advanced Level, awarded by the Associated Examining Board (England). The Tanzania document and the two documents awarded to Zimbabwe students can be considered to represent completion of the same level of education. The best generic description of this level of education is "A-level."

At present, the A-level certificate will be accepted as a little higher than the pre-universitario in Mozambique.

- e. Bachelors Degrees. In Botswana, Lesotho, Malawi, Swaziland, and Zambia, admission to university programs is based on an O-level certificate, and bachelor's degree programs require four years of study. (In Zambia, a bachelor's degree in agriculture, engineering, or mining science requires five years of study.) In Tanzania and Zimbabwe, admission to university programs is based on an A-level certificate, and bachelor's degree programs require three years of study. (In Tanzania, a bachelor's degree in engineering or veterinary science requires four years of study. In Zimbabwe, special honors bachelor's degree programs in accountancy, arts, education, and science require four years of study, as does the bachelor of science engineering honors degree).

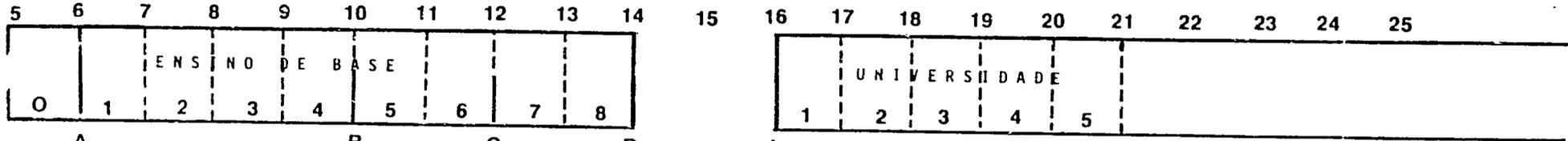
The bachelors' degrees awarded in Botswana, Lesotho, Malawi, Swaziland, and Zambia can be considered to represent completion of the same level of education. The bachelors' degrees awarded in Tanzania and Zimbabwe can be considered to represent completion of the same level of education.

The bachelor's degree in agriculture awarded in Zambia can be considered to represent completion of the same level of education as the bachelor's degree in agriculture awarded in Tanzania and Zimbabwe. The other bachelors' degrees awarded in Tanzania and Zimbabwe can be considered to represent completion of a level of education which is more advanced than the level of education represented by similar bachelors' degrees awarded in Botswana, Lesotho, Malawi, Swaziland, and Zambia.

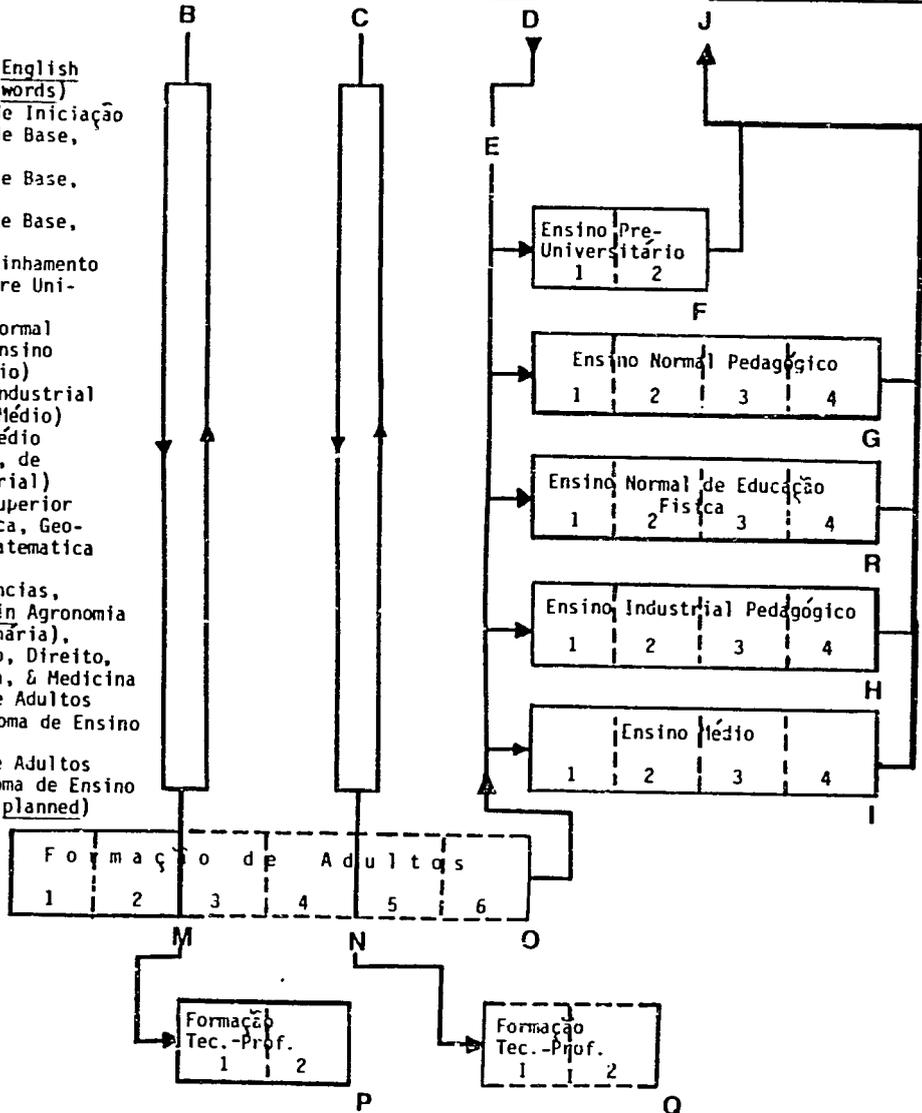
In Mozambique and Angola the bacharelato represents an intermediate first degree while the licenciatura, the traditional Portuguese first degree, is a little higher than the English bachelor degree.

- f. Masters' Degrees. Requirements for masters' degrees vary from country to country and from field to field. Some require one year of study beyond a bachelor's degree, others require two years. Some are based on a combination of advanced coursework and research, others are based on research only. Any comparison between masters' degrees has to be made on a case-by-case basis: no general statements can be made.
- g. Doctoral Degrees. There are few doctoral programs in operation. Those which do operate at this time vary considerably in admission requirements and graduation requirements. Any comparison between doctoral degrees has to be made on a case-by-case basis.

AGE

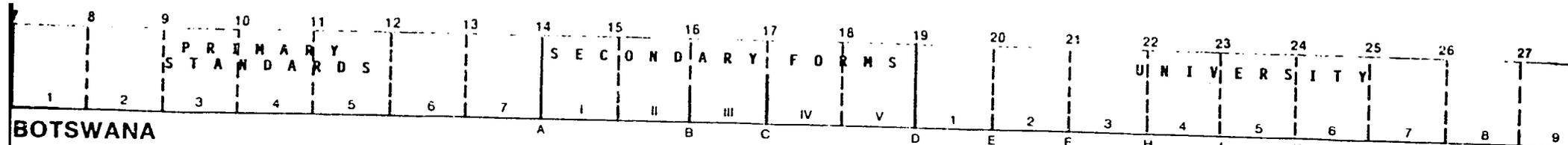


- ANGOLA**  
 (See glossary for the English meaning of Portuguese words)
- A Completion of Ano de Iniciação
  - B Diploma de Ensino de Base, 1º Nível
  - C Diploma de Ensino de Base, 2º Nível
  - D Diploma de Ensino de Base, 3º Nível
  - E Completion of Encaminhamento
  - F Diploma de Ensino Pre-Universitário
  - G Diploma de Ensino Normal Pedagógico para o Ensino de Base (Ensino Médio)
  - H Diploma de Ensino Industrial Pedagógico (Ensino Médio)
  - I Diploma de Ensino Médio (Agrário, Comercial, de Economia, or Industrial)
  - J Entrada no Ensino Superior
  - K Bacharelato in Física, Geofísica, Geologia, Matemática and Química
  - L Licenciatura in Ciências, Ciências Agrárias (in Agronomia and Medicina Veterinária), Ciências de Educação, Direito, Economia, Engenharia, & Medicina
  - M Diploma de Ensino de Adultos (equivalent to Diploma de Ensino de Base, 1º Nível)
  - N Diploma de Ensino de Adultos (equivalent to Diploma de Ensino de Base, 2º Nível) (planned)

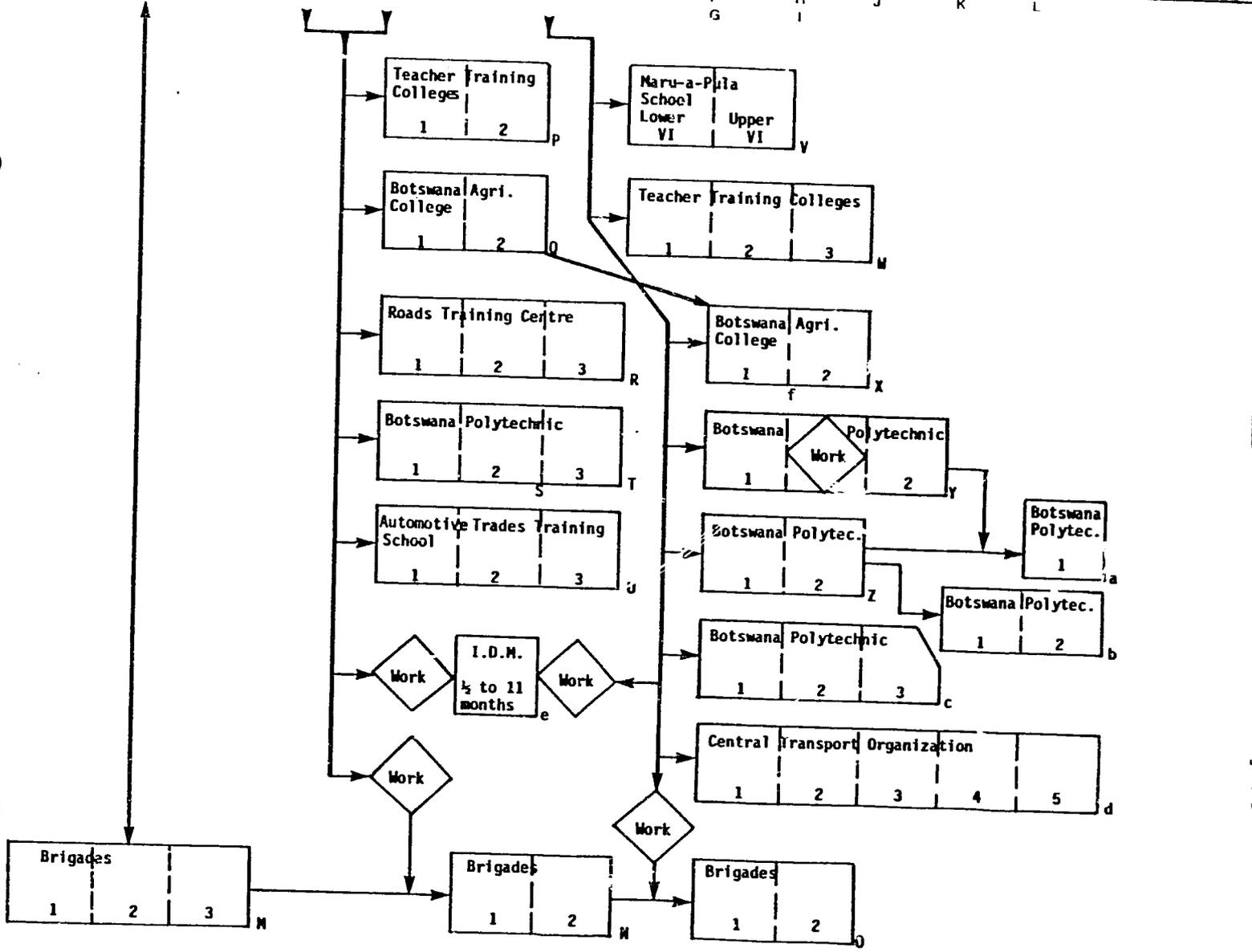


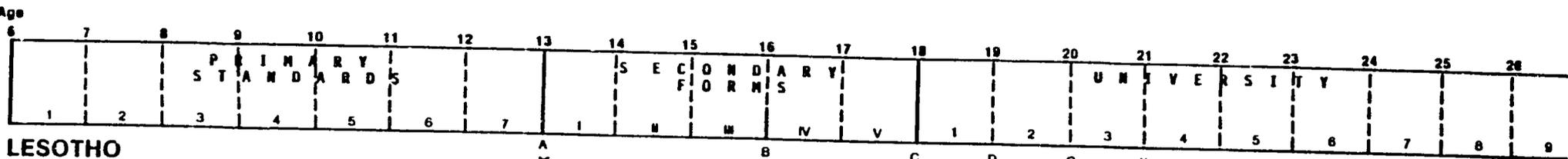
- O Diploma de Ensino de Adultos (equivalent to Diploma de Ensino de Base, 3º Nível) (planned)
- P Diploma de Formação Técnico-Profissional, 1º ciclo
- Q Diploma de Formação Técnico-Profissional, 2º ciclo (in process)
- R Diploma de Ensino Normal de Educação Física

Figure 1



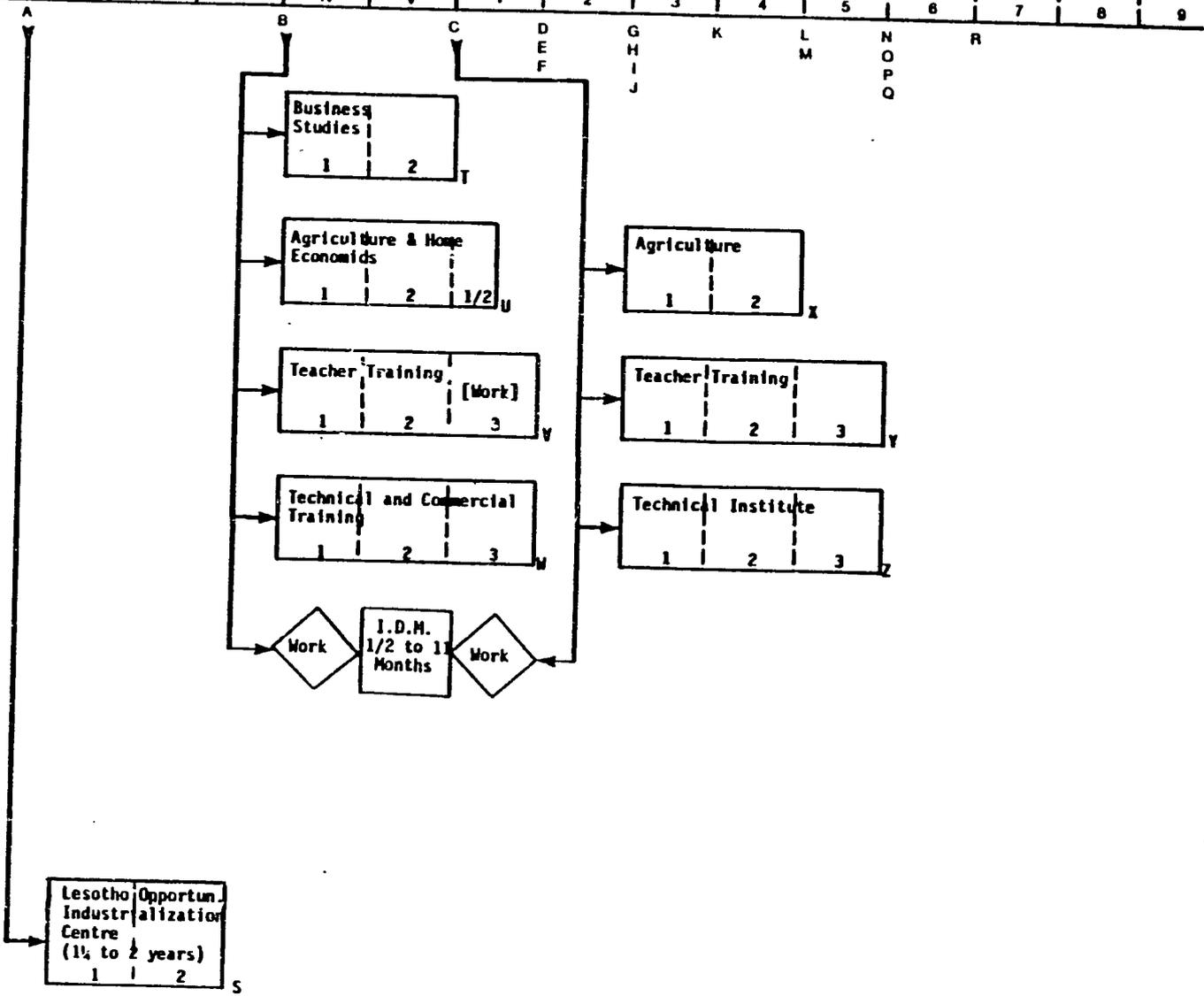
- BOTSWANA**
- A Primary School Leaving Certificate
  - B Junior Certificate (Beginning Jan. 1986)
  - C Junior Certificate (Through Dec. 1986)
  - D School Certificate\*
  - E Certificate in Library Studies, Statistics
  - F Certificate in Acctg. & Business Studies#
  - G Diploma in Adult Education, Library Studies, Primary Education, Statistics
  - H Diploma in Secondary Education (through 1984)
  - I Diploma# in Accounting & Business Studies, Theology by Extension
  - J Bachelor's degree in A-+s, Commerce, Education, Science\*\*
  - K Bachelor of Laws\*\*\*
  - L Master of Arts, Education, Science
  - M Trade Test C
  - N Trade Test B
  - O Trade Test A
  - P Certificate in Primary Education
  - Q Certificate in Ag., Animal Health, Community Development
  - R Roads Technician Certificate (through 1982)
  - S Craft Certificate##
  - T Advanced Craft Certificate##
  - U Diploma in Auto Electrics, Auto Mechanics, Plant Mechanics
  - V Higher School Certificate\*
  - W Diploma in Junior Secondary Education (Beginning 1984)
  - X Diploma in Ag., Animal Health
  - Y Technician Certificate##
  - Z Ordinary Technician Diploma##
  - aa Full Technician Certificate##
  - ab Higher Technician Diploma (Beginning 1985)##
  - ac Secondary Crafts Teacher's Certificate
  - ad Auto Mechanics, Machinists, Plant Mechanics Certificate -- awarded by I.O.M. (Institute of Development Management) upon completion of in-service training programs
  - ae Certificate in Meat Inspection ###
- \* Awarded by the University of Cambridge Local Examinations Syndicate  
 \*\* Part I = years 1 & 2; Part II = yrs. 3 & 4  
 \*\*\* Years I & II at U. of Botswana, years 3 & 4 at U. of Edinburgh, year 5 at U. of Swaziland  
 # Part-time  
 ## Awarded by the City & Guilds of London Institute  
 ### Awarded by the Royal Society of Health





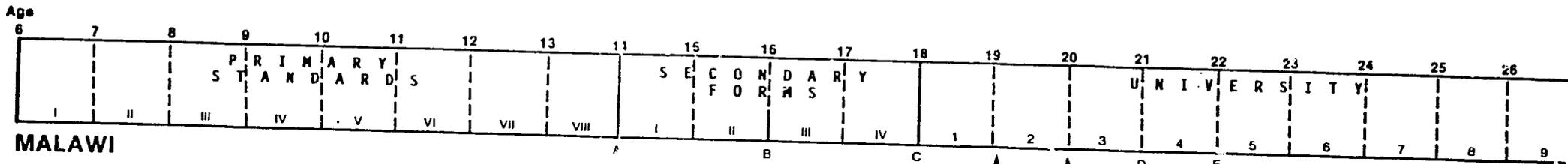
**LESOTHO**

- A Primary School Leaving Certificate
- B Junior Certificate
- C School Certificate\*
- D Diploma in Education (Primary) -- after the Primary Teacher's Certificate [V]
- E Diploma in Education (Secondary) -- after the Secondary Teacher's Certificate [Y]
- F Diploma in Science Education -- after the Secondary Teacher's Certificate [Y]
- G Certificate in Primary Education -- after the Primary Teacher's Certificate [V]#
- H Certificate in Business Studies, Religions Studies, Statistics
- I Diploma in Law, Theology
- J Bachelor of Education -- after Diploma in Education (Primary) [D] or Diploma in Education (Secondary) [E]
- K Diploma in Statistics -- after Certificate in Statistics [H]
- L Certificate in Practical French#
- M Bachelor's degree in Arts, Arts with Education, Arts in Law, Commerce, Science, Science Education
- N Diploma in Science Education -- after Bachelor's degree in Science [M]
- O Postgraduate Certificate in Education -- after a Bachelor's degree in Arts or Science [M]
- P Master's degree in Arts, Commerce, Science
- Q Master's of Education -- after a Bachelor of Education [J] or Bachelor's degree in Arts with Education or Science Education [M], or after a Postgraduate Certificate in Education [O]
- R Bachelor of Laws -- 2 years after Bachelor of Arts in Law [M], 3 years after other degrees [M]
- S Certificate
- T Certificate in Business Studies
- U Certificate in Agriculture, Home Economics
- V Primary Teacher's Certificate
- W Certificate\*\*
- X Diploma in Agriculture
- Y Secondary Teacher's Certificate
- Z Certificate\*\*



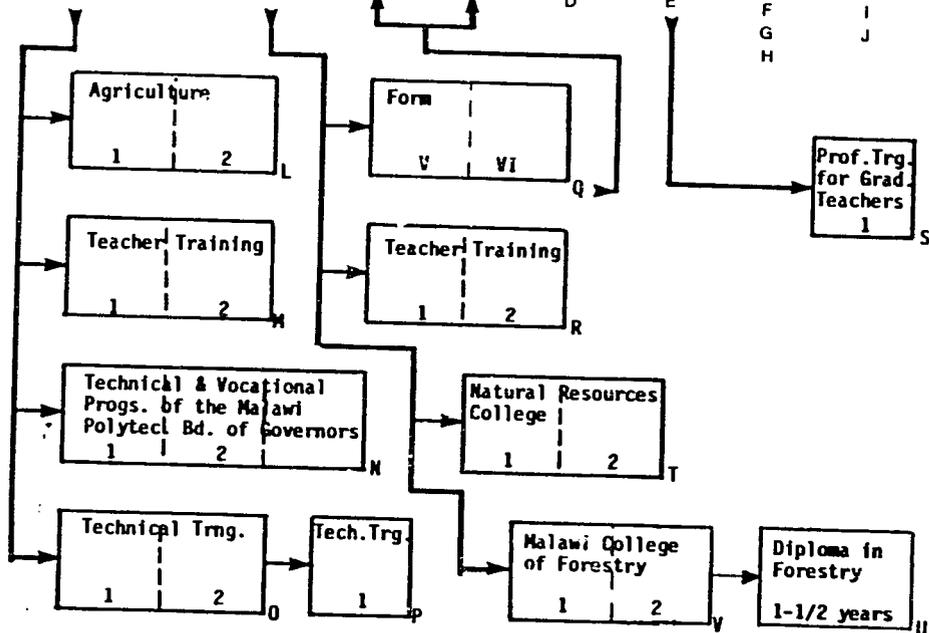
\* Awarded by the U. of Cambridge Local Exam. Syndicate  
 \*\* Awarded by the City & Guilds of London Institute or the Royal Society of Arts  
 # Part-time

Figure 3



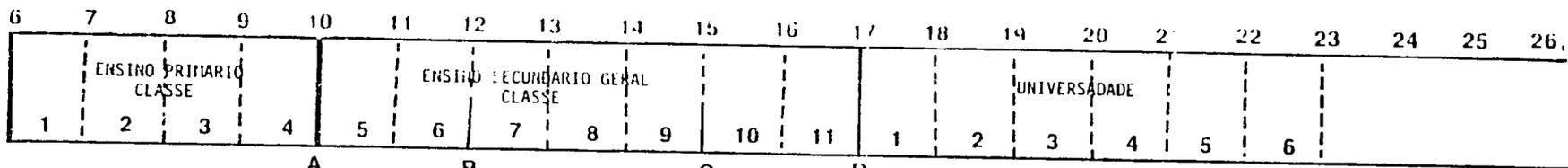
**MALAWI**

- A Primary School certificate
- B Junior Certificate of Education
- C Malawi School Certificate, Malawi General Certificate of Education
- D Diploma in Agriculture, Business Studies, Engineering, Public Administration, Secondary Teaching\*
- E Bachelor's degree (Pass) -- awarded by Chancellor College of the University of Malawi
- F Bachelor's degree in Agriculture, Commerce, Education, Technical Education -- 2 years after the Diploma\*
- G Bachelor's degree (Honours) -- awarded by Chancellor College of the University of Malawi
- H Bachelor of Laws\*
- I Bachelor's degree in Engineering -- 3 years after the Diploma\*
- J Master's degree
- K Doctor of Philosophy
- L Extension Worker Certificate (to 1983)
- M Primary Teacher's Certificate - T3
- N Certificate
- O Craft Certificate
- P Advanced Craft Certificate
- Q Higher School Certificate\*\*
- R Primary Teacher's Certificate - T2
- S University Certificate in Education\*
- T Certificate -- Agricultural Extension Worker, Community Development Worker
- U Diploma in Forestry
- V Certificate in Forestry



\* Awarded by part of the University of Malawi:  
 Bunda College of Agriculture  
 Chancellor College  
 Malawi Polytechnic  
 School of Law and Public Administration

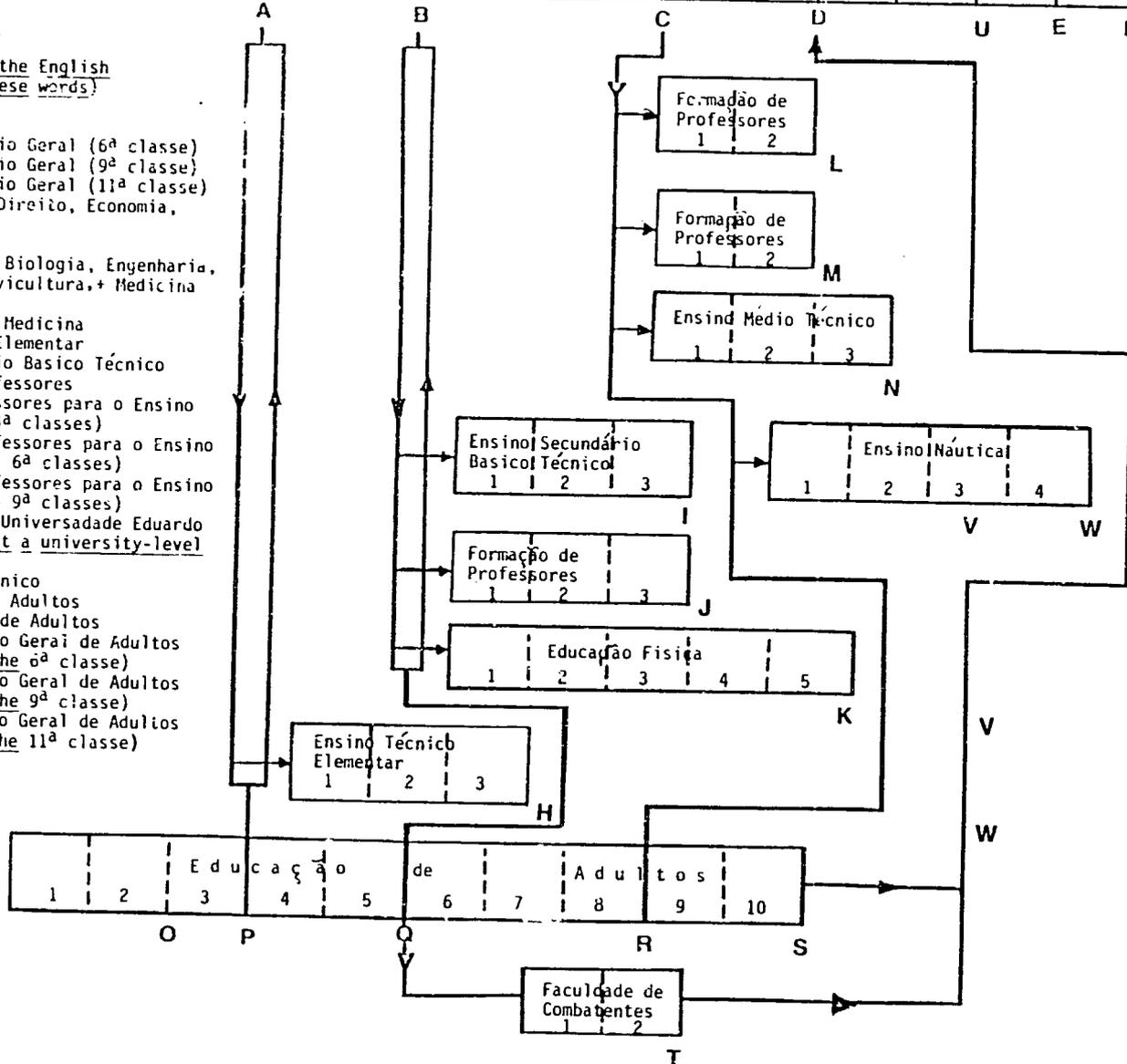
\*\* Awarded by the University of Cambridge Local Exam. Syndicate



**MOZAMBIQUE**

(See glossary for the English meaning of Portuguese words)

- A Ensino Primário
- B Ensino Secundário Geral (6ª classe)
- C Ensino Secundário Geral (9ª classe)
- D Ensino Secundário Geral (11ª classe)
- E Bacharelato in Direito, Economia, and Letras
- F Licenciatura in Biologia, Engenharia, Agronomia e Silvicultura, + Medicina Veterinaria
- G Licenciatura in Medicina
- H Ensino Técnico Elementar
- I Ensino Secundário Básico Técnico
- J Formação de Professores
- K Ensino de Professores para o Ensino Primário (1ª - 4ª classes)
- L Formação de Professores para o Ensino Secundário (5ª - 6ª classes)
- M Formação de Professores para o Ensino Secundário (7ª - 9ª classes) (offered at the Universidade Eduardo Mondlane, but not a university-level program)
- N Ensino Médio Técnico
- O Alfabetização de Adultos
- P Ensino Primário de Adultos
- Q Ensino Secundário Geral de Adultos (equivalent to the 6ª classe)
- R Ensino Secundário Geral de Adultos (equivalent to the 9ª classe)
- S Ensino Secundário Geral de Adultos (equivalent to the 11ª classe)

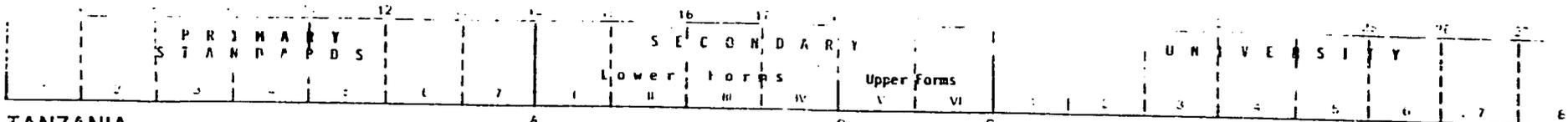


- T Faculdade de Combatentes (Intensive pre-university program for selected military veterans, and civilian workers)
- U Formação de Professores para o Ensino Secundário Geral (10ª - 11ª classes)
- V Curso de Marinha Mercante
- W Curso de Marinha Mercante

NOTE: No educational credentials are awarded to graduates. Formal notification of graduation is sent via the Ministry of Education and Culture to the Ministry of Planning, which assigns the graduates to their places of employment. Official educational credentials are prepared only when a student is being sent to a foreign educational institution by the Government of Mozambique.

Fig. 5





**TANZANIA**

- A Primary Certificate
  - B National Form IV Certificate
  - C National Form VI Certificate
  - D Bachelor's degree in Ag., Arts, Commerce, Forestry, Law, Pharmacy, Science
  - E Bachelor's degree in Arts or Science with an Education option -- for upper secondary teachers
  - F Bachelor's degree in Engr., Veterinary Science
  - G Postgraduate Diploma: in Educ. (for upper secondary teachers); in Wildlife Management\*
  - H Master's degree -- 1 to 2 yrs. after Bachelor's degree
  - I Doctor of Medicine, Doctor of Dental Surgery
  - J Diploma in Public Health (1 yr. after Dr. of Medicine)
  - K Master of Medicine
  - L Doctor of Philosophy
  - M Trade Certificate (Ministry of Labor)
  - N Primary Teacher's Certificate -- Grade C
  - O Primary Teacher's Certificate -- Grade A
  - P Diploma in Education -- for lower secondary teachers
  - Q Certificate in Ag., Food, Science, Applied Nutrition
  - R Diploma in Agricultural Education
  - S Diploma in Agriculture
  - T Full Technician Certificate
  - U Lab Technician Certificate
  - V Certificate in Veterinary Science
  - W Intermediate Certificate in Lab Technology
  - X Diploma in Forestry
  - Y Certificate in Forestry
  - Z Motor Vehicle Maintenance Certificate
  - a Diploma -- of the Bankers' Exam Board, or of the Insurers' Exam Board
  - b Certificate in Law, Management [I.D.M. = Institute of Development Management]
  - c Certificate in Statistics [E.A.S.T.C. = Eastern Africa Statistical Training Center]
  - d Diploma in Statistics
  - e Diploma in Education -- for lower secondary teachers
  - f Diploma in Building Design, Building Economics, Estate Mgmt. + Valuation, Land Surveying, Public Health Engineering, Urban and Rural Planning
  - g Diploma in Accountancy
  - h Diploma in Engineering
  - i Diploma in Ag., Animal Production, Crop Production, Home Economics
  - j Certificate in Wildlife Management
  - k Diploma in Wildlife Management
  - l Diploma in Transport Management
  - m Diploma in Fisheries Science
  - n Advanced Diploma in Economics, Planning, Public Adm., Hospital Administration, Certified Accountancy Business Administration
  - o Certified Public Accountant
  - p Postgraduate Diploma in General Management
- \* Awarded by the College of Wildlife Management

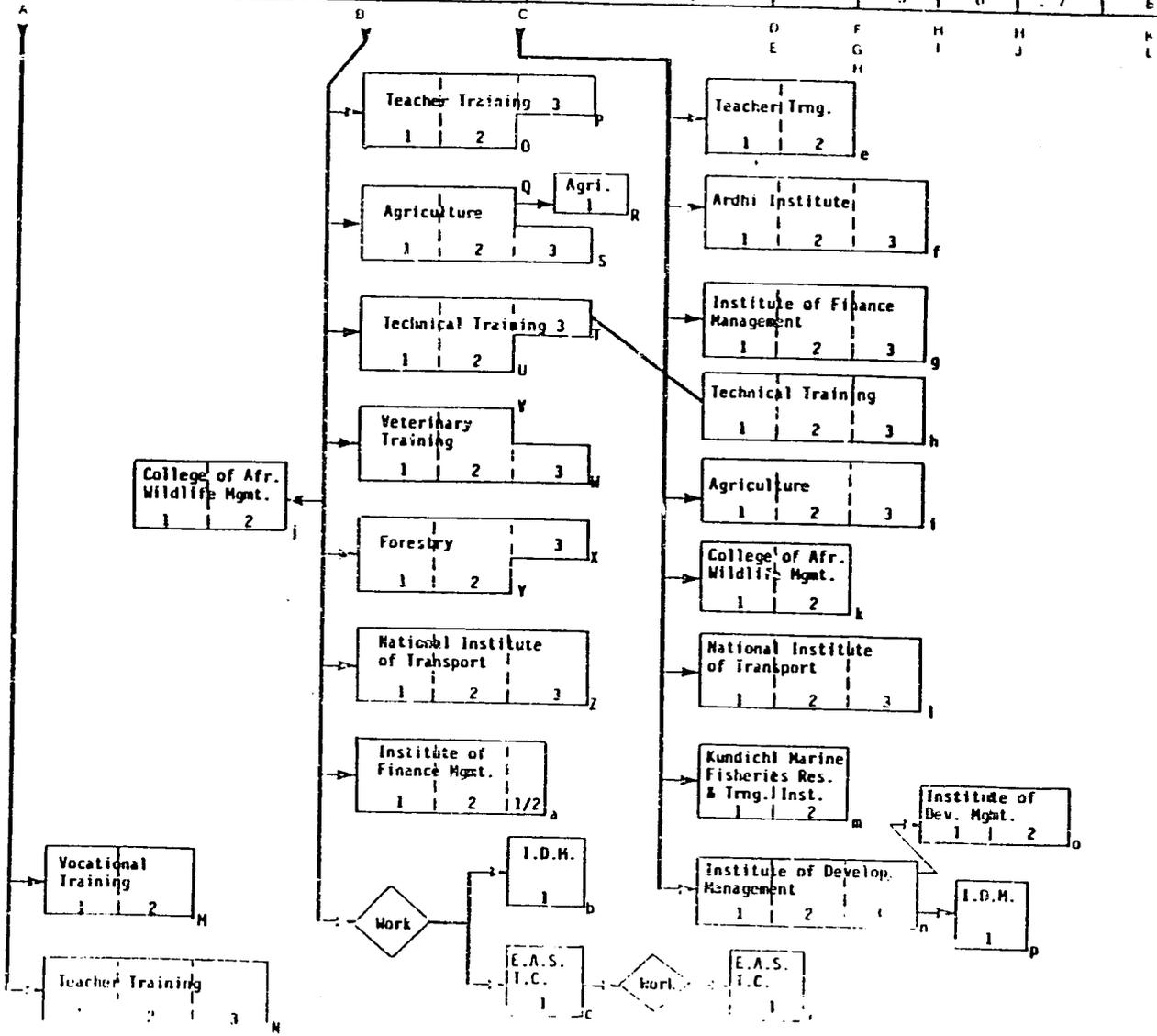
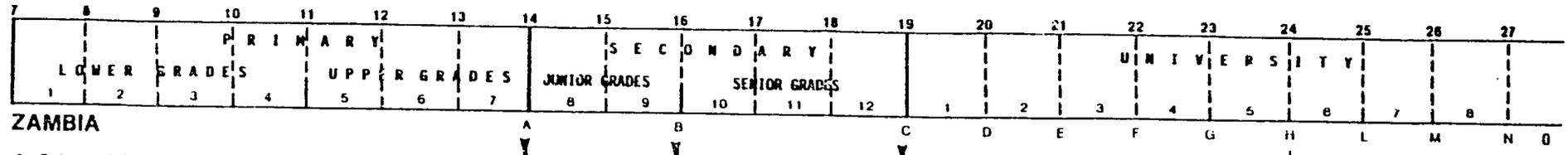


Figure 7

Age



ZAMBIA

- A Primary School Leaving Certificate
- B Junior Secondary School Leaving Certificate
- C School Certificate
- D Certificate in Adult Educ., Library Studies
- E Diploma in Adult Education, Teacher Education
- F Diploma in Library Studies, Social Work
- G Bachelor's degree in Accounting and Finance, Arts, Business Administration, Education, Human Biology, Law, Library Studies, Science, Social Work
- H Bachelor's degree in Agriculture, Engineering, Mineral Sciences, Veterinary Science
- I Postgraduate Certificate in Education
- J Postgraduate Diploma in International Law
- K Master of Laws
- L Master's degree in Arts, Education, Science
- M Bachelor of Medicine, Bachelor of Surgery (M.B. Ch. B.)
- N Doctor of Philosophy
- O Master in Medicine
- P Certificate in Farming
- Q Certificate in Agriculture
- R Certificate of Veterinary Assistant
- S Certificate of Tsetse Control Assistant
- T Certificate of Veterinary Lab. Assistant
- U Primary Teacher's Certificate
- V Certificate
- W Craft Certificate
- X Interim Technician Certificate
- Y Diploma in Technology
- Z Final Technician Certificate
- a Commercial or Technical Teacher's Certificate
- b Commercial Pilot's License
- c Diploma in Aircraft Maintenance Engineering, Aeronautical Electronic Engineering
- d Diploma in Agriculture, Forestry
- e Certificate
- f Diploma in Journalism and Photography
- g Secondary School Teacher's Diploma
- h Master of Engineering
- i Certificate
- j Advanced Certificate
- k Diploma
- l Teaching Diploma
- m Technical College Teacher's Diploma

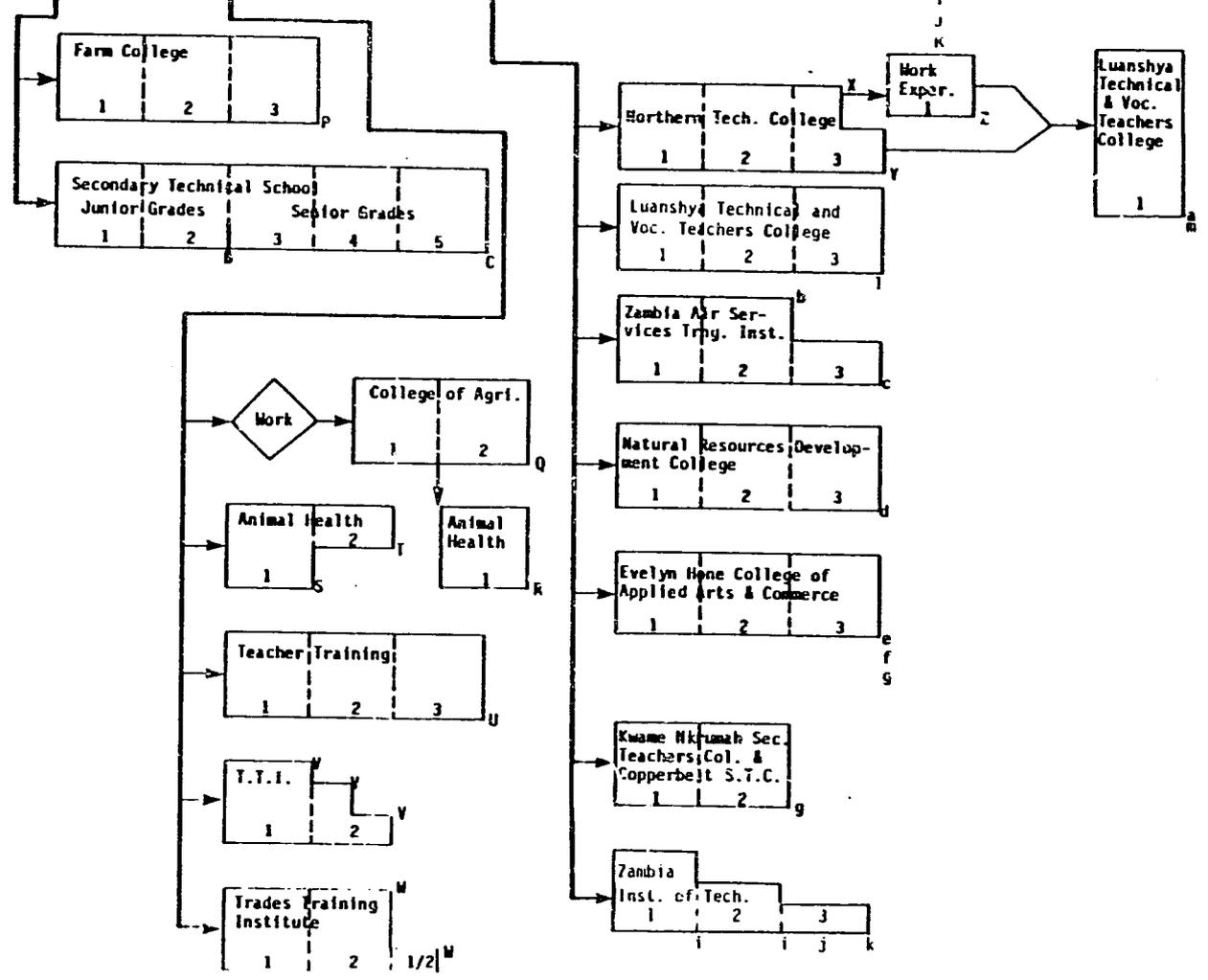
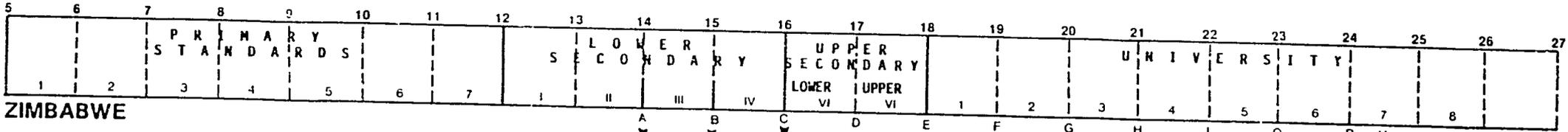


Figure 8

Age

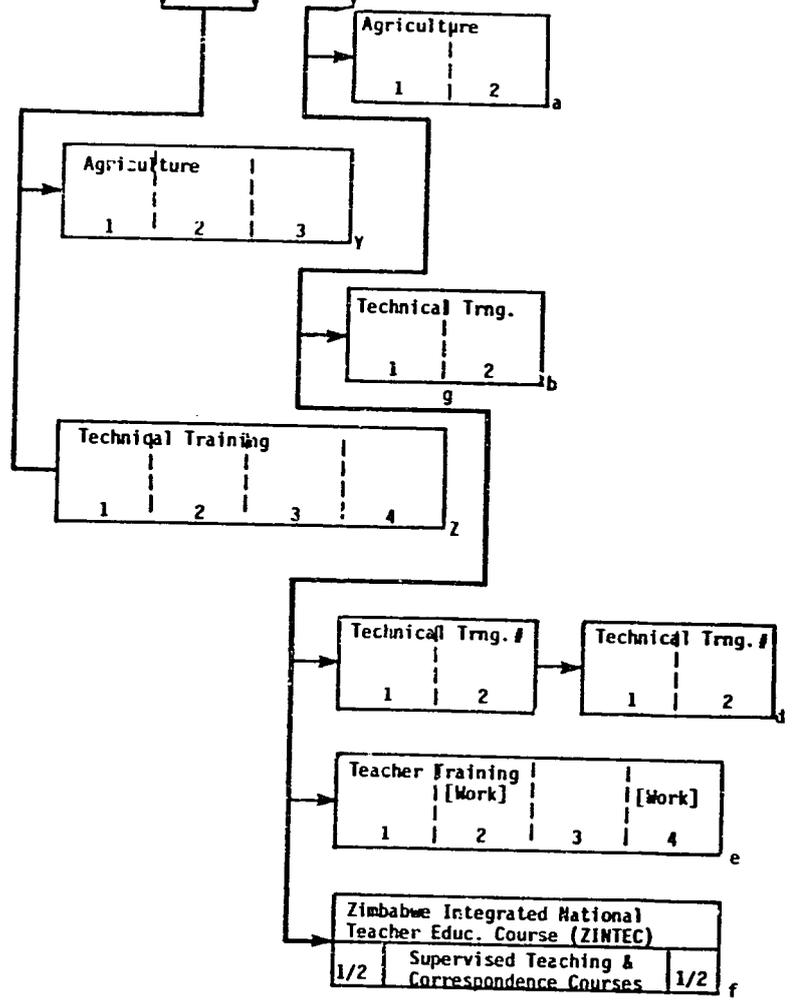


**ZIMBABWE**

- A Zimbabwe Junior Certificate
- B National Certificate of Education
- C School Certificate\* or General Certificate of Education, Ordinary Level\*\*
- D Matriculation Certificate\*\*
- E Higher School Cert.\* or Gen'l. Cert. of Ed. Advanced Level\*\*
- F Diploma in Education
- G Diploma in Adult Education#, Health Education#
- H Bachelor's degree in Accountancy, Agriculture, Arts##, Bus. Studies, Law (B.L.), Pharmacy, Science##
- I Special Honors Bachelor's degree in Accountancy, Arts, Education, Science
- J Bachelor of Education in Adult Education
- K Bachelor of Laws (LL.B.), after [H]
- L Master's degree in Arts, Science
- M Bachelor of Science (Engineering) Honours
- N Diploma in General Medical Lab. Technology#
- O Postgraduate Certificate in Education#, Graduate Certificate in Education
- P Master of Laws (LL.M.), Master of Philosophy###
- Q Bachelor of Veterinary Science
- R Bachelor of Medicine, Bachelor of Surgery (M.B. Ch.B)
- S Master of Education#, Bachelor of Adult Education#
- T Specialist Diploma in Medical Lab. Technology#
- U Diploma in Teacher Education
- V Doctor of Medicine (M.D.), Master of Surgery (Ch.M.)
- W Doctor of Philosophy###
- X Master of Education (Adult Education)
- Y Certificate in Agriculture
- Z Craft Certificate\*\*\*
- a Diploma in Agriculture
- b National Technician's Diploma
- c National Technician's Certificate#
- d National Higher Technician's Certificate#
- e Certificate of Education\*\*\*\*
- f Trained Teacher Certificate
- g Intermediate National Technician's Diploma

\* Awarded by the U. of Cambridge Local Exam. Syndicate  
 \*\* Awarded by the Associated Examining Board (England)  
 \*\*\* Awarded by the City & Guilds of London Inst. (England)  
 \*\*\*\* Awarded by the University of Zimbabwe

# Part-time  
 ## General degree or Honours degree  
 ### Research only



## III INSTITUTIONS OF REGIONAL SIGNIFICANCE

A. Agriculture and Veterinary Science

SADCC member states are acutely aware of the necessity to raise levels of agricultural production. Although the percentage of the population engaged in agriculture varies in the member states from about 45% to 67%, the region is not self-sufficient in food. Industrial development places extraordinary demands on limited foreign exchange. So long as the member states must expend scarce foreign currency on grain and other agricultural products rather than look to this sector for the provision of foreign exchange, the likelihood of sustained development is problematical. Thus, it is not surprising that the SADCC Council of Ministers and its Regional Manpower Training Council have identified agriculture as a high priority training area.

With the exception of formal education, it is likely that more SADCC-region people are involved in agriculture than in any other form of training. Each country can boast a variety of institutions and programs, and soon every university will possess a creditable college of agriculture. Like education, agricultural management and technology is highly labor intensive, and the greater part of required training will probably be carried out within the institution of each member state. However, in such specialized and critical manpower areas as veterinary medicine, fisheries, forestry and wildlife management, a strong argument can be made for the identification, support and cooperative utilization of the region's institutions. Veterinary medicine training culminating in a university degree, not available in the region a few short years ago, is now being offered at the University of Dar es Salaam and the University of Zimbabwe and is about to be offered at the University of Zambia. Substantial programs turning out veterinary assistants and comparable-level professionals exist in many of the SADCC member states. Given the paucity of such resources in some of the smaller countries, it is conceivable that one or two such institutions could provide regional services.

The bracketed letters in the text and on the charts in this section refer to the letter codes on the 9 Figures in Section II.

## 1. Angola

### Centro de Formacao Profissional de Pesces (Fig. 10)

The Center is located in Cacuaco, near Luanda. The school was opened in 1982 with assistance from SIDA (International Development Agency of Sweden).

Current accommodation capacity is for 100 students, but they intend to expand to accommodate 300. The school provides secondary vocational training lasting four semesters and one year of practical training in:

- Sea fishermanship
- Fishing boat electrical management
- Fishing boat navigation
- Refrigeration
- Electronics (to be opened)
- Fishing adviser

Entrance requirements are six years of previous schooling [C] and a 16 to 22 year age limit. This vocational school is equivalent to Ensino de Base III Nivel. Facilities are new and well equipped and the school owns a new boat with up-to-date fishing techniques. They are purchasing more boats suited to Angolan coastal waters. The school also intends to train students in coastal and deep sea fishing in accordance with IMO (International Maritime Organization), FAO (Food and Agricultural Organization, UN) and ILO (International Labour Organization) guidelines.

Technical courses are offered by Swedes (who speak Portuguese) and general subjects are taught by Angolan and Portuguese teachers.

### Instituto Helder Neto - Namibe (Fig. 11)

It was not possible to visit this Institute due to temporary transportation difficulties. The information gathered from the Ministry of Education concerning the Institute strongly recommends that it be considered a potential resource for the SADCC. The Institute is located in Namibe, south Angola, and opened in 1979. The courses are provided in fishery activities:

- Fish technology (opened in 1979)
- Oceanography (opened in 1982)
- Marine engineering (opened in 1982)
- Refrigeration equipment (opened in 1982)

The entrance requirement is eight years of previous schooling. The course lasts for four years. The Institute is well equipped and currently serves 100 students while providing accommodation, but facilities are available for up to 300 students. Facilities include:

- Six laboratories (electrical machines, electricity, electronics, physics, chemistry and biology, and refrigeration)
- Specialized classrooms in: navigation (2); diesel engines and technology; technical drawing; radio and communications; fish technology; and refrigeration
- Workshops (refrigeration, electricity, carpentry, metal working, diesel engines, soldering, a forge, and metal treatment)
- Language laboratory in English

The Institute has received assistance from the Government of Poland. It is a joint venture between the Ministry of Education and the corresponding sector Ministry. This Institute also provides secondary vocational training.

Country: ANGOLA

Name of School: CENTRO DE FORMACAO PROFISSIONAL DE PESCAS - C.F. LUACO (LUANDA)  
(CENTER FOR PROFESSIONAL TRAINING IN FISHING - CACUACO (LUANDA))

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Marinheiro Pescador	36272	6ª Cl. Ensino de Base [C]	3 yrs.	2 yrs.	1 yr.	Certificado de Marinheiro Pescador	General Education, Fisheries Technology, Seamanship, Navigation, Naval Construction, Communications, Workshop (Engines, Electrical Machines, Electronics), Refrigeration Workshop	Marinheiro Pescador	6.41.30	

Country: ANGOLA (NAMIBE)

Name of School: INSTITUTO "HELDER NETO" DE OCEANOGRAFIA, NAUTICA E PROCESSAMENTO DE SPECIES AQUATICAS  
(INSTITUTE HELDER NETO OF OCEANOGRAPHY, SEAMANSHIP AND FISH TECHNOLOGY)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks	
				Acad.	Employ.						
Processamento de Espécies Aquáticas	56272	8ª Cl. [D]	4 yrs.	81.8	18.2	Diploma de Técnico Médio	<p>Gen'l. Trng. (Native Language, Foreign Language, History, Geography, Physical Education) - 13.0%</p> <p>Basic Trng. (Mathematics, Physics, Chemistry, Statistics, Philosophy, Political Economy, Administration Economic Planning and Organization, Biology) 23.3%</p> <p>Specific Basic Trng. (Ichthyology, Marine Ecology, Microbiology, Biochemistry) - 9.7%</p> <p>Specialized Trng. (Treatment of Captured Specimens, Filleting, Refrigeration and Freezing, Processes of Fumigation, Systems of Salting and Drying, Conservation Procedures, Structure of Flours and Oils, Law of the Sea, Equipment of Industrial Transformers, Work Hygiene and Safety - 35.8%</p> <p>Production - 18.3%</p>	Técnico Médio			
Oceanografia		8ª [D]	4 yrs.			} Planned					
Máquinas e Motores Navis		8ª [D]	4 yrs.								
Máquinas e Instal. Frigoríficas		8ª [D]	4 yrs.								

## 2. Botswana

### Proposed FAO/Botswana Meat Inspector Training Course [f]

This proposed regional training program for meat inspectors is a 40-weeks' course which will terminate with an exam leading to the Royal Society of Health Certificate in Meat Inspection. It is anticipated that approximately 20 participants will study the following course components:

- a. Bacteriology
- b. Comparative anatomy
- c. Elementary organic chemistry
- d. Hygiene
- e. Meat inspection
- f. Meat technology
- g. Parasitology
- h. Pathology
- i. Physiology
- j. Zoonoses

First intake is anticipated in mid-1984, with construction of facilities to be completed by the end of 1983. Entrance requirements will be a Certificate in Animal Health from Botswana Agricultural College (Veterinary Assistant level) [Q] or a Cambridge School Certificate [D].

### 3. Lesotho

The highest credential in Agriculture given in Lesotho is at the diploma level. Since all SADCC countries have diploma capability for their own nationals it is not anticipated that Lesotho would need to take students in Agriculture from neighboring countries.

#### 4. Malawi

##### Malawi College of Forestry (MCF)

##### Introduction

Training for all sub-professional grades of forestry personnel is provided in Malawi by the Malawi College of Forestry, operated by the Department of Forestry in the Ministry of Forestry and Natural Resources. For all technical grades this training is given in comprehensive, integrated classroom and field courses at the college, and leads to the award of formal qualifications. The main courses conducted at the college are the Certificate [V] and Diploma [U] Forestry Courses. The college is also undertaking an increasing proportion of the in-service training of Forest Guards, Nurserymen and other skilled forestry workers who were formerly instructed entirely on the job in the forest areas of the country.

The expansion of the college and the training program have allowed students from other countries, e.g., private estates and other government departments, to take the Certificate course. Short courses for Nurserymen and Forest Guards are also conducted.

The Malawi College of Forestry (see Figure 12) has the potential, along with The College of Agriculture in Tanzania, for serving the SADCC region in training technical officers for forestry service in the public and private sectors. Although Tanzania offers the only forestry degree program in the region, the Malawi College of Forestry (MCF) has high quality certificate and diploma programs which have served regional nationals in the past. It is also likely that because of its own national needs and its lead responsibility for SADCC in the area of forestry and wildlife conservation, the MCF will be upgraded to the status of a department of the Faculty of Agriculture of the University of Malawi.

##### Full-time Courses

The college offers two full-time courses:

- a. General Forestry course of two years' duration leading to the award of a Forest Ranger's Certificate [V]. The course is designed for the post of a Forest Ranger in the Technical Assistant grade of the Malawi Forest Service and in similar organizations in the private sector. This course is a prerequisite for further training to diploma level in both forestry and general forest industries' posts.
- b. The diploma course [U] is an advanced course offered as a promotion course for the post of Forester in the Technical Officer grade and lasts for eighteen months.

### Subjects and Course Content

Instruction is given in the following subjects:

Forest terminology	Forest extension and public relations
Silviculture	First aid and safety measures
Mensuration	Forest economics and finance
Botany	Land management
Wood anatomy	Forest management
General government administration and specific forest administration	Harvesting and utilization
Man management	Forest protection
Plan ecology	Care of tools
Soil science	Meteorology
Forest surveying	Forest influences
Forest engineering	Driving of vehicles and maintenance of forestry plant
Forest law and policy	

Instruction is in English.

### Admissions

Training opportunities are advertised locally in Malawi and admission to the college is by open competition. Selections are made by the Public Service Commission in accordance with standing procedures of those candidates intended for public service. Applicants from other countries are accepted under the direction of the Malawi Government, provided that the basic qualifications for admission are met.

### Conditions of Entry

Every candidate for admission is required to fulfill the following conditions:

- a. General Forestry Course
  - 1) To be not less than eighteen years of age on the actual date of entry.
  - 2) To be physically and mentally fit.
  - 3) To have completed four years of secondary school education, gained the Malawi General Certificate of Education, or its "O-level" equivalent, with credits in math, English and science [C].
  - 4) To have good character.

- 5) To have done approved forestry practical work for not less than three months within 12 months of date of admission.

Other ministries or organizations nominate their candidates who are admitted directly to the college, provided they satisfy all of the above conditions. International students are also admitted to the college by possession of similar qualifications except that the home government, in agreement with the Malawi government, will have approved such training.

#### b. Diploma Course

This course is designed to give serving Forest Rangers of the Department of Forestry and other ministries or organizations the additional training they require to qualify them for promotion to Forester. Admission of Malawian students is by competitive selection of the public service commission from men who:

- 1) Possess a Forest Ranger Certificate [V].
- 2) Have had a good record for a minimum of three years service at ranger level.

Admission of foreign students is by arrangement between the Malawi government and the foreign government concerned.

#### Fees and Allowances

Training is free to all direct selection students, but fees are charged for all students nominated by organizations outside the Department of Forestry and for international students. These fees are based on costs of total expenditure per student.

Direct selection students receive a fixed monthly allowance fixed (currently K4000) from which personal tax is deducted every month. Students who are serving officers of the government continue to receive the salaries at the college and they have to pay the appropriate messing fee. All costs are based on the current cost of living. Students are also provided with travel warrants to and from the college for all official trips. However, those who resign are not given warrants. Trainees are surcharged for damage to and losses of government property. Such costs are normally recovered from their monthly allowances.

#### Accommodations and Uniforms

The college has dormitory accommodations for up to 80 Forest Ranger trainees and up to 24 Technical Officer trainees. Students are responsible for keeping their dormitories clean and tidy at all times. Each student is provided with a bed, mattress, 4 blankets, and a wardrobe. Uniforms and protective clothing are also provided. Students are required to take

their meals together in the dining room. No meals are allowed to be served in the dormitories, except when the student is confined to bed.

Country: MALAWI

Name of School: COLLEGE OF FORESTRY

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Forestry Certificate	56262	M.C.E. including credits in math, english & science [C]	2 years	50%	50% applied	Forestry Certificate [V]	Forest Science Forest Biology Forest Engineering Wood Utilization Administration	Forest Protection/Extension Plantation Forestry (Timber, pulp) Forestry Research Forest Industries -- sawmilling, woodworking, etc. Grade: Forestry Assistant and Senior Technical Assistant	0-53.90	See narrative for Theoretical vs. practical content
Forestry Diploma	56262	Forestry Certificate + 3 years of experience; or by arrangement [V]	18 months	45%	55% applied	Diploma in Forestry [U]	Forest Science (Advanced) Forest Biology (Advanced) Forest Engineering (Advanced) Wood Utilization (Advanced) Administration (Advanced)	Same as above Grade: Forester and Senior Technical Officer	0-53.90	

5. Mozambique:

It was not possible to visit an agricultural institution in Mozambique.

## 6. Swaziland

### University of Swaziland, Faculty of Agriculture, Luyengo (Fig. 13)

The Faculty of Agriculture consists of five departments: 1) Crop Production; 2) Animal Production and Health; 3) Land Use and Mechanization; 4) Agricultural Economics, Extension and Education; 5) Home Economics. The faculty offers a certificate course in agriculture (1 year) [D]; two-year diplomas in General Agriculture, Agricultural Education and Home Economics [F]; a Bachelor's degree in Agriculture and a Bachelor's degree in Agricultural Education [H].

Approximately 35 full-time faculty members are employed by the Faculty of Agriculture.

Students who seek a B.Sc. in Agriculture must meet the requirements for entering the Faculty of Science for the first year, then move to the Faculty of Agriculture at the beginning of the second.

There is a pre-entry, 12-week remedial program to upgrade student proficiency in the basic sciences, e.g., biology, chemistry, math, physics, and English.

Country: SWAZILAND

Name of School: UNIVERSITY OF SWAZILAND -- FACULTY OF AGRICULTURE

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
B.Sc. (Agriculture)	66201	School Certificate, Division I, II, III, with english, math, and science [C]	4 years	4 years	None	B.Sc. (Agri.) [H]	General Agriculture including: zoology, microbiology, statistics computer programming. Agriculture, economics, extension, animal production/health, crop production	Professional Agriculturalist	0-53	
B.Sc. (Agriculture Education)	61408	School Certificate, Division I, II, III, english, math, and science [C] or diploma in agricultural educ. [F]	4 years	4 years	None	B.Sc. (Agri. Ed.) [H]	Education: Ag. Ed., Ed. Psychology, Ed. Measurement, curriculum studies analysis of teaching practice, curriculum studies in agriculture, adult and non-formal education. General Agriculture Agri., Econ., Exten. Animal Production and Health	To teach agricultural subjects to Form IV & V	1-32.70	
Diploma in Agriculture Education	51408	School Certificate, division credit in english, math, or certificate from accredited agri. college with minimum of 2 yrs. work exp.	2 years	2 years	None	Diploma (Ag. Ed.) [F]	Practical: 60% Theory: 40% Education -- Ed. Psych. -ed. communications -practice theory -curriculum design. Ag., Econ. Extension	To teach agricultural subjects to Form III	1-32.70	
Diploma in Animal Production and Health	56203	School Certificate, Div. III [C]	2 years	2 years	None	Diploma Agriculture [F]	Animal production and breeding, genetics, nutrition, feeds, beef production, range management	Technical level	6-24.10	
Diploma in Home Economics	56601	School Certificate, Div. III [C]	2 years	2 years	None	Diploma in Home Econ. [F]	Biochemistry and human nutrition, food, clothing, textiles, family life, home technology	Technical level	1-99.30	
B.Sc. (Agriculture Management) (Proposed 1984)	66249	School Certificate, Div. III [C]	4 years	4 years	None	B.Sc. Agriculture Management [H]	Proposed	Professional Agriculture Manager	6-00.20	

Managa Agricultural Management Center (see Figure 14)

Major Programs:

1. Planning and Control in Agricultural Management.
2. Senior Management in Agriculture and Development.

All participants are sponsored. Managa was set up and is sponsored by the Commonwealth Development Corporation -- a British statutory corporation.

The Planning and Control course is a 3-months' training program and the nucleus of Managa. By 1982, 27 courses had been held for some 700 managers from 39 countries in Africa, Asia and the Pacific, and the Caribbean. The focus is on basic management concepts, selected studies and study groups around special fields, and goal-setting. Tutors are used. Admission is granted to managers of agricultural or related organizations, e.g., agri business, with several years of practical experience, and individuals who are considered to have potential for the future. No formal academic requirements are requested. The sponsoring agent selects the candidates, but Managa makes the final selection decision.

The course is limited to 35, and fees are 2,750 pounds sterling which covers tuition, materials, accommodations, full board laundry, local transportation, and medical treatment. International travel is not included.

Ninety percent of the participants are from Africa, with 50% of these from SADCC countries.

Senior Management Training

This is a five-week course for experienced managers with senior responsibilities in agriculture-related institutions. There are no formal entrance qualifications. General managers and senior executives working with agricultural organizations from developing countries are invited through nominations from sponsoring institutions. Enrollment is limited to 35. The program is tailored to individuals' needs through workshops, personal development, lectures, and group discussion.

Topics covered range from global perspectives on agricultural trade, international finance and aid, national matters including technologically innovative organized labor, and organizational activities such as human resources development and structure of systems of organizations.

Tutorial staff works closely with 6-8 managers from similar backgrounds. Fees of 1,800 pounds sterling cover tuition, board and room, etc., but do not cover international travel.

Other courses at Mananga include Credit for Development, the Individual Management Development Program, and Development of Management Trainers. These are carried out on demand.

Country: SWAZILAND

Name of School: MAKANGA AGRICULTURAL MANAGEMENT CENTER

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	L.L.O. Code	Remarks
				Acad.	Employ.					
Planning and Control in Agricultural Management	96202	Management of Agriculture or agriculture-related organizations	11 weeks	11 weeks	None	Participation Certificate	<p>Basic Concepts of Mgmt.</p> <ul style="list-style-type: none"> <li>-study of organizations</li> <li>-agricultural economics</li> <li>-finance &amp; accounting</li> <li>-org. behavior</li> </ul> <p>Selective Studies, e.g.,</p> <ul style="list-style-type: none"> <li>- economics of agriculture production</li> <li>-work performance and motivation</li> <li>-budgetary control</li> <li>-staff development</li> </ul> <p>Management Study Groups</p> <p>Integration</p> <ul style="list-style-type: none"> <li>-project case on nature of work</li> <li>-project case on economic and agricultural development strategy</li> </ul>	Senior agriculturalists and functional specialists	2-1	All participants are sponsored by some institution
Senior Management in Agricultural Development	96202	Senior-level management responsibility	5 weeks	5 weeks	None	Participation Certificate	<p>Group Projects</p> <p>Lectures</p> <ul style="list-style-type: none"> <li>-Organizational Behavior</li> <li>-management finance and accounting</li> <li>-development studies</li> </ul> <p>Individual Study</p> <ul style="list-style-type: none"> <li>-pursue in depth a field of study of individual interest</li> </ul>	<p>Management policy formulation</p> <p>Interpretation and modification of policy</p>	2-1	

## 7. Tanzania

Two institutions in Tanzania warrant careful consideration by SADCC member states as potential institutions for training in agriculture: 1) Kunduchi Fisheries Institute; and 2) College of Wildlife Management. (Although wildlife management might be included in a sector other than agriculture, for the purpose of this study it is included here.)

### Kunduchi Fisheries Institute (KFI)

#### Description and History (See Figure 15)

The KFI is located on the shores of the Indian Ocean, 23 kilometers from the village of Kunduchi. It provides diploma-level training in five subject areas: fisheries biology; fisheries management and administration; food technology; marine engineering; and nautical science. The Institute also carries out applied research and provides consulting services in all aspects of fisheries science. KFI traces its history to 1967 when 13 students were enrolled for the first 2-year diploma course. By 1982 the Institute had trained more than 300 students.

#### The Capacity to Accept Additional SADCC Students

Non-Tanzanian students are required to seek sponsorship through their own relevant ministries. Further information can be obtained from: Director of Fisheries, Ministry of National Resources and Tourism, PO Box 2462, Dar es Salaam, Tanzania.

#### Governance

KFI falls under the jurisdiction of the Fisheries Division of the Ministry of National Resources and Tourism.

#### Tuition

Government bursary

#### Facilities and Infrastructure

The institute has a good specialized library. All students are housed in on-site facilities. A wide range of sports and recreation facilities are available, as is a student canteen. The professional staff numbers about 30, many of whom are graduates of KFI.

The KFI, at this writing, was in process of introducing a 9-months' post graduate diploma course and a 3-year advanced diploma course which would replace the current two-year diploma program.

Country: TANZANIA

Name of School: KUNDUCHI FISHERIES INSTITUTE

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Fisheries Biology	56272	Form VI with passes in biology, chemistry, physics, or 3 subsidiary passes in science, including math. [C]	2 years		Practicum 3rd term of first year	Diploma in Fisheries Science [m]	Fisheries Biology: Ichthyology, population dynamics, oceanography, marine fisheries, mariculture, fresh water fisheries, limnology		6-41	
Fisheries Management & Administration	56272	Same as above	Same as above		Same as above	Same as above	Fisheries Management & Administration: Basic economics Business accountancy and public administration, fisheries statistics, resources use management and planning, fish marketing and development		6-41	
Food Technology	56272	Same as above	Same as above		Same as above	Same as above	Food Technology: Fish processing -- modern and traditional, fish handling, food chemistry, food analysis, applied nutrition, food engineering, food microbiology		7-7	
Marine Engineering	55499	Same as above	Same as above		Same as above	Same as above	Marine Engineering: Internal combustion engines, main engine parts and cycles, auxiliary machinery and systems, engine operation and maintenance, electrotechnology, introduction and magnetism, AC and DC machines, technical drawing		0-39	
Nautical Sciences	56272	Same as above	Same as above		Same as above	Same as above	Nautical Science: Fishing gear technology -- traditional and modern, seamanship, navigation -- intra & coastal, fish attraction, celestial navigation		6-41	

College of African Wildlife Management (See Figure 16)

General Description and History

Located on the slopes of Mt. Kilimanjaro at Mweka, the College of African Wildlife Management is but a short distance from the city of Moshi. The college offers certificate, diploma, and post-diploma courses. It was established in 1963 with assistance from the German government and the Game Department of the Tanzanian government. From the very outset it has functioned as a PanAfrican institution. The first course, in 1963, was attended by students from Tanzania, Kenya, Uganda, and Zambia. To date it has produced more than 1,000 graduates. In subsequent years students have attended from Malawi and Botswana and from many other countries as well.

The school has been the beneficiary of assistance from a wide variety of international and national associations and governments. The college is residential, with room and board provided on campus. Its goal is the training of personnel in the supervision and management of various types of conservation areas. Courses are offered in natural sciences, wildlife management, estate management, and conservation education. Instruction is in English.

Capacity to Enroll SADCC Region Students

The college is currently experiencing some financial difficulties. It is obviously an expensive type of training involving considerable field work. The Tanzanian government has met the greater part of the member government subscription. Shortage of classroom and residence facilities have seriously limited the intake until very recently. Currently the college is undergoing some expansion. New classrooms and dormitories are under construction which will raise the resident capacity from 80 to 120. It is anticipated that by 1985 this should reach 160. When this occurs it is intended to run two streams of certificate and diploma courses each year. Little excess capacity exists at the present time, but beginning in 1984 considerable space should be available to SADCC member states wishing to send students to the college. A possible constraint to regional participation is the relatively high tuition which is currently set at 56,000 Tanzanian shillings per year, which is considerably more per year than, for example, the University of Dar es Salaam. It should be noted that the budget of the college is almost solely dependent upon its fees and charges.

Tanzania's current difficult economic straits and high rate of inflation adversely effect the capacity of the college to provide region-wide services. Communications are increasingly difficult. The college is experiencing a severe shortage of spare parts for its vehicles, a shortage of ammunition and chemicals, as well as binoculars and other specialized equipment. The library is in need of additional reference works and journals.

Students from Mozambique have been and are currently in attendance. Language has proven an obstacle despite the fact that the Mozambique students have had English-language instruction in their own country and three months of extensive English as a second language training in Dar es Salaam before arriving at Mweka.

#### Governance

The governing body is served by representatives of four African nations: Tanzania, Kenya, Zambia, and Nigeria. Five international organizations are also represented on the board.

#### Tuition and Fees

The fees, which cover residential costs, are Tanzanian shillings 56,000 (US\$6,000) of which 18,000 are for board and 38,000 for tuition. Also, non-Tanzanian students are required to pay Tanzanian shillings 200 for an entry permit.

#### Facilities and Infrastructure

With the addition of the new classroom and residence buildings, the facilities will be much improved. The major shortfall is in expendables. Also, access roads are in need of repair and much of the furniture needs replacing. In addition to the classroom block and residence facilities, the college houses a laboratory, study room and social hall. Recent additions include a library, taxidermy room and weapons training area.

Country: TANZANIA

Name of School: COLLEGE OF AFRICAN WILDLIFE MANAGEMENT (CAWM)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Certificate Course Wildlife Management	58999	O-Level [B] pass in biology, chemistry and/or geography plus field experience of 1 year in wild life organization	2 yrs/		30% in field	Certificate in Wildlife Management [j]	Vertebrate biology, earth science, geography, wild life management, surveying, statistics, vehicle and plant engineering, resources administration management of parks, law and conservation, herpetology, ichthyology, botany, ecology, ballistics, invertebrate zoology and wild life diseases, photography, road and building construction, first aid and survival techniques		5-29	
Diploma Course Wildlife Management	58999	Pass in A-Level [C] biology and two of chemistry, physics, or geography	2 years If possess 2-year Certificate from CAWM [j] 1 year		30% in field	Diploma in Wildlife Management [k]	Same as above, plus use of light aircraft and radios; resource administration, law and conservation conventions		6-29	
Post Graduate Diploma Course Wildlife Management	78999	Bachelor's degree in Natural Science [D]	1 year			Post Graduate Diploma in Wildlife Management [6]			6-29	

## 8. Zambia

National Resources Development College (NRDC) (See Figure 17).

### General Description and History

The NRDC, founded in 1964, offers 3-year diploma-level [d] courses in agriculture and related fields, e.g., agriculture, water engineering, nutrition, agricultural education, fisheries, agricultural engineering. Although all programs are substantial and of high quality, all but agricultural education are similar to programs of study offered in nearly all SADC member states. Therefore, analysis of NRDC is limited to its diploma course in agricultural education which potentially could help alleviate the acute shortage of teachers in this area that is characteristic of all SADC member states.

The Natural Resources Development College in Lusaka is situated on a 340 hectare farm, thirteen kilometers from the center of the city and sixteen kilometers from the Lusaka International Airport, on the Great East Road, near Chelston. In addition, the college has a 1600 hectare ranch, three kilometers distant on the side of the Great East Road opposite the college's main entrance.

### Governance

The NRDC falls under the jurisdiction of the Department of Technical Education and Vocational Training in the Ministry of Higher Education.

### Facilities and Infrastructure

The campus is essentially a large, modern, well supplied teaching farm. The farm and adjoining range are stocked with cattle and other livestock. The college has hostel capacity for 500 students.

Country: ZAMBIA

Name of School: NATURAL RESOURCES DEVELOPMENT COLLEGE (NRDC)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Diploma in Agriculture	56201 51408	School Certificate with credit in math, two sciences and english [C]	3 years			Diploma in Agriculture [d]	Agricultural economics, farm accounts, ag. botany, ag. chemistry, math, ag. zoology, surveying, farm management, ag. engineering, animal production, animal health, statistics, soil science, crop production, ag. extension, conservation and irrigation, crop production and research accounting and financial management, marketing and cooperatives, animal production and research, communication curriculum and methods, foundations of education, teaching practice, sociology of education, problems and role of education	Teacher in Agricultural Science at all levels; governmental ag. worker	1-32.70 2-02	

University of Zambia School of Veterinary Medicine .

The University of Zambia planned to enroll its first class in veterinary medicine in October, 1983. It was anticipated that the first class would total 30 students and that in subsequent years the number would rise to 45. If these ambitious plans are realized the University of Zambia should be able to provide an important and sorely needed regional capability. At this point in time little detailed information is available. The SADCC Regional Training Council would be well advised to request the appropriate authorities at the University of Zambia to keep it closely informed as to plans and developments.

## 9. Zimbabwe

University of Zimbabwe Faculty of Veterinary Science (See Figure 18)

### General Information and History

The Faculty of Veterinary Science accepted its first students in March, 1982. Seventeen were accepted, 12 of whom still remain. In 1983 the intake was only 14; however, the goal for 1984 is about 20. The new school's capacity is limited, as it must make do with facilities of sister faculties until its building is completed, hopefully in 1985. At that point the intake could rise to 30. When this occurs, the Faculty anticipates making 15 of the 30 places available to SDCC member states' students.

Entry is limited to candidates at the A-level [E], or to those with two years of college beyond the 0-level. It is not likely that candidates with a bachelor's degree or a diploma in agriculture will be accepted.

### Governance

An integral part of the University of Zimbabwe.

Country: ZIMBABWE

Name of School: UNIVERSITY OF ZIMBABWE FACULTY OF VETERINARY SCIENCE

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Bachelor of Veterinary Science	66232	3 A-level [E] passes: chemistry, biology, math or physics; also pass at O-Level in biology, math, and english	5 years			Bachelor of Veterinary Science [Q]	See University of Zimbabwe prospectus		0-65	

## B. Engineering and Technology

The SADCC member states, with few exceptions, possess substantial mineral wealth. A major impediment to development in this vital sector is the paucity of trained manpower. Thus, it is not surprising that the SADCC Council of Ministers and Regional Manpower Training Council have identified mining engineering and related skills as critical, and seek to further cooperative efforts to meet its manpower requirements. Education and training in this vital field occurs in one form or another in the vocational and technical schools, universities and private sector institutions in nearly every member state. However, the concern of this study is with those few institutions or programs that appear to possess such excellent, highly specialized or extensive resources as to warrant consideration for region-wide utilization.

The relationship between development, and particularly development of a national power and transportation infrastructure, with a variety of engineering levels and skills is readily apparent. All SADCC member states have developed considerable capability in this vital area, with each tending to emphasize those skills and levels of training most critical to its own developmental needs. A few institutions, however, are thought to possess region wide potential capable of augmenting the programs of national institutions, and are included here with that in mind.

1. Angola:Faculdade de Engenharia da Universidade de Angola (Fig. 19)

This Faculty provides quality training but needs additional physical improvement before SADCC cooperation would be viable. The most important difficulty hindering regional cooperation is the unstable faculty brought together by international cooperation, as well as accommodation and food provision restraints. In spite of these drawbacks the Department offers a reasonable standard of training in some fields (electricity, civil engineering, and architecture) and should be encouraged to participate in regional cooperation efforts. The Faculty of Engineering is highly selective. The licenciatura [L] in the following fields requires five years of study.

- Chemical engineering (40 students). It provides training in oil, soap, cement chemistry, and food technology.
- Electricity (50 students). Good facilities in communications and electronics, power systems, and computer science. The computer science program offers a high standard of training and is receiving assistance from Portugal.
- Mechanical engineering (100 students). As a whole, the facilities are obsolete and the equipment is outdated.
- Civil engineering (100 students). The course receives cooperation from the National Engineering Laboratory (a research institute for civil engineers) and therefore has good facilities.
- Mining engineering (80 students). Only three years of a five year training program are currently offered, indicating fundamental irregularities in the program. However, a specialized course in oil extraction is on the drawing board.
- Architecture. The course was established in 1979 and facilities are being built to accommodate 400 to 500 students. The Department also offers a practical internship providing jobs and real technical training for students to compete with other architectural firms worldwide and participate in actual projects in Angola. The program receives assistance from Portugal.

Faculdade de Ciências da Universidade de Angola (Fig. 20)

This small school provides a three-year bacharelato [K] program in biology, chemistry, geology, geophysical science mathematics and physics. The biology, and geological sciences, departments, and the geodesy section of the mathematics department, have good facilities and are well equipped. The Department of Biology provides research and cooperation in the fisheries and agriculture sectors. The Department of Geology also provides technical support to the state Department of Geology and Mines. The faculties of both biology and geology are mainly made up of Angolan teachers, encouraging more stability and a lower rate of teacher turnover.

Country: ANGOLA

Name of School: FACULDADE DE ENGENHARIA, UNIVERSIDADE DE ANGOLA  
(SCHOOL OF ENGINEERING, UNIVERSITY OF ANGOLA)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Arquitectura	65801	Ensino Médio [I]	5 yrs.			Licenciatura em Arquitetura [L]	Architecture, Building, Town Planning, Design, Environmental and Social Studies in Relation to Architecture and Town Planning, Housing, Equipment, Landscape, etc.	Arquitecto	0-21.20.30	
Engenharia	65416	Ensino Médio [I]	5 yrs.			Engenharia Civil [L]	Mathematics, Physical Sciences, Construction, Hydraulics, Structure of Roads, Railways, and Aerodome Construction	Engenheiro Civil	0-22.10	
Engenharia	65422	Ensino Médio [I]	5 yrs.			Engenharia Electrotécnico [L]	Mathematics, Physical Sciences, Applied Electricity, Electronics: 1) Telecommunications and Equipment; 2) Power Production and Distribution; 3) Computer Sciences Technology	Engenheiro Electrotécnico		Specialities: 1. Electronics 2. Power Systems

Country: ANGOLA

Name of School: FACULDADE DE CIENCIAS, UNIVERSIDADE DE ANGOLA  
(SCHOOL OF SCIENCES, UNIVERSITY OF ANGOLA)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Biologia	64202	Ensino Médio [I] or P. Univ. [F]	5 yrs.			Licenciatura em Biologia [L]	Courses (9 semesters): General Mathematics (I & II), Basic Chemistry, Biology (I, II, III), Political Training, Organic Chemistry, General Physics (I & II), Biochemistry (I & II), Histology and Embryology, Talofitos, Anachordates, Parasitology, Cellular Physiology, Geology, Carnophyts, Bacteriology and Virology, Biostatistics, Chordates Ecology (I & II), Genetics, Plant Physiology, Animal Physiology, Economic Botany, Human Biology, Zoology, Internship Projects.	Biologo	0-51.10	
Geologia	64222	Same as above	5 yrs.			Licenciatura em Geologia [L]	Internship (1 semes.). Courses (9 semesters): General Mathematics (I, II, III), Basic Chemistry, Descriptive Geometry, General Geology, Inorganic Chemistry, Elements of Topography, Crystallography, General Physics (I & II), Chemical and Industrial Analysis, Mineralogy, Statistical Methods, Petrology (I & II), Stratigraphy and Geohistory, Geomorphology, Paleontology, Tectonics, Geological Photography and Cartography, Structural Geology, Geology of Angola, Elements of Geophysics, Sedimentology, Geochemistry, Minerals I, Hydrology, Prospecting Techniques, Field Geology, Mineral Analysis, Applied Geology Seminar (1 semester).	Geologo	0-13.30	

Instituto Makarenko

This Institution provides post secondary technical training (a four year program) in civil construction, mechanics, electricity and chemistry. As this school is over-attended and most of its equipment is obsolete, it is not recommended for SADCC regional cooperation.

Instituto Nacional de Petroleos - Sumbe (Fig. 21)

This Institute includes schools of the oil industry:

- a. Instituto Medio de Petroleos located in Sumbe. This Institute will provide a four year post secondary course in prospecting, extraction, production, and petro-chemical processing. Currently drilling and oil production courses are being offered.
- b. Escola Central de Petroleos. This Institute is located about 13 kilometers outside of Sumbe and provides training in the same fields at the secondary technical level. Thirteen courses are offered, but vary according to the needs of the industry. Generally, two or three courses are offered simultaneously. Currently courses are offered for electrical technicians, but will expand into other areas including production operation, auto mechanics, and electricity. Courses last between 15 to 18 weeks which creates a permanently dynamic course program. Residential facilities are located at the school and are utilized by students attending the Instituto Medio as well. The facilities are new and in good order. The school has received assistance from Italy and the UNO (United Nations Organization - Plan for Regional Development).

Country: ANGOLA

Name of School: INSTITUTO NACIONAL DE PETROLEOS  
(NATIONAL INSTITUTE OF PETROLEUM)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Furação e Produção (de Petróleos) (Ensino Técnico Médio)	55435	Ensino de Base (8 yrs.) [D]	4 yrs.	83%	17%		Arts, Social Sciences, Mathematics, Physical Sciences, Geological Sciences, Oil Extraction and Production Technology	Tecnico Médio	0-38.20	
Curso Operadores de Produção (de Petróleos)	35436	Ensino de Base (8 yrs.) [D]	13 mo.	54%	46%		Mathematics, Physical Sciences, Oil Extraction and Production Technology	Operador de Produção		

## 2. Botswana

### Botswana Polytechnic

The policy of the Polytechnic is to train large numbers of craftsman [S] and [T], and a lesser number of higher trained technicians [Y]. To this end, two-year full-time craft courses have a yearly intake and a yearly output. Technician Certificate and Diploma courses have a bi-annual input and output.

Not all of the courses require two years of continuous full-time study. Many are "sandwich-type" courses. A thick sandwich requires one year at the Polytechnic, one year at work, and a final year at the Polytechnic. A thin sandwich requires one term at the Polytechnic, one year at work, and so on until the required number of terms has been covered.

Except for short courses, certification is at international standards. City and Guilds courses suitably modified to suit local needs are used to monitor standards.

It must be emphasized that even successful students will require further on the job training after leaving the Polytechnic before they can be considered to be fully skilled.

### Craft Courses [S] and [T]

Normally these are:

- a. A good pass at a Junior Certificate [B] or [C] level, with a grade of C or better, including English, Mathematics, and Science.
- b. Satisfactory completion of a Polytechnic interview and (possibly) selection test.

Mature students with a good command of English may be accepted without a Junior Certificate provided that they are strongly recommended by their employers.

### Technician Courses [Y]

There are two main methods of entry to Technician Courses:

- a. Possession of a Craft Certificate [T] with credit or distinction.
- b. Possession of a School Certificate [D] with grades of 6 or better in Mathematics, Science, and English.

Automotive Trades Training School (A.T.T.S.)

The objective of the A.T.T.S. is to produce craft level artisans in Auto Mechanics, Auto Electricians and Heavy Plant Mechanics [U]. All courses are of three years full-time duration and the total number under training at any time will be 120. The output is therefore 40 per year.

An international City and Guilds craft certificate is offered in addition to an internal one. Entry requirements are a junior certificate [B] or [C] and an A.T.T.S. test. After training, two further years of on-the-job training are needed before graduates can be classified as fully skilled.

### 3. Lesotho

The highest level credential offered in Lesotho is a certificate, awarded by the City and Guilds of London Institute or the Royal Society of Arts.

#### 4. Malawi:

##### Polytechnic of the University of Malawi (See Figure 22)

The Polytechnic curriculum has relevance for SADCC regional training primarily at the degree level where the following degree programs are provided: Bachelor of Science in Engineering and Bachelor of Science in Technical Education.

The Bachelor of Science in Engineering [I] is a 3-year program after successful completion of the diploma program in engineering [D]. The final year of this program offers specialized options such as operational engineering, electromechanics, and civil engineering.

The Polytechnic also offers a Bachelor of Science in Technical Education [F] for technicians, a two-year program for teaching at technical schools through the senior secondary level. Admission is based upon prior completion of the three-year Diploma in Secondary Teaching [D]. These graduates can teach woodwork, metal, drawing, engineering, math, and science.

Country: MALAWI

Name of School: POLYTECHNIC OF THE UNIVERSITY OF MALAWI

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
B. Sc. (Engineering)	65416 65422 65442	Diploma (Engr.) [D]	3 years	3 years	None	B.Sc. in Engineering [I]	Electro/mechanical option Civil engineering option	Engineer	0-22 0-23 0-24	The last year there is a measure of specialization in either electro-mechanical operational, or civil engineering options
Bachelor of Science (Technical Education)	61408	Diploma in Engineering, or Diploma in Technical Teaching [D]	2 years	2 years	None	B.Sc. in Education (Technician) [F]	Education studies, professional and curriculum studies, subject area studies, supervised teaching experience	Teacher through senior secondary level in technical schools	1-32	

## 5. Mozambique:

All post secondary institutions in Mozambique follow the same pattern. There is only one university. The only school visited was the Instituto Industrial de Maputo.

### Instituto Industrial de Maputo (Fig. 23)

Founded on the Portuguese model in the 1960s, prerequisites include nine years of previous schooling [C]. Courses began in 1978 after a period of post independence transition. Since then approximately 60 students have graduated. Courses take three years in day classes and four years of night classes. They provide training for technicians [N] in four main branches:

- a. Construction
  - Hydraulics and sanitary engineering (day classes)
  - Building (day and evening classes)
- b. Mechanics
  - General mechanics (day and evening classes)
  - Auto mechanics (day classes)
- c. Electricity
  - Electrical and industrial systems (day and evening classes)
  - Electronics (day classes)
- d. Chemistry
  - Analytic chemistry (day classes)
  - Industrial chemistry (evening classes)

There are about 1,000 students, 650 in day classes and 350 in evening classes. There are 64 teachers (47 are full-time permanent, the rest part-time). At the present moment there are no vacancies for students from SADCC except in the daytime construction classes. In spite of financial difficulties, the infrastructure is being improved slowly as buildings need to be improved.

The University is considering abolishing all bacharelato degrees, so it is imperative to upgrade this Institute to fill the coming gap in technical training at the diploma level. Advanced courses at the Institute, courses would be cheaper than those currently provided at the University.

Country: MOZAMBIQUE

Name of School: INSTITUTO INDUSTRIAL DE MAPUTO  
(INDUSTRIAL INSTITUTE OF MAPUTO)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Construção - Hidráulica e Saneamento	55415	9ª Cl. do Ensino Secundario Geral [C]	3 yrs.	85%	15%	Ensino Médio Técnico	General Education, Mathematics and Physical Sciences, Related Applied Sciences, Hydraulics, Water Supply, Sewage	Técnico Médio	0.22.50 and 0/22/55 (both at the technician level.	
Construção - Edifícios	55415	Same as above	3 yrs.	86%	14%	Same as above	General Education, Mathematics and Physical Sciences, Related Applied Sciences, Building.	Técnico Médio	0.33.10	
Mecânica - Geral	55442	Same as above	3 yrs.	86%	14%	Same as above	General Education, Mathematics and Physical Sciences, Related Applied Sciences, Machines, Tool Machines, Machine Making, Industrial Machines	Técnico Médio	0.35.10	
Mecânica - Mecânica	55992	Same as above	3 yrs.	92%	8%	Same as above	General Education, Mathematics and Physical Sciences, Related Applied Sciences, Motor Cars, Engines, Maintenance, Motorized Transportation	Técnico Médio	0.35.20	
Industrial - Sistemas Eléctricos Industriais	55422	Same as above	3 yrs.	84%	16%	Same as above	General Education, Mathematics and Physical Sciences, Related Applied Sciences, Electrical Measurements, Electrical Machines, Electrical Equipment, Lighting, Power Distribution	Técnico Médio	0.34.20	
Industrial - Indústria Electrónica	55422	Same as above	3 yrs.	85%	15%	Same as above	General Education, Mathematics and Physical Sciences, Related Applied Sciences, Instrument and Measurement, Electronics, Telecommunication Systems, Automatic Control	Técnico Médio	0.39.10	

Country: MOZAMBIQUE

Name of School: INSTITUTO INDUSTRIAL DE MAPUTO (cont'd)  
(INDUSTRIAL INSTITUTE OF MAPUTO (cont'd))

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Industrial - Química Laboratorial	55284	Same as above	3 yrs.	85%	15%	Same as above	General Education, Mathematics and Physical Sciences, Related Applied Sciences, Biochemistry and Microbiology, Chemical Analysis, Chemical Technology	Técnico Medio	0-14.20	
Industrial - Química Industrial	55412	Same as above	3 yrs	85%	15%	Same as above	General Education, Mathematics and Physical Sciences, Related Applied Sciences, Chemical Analysis, Industrial Control, Thermo Technology, Chemical Technology	Técnico Medio	0-36.10	

## 6. Swaziland:

### Swaziland College of Technology (SCOT) (See Figure 24)

Located on 40 hectares of land, the College can now accommodate approximately 600 residential students. The teaching staff numbers over 50. Courses vary widely in duration and complexity.

Vocational and technical programs offer craft and artisan level electrical courses. Because workers are asked to make technical decisions beyond repair and maintenance, 70% is theoretical content and 30% practical. Mechanical engineering emphasizes craft over technician training and courses reflect this, i.e., 70% practical and 30% theoretical.

Intake of students at SCOT is of two types: 1) those direct from school enter from Form III [B] for 18-24 months; 2) trainees from industry with 3-5 years experience plus a junior certificate [B] enter for a 12 months' program.

The City and Guilds of London Institute (CGLI) examinations are given, with written papers plus three workshops locally assessed. Also, a trade test is given for multi-skills testing. CGLI Certificates are: Part I, Technicians I; Part II, Technician II; Part III (proposed for next year at which time a full certificate will be given for Technician Engineer [R]).

### Technical Teacher Training

SCOT offers two-year programs leading to a commercial (or technical) Teacher Training Certificate [U]. Admission is based on a School Certificate [C], III Class, with at least two credits. Graduates are qualified to teach up to the Junior Certificate level [B].

SCOT is developing a university-level feeder training program which will lead to a diploma. Admission will be based upon the Teacher Training Certificate [U] and two years of successful teaching experience. Graduates will be qualified to teach up to the School Certificate level [C].

Country: SWAZILAND

Name of School: THE SWAZILAND COLLEGE OF TECHNOLOGY (SCOT)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ					
Ordinary Technician Diploma	654	School Certificate, Div. III [C]	2 years	2 years	None	Ordinary Tech. Diploma [T]	Mechanical or Electrical Engineering (technology)	Technician and Supervisory level	0-34 0-35	
Mechanical Engineering Technicians Certificate	55442	School Certificate, including credit in math and science. Good practical exper.	Part I: 12 mos. Part II: 12 mos.	Part I: 12 mos. Part II: 12 mos.	None None	Technician's Certificate [R]	Mechanical Engineering (technology)	Technician ability without supervision	0-34 0-35	
Electrical Technician Certificate	55422	School Certificate, including credit in math and science. Good practical exper.	Part I: 18 mos. Part II: 18 mos.	Part I: 18 mos. Part II: 18 mos.	None None	Technician's Certificate [R]	Electrical Technician (technology)	Technician ability without supervision	0-34.05 0-34.10	
Telecommunications Technician Certificate	55422	School Certificate including credit in math and science	Part I: 12 mos. Part II: 12 mos.	Part I: 12 mos. Part II: 12 mos.	None None	Technician's Certificate [R]	Telecommunications including technician in post and telegraph and broadcasting, and radio communications	Technician ability without supervision	0-34.30	
Water Technician Course	55416	School Certificate, including pass in chemistry biology, math or CGLI in general construction	4 years "sandwich"	Year 1 at college, Year 4 at college	Year 2 and 3 in field	Internal Exam recognized by the World Health Org.	General knowledge of public health, waterworks, sewage disposal plants -hydraulic and hydrology -chemical operations -rural water supply	Technician ability without supervision	0-39	
Land Surveying Diploma	55402	School Certificate, including math, science and english [C]	3 years	3 years	None	Diploma [W]	Survey theory and practice, engineering and topographical surveying	Private and public sector organizations as technicians in land surveying	0-33.30	
Cartography Certificate	55499	School Certificate [C]	2 years	2 years	None	Certificate [X]	Construction of grids, graticules, drawing, indoor/outdoor maps, air surveys, photography, construction of maps from air photography	Basic skills and techniques of map construction and compilation, draughtsmanship and scribing	0-32.60	
Science Lab Technician Certificate	55284	School Certificate including math and science [C]	12 mos.	12 mos.	None	Certificate [X]	General lab. technician	Broadly trained laboratory technician to work with minimal supervision. Fundamentals of lab practice and procedures, scientific principles	0-54.90	

Country: SWAZILAND

Name of School: THE SWAZILAND COLLEGE OF TECHNOLOGY (SCOT) (cont'd)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	L.L.O. Code	Remarks
				Acad.	Employ.					
Technical Teacher Training Certificate	51408	School Certificate Div. III [C]	2 years	2 years	None	Technical Teacher Training Certificate awarded by the University of Swaziland [U]	Technical and geometric drawing, woodwork and metalwork theory and practice, aims and principles of education, teaching methods, teaching practice, classroom management  /Grad. Requirements Internal exam by Faculty of Educ.	Teach metalwork, woodwork and graphics to Junior Certificate level	1-32.80	
Commercial Teacher Training Certificate	51408	School Certificate, with credit in english [C]	2 years	2 years	None	Commercial Teacher Training Certificate awarded by the University of Swaziland [U]	Commerce, bookkeeping, typing, office practice principles of education, teaching methods and practice, commercial english and math.  /Grad. Requirements Intermediate and advanced Pitman exams, office practice and english	Teach commercial subjects up to the Junior Certificate level	1-32.60	

## 7. Tanzania:

The offerings of the University of Dar es Salaam School of Engineering are extensive and of a high quality. The departments of civil, mechanical, electrical, and chemical and process engineering share a common first year syllabus and provide their own specialized programs in the second, third, and fourth years. Considerable training in industry is also required. The University of Dar es Salaam and the Universidade de Angola are the only institutions in the region offering a degree program in chemical engineering. With this exception, the engineering and technology programs available at the university are essentially similar to those in the universities of the other SADCC member states.

## 8. Zambia

The Zambian economy is highly dependent upon the mining industry generally and particularly that of copper. Copper mining began in the town of Luanshya in 1931. It follows, therefore, that the University of Zambia and the polytechnic and industry training institutions have developed high levels of instruction worthy of consideration by other SADCC member states.

The dimension of the task facing a newly independent Zambia is suggested by the fact that at independence in 1964 nearly 8,000 Europeans were employed in the mining industry. There was also an African labor force of 41,000, 70% of whom were illiterate and 20% possessed only a primary school education. By the end of 1970, however, the expatriate labor force had been reduced by 40%.

At the time of independence, only one Zambian college graduate was employed in the mining industry. No Zambian artisans were employed at that time. In a pattern that has become all too familiar, independence was accompanied by a precipitous exodus of trained manpower before localization had a chance to become effective. Also posing an obstacle was the traditional apprenticeship approach to the preparation of artisans -- a process that took five years and one that obviously could not satisfy the replacement needs of an industry faced with the departure of more than 3,000 white skilled workers.

Unlike most countries, Zambia has opted to place its technical training institutions in a separate Department of Technical Education and Vocational Training (DTEVT) in the Ministry of Higher Education. A number of training institutes were established, some of which are described below. Generally, these institutes accepted school-leavers from Form III (10 years of schooling) to study theoretical skills for 27 months followed by one or two years in practical work situations, after which they received a certificate as artisans or technicians.

The significance of inadequate secondary school preparation in science and mathematics, fields so critical to skills required in mining technology, is revealed by the fact that in 1975 only 390 Zambian candidates sat for the physics O-level exam and only 56 (of whom many were non-Zambians) passed at the 1st, 2nd or 3rd level. None the less, enormous strides have been made which augur well for Zambia's mining technology. By 1981 the single Zambian graduate in the mining industry had been augmented by 456, of whom 177 hold degrees in fields related to mining.

Although not covered in this study, it should be mentioned that the training capability of the mining industry itself, which falls under the authority of the Mining Industry Manpower Services Unit (MIMSU) is extensive. In addition to

mounting its own training program, MIMSU administers scholarships and sponsors programs on a centralized industry basis and also serves as the liaison agency with industry and with the training institutions.

University of Zambia School of Mines: (See Figure 25)

General Description and History

The University of Zambia School of Mines provides a first degree in mineral sciences [H] with a choice of three fields of specialization: geology, metallurgy, and mining engineering. It also offers Master of Science degree programs [L] in geology, metallurgy, and mineral processing.

Capacity of the University of Zambia School of Mines to Enroll SADCC Students

Although the university is afflicted with fiscal and staff difficulties common to most institutions in the region, it possesses a capability of providing valuable services to SADCC member states. A prototype arrangement wherein Tanzania sends students to the University of Zambia's School of Mines, while Zambian students attend the University of Dar es Salaam's School of Pharmacy, is illustrative of what can be accomplished. A small number of students, most often industry-sponsored, are currently enrolled at the undergraduate level. The number of students has grown over the years and now totals 188. The professional instruction staff total 24, including about 6 on leave. About one-half have Ph.D.s and the others have various master's or specialized degrees.

Governance

The School of Mines is a college of the University of Zambia and is administered by a Dean.

Tuition

Undergraduate tuition is K300; board and accommodations K800 for Government of Zambia-sponsored students. For non-sponsored students the costs are K540 and K800, respectively.

Facilities

Facilities are adequate. Some staffing problems are evident while awaiting the completion of studies overseas by young Zambian faculty members.

Country: ZAMBIA

Name of School: UNIVERSITY OF ZAMBIA SCHOOL OF MINES

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Bachelor of Mineral Sciences	64222 65436	School Certificate in English, math (B), chemistry, physics, or physical science + one other science subject + satisfaction of year 1 requirement in School of Natl. Sciences	5 years		Practical work end of 3rd and 4th year	Bachelor of Mineral Sciences [H]	1 year in School of Natural Sciences, geology, metallurgy, mining engineering		0-13.20 0-13.30 0-26 0-27	
Master of Science in Geology, Metallurgy, and Mineral Processing	74222	Relevant undergraduate degree [H]	2 years			Master of Science [L]	Geochemistry, exploration geophysics, sedimentary basin analysis, ore body, geotechnics, regional exploration planning, advanced hydrogeology, resource evaluation		0-13.20 0-13.30 0-26 0-27	

### Zambia Institute of Technology (ZIT) (See Figure 26)

Non-degree mining technology programs are offered at ZIT and warrant SADCC member states' consideration as an institution capable of providing excellent training.

#### History and General Information

ZIT was founded in 1970 and occupies a modern campus (capable of enrolling 3,000 full-time resident students) in the city of Kitwe. The current enrollment is about 1,600. It is certainly one of the region's largest and best equipped polytechnics. ZIT is composed of six training departments: 1) academic and industrial science; 2) business studies; 3) construction; 4) electrical and electronics; 5) mining; 6) secretarial and extension.

The institute operates on a 10-week term -- four terms a year -- and students are required to obtain practical experience in industry on a regular basis ("industrial break"). Successful completion of the technician courses leads to an advanced certificate [j], while those pursuing the technology level courses receive a diploma awarded by the Department of Technical Education and Vocational Training in the Ministry of Higher Education [k].

#### The Capacity of ZIT to Admit Additional SADCC Students

A few SADCC regional students currently attend ZIT; most of them are sponsored by the Commonwealth Office. One must note the possible effect of a 5% limitation on enrollment of non-Zambian students on cooperation in manpower training in the SADCC region. There is evidence that Botswana is interested in sending students to the mining program and ZIT is prepared to accept them if they meet the entry requirements. In terms of physical capacity ZIT could accommodate as many as 500 SADCC students; by diverting lower level skill training programs to other institutions even additional spaces could be obtained. ZIT represents an excellent illustration of an institution with excess capacity, but limited budget and staff resources which adversely affect what additional services it might provide. The unfilled places at ZIT are not caused by satiated need or the absence of legitimate demand. Unfortunately, underutilized facilities are attributable to budgetary limitations and to corresponding staff difficulties.

Consideration should be given by the SADCC Regional Training Council to approach donor(s) with a view to addressing these limitations. The situation is a critical one. ZIT is highly subsidized and the fees of unsponsored students are essentially nil. Therefore, the inclusion of non-Zambian students, despite excess facilities, can only be achieved at the cost of foregoing the enrollment of Zambians -- unless, of course, the SADCC students carry a stipend with them equivalent to the true cost of the training.

Zambia's relatively stagnant economy has had the effect of saturating the training needs in certain areas, e.g., construction technicians, which ironically provides a pool of candidates for the teaching profession.

Acute staffing problems caused by budgetary limitations and by fundable but unfillable vacancies are partially alleviated by part-time instructors recruited from local industry. The detailed data on ZIT presented in this report is limited to the mining programs, which are sufficiently unique as to warrant consideration for utilization by SADCC states.

Although not treated in detail here, reference should also be made to Zambia's Northern Technical College and especially to its heavy equipment technician course of 2-1/2 years duration with entry requirements comparable to those at ZIT and to its similar advanced certificates. Much of the training in this course is carried out on heavy earth moving (mining) equipment which prepares its graduates for positions in the mining industry's heavy equipment workshops.

#### Governance

ZIT is a part of the Ministry of Higher Education, Department of Technical Education and Vocational Training.

#### Fees and Other Costs

The institute is heavily subsidized by the Zambian government. The total package for industry sponsored students is K750 per year, of which K450 is for food. Non-Zambians pay K1,500 per year, which includes food and accommodations. In addition, local students receive a stipend of K20 per month.

#### Facilities and Infrastructure

The equipment generally shows evidence of long periods of hard use, though given the limitations of budgets and foreign currency complications it seems to be well maintained. About 40% of the staff are Zambians. Expatriates include professionals from a variety of nations, e.g. Sri Lanka, India, United Kingdom, Ireland, and the Philippines. Indicative of the budget crunch was the recent necessity to forego the use of ZIT's IBM computer.

Country: ZAMBIA

Name of School: ZAMBIA INSTITUTE OF TECHNOLOGY (MINING DEPT.) (ZIT)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Mining Technician	55436	School Certificate [C] with Math, a suitable science & English	2-1/2 yrs.			Advanced Certificate [j]	Math, physics, chemistry communications skills, technical drawing, engineering drawing and science, geology, metallurgy, surveying management and organization, electrical and mechanical engineering	Shift boss Mine captain	0-38	
Mining Metallurgy Technician	55432	Same as above	2-1/2 yrs.			Advanced Certificate [j]	Math, metallurgy, physics mineral engineering, chemistry, properties & application of materials foundry technology, Communication skills, technical drawing, materials handling, geology, hydro-metallurgy, surveying & drafting, pyrometallurgy management and organization, refractory & furnace design, electrical & mechanical engineering, industrial chemical analysis	Metallurgical Plant Supervisor	0-37 0-38	
Mining Surveying Technician	55436	Same as above	2-1/2 yrs.			Advanced Certificate [j]	Same as Mining Technician + mine surveying, e.g., triangulation curves, tachometry, plan completion, levelling, quantities specialized mining techniques	Assistant Surveyor; Sectional Surveyor	0-31.30	
Mine Ventilation Technician	55436	Same as above	2-1/2 yrs.			Advanced Certificate [j]	Same as Mining Technician + mine ventilation, e.g., natural fan and auxiliary ventilation, air flow and distribution, refrigeration, ventilation planning, mining regulations, dust, fire control, mine gases, heat, ventilation practice and related calculations	Ventilation Assistant Ventilation Officer	0-35.50	

Country: ZAMBIA

Name of School: ZAMBIA INSTITUTE OF TECHNOLOGY (MINING DEPT.) (cont'd)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Mining Surveying Technology	55436	School Cert. [c] with Math, a suitable science and English + a good pass in advanced certificate [j]	1 year			Diploma [k]	Math, physics, survey, instrumentation, theory of observation, advanced surveying, adv. U/G surveying, electronic surveying, field astronomy, photogrammetry, computer programming, mining, economics, geology	Higher Technician Surveying	0-31.30	
Mining Metallurgy Technology	55432	Same as mining metallurgy tech. with good grades and advanced certificate [j]	1 year			Diploma [k]	Chemical principles of metallurgy, math, computer science, process control instrumentation, management for the mining industry, mineral engineering, hydrometallurgy, pyrometallurgy, metallurgical calculations, process metallurgy, project	Higher technical and management areas of metallurgical industry	0-37.20	

## 9. Zimbabwe

The Technical College Bulawayo (TCB) (See Figure 27), offers an excellent program in mining engineering and could make an important contribution to preparing skilled manpower for this industry in member SADCC states.

### Brief Description and History

The Technical College Bulawayo provides training programs in four divisions: civil engineering, mining and building; commerce; electrical engineering; and mechanical engineering. In addition it supports Departments of Adult Education, Secretarial and Commercial Studies, Professional and Management Studies, Mathematics and Science, and Hotel Keeping and Catering. The School of Mines offers National Technician Diploma (b) courses in mining, mine surveying, mineral processing, and extractive metallurgy. Enrollment capability is about 2,500. With few exceptions all students upon entering the mining program are sponsored and subsequently employed by the mining industry.

### Capacity of the Technical College Bulawayo to Enroll Additional SADCC Students

As with most Zimbabwe institutions, TCB is not able to satisfy local demands and only with difficulty can conceive of accepting substantial numbers of SADCC students, and then only if resources are made available to expand existing facilities and staff. At this writing, with the exception of 3 Botswana, there are no non-Zimbabwe nationals enrolled in TCB's division of civil engineering, mining and building. The School of Mines is closely related to Zimbabwe's Chamber of Mines, which sponsors most of the students. So long as it does not deny a place to a Zimbabwe student, TCB spokespersons expressed a willingness to consider accepting additional SADCC students.

It is important to note that the work in the mines is an integral part of the training program and TCB's spokespersons expressed doubt as to whether it would be possible to secure work assignments in Zimbabwe for non-local students. Because of the depressed state of the mining industry it is proving to be increasingly difficult to secure on-the-job work positions for Zimbabwe's own students.

Teaching staff levels are dangerously depleted due to the exodus of expatriates. This has occurred for a variety of reasons, including the fact that most stand to earn 50% more in the private sector in Zimbabwe.

Ironically, improvement in the mining economy would serve to further draw off teaching staff. Adequate staffing in this unit calls for nine professionals. Currently there are only four, three of whom are over 65 years of age. Efforts, have been made to recruit staff from abroad with limited success.

The fact that the students are required to serve a year in the mines in on-the-job training before attending TCB, and then 12 weeks in the mines each year during the second and third years of the program, could pose some obstacles to SADCC-wide participation in the program unless similar on-job experiences could be developed in other SADCC countries.

#### Governance

TCB is within the jurisdiction of the Ministry of Manpower Planning and Development, with close working relationships with the mining industry and its various associations.

#### Tuition and Fees

While learning in the mines during the first year of the program, the learner (cadet) receives from 350 to 500 Zimbabwe dollars per month. This stipend is continued for the second year to the point of obtaining an Intermediate National Technicians's Diploma [g], then through the third year, after which one obtains the National Technician Diploma [b]. Tuition is paid by the mining industry and totals 100 Zimbabwe dollars a year plus a 5 Zimbabwe dollars exam fee per subject, a total of 30 Zimbabwe dollars.

Out-of-country students such as those from Botswana pay 200 Zimbabwe dollars per year.

#### Facilities and Infrastructure

The TCB campus is large, accommodating up to 5,000 students per year. The machine shop is well equipped; stocks and spares, in contrast to Zambia and Tanzania, are plentiful and most machinery is up and running. The absence of journeymen, due to the exodus of expatriates, poses a serious training problem at TCB.

Country: ZIMBABWE

Name of School: TECHNICAL COLLEGE BULAWAYO (TCB) SCHOOL OF MINING

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Intermediate Diploma Course in Mining	55436	1 year training in mining industry + O-Level or school cert. passes in math, english, science & one other, preferably another science	2 years	1 year	1 year	Intermediate National Technician's Diploma [g]	Math, chemistry, assaying, mechanics, statistics, dynamics, electro technology Mining, surveying, geology, ventilation		0-37.20 0-38.10	
National Diploma Course Mining	55436	Successful completion Intermediate course in Mining [g]	1 year			National Technician's Diploma [b]	Math, engineering science, electrotechnology mining, ventilation, mine economics, mineral dressing, extractive metallurgy, mining plant, plant and machinery, physics, mining surveying, geology, legal knowledge	Certificate competency mine survey, mine manager diploma, plant foreman, mill manager	0-37.20 0-38.10	
Intermediate Diploma Course Mine Survey	55436	Same as Intermediate Diploma Course in Mining	2 years	1 year	1 year	Intermediate National Technician's Diploma [g]	Math, chemistry, engineering science, electrotechnology, mining, surveying, geology		0-31.30	
National Diploma Course Mine Survey	55436	Successful completion of Intermediate Mine Survey Course [g]	1 year			National Technician's Diploma [b]	Surveying, geology, ventilation, mine economics, mineral dressing, extractive metallurgy, mining plant, legal knowledge	Certificate competency Mine Survey	0-31.30	
Intermediate Diploma Course Mineral Processing (Metallurgy)	55432	Same as Intermediate Diploma Course in Mining [g]	2 years	1 year	1 year	Intermediate National Technician's Diploma [b]	Math, chemistry, assay, engineering science, electrotechnology, mining, surveying, geology, ventilation		0-37.20 0-38.10	
National Diploma Course Mineral Processing	55432	Successful completion Intermediate course in Mining	1 year			National Technician's Diploma	Ventilation, mine economics, mineral dressing, extractive metallurgy, mining plant, plant and machinery, plant economics, legal knowledge	Mill Manager	0-37.20 0-38.10	

### Commentary on Vocational, Technical, and Polytechnic Institutions

In reviewing the activities of professional and technical training programs, the polytechnics stand out as potential regional training institutions which can play an important role in regional manpower development. Each of the polytechnics visited has strengths and competencies of its own. There is great variation in emphasis however; e.g., occupational skills, technical or professional training, practical versus theoretical approaches.

The two polytechnics discussed in this study were chosen primarily because they represent two different approaches to manpower development in their respective countries, not because they were considered superior to others. SCOT in Swaziland focuses more on the practical, lower- and middle-entry level students, whereas the Malawi Polytechnic, attached to the national university, places more emphasis on higher technician and engineering entry level professionals. The other two polytechnics visited, in Botswana and Lesotho, fall between these two in terms both of level of training and practical/theoretical orientation. It is suggested that these institutions represent a choice for the countries of the region as each has different needs in the area of vocational and technical education.

Some skill up-grading and retraining of manpower is carried out within the polytechnics. However the polytechnics in the region do little on-the-job training of employed workers, or little to support employing establishments who are conducting their own training, particularly in the private sector. Since there will be an increasing shift of employment to the private sector in the coming years it is believed that the polytechnics can play a very active role in complementing private sector efforts. The polytechnics can provide training infrastructure to the private, public, and parastatal employing establishments which are attempting to train their own manpower. Such support can take the form of instructor training, providing tailored curricula and materials, and advisory support.

The direct involvement of these polytechnics in the training efforts of employing organizations has the additional benefit of keeping the polytechnics in touch with the needs of industry and the marketplace. This contact is more likely to result in modifications of curricula in the polytechnics thus bringing them more quickly in line with the state of the art in practice.

### C. Teacher Training

If skilled manpower is requisite to the economic development of SADCC member states then surely quality science, math and technical teachers are critical to the preparation of skilled manpower. Development and technology are interdependent variables; technology is particularly dependent on a citizenry and work force possessing an adequate knowledge of mathematics and science.

Unfortunately, however, it is in this critical area that the educational systems of the SADCC region are most deficient. It is generally recognized that the major factor contributing to inadequate learning in these critical subject areas is the quality of instruction -- which in turn is primarily a factor of ill-prepared and/or unqualified teachers. Without a significant qualitative and quantitative improvement in the supply of science, math and technical teachers, it is doubtful whether SADCC member states will be able to realize their developmental aspirations in such priority areas as transportation, industry, energy, agriculture, construction and mining.

Independence spurred the new governments to examine the relevance of inherited institutions generally and to begin dismantling aspects of the old systems of education and substitute what it was hoped would prove to be more relevant programs and processes. The distance that must be traveled is considerable and varies significantly in each country within the region. For example, the transition rate from primary into secondary school reaches a high of 69% in Swaziland, but is as low as 9% in Tanzania. The magnitude of the task is suggested by the fact that whereas Zimbabwe enrolled 711,000 primary students, in 1965, by 1983 the number had grown to more than 2 million. In 1965 the total secondary enrollment in Zimbabwe was 33,000. By 1983 this number had exceeded 220,000. In a single decade the number of students attending teacher training colleges in Zimbabwe increased from 2,500 to more than 8,000. Obviously these numbers, which can be proportionately replicated in most other SADCC countries, reveal the extraordinary sacrifices that the member states are making to realize their manpower requirements. Ironically, teacher education, possibly the lynch pin in the manpower development structure, is least able to compete for a woefully inadequate pool of secondary school graduates. Other priority sectors attract the best, and most, graduates, leaving very limited resources to foster the next generation of manpower.

The growth rate of the SADCC member state's population is among the highest in the world ranging from 3.5% to more than 4%. At these rates a nation's population can double in about two decades, and as many as two-thirds of its citizens can be under 9 years of age. The sacrifices required to finance additional schools, just to maintain existing percentages of primary and secondary age students in school, is staggering and of necessity will severely tax the resources of the developing countries. In Zimbabwe for example, it is estimated that nearly 800 new schools

and 20,000 additional teachers will be required by 1984 simply to keep pace with the increases in school age population.

Also, there is the ever present danger that massive attempts to prepare the hundreds of thousands of teachers required will tend to further lower the quality of the profession. The costs involved in properly preparing science and technical teachers is high and the process a laborious one. There are no quick fixes or magical solutions.

Except for Angola, Zambia, and Zimbabwe, there is currently no excess capacity in the SADCC member countries which could conceivably help to fill the demand for qualified science, math and technical teachers. Each country has a priority need for teachers in these fields, despite major efforts to fill the gap.

The problem persists despite admirable efforts to cope with it, in part, because the occupations which require scientific or technical credentials are remunerated better than teaching. The limited spaces for students in faculties of science tend to be restricted to the very best students, leaving second-best students for science, math and technical teacher training.

Education is a particularly labor-intensive enterprise. There is no ideal ratio of adults to children. In the SADCC member countries it ranges from 20 to 60. The number of teachers required in and of itself argues formidably that, with important exceptions, each member state must assume responsibility for the preparation of its own teachers. Yet there are teaching areas that are sufficiently specialized and so critically needed as to warrant some degree of regional attention, e.g., science, math, and technical subjects. Unlike such SADCC priority areas as transportation, agriculture, and industry, which tend to require individualized nation-by-nation attention, science, math and technology education needs are relatively uniform across the region. This suggests that cooperation within the region not only can occur via the sharing of institutional services, but might be more economically achieved through cooperative development of syllabi, teaching materials, laboratory equipment, standardized tests and professional curricula. What is suggested is the possibility of SADCC cooperation in the establishment of regional and sub-regional science, math, technology, and education improvement centers.

1. Angola:Instituto Superior de Ciencias de Educacao - Lubango  
(Fig. 28)

This school is of university level, providing training for upper secondary teachers. As the school is located in a war zone it was not possible to visit.

Instituto Normal de Educacao Garcia Neto - Luanda

This Institute provides post secondary training in a four year program for primary and lower secondary teachers [G]. There are several other similar institutes in other provinces (8) which all face many difficulties with international teacher turnover. Most teachers are Cuban or Bulgarian, with some Portuguese. They are hired for two-year assignments. Twenty-five percent teacher turnover is an average at this Institute per year.

Instituto Normal Pedagogico

This Institute provides post secondary training in a four year program for secondary technical teachers. It is unique in the country, and it is located in the central area, in Huambo. Because of temporary transportation difficulties it was not possible to visit. However, according to the information gathered, this institution deserves international support to provide regional training in the field.

Country: ANGOLA

Name of School: INSTITUTO INDUSTRIAL PEDAGOGICO  
(PEDAGOGIC INDUSTRIAL INSTITUTE)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Formação de de Instrutores (Speciality: Corte de Metais)	51408	Ensino de Base (8 yrs.)	4 yrs.	82%	18%	Diploma de Instrutor	General Education, Mathematics and Physical Sciences, Related Applied Sciences, Education, Metal Work, Machines, Work Security, Teacher Training	Tecnico Medio	1.32.80	
(Speciality: Construção Civil)	51408	id.	4 yrs.	82%	18%	Same as above	General Education, Mathematics and Physical Sciences, Related Applied Sciences, Education Materials, Building, Sewage, Topography, Teacher Training	Tecnico Medio	id.	
(Speciality: Mecânica Auto)	51408	id.	4 yrs.	82%	18%	Same as above	General Education, Mathematics and Physical Sciences, Related Applied Sciences, Education, Metal Work, Engines and Motor Car Maintenance, Automotive Electrical Appliances, Teacher Training	Tecnico Medio	id.	
(Speciality: Soldadura)	51408	id.	4 yrs.	82%	18%	Same as above	General Education, Mathematics and Physical Sciences, Related Applied Sciences, Education, Metal Work, Welding, Teacher Training	Tecnico Medio	id.	
(Speciality: Mecanização de Agricultura)	51408	id.	4 yrs.	82%	18%	Same as above	General Education, Mathematics and Physical Sciences, Related Applied Sciences, Education, Agricultural Machines and Tractors, Maintenance, Teacher Training	Tecnico Medio	id.	

## 2. Botswana

Botswana currently has insufficient space in its science and teacher training programs, and thus is more likely to be a user of regional programs than a supplier.

### 3. Lesotho

Lesotho currently has insufficient space in its science and teacher training programs, and thus is more likely to be a user of regional programs than a supplier.

#### 4. Malawi

Malawi currently has insufficient space in its science and teacher training programs, and thus is more likely to be a user of regional programs than a supplier.

5. Mozambique

Mozambique's teacher training programs are currently being revised in accordance with the new Education Act.

6. Swaziland

Swaziland currently has insufficient space in its science and teacher training programs, and thus is more likely to be a user of regional programs than a supplier.

## 7. Tanzania

Tanzania currently has insufficient space in its science and teacher training programs, and thus is more likely to be a user of regional programs than a supplier.

## 8. Zambia

Two institutions in Zambia are potentially capable of providing important teacher education services to SADCC member states.

### Luanshya Technical and Vocational Teachers College (LTVTC) (See Figure 29)

#### General Description and History

The TVTC was established in Luanshya in 1975 with the assistance of the Swedish International Development Authority (SIDA). The college provides technical, vocational, industrial arts, and commercial teacher preparation for Zambia schools, institutes and colleges. Located on the outskirts of Luanshya, the modern campus is capable of accommodating 320 students but currently enrolls only 233. There are three fundamental programs: 1) preparation of college lecturers; 2) preparation of technical teachers; 3) preparation of secondary school teachers in industrial arts and commercial subjects.

Students successfully completing the industrial arts and/or commercial courses, which enroll the greater part of the student body, are qualified as secondary (junior level) school teachers. Within the industrial arts field the student chooses either metalwork or woodwork as the main subjects while technical drawing is common to both. In addition the student studies math and science with special emphasis on practical applications to industrial arts or commercial subjects. Students are sponsored by the government, parastatal organizations, or technical institutions which send craft-trained candidates to LTVTC to acquire educational and teaching credentials. For example, a Form 5 graduate with a craft certificate could qualify as a secondary school teacher in a technical area upon completion of a one-year program.

#### The Capability to Accommodate SADCC Students

At the outset it should be noted that with a capacity of only 320 students LTVTC is not a large institution. Because the college has been operational for nearly a decade and caters to a rather narrow demand, it is approaching a point of saturating its market. Therefore there would seem to be a possibility for the enrollment of SADCC member country candidates. Considerable thought has been given to upgrading the college to enable it to prepare senior secondary teachers as well, a field currently dominated by expatriates.

As with most Zambian training institutions, LTVTC is facing severe budgetary limitations. The availability of nearly 100 places is less a factor of a shortage of candidates than it is of budgetary limitations. If, however, the SADCC Manpower Training Council or other suitable organizations were able to attract donor(s) funding to underwrite a scholarship fund that

would enable SADCC students to enter LTVTC accompanied by an appropriate bursary, the institution and SADCC students alike would benefit. This report treats this possibility in its concluding chapter.

### Governance

LTVTC falls within the jurisdiction of the Department of Technical Education and Vocational Training of the Ministry of Higher Education, to whom applications are addressed and by whom selection of students is made. Academic standards are set by the University of Zambia which also awards the diplomas.

### Tuition and Other Costs

LTVTC is an associate college of the University of Zambia. The only tuition costs for Zambian-sponsored students is K2 registration fee per year and a refundable book fee of K10; non-sponsored students are charged K750 of which K450 is for accommodations and food.

### Facilities and Infrastructure

LTVTC occupies an attractive campus with well-equipped and maintained facilities including a student center, athletic and sports fields, and tennis courts. Simulation facilities including model offices and workshops are available, as are an internal television studio and language laboratory. Also available are well equipped separate workshops for metal-working and wood-working. Problems with foreign currency, budgets and spare parts tend to minimize the availability of a number of important instruction aids and pieces of equipment.

Students are housed in 14 hostel blocks with 2 students to a room, accommodating a total of 320. Food is provided in a common dining hall. The faculty consists of 9 lecturers in commercial subjects and about the same number in industrial arts and education. At present there are approximately 7 vacancies. The library is small but well organized and has received some help from the British Council.

Country: ZAMBIA

Name of School: LUANSHYA TECHNICAL AND VOCATIONAL TEACHERS COLLEGE (LTVTC)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	L.I.O. Code	Remarks
				Acad.	Employ.					
Commercial Teacher Trng. for Secondary Teachers	51408	School Cert. [C] with passes in 5 subjects incl. english, math and one comm'l. subject, or in-service primary school teaching experience with recommendations	3 years		6 weeks industrial break between year 1 & 2 + 2/3 of 3rd year practicum	Teaching Diploma [1] U. of Zambia	Communications skills; Intro. to Accounts; Commerce, Office practice; Business math. and Statistics; Sports; Retailing; Intermediate typing; Principles of accounting; Management and Organization; Business Law; Research in Business Administration; Managerial Economics; Advanced Typing; Fundamentals of Marketing; Economics; Political Education; Education Methods; Psychology; Sociology; Math; Science Education System Zambia; Audio Visual; Principles of Teaching.	Diploma - Secondary Level Teacher	0-32.60	
Commercial Teacher Trng. for Inservice Secondary Teachers	51408	Secondary Teachers in Accounts, Retailing, Typing or Commerce	1 year		Industrial break	Commercial Teacher's Certificate [a] U. of Zambia	Home Trade; Credit; Consumer Protection; Wholesaling; Warehousing; Business Units; Financial Institutions; Financial Markets; transport; Insurance; Int'l. Trade; Trade Associations; Advertising; Stock Exchange; Baltic Exchange; Business Calculations; Marketing.	Up-graded Secondary Teacher	0-32.60	
Industrial Arts Teacher Training for Colleges	51408	Advanced Technician Certificate or Technology Diploma + 2 yrs. Industrial experience	10 months			Technical College Teacher's Certificate [a] U. of Zambia	Metalwork or Woodwork; Technical Drawing -- Advanced Skills; Math; Science; Communications Skills; Sports + Education courses as above.	Technical College Teacher	0-31.80	
Industrial Arts Technical Teacher Training for Inservice Secondary Teachers		Craft Certificate + 2 yrs. industrial experience	1 year			Technical Teacher's Certificate [a] U. of Zambia	Metalwork or Woodwork; Technical Drawing -- Advanced Skills; Math; Science; Communications Skills; Sports + Education courses as above.	Senior Secondary Industrial Arts Teacher	1-32.80	

Country ZAMBIA

Name of School. LUANSHYA TECHNICAL AND VOCATIONAL TEACHERS COLLEGE (LTVTC)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Indust. Arts Tech. Teacher Trng. for Secondary Teachers in Woodworking and Technical Drawing or Metalworking and Technical Drawing	51408	School Cert. C in Div. II with passes in 4 subjects	3 yrs.			Teaching Diploma [1] U. of Zambia	Metalwork or Woodwork; Technical Drawing -- Advanced Skills; Math; Science; Communications Skills; Sports; + Education courses as above.	Junior Secondary Industrial Arts Teacher	1-32.80	

## Copperbelt Secondary Teachers College (See Figure 30)

### General Description and History

Whereas the LTVTC seeks to address manpower training needs in the area of technical education, the Copperbelt Secondary Teachers College (CSTC) is designed to address the serious shortage of qualified secondary math and science teachers. Courses are also offered in home economics education.

The college is located about 16 km from Kitwe in a rural setting which requires that both students and faculty live on the campus. CSTC is a University of Zambia associate college. The college offers a two-year teacher education course leading to the Secondary School Teacher Diploma awarded by the University of Zambia [g]. The home economics department has a potential annual intake of 20 students, the math department 65, and the science department 65.

### Capability of Accepting SADCC Students

As with the LTVTC, the CSTC is not a large institution. The campus, though well maintained, was converted from a residential primary school and considerable expenditures would be required to raise its intake capacity in order to accept a substantial number of additional students from the SADCC region. However, as many as 20 SADCC region students could be absorbed within the existing facilities so long as they carried with them bursaries equivalent to the real costs of the education provided. CSTC has accommodated a few Tanzanian students over the years, but no non-Zambians are currently enrolled. If more than 20 SADCC region students were anticipated, additional faculty would be required as well as the following: 1) a lecture theater for 150-200 students; 2) a physics lab; 3) preparation rooms (physics and biology); 4) science workshops; 5) audio visual aids workshops; 6) a house craft demonstration flat; and 7) equipment and text books.

### Governance

As an associate college of the University of Zambia, diplomas are awarded by the university. The university also approves the syllabi, supervises the academic work, and approves staffing. Administratively, the college falls under the jurisdiction of the Department of Technical Education and Vocational Training in the Ministry of Higher Education.

### Tuition and Fees

Tuition and fees at CSTC are the same as for LTVTC (see above).

### Facilities and Infrastructure

The college has proposed to the Ministry of Higher Education that it be authorized to extend its program to include a third year and thereby prepare its students to teach at the senior secondary level as well. A syllabus for this purpose has been prepared and submitted, as has corresponding requirements in equipment, staff and facilities.

The library is in serious need of upgrading, e.g., card catalogues, books, and periodicals. The academic staff totals about 22 and is served by 13 administrative personnel. The campus, though not new and of limited potential, does have a student common room and a UNESCO club.

Country: ZAMBIA

Name of School: COPPERBELT SECONDARY TEACHERS COLLEGE (CSTC)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Science Teacher, up to Form V	51404	School Cert. [C] with pass in 4 subjects, including English and science	2 years in school, 2 yrs. in supervised teaching practice	2 years	2nd year + 4th yr.	Secondary School Teacher's Diploma [97]	Education: Ed. Psych.; Sociology of Education; Methods and Administration; Principles of Teaching Science: Structural Organization Matter; Behavior of Matter; Matter and Energy; Interaction of Matter; Interaction of Living Things and Environment; Interdependence and Interrelationships in Nature; Energy and Machines; Continuity in Nature; Plants and Animals; Economics; Natural and Man-made Materials; Science Methodology.	Secondary School Teacher - Science to Form V	1-32.30	
Math Teacher up to Form V	51404	Same as above	2 years in school, 2 yrs. in supervised teaching practice	2 years	Same as above	Same as above	Education: (same as above) Math: Sets and Numbers; Mathematical Structure; Relations and Functions; Probability and Statistics; Spatial Math; Mathematical Reasoning and Thought.	Secondary School Teacher - Math to Form V	1-32.20	
Home Economics Teacher up to Form V	51408	Same as above	2 years in school, 2 yrs. in supervised teaching practice	2 years	Same as above	Same as above	Food and Nutrition; Needle work and Dress-making; Health Education; Mother Craft and Child Development; Applied Science	Secondary School Teacher - Home Economics to Form V	1-32.75	

## 7. Zimbabwe (See Figure 31)

### Belvedere Teacher College

#### Description and History

Currently under construction and partially occupied, Belvedere Teacher College represents Zimbabwe's answer to the acute shortage of secondary teachers of technical subjects, and possesses a significant potential as a region-wide institution. When one considers the fact that Zimbabwe requires an additional 6,000 teachers per year for the next two or three years, the importance of this specialized 3,000-student teacher training institution about to come on line can be properly appreciated. It will add considerably to the already existing 9 teacher training colleges which have a total capacity of about 2,500 students. As elsewhere in the region the critical shortage is at the secondary level generally, and specifically in science, math, and technical subjects. Belvedere, like its sister colleges, possesses associate status with the University of Zimbabwe. In 1983, 360 students were admitted for study; in 1984 and in the years thereafter the total of new students will rise to 600. The college has a residential capacity of 420 which will increase to 840 by 1984.

The intent of Belvedere Teacher College is to train its teachers to teach one practical (technical) subject and one academic subject, and also to possess an understanding of educational theory and acquire some teaching skills in technical subjects other than their major fields. All are expected to acquire a solid background in science, math and language.

#### Capability of Belvedere to Admit SADCC Students

Zimbabwe's enormous unmet need for teachers is such that it is not likely that many places will be found for SADCC-region students at Belvedere Teacher College in the immediate future. However, the SADCC Manpower Training Council might give some thought to seeking a limited expansion of Belvedere, to incorporate a new stream composed primarily of SADCC-region students to be trained not as secondary teachers but as teacher educators. Given Belvedere's facilities and staff capabilities, such a program in math, science and technical subjects could be mounted to prepare college level educators. This strategy, if successfully undertaken, could make an important contribution to SADCC manpower teacher education requirements.

An important aspect of the Belvedere program, which is designed to speed the process of providing teachers for the classroom, is its scheduling; years one and three are spent at the college, while years two and four are spent as full-time teachers in the nation's schools.

Tuition and Fees

(Data not available)

Facilities and Infrastructure

Given the work-study schedule of its programs, Belvedere can accommodate, upon its completion, 3,000 students. The campus is large and modern including a theater/auditorium, and a library with space for 100,000 volumes. The staff/student ratio is low; about 1 to 20.

Country: ZIMBABWE

Name of School: BELVEDERE TEACHERS COLLEGE

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	E- ploy.					
Agriculture, Building, Technical Drawing, Woodwork, Metalwork, English, Geography, History, Mathematics, Science, Shona, Sindebele	51404	CGE O-Level School Cert. [C] with passes at grade C or better, one of which must be in a language	4 years	2 years	2 years	Certificate of Education [e]U. of Zambia	Course of Study syllabi prospectus are currently being completed and printed	Secondary Education Technical Fields	1-32	

Zimbabwe Secondary School Science Unit (ZIM-SCI)

ZIM-SCI is not an educational institution in the usual sense, but rather a unique approach to meeting the acute shortage of science teachers in Zimbabwe. It is thought to have valuable replication potential for other SADCC countries and is included here for that reason.

Because Zimbabwe has sought to solve the need for more secondary schools by attaching junior secondary classes to existing primary schools, many of the junior secondary teachers are slightly more than upgraded primary teachers, and most of them have had little or no science preparation. The Ministry of Education and Culture, faced with this dilemma and also determined to make science and other education more relevant to the lives of students and the needs of the country, joined forces with the Science Education Center at the University of Zimbabwe to establish a curriculum and development center.

Inexpensive science kits accompanied by relevant study guides are prepared for student use. The corresponding teacher's kit includes more sophisticated materials and equipment, e.g., microscopes, glassware, bunsen burners, solar rechargeable batteries. It is estimated that ZIM-SCI can equip lower secondary classrooms with teacher kits and student materials for about 1,500 Zimbabwe dollars. Evaluation of this unique approach and curriculum reveals that whereas the mean correct pupil response to 25 multiple choice questions before the course was 36.7 upon the completion of the course, the mean was 62.6.

The course covers the following 8 concepts: 1) the particulate nature of matter; 2) simple kinetic theory; 3) energy and energy chains; 4) measurement: mass, volume, time, temperature; 5) recognition of observational error; 6) chemical change; 7) characteristics of living matter; and 8) basic technological processes of laboratory.

The materials, teaching aids, and curriculum developed by ZIM-SCI appear to be capable of adaptation and use by other SADCC countries also in desparately short supply of science teachers.

This approach and the accompanying material lends itself well to the incorporation of a regional and/or sub-regional education improvement center.

#### D. Transportation and Communication

Of the nine SADCC states only three; Angola, Mozambique, and Tanzania, are fortunately situated along the coast and possess sea-ports. Given the fact that a major purpose of SADCC's existence is the dilution of member state dependence on the Republic of South Africa, improved regional transportation facilities linking the economies of landlocked Botswana, Lesotho, Malawi, Swaziland, Zambia and Zimbabwe with the ocean ports of Angola, Mozambique and Tanzania constitutes one of SADCC's major priorities. The historical fact that SADCC member states have experienced differing forms of imperial domination by quite different colonizing powers has served to complicate transportation and communication between the member nations. The Tanzara Railway is but one dramatic and bold illustration of a number of regional ventures undertaken to improve regional transportation and communication facilities. Railways are a particularly labour intensive industry employing tens of thousands of unskilled and semi-skilled workers. Each SADCC country possesses considerable capability for training lower-level railway manpower.

Despite current economic constraints, national airlines which emerged after independence have made enormous strides in linking together capitals and other major cities within the region. The transportation and communication industry is particularly dependent upon expatriate European and Asian skilled manpower. The determination to speed localization in this vital sector in order to further national and regional goals in conjunction with the precipitous exodus of expatriate skilled manpower has created a serious skilled manpower shortage. Unlike such shortfalls in manpower in other critical areas transportation and communication by their very nature pose peculiarly regional problems. Railroads, airlines and highways are the requisite avenues to co-operation for economic development. Therefore, it is not surprising that training and educational institutions addressing this critical area receive a high priority and are relatively more inclined to be regarded as suppliers of region wide services.

1. Angola:

There are no transportation or communications programs available.

## 2. Botswana

Botswana does not possess institutional capability in the field of communication and transportation training sufficient to warrant regional attention. However, it should be noted that Botswana is currently in the process of assuming responsibility for the management and operation of its railway. The EEC is providing funds to support relevant training and assistance is also being provided by the National Railways of Zimbabwe Training Center in Bulawayo. At the moment most supervisory- and management-level personnel serving the Botswana section of the rail line are employees of the National Railways of Zimbabwe.

3. Lesotho:

Lesotho does not presently have institutional capacity in the fields of communication and transportation sufficient to significantly assist its SADCC neighbors.

#### 4. Malawi

##### Multi-Country Posts and Telecommunications Training Center Malawi (See Figure 32)

The multi-country posts and telecommunications training scheme includes Botswana, Lesotho, Swaziland and Malawi (BLSM). Each country has its own national training center for elementary technician-level training.

The Multi-Country Posts and Telecommunications Training Center in Blantyre, Malawi, was set up with donor assistance to undertake intermediate level training for technicians engaged in transmission, switching, external plant and subscriber equipment installation and maintenance. Strong national institutions which train up through the intermediate level already exist in both Zambia and Zimbabwe. A new facility is being built in Mozambique for itself and Angola. Therefore the principal regional market for the Center will continue to be that of the small states in the region and perhaps Tanzania.

There is an awareness that management-level training in the communications field needs to be given greater attention. Junior-level courses are mounted in Malawi at the Center, but so far senior management courses have been offered only at Harare. The Center would like to continue, even expand, its regional training services. However, the limits on physical space are severe. In fact, an International Communications Union-sponsored study of telecommunications manpower needs for all four BLSM countries from 1983-2000 revealed that the Center does not have the capacity to train even the Malawi nationals in the near future.

The doubts about future external funding for the Center make it difficult to plan. However, because the Center offers an important service to its clients it will probably continue. The short-term problem lies with the substantial delays in expanding the intake of students while an increase in the size of the physical plant is pursued. The present capacity of the center is eight courses mounted simultaneously with a maximum of 10 students in each course (regardless of level).

Since half the courses taking place at any one time are elementary courses for Malawi nationals, only 40 students from the region can be accommodated at once.

The teaching staff of the Center includes 3 chief instructors, 5 senior instructors, and 5 instructors, all Malawi nationals. The instructors were all counterparts to foreign experts for a number of years, then sent abroad for further training.

Figure 33 shows the Multi-Country Posts and Telecommunications Training Center's medium-level training courses which were offered from March through August 1982.

Country: MALAWI

Name of School: MULTI-COUNTRY POSTS AND TELECOMMUNICATIONS TRAINING CENTER

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Intermediate Technician for: 1) Transmission 2) Switching 3) External Plant 4) Subscribers Apparatus	95200	MSC [C] + element. technician program at home P&T training site (3-4 years)	2 yrs. of several sandwich courses of up to 8 wks each which vary by speciality (1, 2, 3, or 4)	50%	50%	None (City & Guilds of London Institute, if desired)	Overhead Plant I; Underground Plant I; Lead Cable Plumbing; Subs Equipment Fitting I; Subs Equipment Fitting II; T.A.T. Induction; Subs Equipment Fitting III; Subs Line & Apparatus NTCE; Overhead Plant II; Underground Plant II; Cable Fault Locating; Cable Pressurization; Line Plant Planning I	Cable Fitter: External Plant	8-57.50	All trainees are P&T employees; no certification is given though trainees may take trade tests on their own.
							Switching Principles; Intr. to Electronic Switching Systems; Minimal PABX Installation and Maintenance; Basic SPC and AXE; Test Desk Procedures; Exchange Power Plant Principles; ITT 2300 Teleprinter Maintenance; Teleprinter Installation and Maintenance	Switching/Subscriber Apparatus Specialist	unknown	
							Basic Electricity; Basic Electronics; Aerial Erection; Electronics II; Logic Electronics; Radio and Transmission; Electronic Maintenance Principles; Basic Microwave Communications; Microwave Systems	Transmission/Electronics Specialist	unknown	
							Telephonist; Telegraphist; Telecomm: Supervision Basic; Telecomm: Supervision Higher; Basic Staffing & Services; Traffic Induction; Basic Traffic Planning; P.B.X. Operators	PROGRAM CONTENT (cont'd)		
							Postal Agency; Sorting Officers; Counter Officers; Postal Executive Officers; Gen'l. Correspondence; Accounts Level I; Postal Supervisory; Accounts Level II; Teaching Tech.; Jr. Mgmt	Postal Supervisory Accounts Level II Teaching Techniques Junior Management		

MULTI-COUNTRY COSTS AND TELECOMMUNICATIONS  
TRAINING CENTER  
MEDIUM-LEVEL TRAINING COURSES  
March - August 1982

	BOTSWANA		LESOTHO		MALAWI		SWAZILAND	
	No. of Trainees	Trainee Weeks						
1. Subs Line and Apparatus Maintenance	4	24	--	--	4	24	2	12
2. Overhead Plant II	2	8	--	--	7	28	1	4
3. Underground Plant II	3	24	1	8	5	40	--	--
4. Cable Fault Locating	5	20	2	8	2	8	1	8
5. Switching Principles	2	6	1	3	5	15	2	6
6. Exchange Power Plant Principles	--	--	--	--	4	24	1	6
7. Introduction to Crossbar Switching	--	--	--	--	7	56	1	8
8. Test Desk Procedures	5	10	--	--	6	36	1	6
9. Intro. to Electronic Switching Systems	2	8	--	--	6	24	2	8
10. Electronics II	4	8	3	6	3	6	--	--
11. Radio and Transmission	--	--	1	6	6	36	2	12
12. Electronic Maintenance Principles	--	--	--	--	5	20	--	--
13. Basic Microwave Communications	2	12	--	--	6	36	1	6
14. Telecom: Supervision Higher	1	5	--	--	5	25	1	5
15. Basic Staffing and Service	--	--	--	--	3	18	1	6
16. Traffic Induction	--	--	--	--	4	20	--	--
17. General Correspondence	--	--	4	12	6	18	--	--
18. Accounts Level II	--	--	2	10	4	20	2	10
19. Teaching Techniques	1	4	2	8	3	12	1	4
20. Junior Management	--	--	7	35	16	80	2	10
TOTAL	31	129	23	96	102	546	21	111

Ministry of Transportation and Communications  
Marine Training College (Proposed)

It is anticipated that this proposed college will be established in late 1983. It is to be a certificate-level program. The original proposed curricula is being downgraded to be more relevant for lake navigation and training of fisheries personnel. The original program was designed at too high a skills level and therefore the redesigned program will be more appropriate for the technology in use on Lake Malawi. This training may have regional utility for other countries with small craft river, ocean, or lake fishing and should be evaluated once it has been instituted. The program will not cover deep water fishing, nor celestial navigation as originally reported.

## 5. Mozambique

### Escola Nautica de Mocambique (Figure 34)

The school was established in 1977 utilizing the building of the old Fish Club (sporting club). It is located in Maputo, two kilometers from the port. Entrance requirements are nine years of primary-secondary schooling [C]. There are 77 students (including 2 women in the radio communications course). Initially, the course was designed to teach navigation in coastal waters, but it evolved to include deep sea navigation. Technical and financial cooperation from Norway was utilized to study the viability of the deep sea navigation program from 1980 to 1982. This project was submitted to the IMO (International Maritime Organization) and approved. Subsequently, all certification has been internationally recognized. The school was opened in 1982 for deep sea navigation.

When the school buildings are completed (extensions currently underway) there will be capacity for 150 students. This is the only school with deep sea navigation courses in the SADCC area which can prepare students for ocean transportation. Courses are provided in three areas:

- a. Navigation. Currently there is no ship available for practical training. Therefore, students alternate academic training with practical training aboard commercial ships, taking eight years to complete their course. With international cooperation, a ship could be provided to the school enabling students to graduate in four years. The course prepares students for official duty on ship from pilot to all careers below that of captain [W].
- b. Mechanical engineering (Marine engineering). Currently there is no ship available for practical mechanical training. Therefore, students alternate academic training with practical training aboard commercial ships, taking eight years to complete their course. With international cooperation, a ship could be provided to the school enabling students to graduate in four years. The course prepares students to be mechanical or engineering officers [W].
- c. Radio-telegraph operator (Telecommunications). The course lasts two years and then requires a six-month practical application program aboard ship [V].

The teachers are: Norwegians (5) who speak Portuguese; Portuguese (2) for technical subjects; and local teachers (8) for basic training and some technical subjects. An Indian teacher offers English courses as required by the IMO.

The provision of a school ship is crucial for reducing the course time to four years. Furthermore, the ship could be made self-sufficient by working and utilizing its crews.

Country: MOZAMBIQUE

Name of School: ESCOLA NAUTICA DE MOZAMBIQUE  
(NAUTICAL SCHOOL OF MOZAMBIQUE)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Navegação	57002	9ª Cl. de Ensino Secundário Geral [C]	4 yrs.	4 yrs.	4 yrs.	'IMO' Recognized Certification		Ship's Officer and Pilot	0-42.30	
Engenharia de Máquinas	57004	id.	4 yrs.	4 yrs.	4 yrs.	'IMO' Recognized Certification		Ship's Engineer	0-42.40	
Radio-Telegrafista	57004	id.	2-1/2 yrs.	2 yrs.	1/2 yr.	'IMO' Recognized Certification		Ship's Radio Officer	3-80.50	

6. Swaziland

No region-wide institution capability in training and education of transportation and communication manpower.

## 7. Tanzania

Tanzania possesses limited capability in port management and operations in Dar es Salaam and Tanga. There is also some railway training capability as well. Neither are thought sufficiently developed or extensive as to provide a regional training capability.

## 8. Zambia

Zambian Air Services Training Institute (ZASTI) (See Figure 35), has the potential of providing regionalized training in the field of transportation and communication.

### General Description and History

ZASTI, established in 1971, is located adjacent to the Lusaka International Airport and like nearly all government vocational and technical institutions it falls under the responsibility of the Department of Vocational and Technical Education in the Ministry of Higher Education. Its extensive facilities are valued at more than US\$5 million and support a professional staff of more than 43 people. Avionics training does occur in other SADCC countries but not to the degree of sophistication and experience as is available at ZASTI. It should be noted that significant training capabilities also exist adjacent to the SADCC region in Soroti, Uganda and in Addis Ababa, Ethiopia. ZASTI enrolls annually more than 300 Diploma and Certificate candidates and in its 9 training programs. ZASTI is organized into three major schools -- 1) Engineering School, 2) Aviation School, and 3) Ground Training School. Each school in turn provides instruction in a variety of fields: 1) Engineering School -- aeronautical electronics, aircraft maintenance, navigational aids, 2) Flying School -- long-term courses in the training of commercial pilots. 3) Ground Training School -- air traffic control, communications operation, meteorology, fire rescue services.

### Capacity of ZASTI to Accommodate SADCC Member State Students

The Institute is keen to increase the number of SADCC and non-Zambian students. Its brochure makes specific reference to SADCC cooperation. As of this writing ZASTI is capable of a slightly larger annual intake of students without significant expansion of staff or facilities. However, if a substantial number, say 50 or more, SADCC students were anticipated, additional facilities for accommodation would be necessary as would additional staff. A possible limitation on the number of non-Zambian SADCC students is the current Zambian government policy of limiting non-Zambian places to 5% of the total. In May, 1983 no SADCC member state-sponsored students were enrolled at ZASTI. However, by July it was anticipated that the first group of SADCC-sponsored students from Malawi would have commenced their studies in meteorology at ZASTI.

The extent of the region's avionics manpower needs is not precisely known. The Australian government recently made available the services of Mr. Bradford, an expert in this area. He was in the process of completing a survey of relevant manpower needs in this sector when this report was written. When his report is available, it will likely provide the SADCC Manpower

Training Council and member states with valuable data concerning the existing and required capacity of ZASTI.

The immediate availability of places and the somewhat under-utilized facilities at ZASTI in conjunction with known manpower needs in the region suggests that immediate arrangements should be concluded between SADCC states for maximum utilization.

#### Infrastructure and Support Facilities

ZASTI employs five qualified flying instructors, operates two flight simulators, one single engine and the other multi-engine, and a full-time simulator instructor, as well as maintaining a fleet of eight aircraft. Complete dining facilities are provided as are limited parking facilities for students. The library contains over 1,000 books and many periodicals. The library contains primarily materials dealing with aviation and related fields.

An institute cinema is located on the campus and includes a training-relevant film library. In addition to the training program outlined above, ZASTI offers courses in its related subjects section -- including courses in communications skills, math and science.

#### Tuition and Fees

The costs of ZASTI are highly subsidized by the Zambian government. Un-sponsored Zambian nationals pay no fees and receive an allowance of K20/month. Sponsored Zambian nationals pay K62.50/month for full board and tuition or 37.50/month for day students. Children of GRZ contract officers pay K62.50/month full board and tuition or K37.50/month as day students.

Country: ZAMBIA

Name of School: ZAMBIA AIR SERVICES TRAINING INSTITUTE (ZASTI)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	L.L.O. Code	Remarks
				Acad.	Employ.					
Engineering 1. Diploma in Aeronautical Electronics Engineering	55499	School Cert. [C] with passes in science & math	3 years		10 weeks	Diploma [c] by Ministry of Higher Education	Safety and Prevention of Accidents; Workshop Practices; Radio Practice; Basic and Advanced Electronics Theory; Electrical Technology; Transmission Lines and Antennas; Radio Communication; Servicing Radio Communication Equipment; Science, Math, and Communications Skills; Navigational Aids and Radar Principles	Dept. of Civil Aviation	0-39.90	
2. Navigational Aids	97009	Diploma [y] from Zambia Dept. of Technical and Vocational Educ. in Telecommunications or equivalent from recognized institution + some practical experience	8 weeks Theory and practice	8 weeks		None	Instrument Landing Systems; Principles of Operation; Routine Maintenance and Flight Check Procedures; Distance Measuring Equipment; Very High Frequency Omnidirectional Range; Maintenance and Flight Check Procedures;	Repair and Maintenance enroute navigational aids and airport landing aids in a department of civil aviation	0-39.90	
3. Lic. Aircraft Maintenance Engineering	55499	School Cert. [C] with 5 passes including English, math, & physical science	3 years	3 years	10 weeks	Diploma [c] by Zambia Ministry of Higher Education -- eligibility to sit DCA Aircraft Maintenance Engineers License Exam with T.R. rating	Safety and Accident Prevention; Basic Workshop Practice; Aircraft Materials and Processes; Avionics; Airframe Structure; Aircraft Engines; Aircraft Instruments; Aircraft Systems; Principles of Flight; Technical Drawings; Maintenance Organization and Regulations; Physics and Math; Communications Skills; Political Science	Fully Licensed Aircraft Engineer	0-39.90	

Country: ZAMBIA

Name of School: ZAMBIA AIR SERVICES TRAINING INSTITUTE (ZASTI)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Flying School	57032	School Cert. [c] with passes in math, physics, english & two other subjects or equivalent + age 17-24 & physical fit	24 months			Single- and multi-engine Instrument Rating Licence [b]	Safety and Accident Prevention Procedures; Math; Physics; and Communications Skills; Aviation Law; Principles of Flight; Air Frames and Air Engines; Navigation General; Navigation Plotting; Navigation Flight Planning; Navigational Radio Aids; Meteorology	Professional Pilot	0-41.30	
Ground Services School: Aeronautical Telecommunications Operations	97000	School Cert. [c] + medical exam.	30 weeks				National and International Organizations; Radio Navigation Aids, Systems and Frequencies; Intro. Aeronautical Meteorology; Manual AI-Morse Code; Radio Teletypewriter Operations; Air Traffic Computer; Aeronautical Telecommunications Network Planning		unknown	
1. Radio and Teletypewriter Operator, Grade II (RTO II)						Certificate Ministry of Higher Education				
2. Radio and Teletypewriter Operator Grade I RTO I	97000	Certified RTO II + Experience	4 weeks			Certificate Ministry of Higher Education	Theory and Practice Radio Teletypewriter Operations; Network Planning; Equipment and Systems	Higher Level Operation of Semi-Automatic and Relay Installations	0-34.90	
3. Aeronautical Station Operator, Communicator	97000	RTO I + working knowledge	10 weeks			Certificate Department of Civil Aviation	Aviation Law; Rules of the Air and Air Traffic Service; Aeronautical Mobile Service Operations	Operate Aeronautical Mobile Services	unknown	
4. Basic Firemanship Course F/07-00	97000	Completion of Form II + 1 mo. experience in an operational Fire Station	16 weeks			Certificate Ministry of Higher Education	Handling of Appliances and Equipment; Fire Fighting Tactics and Techniques		5-81.40	

Country: ZAMBIA

Name of School: ZAMBIA AIR SERVICES TRAINING INSTITUTE (ZASTI)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
5. Leading Firemanship Course F/07-01	97000	Successful completion F/07-00	16 weeks			Certificate Ministry of Higher Education	Station Records; Hydrant Drill Command; Planning of Drills and Exercises; Fire Ground Command		5-81.40	
6. Sub-officer Course Firemanship F07-02	97000	Successful completion F/07-01 + 4 yrs. experience at Airport Fire Service	10 weeks			Certificate Ministry of Higher Education	Supervisor; Station Management; Fire Crew Command			
7. Senior Airport Fire Officers Course F/07-04		Successful completion F/07-03 (Station Fire Officer's Course) or equivalent	6 weeks			Certificate Ministry of Higher Education	Management Techniques; Preparation Annual Estimate; Communication Exercises; Developments in Aircraft Design; Fire Service Equipment; Fire Station Design and Location	In charge of one or more stations in large airport and provide instruction in management	5-81.40	
8. Meteorological Assistants Course	54299	School cert. with passes in science & math				Certificate Ministry of Higher Education + Certificate Zambia Meteorology Department	Principles of Meteorology; Meteorological Instruments; Observation and Reporting; Surface and Upper Air Plotting; Basic Radio Theory; Meteorological and Aeronautical Telecommunications Procedures	Observe, record and report weather; Plot surface and upper air charts; Understand and use standard meteorological instruments	5-81.40	
9. Airtraffic Control Induction Course	97000	School Cert. with 5 passes including english, math, and physical science	4 weeks			None	Airtraffic Services; Aeronautical Information Services; Flight Plan and Flight Progress Strips; Aircraft Recognition; Aviation Geography; I.C.A.O.	Airtraffic Control Assistant	0-14.90	
10. ATC Basic Aerodrome Control Course	97000	School cert. with 5 passes including english, math & science + completion of the Air Traffic Control Induc. course	30 weeks			None	Math; Physics; Aviation Geography; Astronomy; Communications Skills; Airtraffic Control Theory and Practice; Flight Plan and Progress Strips; Principles of Flight, Navigation, Meteorology, Climatology; Radio Practice and Navigational Aids; Search and Rescue	Licensed to standards proscribed in I.C.A.O. Annex I	unknown	

Country **ZAMBIA**

Name of School **ZAMBIA AIR SERVICES TRAINING INSTITUTE (ZASTI)**

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ					
11. Approach/Area Control Course	97000	Air Control License with Aerodrome Control Rating	10 weeks			Approach/Area Control Cert.	Approach Control Theory; Practice Procedures and Service Approach Control Practical; Climatology; Air Navigation; Regulations	Application of Control Approach Procedures	unknown	

## 9. Zimbabwe

### National Railways of Zimbabwe Training Centre (NRZTC) (See Figure 36)

In the field of training skilled workers and supervisory and management personnel for the railways the National Railways of Zimbabwe Training Center (NRZTC) is truly outstanding.

#### General Description and History.

Tracing its history to pre-independence days, and having provided the bulk of the trained manpower for the Anglophone South Central Africa railway systems, NRZTC has earned its reputation as the pre-eminent institution in this field. It is a logical center for regional railway training.

The NRZTC, located in Bulawayo, occupies a number of new instructional buildings adjacent to the sprawling NRZTC workshops. Within a given year more than 3,500 individuals are trained at a cost of about 6 million Zambian dollars.

Except for upper supervisory management and some special courses, the bulk of the training falls within the traditional apprenticeship mode. The skilled artisan and supervisory training programs are designed to prepare personnel to fill positions in the three major units of day-to-day operations -- engineering, traffic, and services. The apprenticeship program which traditionally was spread over 5 years currently is limited to 4 years. The first year deals primarily with related theory, the second embraces application of theory, and the third and fourth years are almost entirely devoted to industrial practices. The successful completion of the apprenticeship program leads to the appropriate examinations of the City and Guilds of London Institute and of Zimbabwe's National Technician and National Higher Technician Certificates.\*

Traditionally, the NRZTC apprentices pursued their training in the massive NRZTC workshops. However, over the past two years substantial progress has been made in the construction of instructional and training blocks. In 1984, for example, engineer training, which is currently accommodated in the railway workshops, will move to new facilities equipped with modern simulated engines, 450 meters of track and relevant equipment. New buildings are either completed or nearing completion that will effectively move most electrical, mechanical and civil engineering workshops into the new facilities.

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\*The academic portion of the training uses the same syllabus as the Technical College in Bulawayo.

The Capacity of the NRZTC to Accommodate SADCC Trainees

Unfortunately, it is not likely that the NRZTC can be looked to to provide a significant solution to the region's critical manpower shortage in this vital priority area. A recent study of manpower needs by a Canadian group reported that NRZ "anticipates a shortage through 1984 of nearly 14,000 skilled employees, in the following areas:

Traffic	1,000
Civil Engineering	1,700
Mechanical Engineering	4,700
Electrical Engineering	3,800
Signals	2,300
TOTAL	<u>13,600</u>

In the related areas of supervision, skilled artisans, and apprentices the shortfall is of comparable proportions."

NRZTC personnel reported that the railway employs 800 artisans but actually requires 1,800 -- a shortfall of more than 1,000. The precipitous exodus of skilled manpower was critical and lead to massive recruitment of Indian and Pakistani engineers. Indeed, the precipitous decline in journeymen jeopardizes the apprenticeship program, resulting in the substitution of third- and fourth-year apprentices for journeymen trainers.

At this writing 584 apprentices are enrolled in NRZTC, somewhat less than two years ago. Plans call for an intake of 250 in 1984, increasing to 320 by 1985. Between 1983-1986, NRZTC needs to recruit 320 apprentices per year. If it is successful in meeting this ambitious goal, the intake after 1986 could be cut back, but until that point in time, in the view of NRZTC officials, they will be able to seriously consider making only a few positions available to other SADCC member countries.

Indeed, when discussing this matter NRZTC personnel generally referred to "the end of the '80s" as that point in time when their training facilities might be able to cope with the critical training needs of the entire SADCC region.

It should be added, however, that on an ad hoc and relatively minor basis NRZTC is currently training artisans, station masters and station foremen for Botswana and is providing some short-term assistance to Mozambique Railways as well. In addition, a few Namibians under UNDP sponsorship are undergoing training at NRZTC. As NRZ operates both diesel and steam equipment and is in the process of electrification, the engineering needs are problematically complex and demanding. A number of trained engineers have been sent to Switzerland, West Germany, and the United Kingdom for advanced electrical engineering studies.

Thus, despite its unique capability and the critical manpower shortage that plagues the railways within the SADCC region, it is not likely that NRZTC can be looked to as a solution to this critical problem.

A number of proposals have been advanced to develop a training capability in the region that is sufficient to address this issue. The Union of African Railways has suggested that a major training center be developed in Kabwe, Zambia -- the terminal point of the Tanzara Railway. The SADCC Regional Manpower Training Council might well further address this issue and seek to resolve the location of a regional training capability.

In two areas -- upper-level management training and the training of trainers -- it is conceivable that the NRZTC could provide region wide services prior to the late '80s. Considerable progress has been made in raising this type of instruction to sophisticated levels. Conceivably, a concentrated program of trainer training for SADCC member country students could help alleviate the critical nature of the current manpower shortfall. The management training program, supported by extensive and sophisticated teaching aids, e.g., video and simulation equipment, and caters to middle- and upper-management training needs. At this point courses are mounted for grade two and grade three engineers in such subject fields as discipline, leadership and communication. The management training division occupies new and well equipped facilities and is considering expanding its services and clientele to the management needs of other private, public, and parastatal enterprises. In this area, if not in the technical and artisan fields, SADCC manpower needs conceivably could be addressed by NRZTC.

#### Governance

The NRZTC is an institution under the jurisdiction of the NRZ -- a semi-autonomous parastatal organization with a long history of relative independence. Not surprisingly, its training plans and priorities are developed primarily with its own needs in mind. In recent years a special relationship has evolved with the Technical College Bulawayo. Normally, NRZTC looks to TCB to provide the technical aspect of engineering and some artisan apprenticeship programs as well; however, because of a shortage of staff and facilities the NRZTC employs the Technical College syllabi and on occasion some of its staff. It is increasingly providing technical instruction as well as on-the-job training to its apprentices, up to the Technical College's standards. There is no data available with respect to students sponsored by other than the NRZ.

#### Facilities, Support Services and Infrastructure

NRZTC can accommodate in hostels nearly all of its first year intake of about 400 students. Food services are available.

The gradual movement of training programs from the railway yard workshop to classroom blocks inclines NRZTC more and more to resemble a vocational technical college campus.

The new and nearly completed and proposed instructional blocks are and will be well equipped, including modern simulators, video capability and relevant library resources as well.

Unlike the situation which characterizes other institutions in this study, it is not likely that the addition of staff or facilities to what already exists at NRZTC would significantly add to its capacity to provide services to other SADCC member states. Through the 1980s, NRZTC will be preoccupied with coping with its enormous backlog of unmet manpower requirements. SADCC's Management Training Council, therefore, might consider other regional alternatives.

Country: ZIMBABWE

Name of School: NATIONAL RAILWAYS OF ZIMBABWE TRAINING CENTRE (NRZTC)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ.					
Services: Station Master Conductors Guards Ticket Issuers Conductor	57006	GCE-O or school certificate [C]				City & Guilds			unknown	
Engineering: Civil Engr. Electrical Eng. Mechanical Eng. Plate Layers Carriage and Wagon Examiners Computer Oprs. Computer Programmers	35201 35222 35232 35242 35262 35299 35422 35459	Form II [A]	4 years 4 years 4 years 4 years	2 2 2 2	2 2 2 2	Craft Certificate [Z] City & Guilds	Same Syllabus as the Technical College Bulawayo. (Engineering only)		unknown	
Clerical: Personnel Accounting Supplies Comm'l. Oprs. Genl. Admin. Typists Teleprinter Opr.	33401 33408 33422 33432 33439	Form II [A]	2 years 2 years 2 years 2 years	1 1 1 1	1 1 1 1				unknown	
Artisans: Boiler Makers Pattern Makers Millwrights Coppersmiths Turners Fitters Blacksmiths Brass Finishers Carpenters	35242 35262 35299	Form II [A]				Craft Certificate [Z]			unknown	

Country: ZIMBABWE

Name of School: NATIONAL RAILWAYS OF ZIMBABWE TRAINING CENTRE (NRZTC)

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	L.L.O. Code	Remarks
				Acad.	Employ.					
Artisans - Semi-skilled: Signals Electrical Mechanical	97000								unknown	
Management: Trng. Trainers		Inservice for staff	5 weeks	5 weeks			Basic Training Theory; Learning Theory; Teaching Aids			
Management for Middle Range		Inservice	5 days	5 days			Discipline; General Leadership; Communications			
Management, Basic Level		Inservice	8 weeks	8 weeks			Management Principles; RR Management; RR Accts; Stores; RR Organization			

### E. Management and Accountancy

The paucity of public managerial talent is a particularly acute manpower problem in the SADCC region. Management education is offered through a number of different kinds of institutions, e.g., government staff colleges, commercial sections of polytechnics, independent management schools or productivity centers, and multi-country regional centers.

The fragmentation of management training in the region reflects the absence of a thoughtful dialogue as to what is needed, at what level, by whom and to what degree of specialization (as opposed to certain generic aspects of management).

Because there has been no systematic approach to identifying manpower requirements by occupational skill and level in most SADCC countries, especially in the private sector, management education curricula tend to be either quite general or specific to an organization at very low levels. Government staff colleges are, for the most part, not very robust institutions, and have their hands full with great national needs and inadequate, underpaid staff. Alternative sources of management training are needed because public and private business enterprises are the unmet frontier for management talent in the region. Industries, and some parastatals, often mount their own in-house supervisory and management courses, even where the technology of the enterprise does not require it, because they do not see any alternative. Finally, there are management training needs in fields which the mainline educational institutions do not provide, e.g., education, agriculture, construction, and health.

Despite these circumstances there are two regional institutions which have made modest efforts to respond to management needs; the Institute of Development Management in Botswana, Lesotho and Swaziland, and the East and Southern African Management Institute (ESAMI) in Tanzania.

#### 1. Institute of Development Management (IDM) -- Botswana, Lesotho, and Swaziland (BLS) (See Fig. 37)

The IDM was established in 1974 to improve the management skills of employees in the public and private sectors of BLS. Through a variety of programs (from workshops tailored to a specific client to several comprehensive management programs) the institute attempts to address the needs of both the region as a whole and those pertinent to the three respective nations.

The IDM attempts to keep abreast of the changing needs of the market through formal advisory committees in each country, as well as through informal feedback from clients and former trainees. Large parts of the institute course portfolio are repeated over time; other parts are revised frequently or

offered only intermittently, and some courses emerge from on-site consultation with a company or organization.

### Governance

The flexibility inherent in IDM programming derives from a combination of its broad mandate and form of governance. Although the three major users of IDM services are the governments of the BLS, and they each contribute a similar amount to the annual recurrent budget of the institute, the institute is essentially autonomous. The Board of Governors includes representatives of all types of clients, private and parastatal as well as government. Consequently, the unique quality of the IDM for serving the SADCC region is due in part to the institute's autonomy and flexibility. Self-sponsored students are welcomed and extensive donor assistance has been forthcoming to provide scholarships and subsidies to participants in IDM programs.

### Types of Courses

Workshops/Seminars -- a few days to 2 weeks

Short Courses -- 1 to 12 weeks

Certificate Programs -- 2 types: 1) variable packaging of several short courses into a special program, e.g., Certificate in Administrative Office Management; 2) prescribed curriculum with no substitutions which occurs either all at once, e.g., Certificate in Health Care Administration (34 weeks), or is taken in discreet parts in cumulative fashion over time, e.g., Certificate in Finance Management -- Parts I and II at 9 weeks' residence each.

Entry requirements vary greatly with the course. Short courses often have no specified minimum entry qualification. In such cases it can be assumed the junior secondary school [B] is the realistic minimum. For courses which last from several weeks to several months the minimum is an 0-level pass, or success on a pre-test given by the IDM, presentation of evidence of success on a recognized external examination, or successful completion of the previous IDM course in a prescribed sequence.

Assessment of performance in IDM courses is done internally through examinations and practicals for all courses longer than two weeks' duration. Some courses are designed to prepare students for standardized achievement or licensing exams, e.g., the AAT Level II Special Preparation courses in accounting. Performance transcripts and marks are provided automatically to course participants and to sponsoring organizations on request.

There are three types of certification for IDM courses: 1) Certificate of Attendance -- courses of two weeks duration or less; 2) Certificate of Completion -- courses of longer than two weeks which are either terminal or are a part of several segments in a program sequence. To get this certificate the

candidate has to pass the internal exams for the course; 3) Program Certificate -- awarded to those who successfully pass all required parts of a program sequence, e.g., Certificate in Financial Management, Parts I and II.

Because the course programs of the IDM are so highly differentiated, it is necessary to consult the prospectus. The representation of programs in the following figure (38) shows selected items which would be of interest to potential SADCC users.

The IDM serves hundreds of participants from the BLS countries every year. It has facilities in all three countries, including hostels. Students from the SADCC region outside of the BLS countries are welcomed on a space-available basis.

Country: BOTSWANA, LESOTHO & SWAZILAND

Name of School: INSTITUTE OF DEVELOPMENT MANAGEMENT

Name of Program	UNESCO Code	Minimum Entry Requirements	Length of Program	Components		Certificate	Program Content	Employment Qualifications	I.L.O. Code	Remarks
				Acad.	Employ					
Finance Management, Parts I and II	93419	Pass Pre-test at 60% or success in IDM Accounting II	18 weeks (2 nine-week sessions)	100%		Certificate in Finance Mgmt.	Accounting; Math and Statistics; Economics; Business Law; Communication; Administration in Business; Data Processing; Review & Testing	Basic Level Accountant	1-10.10	Should be able to pass AAT Level II exam
Health Care Administration	93419	School Cert. + considerable relevant experience	34 weeks	26 weeks	8 weeks field work	Certificate in Health Care Administration	Administration; Communication; Hospital Organization/Planning; Personnel Mgmt.; Community Health Care Admin.; Hospital Accounting/Finance; Psychology; Legal Aspects of Health; Social/Economic Aspects of Health	First Level In/Out-Patient Facility Administrator	2-19.90	
Training of Trainers, Parts I - IV	93419	School Cert. or equivalent	10 weeks			Certificate	Supervisory Management Techniques; Designing, Developing & Evaluating Training Programs; Training Methods and Techniques; Training Administration	To conduct Supervisory Training courses	unknown	
Management	93419	School Cert. or equivalent + mid-level management position	18 weeks	18 weeks divided into 3, 6-week sessions	Project work on-job between residential sessions	Certificate	Management History/Principles; Work Study; MBO; Job Analysis; Manpower Planning; Training & Development; Financial Management; Materials Management; Office Management; Managing Change	Middle Manager -- Government or Private Business Organization	2-19.90	

East and Southern African Management Institute (ESAMI)

ESAMI is a middle- and high-level management institute located in a specially constructed modern highrise tower in Arusha, Tanzania. It traces its origins to the days of the now defunct East African Community. At ESAMI's inception it was dedicated to the training needs of the East African Community generally, and most specifically to those of the East African Railways, Harbors and Airlines. Its long concern has been carried forward into the present.

EASMI's programs are directed primarily to the needs of mid-level managers of parastatal organizations. It also caters to the needs of the private sector (about 20% of its resources are so directed). The flagship course is the Post Graduate Diploma in Management which requires a university degree for admission.

The current building dates from 1973, following a UNDP study. The building costs of US\$11 million were shared by grants from the Danish and East African governments. The original staffing was financed by the UNDP. Even before the demise of the East African Community, ESAMI was offering its services to managers from 12 African nations.

ESAMI programs are not to be confused with the more prosaic function of the national institutes of public administration. Its staff is highly professional and experienced, all possess advanced degrees, many have earned doctorates. The library's collection in the management field has nearly 4,000 volumes and 120 periodical subscriptions specializing in management and related fields.

Instructional techniques testify to a familiarity with the use of modern technology, e.g., video production and taping, closed circuit communication, simulation exercises, games, and case studies. ESAMI also makes use of a Wang 200 computer for instructional and administrative purposes.

Ironically, this high level of sophistication, staff and facilities has inclined some to conclude that ESAMI is overly splendid for the contemporary needs of African public and parastatal managers -- that it is overly costly and abstract. However, it is important not to contrast ESAMI with national institutes, for its role is continent-wide (currently enrolling students from 18 countries) and it serves the needs only of top- and middle-level executives.

In addition to its primary function of mounting management courses for public, private and parastatal executives, ESAMI is also charged with the responsibility of carrying out research and for providing consulting services to regional organizations. As a research institution ESAMI regularly hosts

conferences on critical management issues and publishes relevant research papers. A series of occasional papers and monographs are currently being planned.

ESAMI seeks to relate its consulting function to training in a unique fashion. For example, when ESAMI is requested to provide consulting services to a parastatal or other organization in a given management area, it commences its activities by involving the relevant staff of the organization in the identification and analysis of the management problem. This involvement is continued throughout the duration of the consultation -- to the point that the employees assist in the preparation of the final recommendations and report. In the process, of course, valuable management training is imparted and the organization's staff have also been brought into the improvement process.

Because of its long history and its primary concern with region-wide upper-echelon in-service management training, ESAMI perceives itself responsible to assist in the improvement of national institutes of administration and management. The director of ESAMI and his staff regularly visit local institutes and also arrange to bring key staff from national centers of public administration and management to ESAMI for workshops, training, etc. Currently, staff from national centers are working with ESAMI to develop case studies with region-wide training implications. This innovative and potentially significant undertaking is being financed in large part by a World Bank grant. Forty cases, 20 in agriculture and 20 in general management, are in the process of being prepared.

In the area of management training, as with science, math, and teacher education, effective and efficient regional cooperation can be obtained through the systematic aggregation and diffusion of effective instructional materials, in contrast to the expensive movement of executive manpower from country to country.

Regional and possibly subregional centers of this sort could develop and disseminate materials tailored to the varying needs of the member states' public and parastatal organizations. The management training needs, for example, of countries with a population of less than 1 million differ in important ways from those of countries with a population of more than 14 million. National institutes in the smaller countries can quickly saturate their training requirements in relatively specialized occupational areas, where training institutions in the larger states may never satisfy the requirements. Obviously, this suggests variations in the roles and missions of national institutes of management and administration.

ESAMI can, and to a degree does, play an important role in identifying critical manpower management issues that are

common to the entire region. For example, it is becoming increasingly clear that systematic manpower assignment and utilization is probably as important as manpower development. Trained manpower improperly employed is damaging to national development.

About 1,200 students pass through ESAMI each year, of which 800 are funded by some form of external aid, usually identified and secured by ESAMI itself. The remainder are supported by fees from their sponsoring government, parastatal, or business. Most participants (60%) come to ESAMI for regularly scheduled courses of study, while the remainder are involved in tailor-made courses on request. It is worth noting that only 4 of ESAMI's highly qualified staff of 30 professionals are expatriates.

Courses are not only mounted in the Arusha headquarters but, on request, elsewhere in the region as well, e.g., Uganda, Kenya, and Zambia. ESAMI plans to expand its capacity to bring its management training expertise into regional sites.

There is also one national institution which might be viewed as a model institution.

#### Center for Accounting Studies (CAS) - Lesotho

An important specialized area of management education characterized by variable quality and standards throughout the region is that of accounting. Everyone is aware of the fragmentation in this field. It has been the subject of several studies with the most recent regional examination completed by an ILO advisor to the Malawi Government.\* An institution based in Maseru, Lesotho, the Center for Accounting Studies has much to offer as a model of how to engage both the great need for accounting skills and the quality control necessary to standardize practices. The following detailed description of the CAS, and its role as a training arm of the Lesotho Institute of Accountants (LIA) is reported here for the following reasons:

1. CAS/LIA represents a model for an institutional umbrella under which a country might consolidate national and international professional standards.
2. It represents a model for linking professional accountancy standards with training to those standards (CAS is the testing agency for LIA as well).

\*See Gibbs's report to the International Labour Organisation on "Accounting in The Southern Africa Region - Zambia, Botswana, Lesotho and Swaziland," June, 1983.

3. CAS has played a research/consulting role for the LIA in assuring the level and quality of accounting training around the country, making recommendations on the division of labor for training between institutions as well as suggesting ways in which the University's own accounting program might be adjusted to better prepare its students for semi-professional exams.
4. Although CAS could not accommodate SADCC regional students at the Lesotho center for technician level and semi-professional training because of present and future national demand, they could, and are willing to, accept students from the region qualified to do the professional level (public accountant) course. The standard work release format raises logistical problems for regional participants, but the staff of CAS would be happy to discuss ways around this problem with any interested parties in the region.
5. Finally, CAS/LIA represents a professional spirit of interested and committed personnel who would like to forge ahead with a "SADCC Regional Institute of Accountants." Users of this report might find this contact and approach worth study and discussion.

### The Center for Accounting Studies (CAS)

#### Introduction

This Center was established in 1979 through a memorandum of understanding between the Government of Lesotho and the Irish Government. The center is located in Maseru, and is being developed and managed by an Irish firm of consultants -- Stokes, Kennedy, Crowley & Co.

#### Center's Objectives

The Center's major objective is to assist in the development of the accounting profession in Lesotho through a close working relationship with the Lesotho Institute of Accountants. It currently conducts formal accountancy training for the institute's Licensed, Registered and Public Accountants' examinations which are presently set by the Center's academic staff.

#### Training Programs

The Center for Accounting Studies provides training for accountants at all three levels of accountancy qualification of the Lesotho Institute of Accountants. These are: Licensed Accountant (L.A.) -- 1 year program; Registered Accountant (R.A.) -- 3 years' program; Public Accountant (P.A.) -- 1 year program.

### 1. Licensed Accountant Program

Since the Center currently has no system of exemptions, all entrants to its programs must follow the established sequence of study. Entry qualifications at the Licensed Accountant level include a School Certificate (C) coupled with some accounting experience; holders of a university degree, preferably in Commerce (with an accounting major); a diploma/certificate in business studies and successful completion of the Center's "Commencement" course, which lasts three weeks. The objective of the Commencement course is essentially to ensure that the potential L.A. candidates acquire an understanding of the basic aims and objectives of accounting and the use of accounting information by management. A brief outline of the course contents reveals that the course is entirely devoted to accounting; accounting; bookkeeping; preparation of accounts; accounting concepts and terminology.

On successful completion of the three-weeks' course, students are admitted into the L.A. program proper, where they study accounting, auditing, taxation, law, business methods and communication techniques. In terms of time allocations for subject contact hours, accounting takes 47.5%. Table No. 1, below, shows the detailed breakdown of time allocated to six subjects at the L.A. level.

Table 1

Subject	Hours	% of Time
Accounting (2 papers)	170	47.50
Auditing (1 paper)	68	19.00
Taxation (1 paper)	51	14.25
Law (1 paper)	51	14.25
Business Methods (tests)*	10	2.80
Communicative Technique**	8	2.20
<b>TOTAL CONTACT TIME</b>	<b>358</b>	<b>100.00</b>

\*Continuous assessment through tests

\*\*Non-examinable subject

Source: Center for Accounting Studies - Maseru, April, 1982

Notable in the CAS program, of course, is that it is organized as a 2-week block-release full-time course, conveniently interspaced by evening lectures, usually twice weekly. During the period between the block-release courses students are attached to employers for practical work.

The same system of study applies also to the courses leading to qualifications for Registered Accountants and Public Accountants.

## 2. The Registered Accountant Program

The individual who receives the title of Registered Accountant in Lesotho is expected to occupy the position of "Assistant Chief Accountant" in a large commercial concern, Chief Accountant/Financial Controller in a medium-sized concern; or a senior, but not the most senior position in the accounting services of government departments. Thus, the three-year course for R.A. is designed to equip that person with the knowledge of accountancy and related necessary techniques required of a public accountant.

Over a three-year period of the R.A. study program, the student will have spent roughly 76% of the formal class contact hours studying Financial Accounting, Management Accounting, and Auditing. The remaining time will have been spent in such supporting subjects as Economics, Statistics, Taxation and Data Processing.

## 3. The Public Accountant Program

Since the P.A. is the highest accounting professional qualification, a person holding this title is deemed to be an accountant of international status, with status commensurate to the Chartered Accountants of England and Wales. Consequently this program has been developed in a way that equips the potential P.A. with the necessary tools for analyzing accounting information in a wide framework of socio-economic and political settings.

The course is of one year duration and accepts candidates who have successfully completed the R.A. program. About 42% of the time taken for contact hours (360 in all) is allotted to General Financial Management. The program combines an interdisciplinary array of subjects like Analytical Techniques, Research Methodology, Up-dating in Tax, Case Studies, and Project Assignments, all aimed at sharpening the practical focus of the potential P.A. For details of courses taken in this final year of the professional ladder see Table 3, below.

Table 3  
Public Accountant (L) Course Program

Subjects	Contact Hours	% of Hours
1. General Financial Management	150	41.7
2. Techniques of Analysis and Research Methodology	20	5.5
3. Up-dating in Tax, Accounting, Auditing and Law	30	8.3
4. Integrated Case Study Work	110	30.6
5. Projects and Assignments	50	13.9
TOTAL	360	100.0

Source: Center for Accounting Studies, Maseru, April, 1982

### Current Enrollment at CAS

The Center started accepting students in 1980, with an intake of 18 students. Fourteen students were admitted into the second year of study after successfully completing the Licensed Accountant program. Of the initial 18 students in the professional programs, only 7 are enrolled in the second year of study for the R.A. program. The latest projections show that 1984 will have locally graduated P.A.'s, 7 in 1985, and 6 in 1986. See Table 4, below, for details.

Table 4

<u>Student Enrollment at the Center for Accounting Studies 1980-86</u>							
Professional Level	1980	1981	1982	1983	1984	1985	1986
Licensed Accountants Course	18	38	41	40	40	30	30
Registered Accountants Course	Year 1	14	30	29	28	28	21
	Year 2		7	21	18	17	17
	Year 3			4	13	11	10
Public Accountants Course					2	7	6
TOTAL ENROLLMENT	18	52	78	94	101	93	84

Source: Center for Accounting Studies, Maseru, April, 1982

In summary, when the Center reaches the point where all three levels of professional accounting programs operate simultaneously and at capacity (1984-85), it will be able to produce on average about: 30 Licensed Accountants; 10 Registered Accountants; and 4 Public Accountants annually.

### Physical Facilities and Instructional Staff

**Facilities:** The Center is presently housed in a rented structure and is in the process of securing alternative accommodations (to be newly erected) with capacity equal to the present one. At present the Center has 2 lecture rooms, each with a capacity for 35 students sitting comfortably (maximum 70 students), and another 2 lecture rooms, each with a capacity for 25 students (maximum 50 students); thus it can accommodate a maximum of 120 students at any one time.

**Library:** There exists a small but useful library, with sitting space for about 5-10 persons (20 sq.m) containing some of the most up-to-date published books in business, accounting, and related areas of interest. In addition to the books, journals of a professional nature are also available.

Staffing: At present there are four full-time lecturers at the Center (all fully qualified accountants) complemented by a selected team of four part-time staff from the National University of Lesotho and another eight from government. In addition to the four full-time staff the Center envisages to carry out a program of localization of manpower for teaching at the Center as soon as is considered feasible.

#### Potential for Future Cooperation

In terms of potential for cooperation in the training of accountants on a regional basis, the program structure at the Center poses some practical difficulties for students who would be accepted from outside Lesotho, for they would presumably have to be employed locally within Lesotho for the duration of their study programs.

In terms of space for student intake, it is evident that in the long run Lesotho will utilize about 100 of the 120 student places (maximum enrollment at one time), leaving about 20 spaces only for outsiders. These could presumably be reserved for the P.A. level if cooperation is to be restricted at only the highest professional qualification.

## IV COMPARABILITY STUDY

A. By Fields of Study

The figures (starting at page 146) which accompany this section of the report illustrate the basic patterns of education for each sector (except for Management and Accounting, where insufficient examples were available for comparability) and the documents awarded at each level. The document codes (letters in brackets) are the same as those which appear in the figures for each country, i.e., Figures 1 through 9 (starting on page 15).

1. Agriculture and Veterinary Science.

- a. Secondary Programs - See Figure 38. Secondary-level agriculture programs are offered in Angola, Botswana, Lesotho, Malawi, Mozambique, Zambia, and Zimbabwe. The ensino secundario basico tecnico program in Mozambique [I] is comparable to the Farm College program in Zambia [P]. The other five secondary-level programs in agriculture are higher than these, and appear to be comparable to each other. They lead to a Certificate in Agriculture in Botswana [Q], Lesotho [U], Zambia [Q], and Zimbabwe [Y], and to an Extension Worker Certificate in Malawi [L].

The programs in Zambia which lead to a Certificate of Veterinary Assistant [R] or to a Certificate of Veterinary Lab Assistant [T] are similar to the program in Botswana which leads to a Certificate in Animal Health [Q]. There does not appear to be any other secondary-level program comparable to that which leads to a Certificate of Tsetse Control Assistant [S] in Zambia.

- b. Post Secondary Programs - See Figure 39. Post secondary-level agriculture programs are offered in Angola, Botswana, Lesotho, Malawi, Mozambique, Tanzania, Zambia, and Zimbabwe. It should be noted that while students in Angola and Mozambique have a shorter primary/secondary education, their technical college programs are comparable with post secondary programs in the anglophone countries, and in Angola serve as pre-university training.

The program in ensino medio [I] in Angola is comparable to the program in ensino medio tecnico [N] in Mozambique. Although they represent a shorter period of study than the post secondary programs in other countries, both the content of the curricula and the types of employment to which they lead are post secondary in nature.

There are four other post secondary programs in agriculture which appear to be comparable; they lead to a Diploma in Agriculture in Botswana [X], Lesotho [X], and Zimbabwe [a] and to a Certificate in Agriculture [Q] in Tanzania. The program in Tanzania which leads to a Diploma in Agriculture

[S] appears to be at a slightly higher level. The program in Malawi which leads to a Certificate of Agricultural Extension Worker [T] is similar to these programs.

The program in Malawi which leads to a Diploma in Forestry [U] is similar to those in Tanzania which lead to a Certificate in Forestry [Y] and a Diploma in Forestry [X]. The program in Zambia which leads to a Diploma in Forestry [d] appears to be at a slightly higher level.

There does not appear to be any program in the other countries comparable to the programs in Tanzania leading to a Certificate in Veterinary Science [V] or an Intermediate Certificate in (Veterinary) Laboratory Technology [W], or to a Certificate in Wildlife Management [j] or a Diploma in Wildlife Management [k], or to a Diploma in Agriculture Education [R], a National Diploma in Fisheries [m], a Diploma in Agriculture at the higher level [i], or the various diplomas related to land use [r].

- c. University Programs - See Figure 40. University-level programs in agriculture are offered in Angola, Malawi, Mozambique, Swaziland, Tanzania, Zambia, and Zimbabwe. The incorporation of the Botswana Agricultural College into the University of Botswana and the building of a degree-granting Faculty of Agriculture is just now getting underway.

The program leading to a Licenciatura em Agronomia [L] in Angola is slightly higher than the program leading to a Licenciatura em Agronomia [F] in Mozambique. The one in Angola is comparable to the bachelor's degree programs offered in Malawi [F] and Swaziland [H], and to the one planned in Botswana [J]. The bachelor's degree programs offered in Tanzania [D], Zambia [H], and Zimbabwe [H] are comparable; they are at a slightly higher level than those in Angola, Botswana, Malawi, Mozambique, and Swaziland.

The bachelor's degree program in Forestry in Tanzania [D], is at a slightly higher level than the programs leading to a Licenciatura em Ciencias Agrarias [L] in Angola and a Licenciatura em Silvicultura [F] in Mozambique. The programs in Angola and Mozambique are comparable to each other.

There are bachelor's degree programs in veterinary science in Tanzania [F], Zambia [H], and Zimbabwe [Q] and licenciatura degree programs in Mozambique [L] and [F]. (The programs in Zambia and Zimbabwe are new, and no graduates will be produced for several years.) The program in Zambia requires five years of study beyond O-level, the program in Tanzania requires six years of study beyond O-level, and the program in Zimbabwe requires seven years of study beyond O-level.

The programs which lead to a Licenciatura em Medicina Veterinaria [L] in Angola and to a Licenciatura em Medicina Veterinaria [F] in Mozambique appear to be comparable to each other, and to the programs leading to a bachelor's degree in veterinary science in Tanzania [E] and Zambia [H]. The program leading to a bachelor's degree in veterinary science in Zimbabwe [Q] appears to be slightly higher.

## 2. Engineering and Technology

- a) Secondary Programs - See Figure 41. Secondary-level programs in engineering and technology are offered in every country except Angola.

The lower secondary program in Lesotho which leads to a Certificate [S] appears to be comparable to that in Tanzania which leads to a Trade Certificate [M] and to that in Mozambique which leads to technical training [I].

There are six upper secondary programs which appear to be comparable; they lead to an Advanced Craft Certificate in Botswana [T], a Certificate in Lesotho [W], and Malawi [N], and a Craft Certificate in Swaziland [Q] and Zimbabwe [Z]. The programs in Zambia which lead to a Certificate [V] or Craft Certificate [W] appear to be at a slightly lower level.

The program in ensino secundario basico tecnico in Mozambique requires the same length of study as the Certificate [S] program in Lesotho and the Trade Certificate [M] program in Tanzania, but the curriculum and the types of employment to which it leads are closer to those of the six upper secondary programs just described.

- b. Post Secondary Programs - See Figure 42. Post secondary level programs in engineering and technology are offered in all nine countries.

The program in ensino medio [I] in Angola is comparable to the program in ensino medio tecnico [N] in Mozambique. Although they represent a shorter period of study than the post secondary programs in other countries, both the content of the curricula and the types of employment to which they lead are post secondary in nature.

There are seven upper secondary programs which appear to be comparable; they lead to a Full Technician Certificate in Botswana [a] and Tanzania [T], a Certificate in Lesotho [Z], a Diploma in Engineering in Malawi [D], a Technician Certificate in Swaziland [R], and a Diploma in Technology in Zambia [Y]. Mozambique has a three or four year program, [C] both of which are not pre-university training and are highly technical. The program in Botswana which leads to a Technician Certificate [Y] is comparable to the program in Zimbabwe which leads to a National Technician Certificate [c]; and the program in Botswana which leads to an Ordinary Technician Diploma [Z] is comparable to the program in Zimbabwe which leads to a National Technician Diploma [b].

- c. University Programs - See Figure 43. University-level programs in engineering are offered in Angola, Malawi, Mozambique, Tanzania, Zambia, and Zimbabwe.

The program in Angola which leads to a Licenciatura em Engenharia [L] is slightly higher than the program in Mozambique which leads to a Licenciatura em Engenharia [F]. The program in Angola appears to be comparable to the programs which lead to a Bachelor's degree in Engineering [I] in Malawi, a Bachelor of Science in Engineering [F] in Tanzania, a Bachelor of Engineering [H] Zambia, and a Bachelor of Science (Engineering) Honours [M] in Zimbabwe, all of which appear to be comparable to each other.

### 3. Teacher Training

- a. Secondary Programs - See Figure 44. Secondary-level training programs for teachers are offered in Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, and Zambia.

The Formacao de Professores program in Mozambique [J] appears to be comparable to the program in Tanzania which leads to a Primary Teacher's Certificate, Grade C [N].

Six upper secondary-level programs for primary teachers appear to be comparable; they lead to a Certificate in Primary Education in Botswana [P], Swaziland [N] and Zambia [U], a Primary Teacher's Certificate in Lesotho [V], and a Primary Teacher's Certificate - T3 in Malawi [M]. One Formacao de Professores program in Mozambique [L], which prepares teachers for the first part of lower secondary school (5a and 6a classes), appears to be comparable to these five programs.

- b. Post Secondary Programs - See Figure 45. Post secondary teacher training programs are offered in all nine countries.

The ensino normal pedagogico [G], ensino normal de educacao fisica [R], and ensino industrial pedagogico [H] programs in Angola represent a shorter period of study than the post secondary programs in other countries, but the content of the curricula and the levels of teaching to which they lead are post secondary in nature.

The program in Malawi which leads to a Primary Teacher's Certificate, T2 [R] appears to be comparable to the program in Tanzania, which leads to a Primary Teacher's Certificate, Grade A [O]. The program in Zimbabwe which leads to a Certificate of Education [e] for primary teachers appears to be at a similar level, but it includes two full years of supervised teaching and part-time coursework in addition to two years of full-time coursework.

The program in Botswana which will lead to a Diploma in Junior Secondary Education [W] appears to be similar to the program in Lesotho which leads to a Secondary Teacher's Certificate [Y]. The program in Swaziland which leads to a Secondary Teacher's Diploma [S] appears to be comparable to the one in Zambia which leads to a Junior Secondary Teacher's Certificate [g]. The program in Zimbabwe which leads to a Certificate in Education [e] for secondary teachers appears to be at a similar level, but it includes two full years of supervised teaching and part-time coursework in addition to two years of full-time coursework.

Two of the formacao de professores in Mozambique, [L] and [M], require the same length of study. The first one is

considered to be a secondary program. The second one is offered at the Universidade Eduardo Mondlane, but it is a Ministry of Education and Culture program, not a University program. It cannot yet be described as a post secondary program, but it is being upgraded to post secondary standards.

There is another formacao de professores [U] program in Mozambique which is post secondary. It is a university non-degree program. It appears to be slightly lower than the other post secondary programs in the region.

- c. University Programs - See Figure 46. University-level programs in education are offered in every country except Mozambique.

Five programs leading to a Bachelor's degree in Education appear to be comparable: those in Botswana [J], Lesotho [M], Malawi [F], Swaziland [H], and Zambia [G]. The program in Tanzania [E] requires one additional year of study beyond the O-level, while the program in Zimbabwe [I] requires two additional years of study beyond the O-level.

The program in Angola which leads to a Licenciatura em Ciencias de Educacao appears to be comparable to the Bachelor's degree programs in Botswana [J], Lesotho [M], Malawi [D], Swaziland [H], and Zambia [G].

The programs which lead to a Postgraduate Diploma in Education in Swaziland [J] and a Post Graduate Certificate in Zambia [I] appear to be comparable. Similar programs in Tanzania [G] and Zimbabwe [O] also appear to be comparable; they appear to be slightly more advanced than those in Swaziland and Zambia.

#### 4. Transportation and Communication

- a. Secondary Programs - See Figure 47. Secondary level programs in transportation are offered only in Botswana [R] and [U] for highways and automobiles, and Zimbabwe [Z] for railways.
- b. Post Secondary Programs - See Figure 48. Post secondary level programs in transportation are offered in Botswana [d], Mozambique [V] and [W], Tanzania [Z], Zambia [b] and [c], and Zimbabwe [b], [c], and [d]. They all differ in admission requirements, nature of curriculum, and duration of program.
- c. University Programs - See Figure 49. No university-level programs in transportation and communication are offered in any of the nine countries.

ANGOLA

No Programs Offered at the Secondary Level			
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BOTSWANA

Primary School 7 years	Lower Secondary School 2 - 3 years	Botswana Agri. College 2 years	
	A	B/C	Q

LESOTHO

Primary School 7 years	Lower Secondary School 3 years	Agricul- ture 2-1/2 yrs.	
	A	B	U

MALAWI

Primary School 8 years	Lower Secnd- ary School 2 years	Agri- culture 2 years	
	A	B	L

MOZAMBIQUE

Ensino Primario 4 yrs.	Ensino Sec. Geral 2 yrs.	Ensino Secundario Tecnico Basico 3 years	
	A	B	I

SWAZILAND

No Programs Offered at the Secondary Level			
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TANZANIA

No Programs Offered at the Secondary Level			
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ZAMBIA

Primary School 7 years	Jr. Sec. 2 years	Agri. or Ann.Hlth 1-2 yrs.	
	Farm College 3 years		Q R T
	A	P	

ZIMBABWE

Primary School 7 years	Lower Secondary School 2 years	Agriculture 3 years	
	A	Y	

ANGOLA

Ensino de Base 8 years	Ensino Médio 4 years	
A	B C D	I

BOTSWANA

Primary School 7 years	Secondary School 5 years	Botswana Agri. College 2 years	
A	B C	D	X

LESOTHO

Primary School 7 years	Secondary School 5 years	Agri-culture 2 years	
A	B	C	X

MALAWI

Primary School 8 years	Secondary School 4 years	M.C. of Forestry 2 years Nat. Res. C. Cert. 2 years	Malawi Coll. of Forestry 1-1/2 yr	
A	B	C	T	V U

MOZAMBIQUE

Ensino Primário 4 years	Ensino Secundário Geral 2-5 years	Ens. Sec. Bas. Tec. 3 yrs.	Ensino Méd. Técnico 3 years	
A	B	C	N	I

SWAZILAND

No Programs Offered at the Post Secondary Level			
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TANZANIA

Primary School 7 years	Lower Secondary School 4 years	Upper Sec. 2 years	Agri., Wildlife, Fisheries 2-3 yrs.	
A	B	Q R k f	V S m i	C
		Y W	J X	

ZAMBIA

Primary School 7 years	Secondary School 5 years	Natural Resources Dev. College 3 years	
A	B	C	d

ZIMBABWE

Primary School 7 years	Lower Secondary School 4-5 years	Agri-culture 2 years	
A	B	C	a

ANGOLA

Ensino de Base 8 years	Ensino Médio 4 years	Licenciatura em Ciências Agrárias 5 years	
A	B C D	I	L

BOTSWANA

Primary School 7 years	Secondary School 5 years	Bachelor's Degree in Agri. [proposed] 4 years	
A	B C	D	J

LESOTHO

No Programs Offered at the University Level			
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MALAWI

Primary School 8 years	Secondary School 4 years	Bunda College of Agri. Univ. of Malawi Diploma 3 years	Bunda College of Malawi Bach. 2 years	
A	B	C	D	F

MOZAMBIQUE

Ensino Primário 4 years	Ensino Secundário Geral 7 years	Licenciatura em Agronomia 4 years	
A	B	C D	F

SWAZILAND

Primary School 7 years	Secondary School 5 years	Bachelor of Science in Agriculture 4 years	
A	B	C	H

TANZANIA

Primary School 7 years	Lower Secondary School 4 years	Upper Secondary Sch. 2 years	Bachelor of Science in Ag., Forestry [D], Veterinary Sci. [F] - 3-4 years	P.G. Dip. M.Sci. 1-2 yrs.	Doctor of Philosophy 2-4 years	
A	B	C	D	F G	H	L

ZAMBIA

Primary School 7 years	Secondary School 5 years	Bachelor of Agricultural Sciences or Bachelor of Veterinary Science 5 years	
A	B	C	H

ZIMBABWE

Primary School 7 years	Lower Secondary School 4-5 years	Upper Secondary Sch. 2 years	B.Sc. Agriculture 3 years	Bachelor of Veterinary Science, 5 years	Master of Philosophy-2 yrs	Doctor of Philosophy 3 years*
A	B	C	D E	H	P	Q M

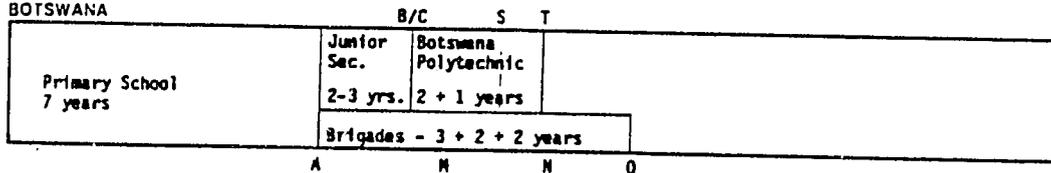
# Also Master of Veterinary Medicine  
\* Research only; no coursework

Fig. 41

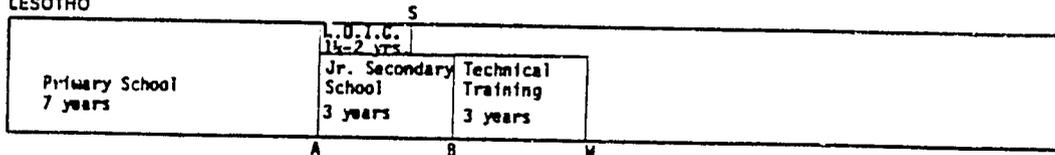
ENGINEERING: CONSTRUCTION, MINING AND TECHNOLOGY - SECONDARY PROGRAMS  
ANGOLA

No Programs Offered at the Secondary Level

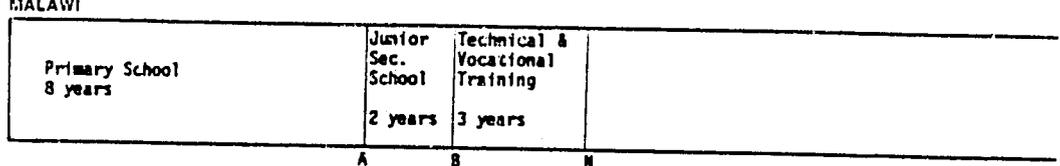
BOTSWANA



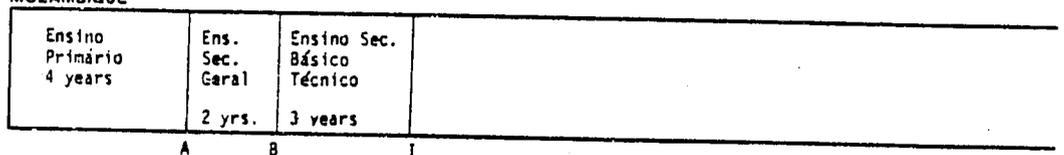
LESOTHO



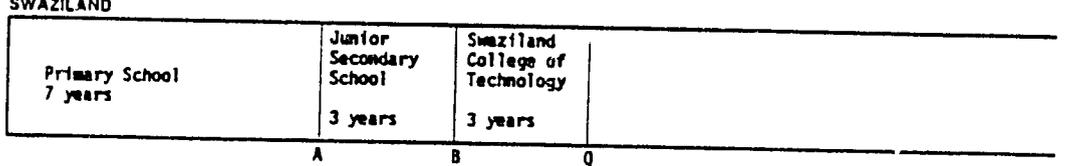
MALAWI



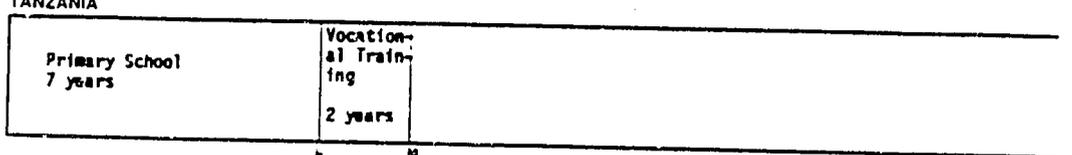
MOZAMBIQUE



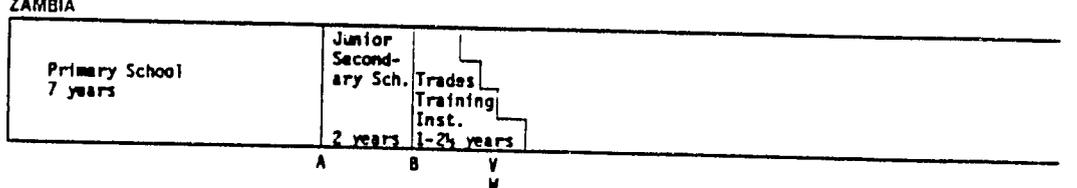
SWAZILAND



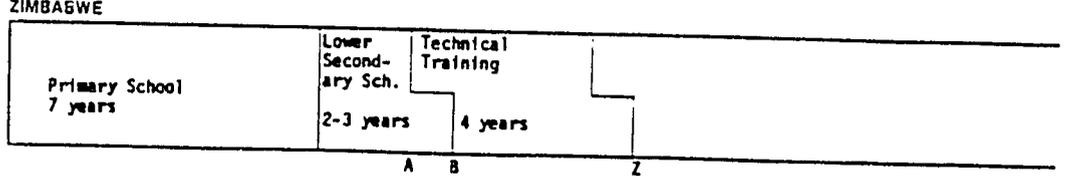
TANZANIA



ZAMBIA



ZIMBABWE



ANGOLA

Ensino de Base 8 years	Ensino Médio 4 years	
A	B C D	E

BOTSWANA

Primary School 7 years	Secondary School 5 years	Botswana Polytechnic 2+1 2+2 3 year programs	
A	B C	D Z Y	b
		a	c

LESOTHO

Primary School 7 years	Secondary School 5 years	Technical Institute 3 years	
A	B	C Z	

MALAWI

Primary School 8 years	Secondary School 4 years	Malawi Polytechnic of Univ. of Malawi 3 years	
A	B	C D	

MOZAMBIQUE

Ensino Primário 4 years	Ensino Secundário Geral 5 years	Ensino Médio Técnico 3 years	
A	B	C N	

SWAZILAND

Primary School 7 years	Secondary School 5 years	Swaziland College of Technology 1-3 years	
A	B	C U T	R

TANZANIA

Primary School 7 years	Lower Secondary School 4 years	Techni- cal Training 2-3 years	
A	B	U T	

ZAMBIA

Primary School 7 years	Secondary School 5 years	Z.I.T. & NORTEC 2½-3 yrs.	
A	B	C I I X Y	J k

ZIMBABWE

Primary School 7 years	Lower Secondary School 4-5 years	Tech. Trng. 2 years	Tech. Trng. 2 years	
A	B C	c*	d*	b

\* Part-time

ANGOLA

Ensino de Base 8 years	Ensino Médio 4 years	Licenciatura em Eugenharía 5 years	
A	B C D	E	F

BOTSWANA

No Programs Offered at the University Level
---

LESOTHO

No Programs Offered at the University Level
---

MALAWI

Primary School 8 years	Secondary School 4 years	Malawi Polytechnic of Univ. of Malawi 3 years	Malawi Polytechnic of Univ. of Malawi 3 years	
A	B	C	D	E

MOZAMBIQUE

Ensino Primário 4 years	Ensino Secundário Geral 7 years	Licenciatura em Eugenharía 4 years	
A	B C	D	E F

SWAZILAND

No Programs Offered at the University Level
---

TANZANIA

Primary School 7 years	Lower Secondary School 4 years	Upper Secondary Sch. 2 years	Bachelor of Science in Engineering 4 years	M. of Sci. in Engr. 1-2 yrs.	Doctor of Philosophy 2-4 years	
A	B	C	D	E F	G H	I L

ZAMBIA

Primary School 7 years	Secondary School 5 years	Bachelor of Engineering 5 years	Master of Engr. 2 years	
A	B	C	D E	F G

ZIMBABWE

Primary School 7 years	Lower Secondary School 4-5 years	Upper Secondary Sch. 2 years	Bachelor of Science in Engineering Honours 4 years	Master of Phi- losophy 2 years*	Doctor of Philosophy 3 years*
A	B C	D	E	F G	H I

\* Research only; no coursework

Fig. 44

TEACHER TRAINING - SECONDARY PROGRAMS

ANGOLA

No Programs Offered at the Secondary Level			
--	--	--	--

BOTSWANA

Primary School 7 years	Junior Secondary School 2-3 years	Primary Teacher Training 2 years	
A	B/C	P	

LESUTHO

Primary School 7 years	Junior Secondary School 3 years	Primary Teacher Training 2 years + 1 year work	
A	B	V	

MALAWI

Primary School 8 years	Junior Second- ary Sch. 2 years	Primary Teacher Trng. 2 years	
A	B	H	

MOZAMBIQUE

Ensino Primário 4 years	Ens. Sec. Geral 2-5 yrs.	Ed. Fis. - 5 yrs.	K
		F. de Prof. 3 years	J
		F. de P. 2 yrs.	L
A	B	C	L

SWAZILAND

Primary School 7 years	Junior Secondary School 3 years	Primary Teacher Trng. 2 years	
A	B	H	

TANZANIA

Primary School 7 years	Primary Teacher Training 3 years		
A	H		

ZAMBIA

Primary School 7 years	Junior Second- ary Sch. 2 years	Primary Teachers Training 3 years	
A	B	J	

ZIMBABWE

No Programs Offered at the Secondary Level			
--	--	--	--

ANGOLA

Ensino de Base 8 years	E. N. Ped.	G	
	E.N. Ed. Fis.		R
	E. Ind. Ped. 4 yr		
A	B C D	H	

BOTSWANA

Primary School 7 years	Secondary School 5 years	Teacher Training (Junior Secondary) 3 years	
A	B C	D	M

LESOTHO

Primary School 7 years	Secondary School 5 years	Teacher Training (Secondary) 3 years	
A	B	C	Y

MALAWI

Primary School 8 years	Secondary School 4 years	Teacher Trng. (Primary) 2 years	
A	B	C	R

MOZAMBIQUE

Ensino Primário 4 years	Ensino Secundário Geral 5 years	Form. de Prof. 2 years	
A	B	C	M L

SWAZILAND

Primary School 7 years	Secondary School 5 years	Teacher Training (Sec.) 2 years	
A	B	C	S

TANZANIA

Primary School 7 years	Lower Secondary School 4 years	Teacher Training (Primary & Lower Sec.) 2-3 years	
A	B	P	O

ZAMBIA

Primary School 7 years	Secondary School 5 years	Teacher Training (Secondary) 2-3 years	
A	B	C	g g 1

ZIMBABWE

Primary School 7 years	Lower Secondary School 4-5 years	Teacher Training (Primary and Secondary) 4 years*	
A	B	C	e

\* Two years of full-time coursework, 2 years of part-time coursework and full-time supervised teaching practice.

ANGOLA

Ensino de Base 8 years	E.N. Ped	Licenciatura em Ciências de Educação
	E.N.E.F.	
	E.I. Ped. 4 yrs.	
A	B C D	H L

BOTSWANA

Primary School 7 years	Secondary School 5 years	2 yrs.	Master of Education 2 years
		3 years	
		Bachelor of Educ. (Secondary Tchrs) 4 years	
A	B C D	J L	

LESOTHO

Primary School 7 years	Secondary School 5 years	Bachelor's Degree - Arts with Educ. or Science Educ. 4 years	M. of Ed. 1 yr
A	B C	D G E J F	M N O Q

MALAWI

Primary School 8 years	Secondary School 4 years	Diploma in Education (Secondary Teachers) 3 years	Bach. of Educ. (Secondary Tchrs) 2 years	M. of Ed. 1 yr
A	B C	D F	J	

MOZAMBIQUE

Ensino Primário 4 years	Ensino Secundário Geral 7 years	Form de Prof. 2 years
A	B C D	U

SWAZILAND

Primary School 7 years	Secondary School 5 years	S.C.O.T.	P.G. Dip. Master of Educ. 2 years
		Bachelor of Educ., Agrl. Education	
		4 years	
A	B C	F H I	M

TANZANIA

Primary School 7 years	Lower Secondary School 4 years	Upper Secondary Sch. 2 years	Tchr. Trg.	Masters P.G. Dip.
			Bach. degree Ed. opt. 3 yr	
			Bach. Degree	
A	B C	D G		

ZAMBIA

Primary School 7 years	Secondary School 5 years	Bachelor of Arts/ Bach. of Science with Education 4 years	P.G. Cert Master of Educ. 2 years
A	B C	D E G	L

ZIMBABWE

Primary School 7 years	Lower Secondary School 4-5 years	Upper Secondary Sch. 2 years	Special Honours Bachelor's Degree in Education 4 years	Master of Education 2 years	Doctor of Philosophy* 3 years
				M. P.G. of Dip. Phil	
A	B C D	E F G	I J	O P	S U W

\* Research only; no coursework

TRANSPORTATION AND COMMUNICATION - SECONDARY PROGRAMS

Fig. 47

ANGOLA

No Programs Offered at the Secondary Level

BOTSWANA

Primary School 7 years	Junior Secondary School	Roads Train- ing Centre 3 years	R
	2-3 years	Automotive Trades Trng. Sch.-3 yrs.	
	A	B/C	U

LESOTHO

No Programs Offered at the Secondary Level

MALAWI

No Programs Offered at the Secondary Level

MOZAMBIQUE

No Programs Offered at the Secondary Level

SWAZILAND

No Programs Offered at the Secondary Level

TANZANIA

No Programs Offered at the Secondary Level

ZAMBIA

No Programs Offered at the Secondary Level

ZIMBABWE

Primary School 7 years	Lower Second- ary	National Railway Zimbabwe Training Centre	
	2 years	4 years	
	A	B	Z

TRANSPORTATION AND COMMUNICATION - POST SECONDARY PROGRAMS

ANGOLA

No Programs Offered at the Post Secondary Level				
---	--	--	--	--

BOTSWANA

Primary School 7 years	Secondary School 5 years	Central Transport Organization 5 years		
A	B C	D		d

LESOTHO

No Programs Offered at the Post Secondary Level				
---	--	--	--	--

MALAWI

No Programs Offered at the Post Secondary Level				
---	--	--	--	--

MOZAMBIQUE

Ensino Primário 4 years	Ensino Secundário Geral 5 years	Escola Nautica 2-1/2 - 4 years		
A	B	C	V	W

SWAZILAND

No Programs Offered at the Post Secondary Level				
---	--	--	--	--

TANZANIA

Primary School 7 years	Lower Secondary School 4 years	National Institute of Transport 3 years		
A	B	Z		

ZAMBIA

Primary School 7 years	Secondary School 5 years	Zambia Air Ser- vices Trng. Inst. 2-3 years		b
A	B	C		c

ZIMBABWE

Primary School 7 years	Lower Secondary School	NRZTC* 2 years		b
		NRZTC 2 years	NRZTC 2 years	
A	B	C	c**	d**

\* National Railway Zimbabwe Training Centre  
 \*\* Part-time

## TRANSPORTATION &amp; COMMUNICATION - UNIVERSITY PROGRAMS

## ANGOLA

No Programs Offered at the University Level

## BOTSWANA

No Programs Offered at the University Level

## LESOTHO

No Programs Offered at the University Level

## MALAWI

No Programs Offered at the University Level

## MOZAMBIQUE

No Programs Offered at the University Level

## SWAZILAND

No Programs Offered at the University Level

## TANZANIA

No Programs Offered at the University Level

## ZAMBIA

No Programs Offered at the University Level

## ZIMBABWE

No Programs Offered at the University Level

## B. General Comparability Findings

The comparison between programs within each field and level of study in Section IV-A must be carried a step further in order to provide an instrument for comparing general levels of education across academic fields.

For this purpose, the academic fields were divided into sub-fields. The major field of agriculture was divided into the sub-fields of agriculture, biological science, fisheries, forestry, veterinary science, and wildlife science.

Engineering was divided into architecture and civil engineering, industrial engineering (including chemical, electrical, and mechanical engineering), and mining and geological science. Teacher training was divided into mathematics and science, and technical subjects. The field of transportation was omitted, because all of the programs mentioned in this report are unique, and because most of the programs are offered in accordance with the standards of international organizations such as the International Maritime Organization (IMO) and the International Air Transport Association (IATA).

For this analysis, only those educational programs offered which are considered to have regional importance were selected. Thus, this section of the report is based upon a sampling of educational programs offered in the region, and is not a comprehensive analysis. It is presented as the basic design for a future complete analysis.

Each program was classified according to two standard international systems: The UNESCO International Standard Classification of Education, (ISCED), and the ILO International Standard Classification of Occupations (ISCO). ISCED was the primary classification system, with ISCO used as an ancillary classification system. The two code systems are Appendixes 2 and 3.

Figure 50 presents a comprehensive list of the selected programs which are described in detail in this report. It lists by field and sub-field each program with its ISCED and ISCO codes, and includes information concerning the years of study involved: for preparation, for the program, and total.

The letters in the country column identify the country involved:

A = Angola	S = Swaziland
Ma = Malawi	T = Tanzania
Mo = Mozambique	Za = Zambia
	Zi = Zimbabwe

All programs specifically mentioned in this report are listed in Figure 50. However, only those programs which fit the ISCED Level 5 (education at the third level, first stage, of the type that leads to an award not equivalent to a first university degree) and level 6 (education at the third level, first stage, of the

PROGRAMS BY CLASSIFICATION

Subfield	Program	Country	Years of Study			ISCED Code	ISCO Code
			At Entry	This Program	Total		
<b>1. AGRICULTURE AND RELATED FIELDS</b>							
Agriculture	B.Sc. in Agriculture	S	12	4	15	6 62 01	0-53.20
	B.Sc. in Agriculture Management	S	12	4	15	6 62 49	6-00-20
	Diploma in Animal Production and Health	S	12	4	15	5 62 03	6-24.10
Biological Science	<u>Licenciatura em Biologia</u>	A	12	5	17	6 42 02	0-51.10
Fisheries	<u>Processamento dos Espécies Aquáticas</u>	A	8	4	12	5 62 72	?
	<u>Marinheiro - Pescador</u>	A	6	2	8	3 62 72	6-41.30
	Fisheries Biology	T	13	2	15	5 62 72	0-51.90
	Fisheries Maintenance & Administration	T	13	2	15	5 62 72	2-19.40
	Food Technology	T	13	2	15	5 62 72	0-39.90
	Marine Engineering	T	13	2	15	5 54 99	0-43.20
	Nautical Sciences	T	13	2	15	5 62 72	0-42.30/6-41
Forestry	Forestry Certificate	Ma	12	2	14	5 62 62	0-53.40
	Forestry Diploma	Ma	14	1-1/2	15-1/2	5 62 62	0-53.40
Veterinary Science	Bachelor of Veterinary Science	Zi	13	5	18	6 62 32	0-65.10
Wildlife	Certificate Course Wildlife Management	T	11	2	13	5 42 99	0-54.90
	Diploma Course Wildlife Management	T	13	2	15	5 42 99	0-51.30
	Post Graduate Diploma Course Wildlife Management	T	16	1	17	7 42 99	0-51.30
<b>2. ENGINEERING AND RELATED FIELDS</b>							
Architecture and Civil Engineering	<u>Licenciatura em Arquitectura</u>	A	12	5	17	6 58 01	0-21.20/30
	<u>Licenciatura em Engenharia Civil</u>	A	12	5	17	6 54 16	0-22.10
	B.Sc. (Civil Engineering option)	Ma	15	3	18	6 54 16	0-22.10
	<u>Curso Medio de Construcao Civil</u>	Mo	9	3	12	5 54 16	0-33.10,
							0-22.50
	Water Technician Course	S	10	2	12	5 54 16	0-22.55
	Land Surveying Diploma	S	10	3	13	5 54 02	0-39.90
	Cartography Certificate	S	10	3	12	5 54 06	0-32.50
							0-32.50

PROGRAMS BY CLASSIFICATION (CONT'D)

Subfield	Program	Country	Years of Study			ISCED Code	ISCO Code
			At Entry	This Program	Total		
Industrial Engineering (Chemical, Electrical, Electronics, Mechanical)	<u>Licenciatura em Engenharia Electrotecnica</u> idem (option <u>Informatica</u> )	A	12	5	17	6 54 22	0-23.50
	B.Sc. (Electro/mechanical option)	A	12	5	17	6 42 22	0-83.10
		Ma	15	3	18	6 54 22	0-24.10
	<u>Curso Médio Industrial, Ramo: Electricidade</u>	Mo	9	3	12	6 54 42	
	<u>Curso Médio Mecânica</u>	Mo	9	3	12	5 54 22	0-34.10/20
	<u>Ordinary Technician Diploma</u>	S	10	2	12	5 54 42	0-33.10/50
	Mechanical Engineering Technician Certificate	S	10	2	12	5 54 42	0-36.05
	Electrical Technician Certificate	S	10	2	12	5 54 42	0-35.10
	Telecommunications Technician Certificate	S	10	2	12	5 54 22	0-34.05
	<u>Curso Médio de Química Industrial</u>	Mo	9	3	12	5 54 22	0-34.30
	<u>Curso Médio de Química Laboratorial</u>	Mo	9	3	12	5 54 12	0-35.10
	Science Laboratory Technician Certificate	S	10	1	11	5 52 84	0-14.20
						5 52 84	0-14.20
	Mining Engineer and Geological Science	<u>Licenciatura em Geologia</u>	A	12	5	17	6 42 22
<u>Curso Médio de Produção de Petróleos</u>		A	8	4	12	5 54 35	0-38.20
<u>Operadores de Produção (Petróleos)</u>		A	8	1	9	3 54 35	7-13
<u>Bachelor of Mineral Science</u>		Za	12	5	17	6 42 22	0-13.30
M.Sc. in Geology, Metallurgy and Mineral Processing		Za	17	2	19	6 56 35	
Mining Technician		Za	12		14	7 92 22	0-13.30
Mining Metallurgy Technician		Za	12	2-1/2	14-1/2	7 54 36	0-13.20
Mining Surveying Technician		Za	12	2-1/2	14-1/2	5 54 36	0-38.20
Mining Ventilation Technician		Za	12	2-1/2	14-1/2	5 54 36	0-37.20
Mining Surveying Technology		Za	12	2-1/2	14-1/2	5 54 36	0-31.30
Mining Metallurgy Technology		Za	12	1	13	5 54 36	0-35.50
Intermediate Diploma Course Mining		Za	12	1	13	5 54 35	0-31.30
National Diploma Course Mining		Zi	11	2	13	5 54 35	0-37.20
		Zi	13	1	14	5 54 35	0-38.10
Intermediate Diploma Course Mineral Processing		Zi	11	2	13	5 54 35	0-37.20
National Diploma Course Mineral Processing		Zi	13	1	14	5 54 36	0-38.10
Intermediate Diploma Course Mine Surveying		Zi	11	2	13	5 54 36	0-37.20
National Diploma Course Mine Surveying	Zi	13	1	14	5 54 36	0-38.10	

Subfield	Program	Country	Years of Study			ISCED Code	ISCO Code
			At Entry	This Program	Total		
<b>3. TEACHER TRAINING (MATHEMATICS, SCIENCE, AND TECHNICAL SUBJECTS)</b>							
Mathematics and Science	Mathematics Teacher (up to form V)	Za	12	2	14	5 14 04	1-32.20
	Science Teacher (up to form V)	Za	12	2	14	5 14 04	1-32.30
Technical Subjects	Formação de Instrutores de Corte de Metais	A	8	4	12	5 14 03	1-32.80
	Formação de Instrutores de Mecanização Agrícola	A	8	4	12	5 14 08	1-32.80
	Formação de Construção Civil	A	8	4	12	5 14 08	1-32.80
	Formação de Instrutores de Mecânica Auto	A	8	4	12	5 14 08	1-32.80
	Formação de Instrutores de Soldadura	A	8	4	12	5 14 08	1-32.80
	Industrial Arts Teacher Training for Colleges	Za	15	1	16	6 14 08	1-32.80
	Industrial Arts Technical Teacher	Za	12	3	15	5 14 08	1-32.80
	Secondary Industrial Arts Teacher in...	Za	12	3	15	5 14 08	1-32.80
	Home Economics Teacher (up to form V)	Za	12	2	14	5 14 08	1-32.80
	B.Sc. (Agriculture Education)	S	12	4	16	5 14 08	1-32.80
	Diploma Agriculture Education	S	12	2	14	5 14 08	1-32.80
	Diploma in Agriculture	Za	12	3	15	5 14 08	1-32.60
	Secondary Teachers Certificate in Agriculture	Zi	11	4	15	5 14 08	1-32.80
	Secondary Teachers Certificate in Building	Zi	11	4	15	5 14 08	1-32.80
	Secondary Teachers Certificate in Tech. Drawing	Zi	11	4	15	5 14 08	1-32.80
Secondary Teachers Certificate in Woodwork	Zi	11	4	15	5 14 08	1-32.80	
Secondary Teachers Certificate in Metalwork	Zi	11	4	15	5 14 08	1-32.80	

type that leads to a first university degree or equivalent) will be compared. Programs which fit the ISCED level 3 (education at the second level, second stage) were not considered, because they are not post secondary. Programs which fit the ISCED level 7 (education at the third level, second stage, of the type that leads to a post graduate university degree or equivalent) were also not considered, because only two programs at this level were described in this report.

The programs which fit into ISCED level 6 are similar to each other, as was pointed out in Chapter IV, Section A. The programs which fit into ISCED level 5 vary greatly. To compare programs in level 5, it is necessary to divide them into high and low sub-levels. For this purpose, the programs were divided according to the number of years of study required prior to admission to the program, and the number of years of study required to complete the program (See Figure 51).

This comparison refers to the programs selected for detailed description in this report. It is not meant to be applied to all educational programs offered by educational institutions in the SADCC region. It represents a first approach to the comparison of educational programs within the region.

To illustrate the application of this division of programs, a chart of the levels of occupation is presented for the fields of Agriculture, Engineering, and Teacher Training, and their related sub-fields (See Figure 52).

In order to highlight how the comparative typology works, some of the programs described in this report were classified according to it in Figure 53. Angola and Mozambique have no programs within the classification 5H. Programs within this classification could typically be provided by adding advanced programs or specialized programs of at least two years in length to the ensino medio program in each country.

This system of comparison can be used for broad comparisons of main groups, in terms of entry requirements and years of study. For more detailed comparisons, additional information has to be obtained by curriculum and testing experts in each academic field, because detailed comparisons must be based on course content, not just level of program and length of study.



## OCCUPATIONS BY LEVEL OF STUDY

LEVEL	AGRICULTURE AND RELATED FIELDS	ENGINEERING AND RELATED FIELDS	TEACHER TRAINING
6	Agronomist <u>Agrônomo</u> Forester Silvicultor Veterinarian <u>Veterinário</u> Biologist <u>Biólogo</u>	Engineer <u>Engenheiro</u>	Teacher for upper secondary education. <u>Professor para o</u> <u>ensino secundário</u> <u>complementar ou</u> <u>pre-universitário.</u>
5H	Agricultural Technologist and related occupations. <u>Tecnólogo</u> (and <u>Bacharelato</u> or equivalent)	Technologist <u>Tecnólogo</u> (and <u>Bacharelato</u> or equivalent)	Teacher for lower secondary education. <u>Professor para o</u> <u>ensino secundário</u> <u>geral ou básico.</u>
5L	Agricultural Technician and related occupations. <u>Técnico Médio</u>	Technician <u>Técnico Médio</u>	<u>Primary Teacher</u> <u>Professor Primario</u>

## LEVELS OF STUDY PROGRAMS TYPOLOGY

LEVEL	ENTRY REQUIREMENTS	YEARS OF STUDY	ISCED LEVEL
6	Eleven to 13 years of previous education, including an upper secondary program, or any equivalent pre-university program.	Three to 5 years of study, resulting in a total of 16 years or more; it leads to a university first degree or equivalent.	6
5H	The same as above.	Two to 3 years of study resulting in a total of 14 to 15 years; it can be offered at a university or at a non-university school, but does not lead to a degree.	5
5L	Eight to 12 years of a complete stage of secondary education, or any equivalent technical or vocational secondary program.	One to 4 years of study, resulting in a total of 11 to 13 years; it leads to a non-secondary certification.	

## V ADDITIONAL OBSERVATIONS

This report arrays selective data about the post secondary educational and training systems of the nine SADCC member countries to assist policy makers in determining educational equivalencies, so as to facilitate cooperative utilization of the region's educational and training institutions. The report also presents information about twenty-three educational and/or training institutions which have the potential of serving region-wide needs and of enrolling students from the member states.

In the process of gathering these data a number of observations and conclusions were drawn which are included here for possible use by SADCC's Regional Training Council and by other manpower and training officials in the region.

### 1. Keeping the Data Current

The educational systems of the SADCC member countries are constantly changing. Thus, the information contained herein will quickly become dated. It is therefore imperative that a methodology be developed to purge outdated material and to enter new data. Furthermore, new institutions with potential regional significance are either being planned or are already in the construction stage. It is important therefore that a systematic method be adopted to incorporate the existence and nature of these new regionally significant institutions into the data contained in this report.

Cognizant of the need to update the data contained in this report, whenever possible, the information was related to UNESCO and ILO standard classifications. Consideration might well be given to the adoption by the SADCC member states of a uniform procedure employing the UNESCO and ILO standard classifications, to facilitate the determination of equivalencies and the availability of relevant educational and training capabilities. Arrayed in this fashion the data would lend itself to computer storage and retrieval. Only when this is accomplished will it be possible to maintain the currency and accuracy, and thus the utility, of the data.

All of this suggests that a relatively sophisticated secretarial function will be required. Consideration might be given to integrating this process with the evolving Southern African Documentation and Information System.

### 2. Functional Versus Instructional SADCC Cooperation in Manpower Training

Obviously, the major concern of the SADCC Manpower Training Council with furthering cooperative endeavors is with the maximizing and the use of the many excellent institutions in the region. However, more thought and possibly research might well be profitably devoted to the relative utility and efficacy of

other forms of manpower training cooperation. A functional approach seems to have particular merit in those sectors where the curriculum need varies only slightly between countries, and/or where the numbers requiring specialized training are large, e.g. teacher training, health, and other areas of management instruction.

Donor supported investment in what might be termed Science and Math Education Improvement Centers, conceivably could enhance manpower improvement in this critical area far more effectively than could the expensive movement of thousands of teachers whose services would be temporarily denied to their home countries. Such centers, drawing upon existing expertise and areas of special excellence, in the region and upon the expertise of the international community could: 1) develop regionally effective model curriculum; 2) develop teaching aids and materials, e.g., audio-visual, video, computer, case studies, simulation; 3) prepare teacher training packages that could either be diffused to member state institutions or mounted at the improvement center, or made available by center and local staff within the member countries; 4) promote various levels of networking or communication, e.g., among educational administrators, science teachers, math teachers, technical subject teachers, etc.; 5) develop and house a roving staff of expert trainers and consultants available to member institutions on demand; 6) produce research capability to predict and anticipate manpower needs and to develop relevant responses to each of those needs.

### 3. Finance as an Obstacle to the Movement of Students Within the SADCC Region

Because the member SADCC states vary enormously in size, resources, and state of development, it is highly unlikely that the movement of students between countries will be approximately equal. Therefore it is likely that some countries will be net exporters and others net importers of students, resulting in different financial burdens. As long as the movement of students is not large, as is the case at the present moment, this does not pose a significant barrier to cooperation. However, if the goals of SADCC in this area were to involve a large number of students moving from country to country, the financial burdens in the host countries would be significant and would likely impede the flow of students.

One solution would be a fiscal clearing house operation. However, given the complexity of currency exchange and other administrative costs such an approach is not recommended.

Another aspect of this problem is relevant to any proposed solution. With few exceptions the training institutions involved are government owned and provide training services to their respective nationals at no or little cost. Indeed in many cases government or parastatal sponsored students also receive a stipend while studying. To the extent that this situation prevails, a host country institution could be required to provide

expense free or near free education and possibly a stipend to non-nationals. Because education is highly subsidized the actual per capita costs are rarely precisely calculated. Unless these obstacles can be overcome it is not likely that the movement of students in the region will ever reach the desired magnitude.

Most institutions are currently facing extreme budgetary, staff, and infrastructure deficiencies -- unable in many cases to admit as many of their own eligible nationals for which they have capacity.

To cope with these dysfunctional conditions the following is suggested for consideration:

- a. SADCC's Regional Training Council, with support of the Council of Ministers, should seek donor(s) support to establish a SADCC scholarship fund.
- b. Create a capability and process to allocate bursaries, at least equivalent to the actual (real) costs of training/education, to students approved to study and accepted by a regional host institution.
- c. Provide bursaries directly to the host institution rather than the host government and require that it be used to augment staff and services sufficient to accommodate the added SADCC students.
- d. Pay the bursaries in foreign exchange rather than in the currency of either the sending or receiving country.

The above would tend to turn a disinclination to accept SADCC students into a positive inducement and would not only expedite movement but would enhance the status of SADCC students.

#### 4. The Necessity of Improving and/or Augmenting the Capacity of Potential Regional Training Institutions

Nearly all institutions willing to contemplate accepting sizeable numbers of SADCC students are faced with either staff, budget or facility inadequacies. It is proposed that: 1) a study of the resources required by such institutions to permit them to accept a given number of additional students be carried out; 2) that donor nations be approached with specific proposals to "top up" existing institutions with the understanding that so doing would generate and guarantee places for SADCC students in each institution.

#### 5. Science and Math Education

The shortage of science and math teachers in the SADCC region is critical. A large primary student population now moving into the secondary schools has brought tremendous pressure to bear on the educational systems as they seek to address the need for more teachers, particularly in science, math and technical subjects.

The situation is particularly critical in Malawi and the BLS countries because the few students who do graduate in these fields are immediately hired by government and the private sector as scientists and math technicians, leaving few if any to go into the teaching of these subjects.

To meet the critical shortage of science, math and technical subject teachers, the universities and teacher colleges in these four countries have developed pre-science entry programs to upgrade the qualifications of secondary school graduates who would normally not be admitted into the science and math programs of the universities.

Even with such pre-science programs, however, there is continuing concern that the supply of science and math teachers will not adequately meet the demand throughout the SADCC region.

A number of proposals have been put forward by individual countries in the region to address this continuing problem. These proposals should receive the highest attention of the SADCC Secretariat. However, a suggestion has been made that a study be undertaken to determine the feasibility of instituting a regional science and math teachers college and resource center solely to meet the critical need for science and math teachers.

One suggested location for such a proposed regional teachers' college is at the University of Botswana where there is a strong faculty of science, a pre-science program which has permanent department status and a strong faculty of education offering degree and post graduate programs. The development of such a college is consistent with the suggestion that the feasibility of one or more science and math regional resource center/clearinghouses be examined to assist countries in the development of science and math curricula and materials, to provide on-call specialists to assist member countries in the development of their science and math programs, and to provide a clearinghouse for the exchange of ideas and materials. The proposed resource center/clearinghouse(s) might focus on assisting member states in up-grading teachers presently serving in the educational system.

#### 6. Manpower Demand and the Availability of Information

Collecting and verifying manpower data was not a part of the scope of work of this project. The study team proceeded under the assumption that existing manpower data and analysis provided an adequate capacity for prioritization of regional and national manpower needs, as well as providing guidance to the respective educational and training institutions.

However, discussions held with the staff of the many educational and training institutions visited clearly revealed that they were not receiving from government or industry manpower data adequate to their needs. Some macro manpower data of varying quality is available in all SADCC member states. However, the micro data by occupational skills and by technical or professional level,

requisite to relevant curriculum development, to equipment acquisition and to institutional construction are not available.

The SADCC secretariat might consider the feasibility of assisting member countries and regional institutions, to develop standardized manpower data, or to make this data available in a systematic fashion to appropriate educational and training institutions.

## PORTUGUESE--TO--ENGLISH GLOSSARY

A

a	the
adultos	adults
agrarias	agrarian
agrario	agrarian
agricola	agriculture
agronomia	agronomy; agriculture
agronomo	agronomist
alfabetizacao	alphabetization; literacy
ano de iniciacao	year of special preparation for entry into primary edu- cation; the emphasis is on teaching the Portuguese language
aquaticas	aquatic
arquitectura	architecture
auto	auto, automobile

B

bacharelato	baccalaureate; completion of a short first university degree program
base	basic
basico	basic
biologia	biology
biologo	biologist

C

ciencias	sciences
civil	civil
classe	class (year of study)
combatentes	veterans
comercial	commercial
complementar	complementary; supplementary
construcao	construction
corte de metais	metal cutting; metalworking
cultura	culture
curso	course, program

D

de	of
diploma	diploma
direito	law

E

e	and
economia	economics

educacao	education
electricidade	electricity
electrotecnia	electrical engineering
electrotecnico	electrical; electrical engr.
elementar	elementary
encaminhamento	streaming; branching; (screening process for entrance into a <u>pre-</u> <u>universitario</u> or <u>ensino</u> <u>medio</u> program in Angola)
engenharia	engineering
engenheiro	engineer
ensino	instruction; education; schooling
ensino pedagogico industrial	teacher training programs for teachers for <u>Formacao</u> <u>Professional</u> in Angola
ensino pre-universitario	<u>pre-university</u> education; upper secondary education; in Angola, an accelerated temporary upper secondary program for gifted youth. upper secondary education entrance
ensino secundario complementer	equivalent
entrada	equivalent
equivalente	species (of animals and plants)
especies	
<u>F</u>	
-	
fisica	physical
fisicas	physical
formacao	formation; training
<u>G</u>	
geologia	geology
geral	general (academic)
<u>I</u>	
iniciacao	initiation
industrial	industrial; technical
informatica	computer science
instrutores	instructors; technical teachers
<u>L</u>	
laboratorial	laboratory
letras	letters
licenciatura	licentiate; completion of a long, first university de- gree program

M

marinha  
 marinheiro  
 mecanica  
 mecanizacao  
 medicina  
 medio

marine  
 seaman; sailor  
 mechanics; mechanical  
 mechanization  
 medicine  
 middle; intermediate  
 (between secondary and  
 university levels)  
 merchant

mercante

N

nivel  
 no

level  
 into

O

o  
 ou

the  
 or

P

para  
 pescador  
 petroleos  
 pre-universitario

for  
 fisherman  
 petroleum  
 pre-university program  
 (academic upper secondary  
 school) in Angola  
 primary; first level  
 processing  
 production  
 professor  
 teachers; professors

primario  
 processamento  
 producao  
 professor  
 professores

Q

quimica

chemistry; chemical

R

ramo

branch; option

S

secundario  
 silvicultor  
 silvicultura  
 soldadura  
 superior

secondary; second level  
 forester  
 silviculture; forestry  
 welding  
 higher

T

tecnico  
tecnologo

technical  
technologist

U

universidade

university

V

veterinaria  
veterinario

veterinary  
veterinary; veterinarian

**INTERNATIONAL STANDARD CLASSIFICATION  
OF EDUCATION (ISCE)  
UNESCO**

**FIELD 01: GENERAL PROGRAMMES**Level 0 (Education Preceding the First Level)

001 General Programmes for Children of Pre-primary Age  
 00100 General Programmes for Children of Pre-primary Age

Level 1 (Education at the First Level)

101 General Elementary Programmes  
 10100 General Elementary Programmes

Level 2 (Education at the Second Level, First Stage)

201 General Programmes Containing Little or No Technical Education  
 20100 General Programmes Containing Little or No Technical Education

Level 3 (Education at the Second Level, Second Stage)

301 General Programmes Containing Little or No Technical Education  
 30101 General Programmes with no Special Subject Emphasis  
 30104 General Programmes with Special Emphasis on Humanities and  
 Social Sciences  
 30108 General Programmes with Special Emphasis on Mathematics and  
 Natural or Applied Sciences  
 30199 General Programmes with Special Emphasis on Other Non-technical  
 Subjects

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

601 General Programmes  
 60100 General Programmes

Level 9 (Education Not Definable by Level)

901 General Programmes  
 90100 General Programmes

**FIELD 08: LITERACY PROGRAMMES**Level 1 (Education at the First Level)

- 108 Literacy Programmes
- 10811 Simple Literacy
- 10821 Functional Literacy Programmes

**FIELD 14: TEACHER TRAINING AND EDUCATION SCIENCE PROGRAMMES**Level 2 (Education at the Second Level, First Stage)

- 214 Teacher Training Programmes
- 21401 General Teacher Training for Elementary School Teaching
- 21408 Teacher Training for Specialists such as those in Vocational or Adult Education Programmes

Level 3 (Education at the Second Level, Second Stage)

- 314 Teacher Training Programmes
- 31401 General Teacher Training Programmes
- 31408 Teacher Training with Specialization in Specific Vocational or Practical Subject
- 31412 Teacher Training for Pre-school and Kindergarten Teachers
- 31416 Teacher Training for Teachers in Adult Education
- 31422 Teacher Training for Teachers of Handicapped Children
- 31499 Other Specialized Teacher Training Programs

Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree)

- 514 Teacher Training Programmes
- 51401 General Teacher Training Programmes
- 51404 Teacher Training Programmes with Specialization in a Non-vocational Subject
- 51408 Teacher Training Programmes for Teachers of Vocational Subjects
- 51412 Teacher Training Programmes for Pre-school and Kindergarten Teachers
- 51416 Teacher Training Programmes for Teachers in Adult Education, n.e.c.
- 51422 Teacher Training Programmes for Teachers of Handicapped Children
- 51499 Other Specialized Teacher Training Programmes

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

- 614 Programmes in Education Science and Teacher Training
- 61401 General Teacher Training Programmes
- 61404 Teacher Training Programmes with Specialization in a Non-vocational Subject
- 61408 Teacher Training for Teaching Practical or Vocational Subjects
- 61412 Teacher Training Programmes for Teaching Pre-school or Kindergarten
- 61416 Teacher Training for Teachers in Adult Education
- 61422 Teacher Training for Teaching Handicapped Children
- 61432 Teacher Training for Teacher Trainers
- 61499 Other Programmes in Education Science and Teacher Training

**Field 14: Teacher Training and Education Science Programmes (cont'd)**Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent)

- 714 Programmes in Education Science and Teacher Training
- 71401 General Programmes in Education Science
- 71404 Programmes in Education with Specialization in Curriculum Development in a Non-vocational Subject
- 71408 Programmes in Education with Specialization in Curriculum Development in a Vocational Subject
- 71412 Programmes with Specialization in Early Childhood Education
- 71416 Programmes with Specialization in Adult Education
- 71422 Programmes with Specialization in the Education of the Handicapped
- 71432 Programmes in Education for Teacher Trainers
- 71472 Programmes in Education Science without Teacher Training
- 71499 Other Programmes in Education Science and Teacher Training

Level 9 (Education Not Definable by Level)

- 914 Programmes in Teacher Training Including Training for Extension and Other Fields of Non-formal Education
- 91416 Education Science and Teacher Training for Work in Adult Education
- 91499 Other Programmes in Teacher Training

**FIELD 18: FINE ARTS PROGRAMMES**Level 3 (Education at the Second Level, Second Stage)

- 318 Fine and Applied Arts Programmes
- 31804 Programmes in Drawing and Painting
- 31812 Programmes in Handicrafts
- 31822 Programmes in Music
- 31899 Other Programmes in Fine and Applied Arts

Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree)

- 518 Fine and Applied Arts Programmes
- 51801 General Programmes of Art Studies
- 51804 Programmes in Drawing and Painting
- 51808 Programmes in Sculpturing
- 51812 Programmes in Handicrafts
- 51822 Programmes in Music
- 51832 Programmes in the Drama
- 51842 Programmes in Photography and Cinematography
- 51899 Other Fine and Applied Arts Programmes

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

- 618 Fine and Applied Arts Programmes
- 61801 General Programmes of Art Studies
- 61804 Programmes in Drawing and Painting
- 61808 Programmes in Sculpturing
- 61822 Programmes in Music
- 61832 Programmes in the Drama
- 61852 Programmes in Interior Design
- 61899 Other Fine and Applied Arts Programmes

Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent)

- 718 Fine and Applied Arts Programmes
- 71802 Programmes in the History and Philosophy of Art
- 71804 Programmes in Drawing and Painting
- 71808 Programmes in Sculpturing
- 71822 Programmes in Music
- 71832 Programmes in the Drama
- 71852 Programmes in Interior Design
- 71899 Other Fine and Applied Arts Programmes

Level 9 (Education Not Definable by Level)

- 918 Fine and Applied Arts Programmes
- 91810 Programmes in Visual and Plastic Arts
- 91812 Programmes in Handicrafts
- 91822 Programmes in Music
- 91832 Programmes in Drama
- 91899 Other Fine and Applied Arts Programmes

**FIELD 22: HUMANITIES PROGRAMMES**Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree)

- 522 Humanities Programmes
- 52202 Programmes for Interpreters and Translators
- 52208 Other Programmes in Languages, Except the Current or Vernacular Language
- 52211 Programmes in the Current or Vernacular Language and Its Literature
- 52299 Other Humanities Programmes

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

- 622 Humanities Programmes
- 62201 General Programmes in the Humanities
- 62211 Programmes in the Current or Vernacular Language and Its Literature
- 62215 Programmes in Other Living Languages and Their Literature
- 62221 Programmes in "Dead" Languages and Their Literature
- 62231 Programmes in Linguistics
- 62241 Programmes in Comparative Literature
- 62251 Programmes in History
- 62261 Programmes in Archaeology
- 62271 Programmes in Philosophy
- 62299 Other Programmes in the Humanities

Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent)

- 722 Humanities Programmes
- 72211 Programmes in the Current or Vernacular Language and Its Literature
- 72215 Programmes in Other Living Languages and Their Literature
- 72221 Programmes in "Dead" Languages and Their Literature
- 72231 Programmes in Linguistics
- 72241 Programmes in Comparative Literature
- 72251 Programmes in History
- 72261 Programmes in Archaeology
- 72271 Programmes in Philosophy
- 72299 Other Humanities Programmes

Level 9 (Education Not Definable by Level)

- 922 Humanities Programmes
- 92215 Programmes in a "Foreign" or Second Language and Its Literature
- 92221 Programmes in "Dead" Languages and Their Literature
- 92251 Programmes in History
- 92261 Programmes in Archaeology
- 92299 Other Humanities Programmes

**FIELD 26: RELIGION AND THEOLOGY PROGRAMMES**Level 1 (Education at the First Level)

126 Religion and Theology Programmes  
 12600 Religion and Theology Programmes

Level 2 (Education at the Second Level, First Stage)

226 Religion and Theology Programmes  
 22600 Religion and Theology Programmes

Level 3 (Education at the Second Level, Second Stage)

326 Religion and Theology Programmes  
 32600 Religion and Theology Programmes

Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree)

526 Religion and Theology Programmes  
 52600 Religion and Theology Programmes

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

626 Religion and Theology Programmes  
 62600 Religion and Theology Programmes

Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent)

726 Religion and Theology Programmes  
 72600 Religion and Theology Programmes

Level 9 (Education Not Definable by Level)

926 Religion and Theology Programmes  
 92600 Religion and Theology Programmes

**FIELD 30: SOCIAL AND BEHAVIOURAL SCIENCE PROGRAMMES**Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree)

- 530 Social and Behavioural Science Programmes
- 53012 Programmes in Economics
- 53022 Programmes in Political Science
- 53032 Programmes in Sociology
- 53052 Programmes in Psychology
- 53099 Other Programmes in Social and Behavioural Science

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

- 630 Social and Behavioural Science Programmes
- 63001 General Programmes in the Social and Behavioural Sciences
- 63012 Economic Programmes
- 63022 Political Science Programmes
- 63032 Sociology Programmes
- 63042 Anthropology Programmes
- 63052 Psychology Programmes
- 63062 Geography Programmes
- 63072 Studies of Regional Cultures
- 63099 Other Social and Behavioural Science Programmes

Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent)

- 730 Social and Behavioural Science Programmes
- 73012 Economics Programmes
- 73022 Political Science Programmes
- 73033 Programmes in Demography
- 73035 Programmes in Sociology Except Demography
- 73042 Anthropology Programmes
- 73052 Programmes in Psychology
- 73062 Geography Programmes
- 73072 Studies of Regional Cultures
- 73099 Other Social and Behavioural Science Programmes

Level 9 (Education Not Definable by Level)

- 930 Social and Behavioural Science Programmes
- 93012 Programmes in Economics
- 93022 Programmes in Political Science
- 93032 Programmes in Sociology
- 93052 Programmes in Psychology
- 93062 Programmes in Geography
- 93099 Other Programmes in Social and Behavioural Science

**FIELD 34: COMMERCIAL AND BUSINESS ADMINISTRATION PROGRAMMES**Level 1 (Education at the First Level)

- 134 Commercial Programmes
- 13401 General Commercial Programmes
- 13411 Specialized Commercial Programmes

Level 2 (Education at the Second Level, First Stage)

- 234 Commercial Programmes
- 23401 General Commercial Programmes
- 23404 Typing and Shorthand Programmes
- 23499 Other Commercial Programmes

Level 3 (Education at the Second Level, Second Stage)

- 334 Commercial and Business Programmes
- 33401 General Commercial Programmes
- 33404 Shorthand-typing (Secretarial) Programmes
- 33408 Clerical-typists Programmes
- 33422 Programmes in the Operation of Office Machines
- 33432 Book-keeping Programmes
- 33439 Other Commercial and Business Programmes
- 33452 Programmes in Local Public Administration

Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award not Equivalent to a First University Degree)

- 534 Commercial and Business Administration Programmes
- 53401 General Commercial Programmes
- 53404 Secretarial Programmes
- 53422 Programmes in Business Machine Operation Except Electronic Data Processing
- 53426 Programmes in Electronic Data Processing
- 53432 Accountancy Programmes
- 53434 Business Administration, Marketing and Sales Programmes
- 53436 Programmes in Financial Management and Investment Analysis
- 53439 Other Commercial and Business Programmes
- 53452 Programmes in Public Administration
- 53462 Programmes in Institutional Administration

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

- 634 Business Administration and Related Programmes
- 63401 General Programmes in Business Administration (Commerce)
- 63432 Programmes in Business Administration with Specialization in Accountancy
- 63439 Programmes in Business Administration with Other Specialization
- 63452 Programmes in Public Administration
- 63462 Programmes in Institutional Administration

**Field 34: Commercial and Business Administration Programmes (cont'd)**Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate Degree or Equivalent)

- 734 Business Administration and Related Programmes
- 73432 Programmes in Business Administration with Specialization in Accountancy
- 73434 Programmes in Business Administration with Specialization in Marketing
- 73436 Programmes in Business Administration with Specialization in Finance and Investment
- 73439 Programmes in Business Administration with Other Specialization
- 73452 Programmes in Public Administration
- 73462 Programmes in Institutional Administration

Level 9 (Education Not Definable by Level)

- 934 Commercial, Clerical, Business and Public Administration Programmes
- 93404 Shorthand-typing (Secretarial Programmes)
- 93408 Clerical Programmes
- 93438 Programmes in Labour Studies Including Personnel Administration
- 93499 Other Commercial, Clerical, Business and Public Administration Programmes

**Field 38: LAW AND JURISPRUDENCE PROGRAMMES**Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree)

538 Law and Jurisprudence Programmes  
 53800 Programmes for Local Magistrates

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

38 Law and Jurisprudence Programmes  
 63801 General Programmes in Law  
 63812 Programmes for "Notaires"

Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to Post-Graduate University Degree or Equivalent)

738 Law and Jurisprudence Programmes  
 73802 Programmes in Jurisprudence and History of Law  
 73804 Programmes in International Law  
 73806 Programmes in Labour Law  
 73808 Programmes in Maritime Law  
 73899 Other Law and Jurisprudence Programmes

Level 9 (Education Not Definable by Level)

938 Programmes in Law  
 93800 Programmes in Law

**FIELD 42: NATURAL SCIENCE PROGRAMMES**Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree)

- 542 Natural Science Programmes
- 54202 Biological Science Programmes
- 54212 Chemistry Programmes
- 54222 Geological Science Programmes
- 54232 Physics Programmes
- 54299 Other Natural Science Programmes

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

- 642 Natural Science Programmes
- 64202 Biological Science Programmes
- 64212 Chemistry Programmes
- 64222 Geological Sciences Programmes
- 64232 Physics Programmes
- 64242 Astronomy Programmes
- 64252 Meteorology Programmes
- 64262 Oceanography Programmes
- 64299 Other Natural Science Programmes

Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent)

- 742 Natural Science Programmes
- 74202 Biological Sciences Programmes
- 74212 Chemistry Programmes
- 74222 Geological Sciences Programmes
- 74232 Physics Programmes
- 74242 Astronomy Programmes
- 74252 Meteorology Programmes
- 74262 Oceanography Programmes
- 74299 Other Natural Science Programmes

Level 9 (Education Not Definable by Level)

- 942 Natural Science Programmes
- 94202 Biological Science Programmes
- 94222 Geological Science Programmes
- 94232 Physics Programmes
- 94242 Astronomy Programmes
- 94299 Other Natural Science Programmes

**FIELD 46: MATHEMATICS AND COMPUTER SCIENCE PROGRAMMES**Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree)

- 546 Mathematics and Computer Science Programmes
- 54601 General Programmes in Mathematics
- 54611 Programmes in Statistics
- 54621 Programmes in Actuarial Science
- 54639 Other Programmes in Applied Mathematics
- 54641 Programmes in Computer Science

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

- 646 Mathematics and Computer Science Programmes
- 64601 General Programmes in Mathematics
- 64611 Programmes in Statistics
- 64621 Programmes in Actuarial Science
- 64639 Other Programmes in Mathematics
- 64641 Programmes in Computer Science

Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent)

- 746 Mathematics and Computer Science Programmes
- 74611 Programmes in Statistics
- 74621 Programmes in Actuarial Science
- 74639 Other Programmes in Mathematics
- 74641 Programmes in Computer Science

Level 9 (Education Not Definable by Level)

- 946 Programmes in Computer Science
- 94600 Programmes in Computer Science

**FIELD 50: MEDICAL AND HEALTH-RELATED PROGRAMMES**Level 1 (Education at the First Level)

- 150 Elementary Public Health Programmes
- 15000 Elementary Public Health Programmes

Level 2 (Education at the First Level, First Stage)

- 250 Health-related Auxiliary Programmes
- 25002 General Medical Auxiliary Programmes
- 25012 Nursing Programmes
- 25015 Midwifery Programmes
- 25099 Other Health-related Auxiliary Programmes

Level 3 (Education at the Second Level, Second Stage)

- 350 Health-related Auxiliary Programmes
- 35002 General Medical Auxiliary Programmes
- 35012 Nursing Programmes
- 35015 Midwifery Programmes
- 35099 Other Health-related Auxiliary Programmes

Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree)

- 550 Medical Diagnostic and Treatment Programmes
- 55002 Public Health Inspection Programmes
- 55008 Physiotherapy and Occupational Therapy Programmes
- 55012 Nursing Programmes
- 55015 Midwifery Programmes
- 55017 Programmes in medical X-ray Techniques
- 55019 Other Programmes in medical Diagnostic and Treatment Techniques Except Dental Techniques
- 55042 Dental Practitioner Programmes
- 55046 Other Programmes in Dental Techniques
- 55052 Pharmacy Programmes
- 55062 Optometry Programmes
- 55099 Other Medical Diagnostic and Treatment Programmes

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

- 650 Medical Diagnostic and Treatment Programmes
- 65002 Programmes in Hygiene
- 65006 Programmes in Medicine and Surgery
- 65008 Rehabilitation Medicine Programmes
- 65012 Programmes in Nursing
- 65030 Medical Technology Programmes
- 65042 Programmes in Dentistry, Stomatology, Odontology
- 65052 Programmes in Pharmacy
- 65099 Other Medical Diagnostic and Treatment Programmes

**Field 50: Medical and Health-related Programmes (cont'd)**Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent)

- 750 Medical Science Programme
- 75006 Programmes in Medical Specialities
- 75042 Programmes in Dental and Stomatological Specialities
- 75052 Programmes in Pharmacy
- 75099 Other Medical Science Programmes

Level 9 (Education Not Definable by Level)

- 950 Health-related Programmes
- 95018 Nursing and Other Medical Auxiliary Programmes
- 95099 Other Health-related Programmes

**FIELD 52: TRADE, CRAFT AND INDUSTRIAL PROGRAMMES**Level 1 (Education at the First Level)

- 152 Trade, Craft and Industrial Programmes
- 15201 General Trade and Crafts Programmes
- 15212 Food and Drink Processing Trades Programmes
- 15216 Building Trades Programmes, n.e.c.
- 15222 Electrical Trades Programmes
- 15232 Metal Trades Programmes
- 15242 Mechanical and Mechanical Repair Trades Programmes
- 15262 Woodworking Trades Programmes
- 15272 Leather Trades Programmes
- 15274 Textile Trades Programmes
- 15276 Clothing and Related Trades Programmes
- 15299 Other Trade, Craft, and Industrial Programmes

Level 2 (Education at the Second Level, First Stage)

- 252 Trade, Craft and Industrial Programmes, n.e.c.
- 25201 General Trade and Craft Programmes
- 25212 Food and Drink Processing Trades Programmes
- 25216 Building Trades Programmes
- 25222 Electrical Trades Programmes
- 25232 Metal Trades Programmes
- 25242 Mechanical and Mechanical Repair Trades Programmes
- 25262 Woodworking Trades Programmes
- 25266 Materials Equipment and Earth-moving Equipment Operating Trades
- 25272 Leather Trades Programmes
- 25274 Textile Trades Programmes
- 25276 Clothing and Related Trades Programmes
- 25278 Printing and Book-binding Trades Programmes
- 25299 Other Trade, Craft and Industrial Programmes, n.e.c.

Level 3 (Education at the Second Level, Second Stage)

- 352 Trade, Craft and Industrial Programmes, n.e.c.
- 35201 General Programmes with a Trade, Craft or Industrial Emphasis
- 35216 Building Trades Programmes, n.e.c.
- 35222 Electrical and Electronics Trades Programmes
- 35232 Metal Trades Programmes
- 35242 Mechanical and Mechanical Repair Trades Programmes
- 35262 Woodworking Trades Programmes
- 35264 Heating, Air-conditioning and Refrigeration Trades Programmes
- 35266 Materials-handling and Earth-moving Equipment Operating Programmes
- 35272 Leather Trades Programmes
- 35274 Textile Trades Programmes
- 35276 Clothing and Related Trades Programmes
- 35278 Graphic Arts and Book-binding Trades Programmes
- 35282 Laboratory Assistant Programmes
- 35299 Other Trade, Craft and Industrial Programmes, n.e.c.

**Field 52: Trade, Craft and Industrial Programmes (cont'd)**Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree)

- 552 Trade, Craft and Industrial Programmes, n.e.c.
- 55212 Food Processing Programmes
- 55222 Electrical and Electronics Trades Programmes
- 55232 Metal Trades Programmes
- 55242 Mechanical and Mechanical Repair Trades Programmes
- 55264 Heating, Air-conditioning and Refrigeration Trades Programmes
- 55274 Programmes in Textile Techniques
- 55278 Graphic Arts Programmes
- 55284 Laboratory Technician Programmes
- 55286 Optical Lens Making
- 55299 Other Trade, Craft and Industrial Programmes, n.e.c.

Level 9 (Education Not Definable by Level)

- 952 Trade, Craft and Industrial Programmes, n.e.c.
- 95200 Trade, Craft and Industrial Programmes, n.e.c.

**FIELD 54: ENGINEERING PROGRAMMES**Level 3 (Education at the Second Level, Second Stage)

- 354 Engineering Programmes
- 35402 Programmes in Surveying
- 35406 Programmes in Engineering Drawing
- 35422 Electrical and Electronics Engineering Technician Programmes
- 35426 Industrial Engineering Technician Programmes
- 35436 Mining Engineering Technician Programmes
- 35452 Agriculture, Forestry and Fishery Engineering Technician Programmes
- 35499 Other Engineering Programmes

Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award not Equivalent to a First University Degree)

- 554 Engineering Programmes
- 55402 Programmes in Surveying
- 55406 Programmes in Drafting and Design
- 55412 Chemical Engineering and Materials Technology Programmes
- 55416 Civil Engineering Technology Programmes
- 55422 Electrical and Electronics Engineering Technology Programmes
- 55426 Industrial Engineering Technical Programmes
- 55432 Metallurgical Engineering Technology Programmes
- 55436 Mining Engineering Technology Programmes
- 55442 Mechanical Engineering Technology Programmes, n.e.c.
- 55452 Agricultural and Forestry Engineering Technology Programmes
- 55499 Other Engineering Programmes

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

- 654 Engineering Programmes
- 65412 Chemical Engineering Programmes
- 65416 Civil Engineering Programmes
- 65422 Electrical and Electronics Engineering Programmes
- 65426 Industrial Engineering Programmes
- 65432 Metallurgical Engineering Programmes
- 65436 Mining Engineering Programmes
- 65442 Mechanical Engineering Programmes
- 65453 Agricultural Engineering Programmes
- 65463 Forestry Engineering Programmes
- 65499 Other Engineering Programmes

Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent)

- 754 Engineering Programmes
- 75412 Chemical Engineering Programmes
- 75416 Civil Engineering Programmes
- 75422 Electrical and Electronics Engineering Programmes
- 75426 Industrial Engineering Programmes
- 75432 Metallurgical Engineering Programmes
- 75436 Mining Engineering Programmes
- 75442 Mechanical Engineering Programmes
- 75453 Forestry Engineering Programmes
- 75463 Forestry Engineering Programmes
- 75499 Other Engineering Programmes

Level 9 (Education Not Definable by Level)

- 954 Engineering Programmes
- 95400 Engineering Programmes

**FIELD 58: ARCHITECTURAL AND TOWN PLANNING PROGRAMMES**Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree)

- 558 Architectural and Town Planning Programmes
- 55801 General Programmes in Architecture and Town Planning
- 55802 Programmes in Structural Architecture
- 55812 Programmes in Landscape Architecture
- 55822 Programmes in Town or Community Planning

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

- 658 Architectural and Town Planning Programmes
- 65801 General Programmes in Architecture and Town Planning
- 65802 Programmes in Structural Architecture
- 65812 Programmes in Landscape Architecture
- 65822 Programmes in Town Planning

Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent)

- 758 Architectural and Town Planning Programmes
- 75802 Programmes in Structural Architecture
- 75812 Programmes in Landscape Architecture
- 75822 Programmes in Town Planning

Level 9 (Education Not Definable by Level)

- 958 Architectural and Town Planning Programmes
- 95810 Architectural Programmes
- 95822 Town or Community Planning Programmes

**FIELD 62: AGRICULTURAL FORESTRY AND FISHERY PROGRAMMES**Level 1 (Education at the First Level)

- 162 Agricultural, Forestry and Fishery Programmes
- 16202 Agricultural Programmes
- 16262 Forestry Programmes
- 16272 Fishery Programmes

Level 2 (Education at the Second Level, First Stage)

- 262 Agricultural, Forestry and Fishery Programmes
- 26202 Agricultural Programmes
- 26262 Forestry Programmes
- 26272 Fishery Programmes

Level 3 (Education at the Second Level, Second Stage)

- 362 Agricultural, Forestry and Fishery Programmes
- 36201 General Agricultural Programmes
- 36203 Animal Husbandry Programmes
- 36206 Horticulture and Gardening Programmes
- 36208 Crop Husbandry Programmes
- 36249 Other Programmes in Agriculture
- 36262 Forestry Programmes
- 36272 Fishery Programmes

Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree)

- 562 Agricultural, Forestry and Fishery Programmes
- 56201 General Programmes in Agriculture
- 56203 Animal Husbandry Programmes
- 56206 Horticulture Programmes
- 56208 Crop Husbandry Programmes
- 56212 Agricultural Economics Programmes
- 56226 Soil and Water Technology Programmes
- 56232 Animal Health Programmes
- 56249 Other Programmes in Agriculture
- 56262 Forestry and Forest Products Technology Programmes
- 56272 Fishery Programmes

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

- 662 Agricultural, Forestry and Fishery Programmes
- 66201 General Programmes in Agriculture
- 66203 Animal Husbandry Programmes
- 66206 Horticulture Programmes
- 66208 Crop Husbandry Programmes
- 66212 Agricultural Economics Programmes
- 66222 Food Sciences and Technology Programmes
- 66226 Soil and Water Sciences Programmes

**Field 62: Agricultural Forestry and Fishery Programmes (Cont'd)**

(Level 6, Cont'd.)

- 66232 Programmes in Veterinary Medicine
- 66249 Other Programmes in Agriculture
- 66262 Forestry Programmes
- 66272 Programmes in Fishery Science and Technology

Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent)

- 762 Agricultural, Forestry and Fishery Programmes
- 76203 Animal Husbandry Programmes
- 76206 Horticulture Programmes
- 76208 Crop Husbandry Programmes
- 76212 Agricultural Economics Programmes
- 76222 Food Sciences and Technology Programmes
- 76226 Soil and Water Sciences Programmes
- 76232 Programmes in Veterinary Medicine
- 76249 Other Programmes in Agriculture
- 76262 Forestry Programmes
- 76272 Programmes in Fishery Science and Technology

Level 9 (Education Not Definable by Level)

- 962 Agricultural, Forestry and Fishery Programmes
- 96202 Programmes in Agriculture
- 96262 Forestry and Forest Products Technology Programmes
- 96272 Fishery Programmes

**FIELD 66: HOME ECONOMICS (DOMESTIC SCIENCE) PROGRAMMES**Level 1 (Education at the First Level)

- 166 Home Economics (Domestic Science) Programmes
- 16601 General Home Economics Programmes
- 16604 Home Economics Programmes with Emphasis on Dressmaking and Sewing
- 16608 Home Economics Programmes with Emphasis on Cooking, Food Preservation and Nutrition
- 16622 Home Economics Programmes with Emphasis on Child Care
- 16699 Other Home Economics Programmes

Level 2 (Education at the Second Level, First Stage)

- 266 Home Economics (Domestic Science) Programmes
- 26601 General Home Economics Programmes
- 26604 Home Economics Programmes with Emphasis on Dressmaking and Sewing
- 26608 Home Economics Programmes with Emphasis on Cooking and Food Preservation
- 26699 Other Home Economics Programmes

Level 3 (Education at the Second Level, Second Stage)

- 366 Home Economics (Domestic Science) Programmes
- 36601 General Programmes in Home Economics
- 36612 Programmes with Emphasis on Nutrition
- 36622 Programmes with Emphasis on Child Care
- 36699 Other Home Economics Programmes

Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree)

- 566 Home Economics (Domestic Science) Programmes
- 56601 General Programmes in Home Economics
- 56612 Programmes with Emphasis on Household Food Management and Nutrition
- 56622 Programmes with Emphasis on Child Care
- 56632 Programmes with Emphasis on Household Arts
- 56699 Other Home Economics Programmes

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

- 666 Home Economics (Domestic Science) Programmes
- 66601 General Programmes in Home Economics
- 66612 Programmes in Home Economics with Emphasis on Household and Consumer Food Research, Nutrition
- 66632 Programmes in Home Economics with Emphasis on Household Arts
- 66699 Other Home Economics Programmes

**Field 66: Home Economics (Domestic Science) Programmes**Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent)

- 766 Home Economics (Domestic Science) Programmes
- 76612 Programmes in Household and Consumer Food Research, Nutrition
- 76632 Programmes in Household Arts
- 76699 Other Home Economics Programmes

Level 9 (Education Not Definable by Level)

- 966 Home Economics (Domestic Science) Programmes
- 96604 Programmes with Emphasis on Dressmaking and Needlecrafts
- 96612 Programmes with Emphasis on Household Food Management and Nutrition
- 96622 Programmes with Emphasis on Child Care
- 96699 Other Home Economics (Domestic Science) Programmes

**FIELD 70: TRANSPORT AND COMMUNICATIONS PROGRAMMES**Level 2 (Education at the Second Level, First Stage)

- 270 Transport Programmes
- 27004 Seamen's Programmes
- 27006 Railway Operation Programmes
- 27008 Road Motor Vehicle Operating Programmes

Level 3 (Education at the Second Level, Second Stage)

- 370 Transport and Communications Programmes
- 37004 Seaman's Certificate Programmes
- 37006 Railway Operating Trades Programmes
- 37008 Road Motor Vehicle Operation Programmes
- 37026 Postal Service Programmes Except Electronics Equipment  
Installation and Servicing
- 37029 Other Communications Programmes

Level 5 (Education at the Third Level, First Stage, of the Type that leads to an Award Not Equivalent to a First University Degree)

- 570 Transport and Communications Programmes
- 57002 Air Crew Programmes
- 57004 Ships' Officer Programmes
- 57006 Railway Operating Trades Programmes
- 57008 Road Motor Vehicle Operation Programmes
- 57026 Postal Service Programmes, Except Electronics Equipment  
Installation and Servicing
- 57029 Other Communications Programmes

Level 9 (Education Not Definable by Level)

- 970 Transport and Communications Programmes
- 97000 Transport and Communications Programmes

**FIELD 78: SERVICE TRADES PROGRAMMES**Level 1 (Education at the First Level)

- 178 Service Trades Programmes
- 17812 Barbering and Beauty Culture Programmes
- 17822 Hotel and Restaurant Trades Programmes
- 17842 Laundry and Dry Cleaning Trades Programmes
- 17899 Other Service Trades Programmes

Level 2 (Education at the Second Level, First Stage)

- 278 Service Trades Programmes
- 27812 Barbering and Beauty Culture Programmes
- 27822 Hotel and Restaurant Trades Programmes
- 27842 Laundry and Dry Cleaning Trades Programmes
- 27862 Retailing Programmes
- 27899 Other Service Trades Programmes

Level 3 (Education at the Second Level, Second Stage)

- 378 Service Trades Programmes
- 37812 Barbering and Beauty Culture Programmes
- 37822 Hotel and Restaurant Trades Programmes
- 37862 Retailing Programmes
- 37872 Tourist Trades Programmes
- 37899 Other Service Trades Programmes

Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree)

- 578 Service Trades Programmes
- 57826 Programmes in Cooking (Restaurant and Hotel Type)
- 57862 Retailing Programmes
- 57872 Tourist Trades Programmes
- 57899 Other Service Trades Programmes

Level 9 (Education Not Definable by Level)

- 978 Service Trades Programmes
- 97800 Service Trades Programmes

**FIELD 84: PROGRAMMES IN MASS COMMUNICATION AND DOCUMENTATION**Level 5 (Education at the Third Level, First Stage of the Type that Leads to an Award Not Equivalent to a First University Degree)

- 584 Programmes in Mass Communication and Documentation
- 58402 Programmes in Journalism
- 58404 Programmes in Radio and Television Broadcasting
- 58407 Public Relations Programmes
- 58409 Other Programmes in Communications Arts
- 58422 Library Technician Programmes
- 58425 Programmes for Technicians in Museums and Similar Repositories
- 58429 Programmes in Documentation Techniques, n.e.c.

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

- 684 Programmes in Mass Communication and Documentation
- 68402 Journalism Programmes
- 68404 Programmes in Radio and Television Broadcasting
- 68407 Public Relations Programmes
- 68409 Other Programmes in Communications Arts
- 68422 Library Science Programmes

Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent)

- 784 Programmes in Mass Communication and Documentation
- 78402 Programmes in Journalism
- 78404 Programmes in Radio and Television Broadcasting
- 78407 Public Relations Programmes
- 78409 Other Programmes in Communications Arts
- 78422 Library Science Programmes

Level 9 (Education Not Definable by Level)

- 984 Programmes in Mass Communication and Documentation
- 98400 Programmes in Mass Communication and Documentation

**FIELD 89: OTHER PROGRAMMES**Level 1 (Education at the First Level)

- 189 Other Programmes of Education at the First Level
- 18900 Other Programmes of Education at the First Level

Level 2 (Education at the Second Level, First Stage)

- 289 Other Programmes of Education at the Second Level, First Stage
- 28900 Other Programmes of Education at the Second Level, First Stage

Level 3 (Education at the Second Level, Second Stage)

- 389 Other Programmes of Education at the Second Level, Second Stage
- 38900 Other Programmes of Education at the Second Level, Second Stage

Level 5 (Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree)

- 589 Other Programmes of Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree
- 58912 Programmes in Police Work and Related Law Enforcement
- 58915 Fire-protection and Fire-fighting Programmes
- 58917 Military Programmes
- 58919 Other Programmes in Civil Security
- 58932 Programmes in Social Work
- 58942 Programmes in Vocational Counselling
- 58952 Programmes in Environmental Studies
- 58962 Programmes in Physical Education
- 58999 Other Programmes of Education at the Third Level, First Stage, of the Type that Leads to an Award Not Equivalent to a First University Degree, n.e.c.

Level 6 (Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent)

- 689 Other Education at the Third Level, First Stage, of the Type that Leads to First University Degree or Equivalent
- 68913 Programmes in Criminology
- 68919 Other Civil Security and Military Programmes
- 68932 Social Welfare Programmes
- 68942 Programmes in Vocational Counselling
- 68952 Programmes in Environmental Studies
- 68962 Programmes in Physical Education
- 68972 Programmes in Nautical Science
- 68999 Other Programmes of Education at the Third Level, First Stage, of the Type that Leads to a First University Degree or Equivalent, n.e.c.

**Field 89: Other Programmes (Cont'd)**Level 7 (Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent)

- 789 Other Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent
- 78913 Programmes in Criminology
- 78919 Other Civil Security and Military Programmes
- 78932 Social Welfare Programmes
- 78942 Programmes in Vocational Counselling
- 78952 Programmes in Environmental Studies
- 78999 Other Programmes of Education at the Third Level, Second Stage, of the Type that Leads to a Post-Graduate University Degree or Equivalent n.e.c.

Level 9 (Education Not Definable by Level)

- 989 Other Education Not Definable by Level
- 98962 Programmes in Physical Education
- 98999 Other Education Not Definable by Level, n.e.c.

INTERNATIONAL LABOUR OFFICE

**INTERNATIONAL  
STANDARD CLASSIFICATION  
OF OCCUPATIONS**

**REVISED EDITION 1968**



GENEVA

## PREFACE

This volume, *International Standard Classification of Occupations* (revised edition, 1968), replaces that issued in 1958 and reprinted in 1962.

The history of the development of the International Standard Classification of Occupations (ISCO) reaches back some 20 years. The first concrete step towards its establishment as a basic tool for organising occupational information for international purposes was the adoption of a provisional classification (comprising nine major groups) by the Seventh International Conference of Labour Statisticians, which was convened by the International Labour Organisation in 1949. The publication of the first edition of the *International Standard Classification of Occupations* in 1958 was the culmination of a very difficult task which could be accomplished only through a long and intensive international effort. Many governments contributed by lending expert staff to the I.L.O. and helping in many other respects. International organisations also gave valuable assistance.

A similar collaborative effort marked the work on revision of ISCO, which began in 1964 with the dispatch of a questionnaire to governments and other interested parties, requesting their views and recommendations regarding revision of ISCO. Many valuable suggestions were received and many have been implemented in this edition.

With a view to issuing an improved and up-to-date ISCO in advance of the 1970 round of population censuses, preliminary draft proposals were prepared by the I.L.O. in 1965 and submitted to a meeting of experts. After further development and refinement the draft revised ISCO proposed by the experts was submitted to the Eleventh International Conference of Labour Statisticians, 1966. The Conference introduced some further improvements and adopted the list of major, minor and unit groups given in the present volume.

ISCO has been developed to provide a systematic basis for presentation of occupational data relating to different countries in order to facilitate international comparisons. A second objective, related to the first, is to provide an international standard classification system which countries may use in developing their national occupational classifications, or in revising their existing classifications, with the aim of achieving convertibility to the international system.

The minor groups and unit groups provide summary classifications suitable for organisation and presentation of statistical data, such as those derived from manpower inquiries, including population censuses. The more detailed classification, which has been developed by the International Labour Office in the form of a subdivision of the unit groups into "occupations" (or occupational categories bearing five-digit code numbers), is intended to serve other purposes, such as the organisation of records of employment placement offices.

**INTERNATIONAL STANDARD CLASSIFICATION OF OCCUPATIONS**

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Since many countries have made use of ISCO (1958 edition), either for reporting of occupational data or as a basis for development of national occupational classification systems, a conversion table has been included in the present edition. This table shows unit groups of ISCO 1958 in the left-hand column and on the right the corresponding unit groups of the revised ISCO. The main structural changes made in revising the classification have also been referred to in the Introduction below, in the "Notes on Characteristics of Particular Occupational Groups".

## MAJOR, MINOR AND UNIT GROUPS

### Major Group 0/1: Professional, Technical and Related Workers

- 0-1 Physical Scientists and Related Technicians
  - 0-11 Chemists
  - 0-12 Physicists
  - 0-13 Physical scientists not elsewhere classified
  - 0-14 Physical science technicians
- 0-2/0-3 Architects, Engineers and Related Technicians
  - 0-21 Architects and town planners
  - 0-22 Civil engineers
  - 0-23 Electrical and electronics engineers
  - 0-24 Mechanical engineers
  - 0-25 Chemical engineers
  - 0-26 Metallurgists
  - 0-27 Mining engineers
  - 0-28 Industrial engineers
  - 0-29 Engineers not elsewhere classified
  - 0-31 Surveyors
  - 0-32 Draughtsmen
  - 0-33 Civil engineering technicians
  - 0-34 Electrical and electronics engineering technicians
  - 0-35 Mechanical engineering technicians
  - 0-36 Chemical engineering technicians
  - 0-37 Metallurgical technicians
  - 0-38 Mining technicians
  - 0-39 Engineering technicians not elsewhere classified
- 0-4 Aircraft and Ships' Officers
  - 0-41 Aircraft pilots, navigators and flight engineers
  - 0-42 Ships' deck officers and pilots
  - 0-43 Ships' engineers
- 0-5 Life Scientists and Related Technicians
  - 0-51 Biologists, zoologists and related scientists
  - 0-52 Bacteriologists, pharmacologists and related scientists
  - 0-53 Agronomists and related scientists
  - 0-54 Life sciences technicians
- 0-6/0-7 Medical, Dental, Veterinary and Related Workers
  - 0-61 Medical doctors
  - 0-62 Medical assistants
  - 0-63 Dentists
  - 0-64 Dental assistants
  - 0-65 Veterinarians

**MAJOR, MINOR AND UNIT GROUPS**

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- 0-66 Veterinary assistants
- 0-67 Pharmacists
- 0-68 Pharmaceutical assistants
- 0-69 Dietitians and public health nutritionists
- 0-71 Professional nurses
- 0-72 Nursing personnel not elsewhere classified
- 0-73 Professional midwives
- 0-74 Midwifery personnel not elsewhere classified
- 0-75 Optometrists and opticians
- 0-76 Physiotherapists and occupational therapists
- 0-77 Medical X-ray technicians
- 0-79 Medical, dental, veterinary and related workers not elsewhere classified
- 0-8 Statisticians, Mathematicians, Systems Analysts and Related Technicians
  - 0-81 Statisticians
  - 0-82 Mathematicians and actuaries
  - 0-83 Systems analysts
  - 0-84 Statistical and mathematical technicians
- 0-9 Economists
  - 0-90 Economists
- 1-1 Accountants
  - 1-10 Accountants
- 1-2 Jurists
  - 1-21 Lawyers
  - 1-22 Judges
  - 1-29 Jurists not elsewhere classified
- 1-3 Teachers
  - 1-31 University and higher education teachers
  - 1-32 Secondary education teachers
  - 1-33 Primary education teachers
  - 1-34 Pre-primary education teachers
  - 1-35 Special education teachers
  - 1-39 Teachers not elsewhere classified
- 1-4 Workers in Religion
  - 1-41 Ministers of religion and related members of religious orders
  - 1-49 Workers in religion not elsewhere classified
- 1-5 Authors, Journalists and Related Writers
  - 1-51 Authors and critics
  - 1-59 Authors, journalists and related writers not elsewhere classified
- 1-6 Sculptors, Painters, Photographers and Related Creative Artists
  - 1-61 Sculptors, painters and related artists
  - 1-62 Commercial artists and designers
  - 1-63 Photographers and cameramen
- 1-7 Composers and Performing Artists
  - 1-71 Composers, musicians and singers
  - 1-72 Choreographers and dancers
  - 1-73 Actors and stage directors
  - 1-74 Producers performing arts
  - 1-75 Circus performers
  - 1-79 Performing artists not elsewhere classified

- 1-8 Athletes, Sportsmen and Related Workers
  - 1-80 Athletes, sportsmen and related workers
- 1-9 Professional, Technical and Related Workers Not Elsewhere Classified
  - 1-91 Librarians, archivists and curators
  - 1-92 Sociologists, anthropologists and related scientists
  - 1-93 Social workers
  - 1-94 Personnel and occupational specialists
  - 1-95 Philologists, translators and interpreters
  - 1-99 Other professional, technical and related workers

#### Major Group 2: Administrative and Managerial Workers

- 2-0 Legislative Officials and Government Administrators
  - 2-01 Legislative officials
  - 2-02 Government administrators
- 2-1 Managers
  - 2-11 General managers
  - 2-12 Production managers (except farm)
  - 2-19 Managers not elsewhere classified

#### Major Group 3: Clerical and Related Workers

- 3-0 Clerical Supervisors
  - 3-00 Clerical supervisors
- 3-1 Government Executive Officials
  - 3-10 Government executive officials
- 3-2 Stenographers, Typists and Card- and Tape-Punching Machine Operators
  - 3-21 Stenographers, typists and teletypists
  - 3-22 Card- and tape-punching machine operators
- 3-3 Bookkeepers, Cashiers and Related Workers
  - 3-31 Bookkeepers and cashiers
  - 3-39 Bookkeepers, cashiers and related workers not elsewhere classified
- 3-4 Computing Machine Operators
  - 3-41 Bookkeeping and calculating machine operators
  - 3-42 Automatic data-processing machine operators
- 3-5 Transport and Communications Supervisors
  - 3-51 Railway station masters
  - 3-52 Postmasters
  - 3-59 Transport and communications supervisors not elsewhere classified
- 3-6 Transport Conductors
  - 3-60 Transport conductors
- 3-7 Mail Distribution Clerks
  - 3-76 Mail distribution clerks
- 3-8 Telephone and Telegraph Operators
  - 3-80 Telephone and telegraph operators

**MAJOR, MINOR AND UNIT GROUPS**

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**3-9 Clerical and Related Workers Not Elsewhere Classified**

- 3-91 Stock clerks
- 3-92 Material and production planning clerks
- 3-93 Correspondence and reporting clerks
- 3-94 Receptionists and travel agency clerks
- 3-95 Library and filing clerks
- 3-99 Clerks not elsewhere classified

**Major Group 4: Sales Workers**

- 4-0 Managers (Wholesale and Retail Trade)
  - 4-00 Managers (wholesale and retail trade)
- 4-1 Working Proprietors (Wholesale and Retail Trade)
  - 4-10 Working proprietors (wholesale and retail trade)
- 4-2 Sales Supervisors and Buyers
  - 4-21 Sales supervisors
  - 4-22 Buyers
- 4-3 Technical Salesmen, Commercial Travellers and Manufacturers' Agents
  - 4-31 Technical salesmen and service advisers
  - 4-32 Commercial travellers and manufacturers' agents
- 4-4 Insurance, Real Estate, Securities and Business Services Salesmen and Auctioneers
  - 4-41 Insurance, real estate and securities salesmen
  - 4-42 Business services salesmen
  - 4-43 Auctioneers
- 4-5 Salesmen, Shop Assistants and Related Workers
  - 4-51 Salesmen, shop assistants and demonstrators
  - 4-52 Street vendors, canvassers and newsvendors
- 4-9 Sales Workers Not Elsewhere Classified
  - 4-90 Sales workers not elsewhere classified

**Major Group 5: Service Workers**

- 5-0 Managers (Catering and Lodging Services)
  - 5-00 Managers (catering and lodging services)
- 5-1 Working Proprietors (Catering and Lodging Services)
  - 5-10 Working proprietors (catering and lodging services)
- 5-2 Housekeeping and Related Service Supervisors
  - 5-20 Housekeeping and related service supervisors
- 5-3 Cooks, Waiters, Bartenders and Related Workers
  - 5-31 Cooks
  - 5-32 Waiters, bartenders and related workers
- 5-4 Maids and Related Housekeeping Service Workers Not Elsewhere Classified
  - 5-40 Maids and related housekeeping service workers not elsewhere classified
- 5-5 Building Caretakers, Charworkers, Cleaners and Related Workers
  - 5-51 Building caretakers
  - 5-52 Charworkers, cleaners and related workers

- 5-6 Launderers, Dry-Cleaners and Pressers
  - 5-60 Launderers, dry-cleaners and pressers
- 5-7 Hairdressers, Barbers, Beauticians and Related Workers
  - 5-70 Hairdressers, barbers, beauticians and related workers
- 5-8 Protective Service Workers
  - 5-81 Fire-fighters
  - 5-82 Policemen and detectives
  - 5-89 Protective service workers not elsewhere classified
- 5-9 Service Workers Not Elsewhere Classified
  - 5-91 Guides
  - 5-92 Undertakers and embalmers
  - 5-99 Other service workers

**Major Group 6: Agricultural, Animal Husbandry and Forestry Workers, Fishermen and Hunters**

- 6-0 Farm Managers and Supervisors
  - 6-00 Farm managers and supervisors
- 6-1 Farmers
  - 6-11 General farmers
  - 6-12 Specialised farmers
- 6-2 Agricultural and Animal Husbandry Workers
  - 6-21 General farm workers
  - 6-22 Field crop and vegetable farm workers
  - 6-23 Orchard, vineyard and related tree and shrub crop workers
  - 6-24 Livestock workers
  - 6-25 Dairy farm workers
  - 6-26 Poultry farm workers
  - 6-27 Nursery workers and gardeners
  - 6-28 Farm machinery operators
  - 6-29 Agricultural and animal husbandry workers not elsewhere classified
- 6-3 Forestry Workers
  - 6-31 Loggers
  - 6-32 Forestry workers (except logging)
- 6-4 Fishermen, Hunters and Related Workers
  - 6-41 Fishermen
  - 6-49 Fishermen, hunters and related workers not elsewhere classified

**Major Group 7/8/9: Production and Related Workers, Transport Equipment Operators and Labourers**

- 7-0 Production Supervisors and General Foremen
  - 7-00 Production supervisors and general foremen
- 7-1 Miners, Quarrymen, Well Drillers and Related Workers
  - 7-11 Miners and quarrymen
  - 7-12 Mineral and stone treaters
  - 7-13 Well drillers, borers and related workers

MAJOR, MINOR AND UNIT GROUPS

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- 7-2 Metal Processers
  - 7-21 Metal smelting, converting and refining furnacemen
  - 7-22 Metal rolling-mill workers
  - 7-23 Metal melters and reheaters
  - 7-24 Metal casters
  - 7-25 Metal moulders and coremakers
  - 7-26 Metal annealers, temperers and case-hardeners
  - 7-27 Metal drawers and extruders
  - 7-28 Metal platers and coaters
  - 7-29 Metal processers not elsewhere classified
- 7-3 Wood Preparation Workers and Paper Makers
  - 7-31 Wood treaters
  - 7-32 Sawyers, plywood makers and related wood-processing workers
  - 7-33 Paper pulp preparers
  - 7-34 Paper makers
- 7-4 Chemical Processers and Related Workers
  - 7-41 Crushers, grinders and mixers
  - 7-42 Cookers, roasters and related heat-treaters
  - 7-43 Filter and separator operators
  - 7-44 Still and reactor operators
  - 7-45 Petroleum-refining workers
  - 7-49 Chemical processers and related workers not elsewhere classified
- 7-5 Spinners, Weavers, Knitters, Dyers and Related Workers
  - 7-51 Fibre preparers
  - 7-52 Spinners and winders
  - 7-53 Weaving- and knitting-machine setters and pattern-card preparers
  - 7-54 Weavers and related workers
  - 7-55 Knitters
  - 7-56 Bleachers, dyers and textile product finishers
  - 7-59 Spinners, weavers, knitters, dyers and related workers not elsewhere classified
- 7-6 Tanners, Fellmongers and Pelt Dressers
  - 7-61 Tanners and fellmongers
  - 7-62 Pelt dressers
- 7-7 Food and Beverage Processers
  - 7-71 Grain millers and related workers
  - 7-72 Sugar processers and refiners
  - 7-73 Butchers and meat preparers
  - 7-74 Food preservers
  - 7-75 Dairy product processers
  - 7-76 Bakers, pastrycooks and confectionery makers
  - 7-77 Tea, coffee and cocoa preparers
  - 7-78 Brewers, wine and beverage makers
  - 7-79 Food and beverage processers not elsewhere classified
- 7-8 Tobacco Preparers and Tobacco Product Makers
  - 7-81 Tobacco preparers
  - 7-82 Cigar makers
  - 7-83 Cigarette makers
  - 7-89 Tobacco preparers and tobacco product makers not elsewhere classified

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- 7-9 Tailors, Dressmakers, Sewers, Upholsterers and Related Workers
    - 7-91 Tailors and dressmakers
    - 7-92 Fur tailors and related workers
    - 7-93 Milliners and hatmakers
    - 7-94 Patternmakers and cutters
    - 7-95 Sewers and embroiderers
    - 7-96 Upholsterers and related workers
    - 7-99 Tailors, dressmakers, sewers, upholsterers and related workers not elsewhere classified
  - 8-0 Shoemakers and Leather Goods Makers
    - 8-01 Shoemakers and shoe repairers
    - 8-02 Shoe cutters, lasters, sewers and related workers
    - 8-03 Leather goods makers
  - 8-1 Cabinetmakers and Related Woodworkers
    - 8-11 Cabinetmakers
    - 8-12 Woodworking-machine operators
    - 8-19 Cabinetmakers and related woodworkers not elsewhere classified
  - 8-2 Stone Cutters and Carvers
    - 8-20 Stone cutters and carvers
  - 8-3 Blacksmiths, Toolmakers and Machine-Tool Operators
    - 8-31 Blacksmiths, hammersmiths and forging-press operators
    - 8-32 Toolmakers, metal patternmakers and metal markers
    - 8-33 Machine-tool setter-operators
    - 8-34 Machine-tool operators
    - 8-35 Metal grinders, polishers and tool sharpeners
    - 8-39 Blacksmiths, toolmakers and machine-tool operators not elsewhere classified
  - 8-4 Machinery Fitters, Machine Assemblers and Precision Instrument Makers (except Electrical)
    - 8-41 Machinery fitters and machine assemblers
    - 8-42 Watch, clock and precision instrument makers
    - 8-43 Motor vehicle mechanics
    - 8-44 Aircraft engine mechanics
    - 8-49 Machinery fitters, machine assemblers and precision instrument makers (except electrical) not elsewhere classified
  - 8-5 Electrical Fitters and Related Electrical and Electronics Workers
    - 8-51 Electrical fitters
    - 8-52 Electronics fitters
    - 8-53 Electrical and electronic equipment assemblers
    - 8-54 Radio and television repairmen
    - 8-55 Electrical wiremen
    - 8-56 Telephone and telegraph installers
    - 8-57 Electric linemen and cable jointers
    - 8-59 Electrical fitters and related electrical and electronics workers not elsewhere classified
  - 8-6 Broadcasting Station and Sound Equipment Operators and Cinema Projectionists
    - 8-61 Broadcasting station operators
    - 8-62 Sound equipment operators and cinema projectionists
  - 8-7 Plumbers, Welders, Sheet Metal and Structural Metal Preparers and Erectors
    - 8-71 Plumbers and pipe fitters
    - 8-72 Welders and flame-cutters
    - 8-73 Sheet-metal workers
    - 8-74 Structural metal preparers and erectors

## MAJOR, MINOR AND UNIT GROUPS

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- 8-8 Jewellery and Precious Metal Workers
    - 8-80 Jewellery and precious metal workers
  - 8-9 Glass Formers, Potters and Related Workers
    - 8-91 Glass formers, cutters, grinders and finishers
    - 8-92 Potters and related clay and abrasive formers
    - 8-93 Glass and ceramics kilnmen
    - 8-94 Glass engravers and etchers
    - 8-95 Glass and ceramics painters and decorators
    - 8-99 Glass formers, potters and related workers not elsewhere classified
  - 9-0 Rubber and Plastics Product Makers
    - 9-01 Rubber and plastics product makers (except tire makers and tire vulcanisers)
    - 9-02 Tire makers and vulcanisers
  - 9-1 Paper and Paperboard Products Makers
    - 9-10 Paper and paperboard products makers
  - 9-2 Printers and Related Workers
    - 9-21 Compositors and typesetters
    - 9-22 Printing pressmen
    - 9-23 Stereotypers and electrotypers
    - 9-24 Printing engravers (except photo-engravers)
    - 9-25 Photo-engravers
    - 9-26 Bookbinders and related workers
    - 9-27 Photographic darkroom workers
    - 9-29 Printers and related workers not elsewhere classified
  - 9-3 Painters
    - 9-31 Painters, construction
    - 9-39 Painters not elsewhere classified
  - 9-4 Production and Related Workers Not Elsewhere Classified
    - 9-41 Musical instrument makers and tuners
    - 9-42 Basketry weavers and brush makers
    - 9-43 Non-metallic mineral product makers
    - 9-49 Other production and related workers
  - 9-5 Bricklayers, Carpenters and Other Construction Workers
    - 9-51 Bricklayers, stonemasons and tile setters
    - 9-52 Reinforced-concreters, cement finishers and terrazzo workers
    - 9-53 Roofers
    - 9-54 Carpenters, joiners and parquetry workers
    - 9-55 Plasterers
    - 9-56 Insulators
    - 9-57 Glaziers
    - 9-59 Construction workers not elsewhere classified
  - 9-6 Stationary Engine and Related Equipment Operators
    - 9-61 Power-generating machinery operators
    - 9-69 Stationary engine and related equipment operators not elsewhere classified
  - 9-7 Material-Handling and Related Equipment Operators, Dockers and Freight Handlers
    - 9-71 Dockers and freight handlers
    - 9-72 Riggers and cable splicers
    - 9-73 Crane and hoist operators
    - 9-74 Earth-moving and related machinery operators
    - 9-79 Material-handling equipment operators not elsewhere classified

- 9-8 Transport Equipment Operators
  - 9-81 Ships' deck ratings, barge crews and boatmen
  - 9-82 Ships' engine-room ratings
  - 9-83 Railway engine drivers and firemen
  - 9-84 Railway brakemen, signalmen and shunters
  - 9-85 Motor vehicle drivers
  - 9-86 Animal and animal-drawn vehicle drivers
  - 9-89 Transport equipment operators not elsewhere classified
- 9-9 Labourers Not Elsewhere Classified
  - 9-99 Labourers not elsewhere classified

**Major Group X: Workers Not Classifiable by Occupation**

- X-1 New Workers Seeking Employment
  - X-10 New workers seeking employment
- X-2 Workers Reporting Occupations Unidentifiable or Inadequately Described
  - X-20 Workers reporting occupations unidentifiable or inadequately described
- X-3 Workers Not Reporting Any Occupation
  - X-30 Workers not reporting any occupation

**Armed Forces: Members of the Armed Forces**