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Japan International Cooperation Agency (JICA)
Ministry of Education, the Republic of Ghana

The Study for Development of a Master Plan to Strengthen Technical Education in the Republic of Ghana

Final Report
Appendix

November 2001

Pacific Consultants International

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Ministry of Education, the Republic of Ghana

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The exchange rate applied in the Study is;

US$ 1.00 = 101 Jpanese YEN = Cedis 6,500

(September, 2001)

Preface

In response to a request from the Government of the Republic of Ghana, the Government of Japan decided to conduct a "Study for Development of a Master Plan to Strengthen Technical Education in the Republic of Ghana" and entrusted the study to the Japan International Cooperation Agency.

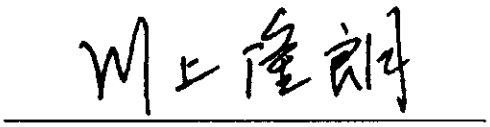
JICA selected and dispatched a study team headed by Dr. Yoshihiro Asano of Pacific Consultants International to Ghana between March 2000 to December 2001. In addition, JICA set up an advisory committee headed by Mr. Nobuhide Sawamura, Associate Professor of Hiroshima University, between March 2000 and December 2001, which examined the study from technical points of view.

The Team held discussions with the officials concerned of the Government of Ghana and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Ghana for their close cooperation extended to the study.

December, 2001



Takao Kawakami
President
Japan International Cooperation Agency

Mr. Takao Kawakami
President
Japan International Cooperation Agency
Tokyo, Japan

Letter of Transmittal

Dear Sir,

We are pleased to formally submit herewith the Final Report of "the Study for Development of a Master Plan to Strengthen Technical Education in the Republic of Ghana".

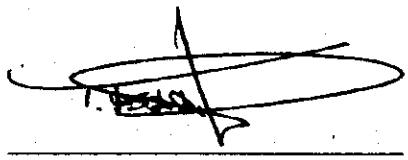
This report compiles the results of the Study, which was undertaken in the Republic of Ghana from March 2000 through December 2001 by the Study Team, represented by Pacific Consultants International.

We had been assisted by many people for the accomplishment of the Study, and we would like to express our sincere gratitude and appreciation to all those who extended their kind assistance and cooperation to the Study Team, in particular, Ministry of Education who act as the counterpart agency.

Also, we acknowledge the effective assistance by all the officials of your Agency and the Embassy of Japan in the Republic of Ghana.

We hope that the report will be able to contribute to the development of technical education for Ghana.

Very truly yours,



Yoshihiro Asano

Team Leader,
The Study for Development of
a Master Plan to Strengthen
Technical Education in the
Republic of Ghana

TABLE OF CONTENTS

APPENDIX

CHAPTER 1 INTRODUCTION

1.1 Scope of Works of the Study

(Copy of Scope of Works of the Study will be inserted here.)

1.2 Minutes of Meeting of Steering Committee Meeting on Inception Report

(Copy of Minutes of Meeting of Steering Committee Meeting on Inception Report will be inserted here.)

1.3 Minutes of Meeting of Steering Committee Meeting on Interim Report

(Copy of Minutes of Meeting of Steering Committee Meeting on Interim Report will be inserted here.)

SCOPE OF WORK

FOR

THE STUDY FOR DEVELOPMENT OF A MASTER PLAN TO STRENGTHEN TECHNICAL EDUCATION IN THE REPUBLIC OF GHANA

AGREED UPON BETWEEN

MINISTRY OF EDUCATION

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

ACCRA

10 DECEMBER 1999

Mr.F.A.Ben-Eghan
Acting Chief Director,
Ministry of Education

Dr. Yumiko Yokozeki
Leader,
Preparatory Study Team,
Japan International Cooperation Agency

I. INTRODUCTION

In response to a request from the Government of the Republic of Ghana (hereinafter referred to as "GOG") for technical cooperation on the Study for Development of a Master Plan to Strengthen Technical Education in the Republic of Ghana (hereinafter referred to as "the Study"), the Government of Japan has decided to conduct the Study in accordance with relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programmes of the Government of Japan, will undertake the Study in close cooperation with the relevant authorities of GOG.

The present document, which sets forth the scope of work with regard to the Study, was signed by JICA and the Ministry of Education.

II. OBJECTIVES OF THE STUDY

The objectives of the Study are to:

1. develop a master plan to improve technical education in terms of human resource development and educational facilities improvement toward the year 2020,
2. prepare institutional strengthening programmes for selected Polytechnics, and
3. pursue technology transfer in the course of the Study.

III. THE STUDY AREA

The overall system of technical education shall be reviewed under the Study with a focus on the strengthening of Polytechnics in Ghana.

GG

IV. SCOPE OF THE STUDY

In order to achieve the objectives mentioned above, the Study shall cover the following items:

Phase I : Assessment of the existing situation of technical education

(1) Review the present technical educational systems and skills development policy
(2) Review the present training systems for technical personnel
(3) Review the existing plans for industrial development
(4) Study the existing conditions of technical education, including policy, budgetary allocation, managerial and administrative capabilities
(5) Identify human resource requirements in the technical fields
(6) Forecast the number of technical personnel and instructors to be trained and prepare a list of equipment and facilities required

Phase II : Development of a master plan for human resource development in technical education institutes toward the year 2020

(1) Study the current linkage between the education sector and the industrial sector
(2) Identify roles and functions of technical education institutes including Polytechnics, Technical Institutes (TI) and Technical Teacher Training Colleges
(3) Review the current curricula/syllabi and learning materials
(4) Prepare an outline implementation schedule and preliminary cost estimates
(5) Recommend strategies to implement the master plan, including funding resources and institutional development

Phase III : Institutional strengthening programmes for selected Polytechnics

(1) Select Polytechnics for the purpose of the programmes
(2) Identify issues and potential of the selected Polytechnics
(3) Prepare a set of measures to strengthen institutional capacity of each of the selected Polytechnics
(4) Prepare an implementation schedule and cost estimates
(5) Assess technical, financial and economic viability of the proposed programmes

V. STUDY SCHEDULE

The Study will be conducted in accordance with the attached tentative schedule as shown in APPENDIX-1.

VI. REPORTS

JICA shall prepare and submit the following reports to GOG:

1. INCEPTION REPORT
20 copies in English at the commencement of the Study

2. PROGRESS REPORT
20 copies in English within five (5) months after the commencement of the Study

3. INTERIM REPORT
20 copies in English within eight (8) months after the commencement of the Study

4. DRAFT FINAL REPORT
20 copies of main report and its summary within thirteen (13) months after the commencement of the Study

GOG will submit its comments on the report to JICA within one (1) month after receipt of the Draft Final Report.

5. FINAL REPORT
20 copies of main report and its summary within one (1) month after the receipt of written comments on Draft Final Report from GOG.

VII. UNDERTAKING OF GOG

1. To facilitate smooth implementation of the Study, GOG shall take the following necessary measures to:

(1) secure the safety of the Team;

(2) permit the members of the Team to enter, leave and sojourn in Ghana for the duration of their assignments therein and exempt them from alien registration requirements and consular fees;

(3) exempt the members of the Team from taxes, duties and any other charges on equipment, machinery and other material brought into Ghana for the implementation of the Study;

(4) exempt the members of the Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the team for their services in connection with the implementation of the Study;

(5) provide necessary facilities to the Team for the remittance as well as utilization of the funds introduced into Ghana from Japan in connection with the implementation of the Study;

(6) secure permission for entry into project area and its vicinity for the implementation of the Study;

(7) secure permission for the Team to take all data and documents (including photographs) related to the Study out of Ghana to Japan for analysis; and

(8) provide the medical services as needed, while its expenses will be chargeable on the members of the Team.

2. GOG shall bear claims, if any arises, against the members of the Team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Team.

3. Ministry of Education shall act as a counterpart agency to the Team and also as a coordinating body with other relevant organizations for the smooth implementation of the Study, on behalf of GOG.

4. Ministry of Education shall, at its own expense, provide the Team with the following, in cooperation with other organizations concerned:

(1) available data and information related to the Study,

(2) counterpart personnel,

(3) suitable office space with necessary office equipment and facilities at Ministry of Education, and

(4) credentials or identification cards.

VIII. UNDERTAKING OF JICA

For the implementation of the Study, JICA shall take the following measures to:

1. dispatch, at its own expense, the Team to Ghana; and
2. pursue technology transfer to the Ghanaian counterpart personnel in the course of the Study.

IX. OTHERS

JICA and Ministry of Education shall consult with each other in respect of any matter that may arise from or in connection with the Study.

TENTATIVE STUDY SCHEDULE

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Work in Ghana															
Work in Japan															
Report Presentation	△ IC/R				△ PR/R			△ IT/R					△ DF/R		△ F/R

← Phase I and II → ← Phase III →

Note. IC/R: Inception Report

PR/R: Progress Report

IT/R:Interim Report

DF/R: Draft Final Report

F/R: Final Report

APPENDIX-1

MINUTES OF MEETING

FOR

THE SCOPE OF WORK

FOR

THE STUDY FOR DEVELOPMENT OF A MASTER PLAN

TO STRENGTHEN TECHNICAL EDUCATION

IN THE REPUBLIC OF GHANA

AGREED UPON BETWEEN

MINISTRY OF EDUCATION

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

ACCRA

10 DECEMBER 1999

Mr.F.A.Ben-Eghan
Acting Chief Director,
Ministry of Education

Dr. Yumiko Yokozeki
Leader,
Preparatory Study Team,
Japan International Cooperation Agency

The Japanese Preparatory Study Team, organized by Japan International Cooperation Agency (JICA) and headed by Dr.Yumiko Yokozeki, visited the Republic of Ghana from 30 November to 11 December 1999, to discuss the Scope of Work for the Study for Development of a Master Plan to Strengthen Technical Education in the Republic of Ghana (hereinafter referred to as "the Study").

During the Preparatory Study Team's stay in Ghana, a series of discussions were held between the Team and the Ghanaian side and both sides agreed and signed the Scope of Work for the Study.

The list of participants appears in the Appendix.

1. Steering Committee

Both sides agreed that the Ghanaian side would establish a Steering Committee under the chairmanship of the Ministry of Education to facilitate smooth implementation of the Study.

The Steering Committee will consist of the following concerned organizations under the Ministry of Education;

(1) National Council for Tertiary Education in charge of Polytechnics and University College of Education of Winneba (UCEW)
(2) Technical and Vocational Education Division of GES in charge of Technical Institutes

2. Technical Teacher Training Colleges

Both sides agreed that Technical Teacher Training Colleges in Phase II include UCEW-Kumasi Campus and Mampong Technical Teacher Training College.

3. Phase III Programmes

The Ghanaian side requested that the proposed programmes in Phase III should include production-oriented activities in some departments and the Japanese side understood this Ghanaian request.

4. Counterpart Training

The Ghanaian side requested the training of counterpart personnel in Japan and the Japanese side agreed to convey it to JICA headquarters.

5. Seminars

In order to facilitate technology transfer, both sides agreed to hold seminars on technical education in which all Polytechnics will take part. The details of these seminars will be discussed in the course of the Study.

APPENDIX

LIST OF PARTICIPANTS

[GHANAIAN SIDE]

Mr.F.A.Ben-Eghan	Ag.Chief Director, MOE
Mr.A.Tetteh-Enyo	Deputy Director-General, GES, (F&A)
Mr.J.Budu-Smith	Deputy Director-General,GES, (Academic)
Mr.A.N.Kaku	Ag.Director, Tech/Vocational Education,GES
Mr.K.C.Appiah-Num	Director, F&A, MOE
Mrs.J.A.Dogbe	Desk Officer, Polytechnics
Dr.Baah Boakye	Principal, Accra Polytechnic
Dr.G.M.Afeti	Principal, Ho Polytechnic

[JAPANESE SIDE]

Dr.Yumiko Yokozeki	Leader of the Mission
Mr.Nobuhide Sawamura	Member of the Mission
Ms.Reiko Akezumi	Member of the Mission
Mr.Kunio Nishimura	Member of the Mission
Mr.Takashi Nakajima	Member of the Mission
Mr.Kazutomo Hihara	JICA Ghana Office

MINUTES OF MEETING
ON
THE INCEPTION REPORT
FOR
THE STUDY FOR DEVELOPMENT OF A MASTER PLAN TO STRENGTHEN TECHNICAL EDUCATION IN THE REPUBLIC OF GHANA

Agreed upon between

MINISTRY OF EDUCATION OF THE REPUBLIC OF GHANA
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

Accra, April 20th, 2000

Hon. Kwabena Kyereh
Deputy Minister,
Ministry of Education

Dr. Yoshihiro Asano
Team Leader,
JICA Study Team

Witnessed by

Dr. William Adote
Director, IERD
Ministry of Finance

Prof. Nobuhide Sawamura
Chairman,
JICA Advisory Committee

1. Based on the official agreement signed between the Ministry of Education (MOE) of the Republic of Ghana and the Japan International Cooperation Agency (JICA) on December 10th, 1999 in Accra, JICA sent a Study Team for "The Study for Development of a Master Plan to Strengthen Technical Education in the Republic of Ghana" (hereinafter referred to as "the Study") to the Republic of Ghana on April 15th, 2000.

2. The Study Team submitted the Inception Report (draft) for the Study to the MOE on April 17th, 2000. A meeting on the Inception Report (draft) was held on April 18th, 2000 at the office of MOE in Accra. A list of participants at the meeting is attached as an APPENDIX. Following the presentation made by the Study Team, a detailed discussion of the Inception Report (draft) was undertaken by the Ghanaian and the Japanese sides.

3. At the meeting, the Ghanaian side accepted the Inception Report (draft). The following matters were discussed and agreed upon by the Ghanaian and the Japanese sides:

3.1. The Ghanaian side agreed to provide full collaboration with the Study Team during the course of the Study.

3.2. Although the main objective of the Study is to strengthen the technical education sector focusing on Polytechnics, the Ghanaian side requested for the analysis of vocational education as a part of the Study. The Study Team agreed to include selected vocational institutions in the Study.

3.3. Both sides agreed that some action programs to improve Polytechnics should be proposed in a practical manner, taking into account the financial capabilities and human resources of the MOE.

3.4. At the request of the Ghanaian side, the Study Team agreed to include institutional capacity building related to technical/vocational education of the MOE in the Study.

3.5 Both sides noted that programs offered by Polytechnics include not only those related to engineering sector but also to commercial and service sectors according to the country's human resource requirements. Both sides identified that the functions of the Polytechnics should include promotion of job opportunities in addition to training and education.

3.6 Both sides agreed that workshops should be organized to promote the

participation of stakeholders from the private sector as well as ministries and other agencies.

4. The Ghanaian and the Japanese sides agreed on the following measures to be taken by the end of April 2000:

4.1. The Ghanaian side will provide office space for the Study Team.

4.2. The Ghanaian side will select members of the Steering Committee.

4.3. The Ghanaian side will appoint full-time counterpart personnel (3-4 persons from the MOE) to support the Study Team.

(APPENDIX)

LIST OF PARTICIPANTS

Ghanaian Side

Mr. F.A. Ben-Eghan	MOE
Mr. Paul Effah	National Council for Tertiary Education
Mr. J. Budu-Smith	MOE-GES
Dr. Stephen Ayidiya	MOE
Mr. A.N. Kaku	MOE-GES, Tech. & Voc. Educ. Div.
Nana (Dr.) Baah Boakye	Accra Polytechnic
Dr. George M. Afeti	Ho Polytechnic
Alhaji Salifu Seidu	National Council for Tertiary Education

Japanese Side

JICA

Prof. Nobuhide Sawamura	JICA Advisory Committee
Ms. Reiko Akezumi	JICA Headquarters
Mr. Kazutomo Hihara	JICA Ghana Office
Ms. Rabi Ali-Abaari	JICA Ghana Office

JICA Study Team

Dr. Yoshihiro Asano	Team leader
Mr. Toru Ishibashi	Deputy team leader

(Note) MOE: Ministry of Education
GES: Ghana Education Service

MINUTES OF THE MEETING
ON
THE INTERIM REPORT
OF
THE STUDY FOR DEVELOPMENT OF A MASTER PLAN
TO STRENGTHEN TECHNICAL EDUCATION
IN THE REPUBLIC OF GHANA

AGREED UPON BETWEEN

MINISTRY OF EDUCATION,
THE GOVERNMENT OF GHANA
AND
THE JICA STUDY TEAM

12 MARCH 2001, ACCRA

PAUL EFFAH
EXECUTIVE SECRETARY
NATIONAL COUNCIL FOR
TERTIARY EDUCATION

YOSHIHIRO ASANO
TEAM LEADER
THE JICA STUDY TEAM

Since the beginning of the Study in March 2000, the JICA Study Team has expended significant efforts in understanding the current condition of technical education and in formulating useful measures, programs and plans to strengthen technical education in the Republic of Ghana. Notable technical progress has been achieved by the Study, and its results are included in the Interim Report.

The JICA Study Team submitted 20 copies of the Interim Report to the Ministry of Education (MOE) on 27 February 2001. The MOE accepted the Interim Report and acknowledged the capable and professional efforts of the JICA Study Team. The meeting to discuss the content of the Interim Report was conducted on 9 March 2001 between the Working Group (core members of the Steering Committee) and the JICA Study Team, under the chairmanship of Dr. George Afeti, Counterpart Team Leader.

The following are the main comments provided by the Working Group and the agreements reached between the Working Group and the JICA Study Team regarding the contents of the Interim Report.

(1) Model polytechnics and pilot departments:

- Agreement has been reached on the six (6) new departments or programs to be delivered in polytechnics. These departments are: 1) hospitality and tourism, 2) information and communications technology, 3) business information technology, 4) post harvest and food processing, 5) wood processing technology, and 6) manufacturing technology. The Working Group, however, expressed the view that the selection of polytechnics to start the new programs in the short-term would require further discussion within the MOE.

- Both sides agreed that Competency-Based Training (CBT) is a demand-driven and outcome-oriented education and training system, and that it is appropriate to introduce this form of training in Ghana. The Working Group noted that the CBT approach must be applied initially to the new programs and then extended to the existing programs. In the formulation of CBT, industry must be fully involved in the process of designing, development and delivery of curricula as well as teacher training through new structures such as the Industrial Training Advisory Board (ITAB).

- The Working Group emphasized that the action programs for the new departments

should be carefully designed to avoid any negative fallouts on the existing departments. The new departments, therefore, should function as a catalyst to improve existing programs and departments. Possible spill over effects from the new departments should be analyzed in the next phase of the study. The JICA Study Team accepted this recommendation.

(2) Financing

- The Working Group agreed that a cost recovery strategy is required in order to improve the technical/vocational education and training (TVET) sector in Ghana. The Working Group stressed that the cost of education is proportional to the provision of good quality educational services. In this regard, the Working Group noted that the proposed tuition fee of US$1,000 per year for a student of the new departments is reasonable; however, the provision of financial assistance, such as scholarships, loans and support from the public and private sectors, should be given greater consideration in the study. The JICA Study Team agreed to this suggestion.

- The Working Group accepted the concept of Skill Development Fund (SDF), and requested the JICA Study Team to further consider the practical implementation mechanism of SDF. The Working Group pointed out that major issues of the SDF are: 1) who should contribute to the fund and by what mechanism, 2) who should be the beneficiaries, and 3) the role of government bodies involved in the SDF scheme. The JICA Study Team agreed to provide further clarification of these issues during the phase III of the study.

- The Working Group accepted the basic ideas of the Ghana Emigrant Fund (GEF) and the Tuition Payback Scheme (TPS) as possible funding sources to improve financial support to TVET. However, the Working Group expressed the need for a more detailed study of the practical implementation mechanism of the schemes. Both sides agreed to have further discussions on this issue.

(3) Management

- The Working Group noted that the term "model polytechnics" used in the Interim Report could cause confusion and misunderstanding, because the term "model polytechnics" conveys the meaning of disparities between model and other polytechnics. The Working Group suggested that "pilot polytechnics" is a more

appropriate term. The JICA Study Team agreed to the change of terminology. Both sides recognized that the purpose of the phase III study in selected "pilot polytechnics" is to conduct case studies to examine institutional and managerial strengthening programs, so that the results could be applied or disseminated to other polytechnics. Agreement, however, has not been reached yet on the location of the three (3) "pilot polytechnics".

- The formulation of a National Qualifications Framework (NQF) proposed in the Interim Report is important to improve the TVET system as a whole. The Working Group expressed the view that the issue of NQF should be discussed in a holistic manner with other agencies at the national level. The Working Group also noted that NQF must be designed to avoid duplication of functions of existing bodies responsible for TVET reform under the auspices of NACVET. The JICA Study Team agreed on this issue.

- The Working Group noted that sustainability of TVET sector should be emphasized and discussed in a more practical manner, including cost recovery mechanisms. The JICA Study Team agreed to provide further clarification on this issue during the phase III study period.

The JICA Study Team requested the Working Group for the appointment of a new chairperson for the Steering Committee of the Study. The Working Group agreed on the need to appoint a new chairperson as earlier as possible. For this purpose, the JICA Study Team has submitted a request letter on this matter to the Minister of Education on 9 March 2001.

In order to conduct institutional strengthening programs in selected polytechnics, as main part of the phase III study, the Study Team proposed three workshops to be held in Accra, Ho and Tamale during the period ending 20 March 2001. The Working Group agreed on the workshop to be held in Accra on 13 March 2001, but agreement has not been reached on the locations of the two other workshops. The final decision will be made with the approval of the Minister of Education. The JICA Study Team agreed.

MINUTES OF THE MEETING
ON
THE DRAFT FINAL REPORT
OF
THE STUDY FOR DEVELOPMENT OF A MASTER PLAN
TO STRENGTHEN TECHNICAL EDUCATION
IN THE REPUBLIC OF GHANA

AGREED UPON BETWEEN

THE MINISTRY OF EDUCATION,
THE GOVERNMENT OF GHANA
AND
THE JICA STUDY TEAM

2 OCTOBER 2001, ACCRA

PAUL EFFAH
EXECUTIVE SECRETARY
NATIONAL COUNCIL FOR
TERTIARY EDUCATION
MINISTRY OF EDUCATION

YOSHIHIRO ASANO
TEAM LEADER
THE JICA STUDY TEAM

The Study Team produced a Draft Final Report of the Study for Development of a Master Plan to Strengthen Technical Education in the Republic of Ghana during the Phase III period of the Study, which consists of three volumes: Executive Summary, Main Report and Appendix. Ten (10) copies of each Report were couriered to Ghana prior to the arrival of the Study Team members to obtain feedback from members of the Steering Committee on the Draft Final Report. Unfortunately however, due to the problems of airmail delivery caused by the accident on September 11 in the U.S.A., the copies did not arrive in time for all the documents to be read prior to the Steering Committee Meeting.

The JICA Study Team submitted twenty (20) copies of the Draft Final Report (Main Report and Appendix) and thirty (30) copies of the Executive Summary to the Ministry of Education (MOE) on 21 September 2001. The MOE received the Draft Final Report and acknowledged the efforts of the JICA Study Team. The Steering Committee Meeting, to discuss the contents of the Draft Final Report, was conducted on 24 September 2001 between the Steering Committee members and the JICA Study Team (the attendance list is attached), under the chairmanship of Mr. Paul Effah, Executive Secretary of National Council for Tertiary Education (NCTE).

Members of the Steering Committee supported the major analyses, conclusions and recommended strategies in the Draft Final Report. The following is a summary of the discussion in the Steering Committee Meeting.

1. After further review of the Draft Final Report and collecting opinions from stakeholders who will participate in the National Forum held on 28 September 2001, the Steering Committee will send written comments on the Draft Final Report to JICA Ghana office by 10 October 2001.

2. Major comments regarding the Executive Summary provided by the member of Steering Committee are summarized as follows:

2.1 The first paragraph of the Overview stated that "The most important feature of the recently elected Government's policy to address Ghana's economic problems is to develop an export-oriented industrial sector." The members of the Steering Committee commented that, although this is a priority of the current Government, it has also been a policy direction adopted by the previous Government as well. The Team accepted the comment to acknowledge that

developing an export-oriented industrial sector has been a continuing policy.

2.2 In making a summary of current TVET delivery in Ghana, the Report stated that "Institutions are classified by academic ranking..." (p. 1). The Steering Committee members pointed out that although there was an "informal" ranking system, there was no formal classification of TVET institutions as such. The Study Team agreed to change the description to note that institutions were perceived to have varying academic status, and differed according to the ratio of theoretical to practical work offered in their respective courses.

2.3 In discussing appropriate strategies for developing national competency standards, the Report stated that "the industries identify and develop competency standards, assessment guidelines and qualifications" (p. 2).

Members of the Steering Committee commented that although this was now the practice in many countries which had adopted a CBT approach, it was probably premature in Ghana to expect that industry would be provide this level of input, at least in the short term. They commented that there would have to be a very high level of collaboration between the industry and education sectors especially in the formative period of the introduction of a national CBT system. The phrase was accordingly amended to read "industries identify and develop competency standards, assessment guidelines and qualifications in collaboration with training institutions."

2.4 In the discussion of estimations of the Ghanaian working population in the labour market analysis (p. 10), the Report quoted the major source as a "recent" survey conducted by the Ministry of Employment and Social Welfare with support form the World Bank. Some of the Steering Committee members questioned whether it was accurate to preface the notation with the phrase "most recent survey". It was agreed that although the survey results had validity, it would be best to omit the phrase "the most recent".

2.5 The Report referred to Technical Institutes as "second cycle institutions" (p. 13). The Steering Committee members felt that this description would be better left out since it could cause unnecessary controversy regarding the precise definition of the term "second cycle". It had been asserted that Technical Institutes were primarily intended to take in "senior secondary school leavers". The Committee members pointed out that the original mission of the Technical

Institutes was to take in junior secondary school leavers. Due to growing demand, Technical Institutes were now accepting larger numbers of senior secondary school leavers. It was agreed to amend the phrase to read, " Technical Institutes mainly provide TVET courses for junior and some secondary school leavers".

2.6 In the reference to the universities that provide technical courses (p. 14), the group noted that the "University of Science and Technology" at Kumasi is now officially known as the Kwame Nkrumah University of Science and Technology (KNUST). In the same section it was noted that courses in technical fields (agriculture, engineering, science and mining) are not provided by each of the universities. The Study Team agreed to amend the description.

2.7 The Steering Committee members pointed out that there was some inconsistency in the description of the HND curriculum development process related to polytechnics (p. 18). The Team agreed to amend the description according to advice from the MOE representatives.

2.8 The Report listed one of the current foreign (Netherlands) assisted projects as the Technical Resource Center (TRC) project (p. 19). It was noted that the accurate title of the project is VOTEC – Vocational Technical Resource Centers.

2.9 The Steering Committee commented that the National Accreditation Board (NAB) needed to be included in the recommended overall administrative structure for implementation of pilot programs (p. 31). The Team undertook to include the NAB with NABPTEX to perform the role of the National Qualifications Authority in the recommended reform process.

3 On the topic of the National Forum to be conducted for all stakeholders on 28 September 2001, the following were the major outcomes:

3.1 Paul Effah, Chairman of the Steering Committee, confirmed that the Vice President of the Republic Ghana would be attending the Forum and will present the keynote address.

3.2 The Study Team presented the Forum Agenda, and it was approved by the Steering Committee. The Forum Agenda is attached.

3.3 The Study Team proposed to hand out copies of the Executive Summary

of the Draft Final Report as a discussion material to all participantss at the Forum. The Steering Committee agreed to this.

4 Following the recommendations proposed in the Draft Final Report, it was agreed that MOE will initiate some actions and measures to introduce a Competency-Based Training (CBT) approach into Polytechnics.

Steering Committee Participant List

NAME	TITLE & ORGANISATION
Paul Effah	Executive Secretary, NCTE
John Budu-Smith	Deputy Director, GES/MOE
George Afeti	Counterpart Team Leader, JICA Study Team
Antwi Boasiako	Executive Secretary, NABPTEX
Yosihiro Asano	Team Leader, JICA Study Team
Toru Ishibashi	Deputy Team Leader, JICA Study Team
Akio Odani	Team Member, JICA Study Team
Roger De Zilwa	Team Member, JICA Study Team
Joji Watanabe	Team Member, JICA Study Team
Francis Angmorteh	Counterpart Team Member, JICA Study Team

Agenda for National Forum

A NATIONAL FORUM
STRENGTHENING TECHNICAL EDUCATION IN GHANA

Organized by

Ministry of Education (MOE)

Japan International Cooperation Agency (JICA)

28 September 2001

PROGRAM

9:00-9:30 Registration

Opening Session

Chaired by Hon. Minister of Education, Prof. C. Ameyaw-Akumfi

9:30	Introduction of Chairman	Alhaji S. A. Seidu
9:35	Welcome and Outline of Program	Mr. Paul Effah
9:40	Statement by JICA Ghana Office	Mr. F. Miyagawa
9:50	Statement by Ambassador of Japan	H.E. Hiromu Nitta
10:00	Keynote Address by the Vice President of the Republic of Ghana	H.E. Alhaji Aliu Mahama
10:20-10:50	Coffee Break	

Session I: Presentations by JICA Study Team

Chaired by Principal of Ho Polytechnic, Dr. George Afeti

10:50	Overview of the Study	Dr. Y. Asano
11:10	Education Policy and Economic Development	Mr. J. Watanabe
11:30	TVET Reform and National Qualification Framework	Mr. R. De Zilwa
11:50	Pilot Programs and Urgent Action Plan	Mr. T. Ishibashi
12:10	Discussion	Dr. George Afeti
12:40-2:00	Lunch	

Session II: Reactions from Stakeholders

Chaired by Executive Secretary of NCTE, Mr. Paul Effah

2:00	Presentation by AGI	Mr. T. Gyau
2:15	Presentation by MOE	Mr. Budu-Smith
2:30	Presentation by Polytechnics	Dr. N. Aidoo-Taylor
2:45-3:00	Coffee Break	
3:00	Discussion	Mr. Paul Effah
3:50	Closing Remark by Hon. Minister of Education	Prof. C. Ameyaw-Akumfi
4:00	Vote of Thanks by NABPTEX	Mr. Antwi-Boasiako

APPENDIX

CHAPTER 4 OVERVIEW OF THE TECHNICAL EDUCATION SECTOR IN GHANA

4.1 Statistical Analysis of Technical Education Schools

4.1.1 Universities

Ghana has five universities - the University of Science & Technology (UST), University of Ghana, and the University of Cape Coast which has Engineering and Science faculties. Table A-4.1.1 shows the recent student enrolment at each university.

Table A-4.1.1 University student enrolment for selected faculties, 1998/99

Univ. / Faculty	Diploma 3 yrs	First Degree 4 yrs	Graduates	Total
University of Science and Technology				
Agriculture	0	585	31	**616**
Engineering	29	1,211	60	**1,300**
Science	0	1,471	108	**1,579**
Mining	339	408	58	**805**
College of Renewable Natural Resources	0	336	59	**395**
Sub-total	**368**	**4,011**	**316**	**4,695**
University of Ghana				
Agriculture	103	214	94	**411**
Science	30	1,054	145	**1,229**
Sub-total	**133**	**1,268**	**239**	**1,640**
University of Cape Coast				
Agriculture	0	504	61	**565**
Science	85	710	83	**878**
Sub-total	**85**	**1,214**	**144**	**1,443**
Total	**586**	**6,493**	**699**	**7,778**

Source: 1998/99 Statistical Digest of the Universities and Institute of Professional Studies, NCTE, MOE, 9th Dec. 1999

4.1.2 Polytechnics

There are eight polytechnics in Ghana, available on a competitive basis to those qualifying students who have successfully completed senior secondary school. Among them, three polytechnics, Accra, Kumasi and Takoradi, were established first in 1993, followed by Cape Coast, Ho and Tamale Polytechnics. Two more, Sunyani and Koforidua Polytechnics, were established in the past three years. (Two more, at Wa and

Bolgatanga, will open this year, making a total of ten.) In addition to technical courses such as electrical engineering and mechanical engineering, most of them offer Applied Mathematics/Science and Management courses. The polytechnics provide tertiary education for the Higher National Diploma (HND), and also offer non-tertiary education. Currently about 1% of the total population of post-secondary age goes to HND programs at the polytechnics.

Numbers of new entrants for full time students in 1998/99 are summarised in Table A-4.1.2 Technician courses are available only at Accra, Kumasi, Takoradi and Ho polytechnics, of which their share is 9.6%. HND level courses have a 90.4% share. Since the MOE (Ministry of Education) has instructed polytechnics to focus only on HND, all Technician Certificate courses will be shifted to TIs in the near future. Although the share of female enrolment is only 20.7%, it is expected to increase.

Table A-4.1.2 New entrants for full-time admission by gender in 1998/1999

	Technician Certificate			Higher National Diploma			Grand total by gender			Share
Polytechnic	Male	Female	Total	Male	Female	Total	Male	Female	Total	(%)
Accra	256	0	256	550	163	713	806	163	969	16.3%
Kumasi	134	0	134	745	243	988	879	243	1122	18.9%
Takoradi	144	2	146	635	163	798	779	165	944	15.9%
Ho	33	0	33	401	162	563	434	162	596	10.0%
Cape Coast	0	0	0	571	87	658	571	87	658	11.1%
Tamale	0	0	0	343	30	373	343	30	373	6.3%
Sunyani	0	0	0	509	301	810	509	301	810	13.6%
Koforidua	0	0	0	391	79	470	391	79	470	7.9%
Total	567	2	569	4145	1228	5373	4712	1230	5942	100.0%
(%)	9.5%	0.0%	9.6%	69.8%	20.7%	90.4%	79.3%	20.7%	100.0%	

Source: 1998/99 Statistical Digest of the Polytechnics and Ghana Institute of Language, NCTE, MOE, 9th Dec., 1999

Courses offered by polytechnics can be classified into the following four groups: Engineering, Applied Science and Technology, Business and Management studies and Art and Design, as shown in Table A-4.1.3. Tamale and Sunyani have only two Engineering courses. No Engineering courses are available at Koforidua Polytechnic. An Agricultural engineering course is available only at Ho and Tamale Polytechnics, and Chemical and Metallurgy and Foundry are available only at Kumasi Polytechnic.

Table A-4.1.3 Courses offered by polytechnic in 1998/99

Higher National Diploma (HND)	Accra	Kumasi	Takoradi	Ho	Cape Coast	Tamale	Sunyani	Koforidua	Total
Engineering									
Mechanical	x	x	x		x	x			5
Electrical/Electronic	x	x	x	x	x		x		6
Building construction	x	x	x	x	x		x		6
Civil	x	x	x	x	x				4
Agricultural				x		x			2
Automobile	x	x	x	x	x				5
Chemical		x							1
Metallurgy and foundry		x							1
Furniture design and wood processing	x	x	x						3
Applied science and technology									
Computer science and statistics	x	x	x	x		x		x	6
Hotel catering and institutional management	x	x	x	x			x		5
Science laboratory technology	x								1
Dispensing technology		x							1
Business and management studies									
Accountancy	x	x	x	x	x	x	x	x	8
Marketing	x	x	x	x	x		x	x	7
Secretaryship and management studies	x	x	x	x	x	x			6
Purchasing and supply	x	x	x					x	4
Bilingual secretaryship	x								1
Estate management		x							1
Art and design									
Fashion, design and modelling	x	x	x	x					4
Commercial art			x						1
Total	14	17	14	11	8	5	5	4	78

Source: 1998/99 Statistical Digest of the Polytechnics and Ghana Institute of Language, NCTE, MOE, 9th Dec., 1999

Norms developed by NCTE indicate the student-teacher ratios in the polytechnics should be lower than 12, 15 and 20 respectively for Engineering, Applied Science and Management and Business. However, the current average student-teacher ratio of all polytechnics is 21.4, which implies a strong need for teacher development.

Table A-4.1.4 shows numbers of full time enrolment by course in each Polytechnic.

Table A-4.1.4 Enrolments by courses in polytechnics, 1998/99

(Full-time enrolment only)

	Course	Technician Certificate	HND	Total
Accra Polytechnic				
Engineering				
	Automobile Eng.	63	0	63
	Electrical Eng.	97	297	394
	Mechanical Eng.	28	212	240
	Building, Construction	0	171	171
	Civil Eng.	0	37	37
	Furniture Design Production	0	15	15
	Sub-total	188	732	920
Applied Math/Science				
	Hotel, Catering, Inst. MGT.	0	65	65
	Statistics	0	119	119
	Fashion	0	84	84
	Science Lab.Technology	0	171	171
	Sub-total	0	439	439
Management/Business study				
	Accountancy	0	472	472
	Secretaryship	0	94	94
	Marketing	0	376	376
	Purchase & Supply	0	315	315
	Bilingual Secretaryship	0	68	68
	Sub-total	0	1,325	1,325
Total		**188**	**2,496**	**2,684**
Kumasi Polytechnic				
Engineering				
	Automobile Eng.	45	73	118
	Electrical & Electronic Eng.	56	139	195
	Mechanical Eng.(Prod.)	0	125	125
	Mechanical Eng.(Plant)	0	152	152
	Metallurgy	0	107	107
	Chemical Engineering	0	46	46
	Civil Engineering	0	40	40
	Building Technology	29	88	117
	Furniture Design	0	80	80
	Sub-total	130	850	980
Applied Math/Science				
	Hotel, Catering, Inst. MGT.	0	76	76
	Dispensing Technology	0	189	189
	Statistics	0	130	130
	Fashion & Textiles	0	89	89
	Sub-total	0	484	484
Management/Business study				
	Accountancy	0	358	358
	Secretary/Management	0	139	139
	Marketing	0	163	163
	Purchase & Supply	0	192	192
	Estate Management	0	129	129
	Sub-total	0	981	981
Total		**130**	**2,315**	**2,445**

Takoradi Polytechnic				
Engineering				
	Automobile Eng.	22	35	57
	Electrical Eng.	38	181	219
	Mechanical Eng.(Plant)	16	65	81
	Mechanical Eng.(Product)	0	48	48
	Mechanical Eng.(Ref&Air)	0	37	37
	Civil Engineering	0	198	198
	Building Construction	122	244	366
	Furniture Design	0	57	57
	Sub-total	198	865	1,063
Applied Math/Science				
	Hotel, Catering, Inst. MGT.	0	63	63
	Statistics	0	91	91
	Fashion & Textiles	0	57	57
	Commercial Art	0	144	144
	Sub-total	0	355	355
Management/Business study				
	Accountancy	0	229	229
	Secretary	0	87	87
	Marketing	0	202	202
	Purchase & Supply	0	157	157
	ICA Part 1	5	0	5
	Sub-total	5	675	680
Total		**203**	**1,895**	**2,098**

Ho Polytechnic				
Engineering				
	Electrical Eng.	11	231	242
	Automobile	14	85	99
	Agriculture	0	89	89
	Building	8	164	172
	Sub-total	33	569	602
Applied Math/Science				
	Hotel, Catering, Inst. MGT.	0	101	101
	Statistics	0	104	104
	Fashion Design	0	110	110
	Sub-total	0	315	315
Management/Business study				
	Accountancy	0	499	499
	Secretaryship	0	166	166
	Marketing	0	0	0
	Sub-total	0	665	665
Total		**33**	**1,549**	**1,582**

Cape Coast Polytechnic				
Engineering				
	Civil Engineering	0	66	66
	Electrical Eng.	0	139	139
	Mechanical Eng.	0	129	129
	Building Construction	0	65	65
	Sub-total	0	339	339
Applied Math/Science				
	Accountancy	0	344	344
	Secretaryship	0	76	76
	Marketing	0	314	314
	Sub-total	0	734	734
Total		**0**	**1,073**	**1,073**

Tamale Polytechnic				
Engineering				
	Mechanical Eng.	0	53	53
	Agriculture Eng.	0	86	86
	Sub-total	0	139	139
Applied Math/Science				
	Statistics	0	108	108
	Sub-total	0	108	108
Management/Business study				
	Accountancy	0	280	280
	Secretaryship	0	125	125
	Sub-total	0	405	405
Total		**0**	**652**	**652**

Sunyani Polytechnic				
Engineering				
	Electrical & Electronic Eng.	0	99	99
	Building Technology	0	152	152
	Sub-total	0	251	251
Applied Math/Science				
	Hotel, Catering, Inst. MGT.	0	95	95
	Sub-total	0	95	95
Management/Business study				
	Accountancy	0	453	453
	Marketing	0	422	422
	Sub-total	0	875	875
Total		**0**	**1,221**	**1,221**

Koforidua Polytechnic				
Applied Math/Science				
	Statistics	0	166	166
	Sub-total	0	166	166
Management/Business study				
	Accountancy	0	406	406
	Marketing	0	281	281
	Purchasing & Supply	0	229	229
	Sub-total	0	916	916
Total		**0**	**1,082**	**1,082**

All Polytechnics			
Engineering	**549**	**3,745**	**4,294**
Applied Math/Science	**0**	**2,696**	**2,696**
Management/Business study	**5**	**5,842**	**5,847**
Grand total	**554**	**12,283**	**12,837**

Source: 1998/99 Statistical Digest of the Polytechnics and Ghana Institute of Language, NCTE, MOE, 9th Dec., 1999

4.1.3 Teacher Training Institutes

The University College of Education, Winneba, provides teacher education with certificate, diploma and degree programmes in the fields of science education and applied arts and technology. A total of 2,600 students enrol in the university, 1998/99. (Table A-4.1.5)

Table A-4.1.5 Student enrolment in University College of Education, Winneba, 1998/99

Faculty	Certificate 1yr	Diploma 3yrs	First Degree 4yrs	Total
Science Education	19	584	231	834
Applied Arts & Technology	0	1,116	669	1,785
Total	19	1,700	900	2,619

There are also two other universities, University of Cape Coast and USST, providing undergraduate and graduate teacher education on a small scale shown in Table A-4.1.6.

Table A-4.1.6 Student enrolment in Teacher Education in University of Cape Coast and USST

University	Undergraduate	Graduate
University of Cape Coast	136	6
Univ. of Science & Tech.	20	33

4.1.4 Technical Institutes (TI)

For the students who have completed at least junior secondary education and are planning to have technical jobs up to the technician level, there are 22 TI's under MOE. About 22,000 are pursuing various courses for technicians and craftsmen, among which 2/3 are pursuing full-time programs. The graduates are given Intermediate Qualifications: Craft Certificate and Technician Part I, II. The students typically complete three years of courses consisting of technological theory and practical training.

Table A-4.1.7 shows the full-time student enrolment for all the TI's for 1998/99.

Table A-4.1.7 Student enrolment in technical institutes, 1998/99

Institute	Craft 4yr	Advanced Craft 2yr	Technician		Grand Total
			Part I	Part II	
1. Accra Tech. Training Centre	1,593				1,593
2. Ada TI	281	2			283
3. Tema TI	598	71	145	21	834
4. Sacred Heart TI	393				393
5. Abeitifi TI	237				237
6. Akwatia TI	393				393
7. Koforidua TI	615				615
8. St. Paul TI	695		41		736
9. St. Joseph's Tech. K'Tafo	200				200
10. Amankwakrom FAT TI	90				90
11. Asuansi TI	692				692
12. Cape Coast TI	1,060				1,060
13. Kikam TI	646				646
14. Takoradi TI	633				633
15. Anlo TI	430				430
16. Have TI	364				364
17. Kpando TI	1,083	98			1,181
18. Kumasi TI	1,403				1,403
19. St. Joseph's Saboba TI	221				221
20. Wa TI	360				360
21. Bawku TI	460				460
22. Bolga TI	1,378				1,378
Total	13,825	171	186	20	14,202

Source: GES, MOE

These TIs offer 22 training courses for specific technical skills, such as auto body repair and welding, as summarised in Table A-4.1.8. According to the 1997/98 statistics, as shown in Table A-4.1.9, 50 and 154 respectively, out of 868 teachers, have Bachelor or Diploma degrees. The student-teacher ratio is 16.4 (Full time student 14,202 divided by 868), which is better than either university (20.5) or polytechnic (21.4).

Table A-4.1.8 Outlooks of TI in 1996/97

Region		TI	Auto body repair	Agricultural mechanics	Business studies	Block work & construction	Catering	Carpentry & joinery	Dressmaking	Diesel mech./heavy duty	Electrical mech	Electrical installation	Furniture	Hair dressing	Industrial mechanic	Mech. Eng. Craft practice	Motor vehicle mechanics	Plumbing	Painting & decorating	Refrigeration & air-con	Small engine repair	Textile	Upholstery	Welding
Greater Accra	1	Accra TTC	x			x		x			x						x	x		x	x			x
	2	Tema TI						x				x				x								x
	3	Ada TI			x	x		x	x		x													
	4	Sacred Heart TI			x			x	x					x										
Eastern	5	St. Paul Tech School				x		x				x				x	x							
	6	Akwatia TI				x						x				x	x							
	7	Abetifi TI			x				x								x							
	8	St. Joseph's TI (Kwahu-Tafo)				x	x	x																	
	9	Amankwakrom Fisheries & Agriculture TI				x		x	x																
	10	Koforidua TI				x		x				x				x	x	x	x						
Volta	11	Kpando TI			x	x		x				x	x			x	x		x	x					x
	12	Anlo TI			x	x		x	x								x		x			x			
	13	Have TI			x	x		x	x				x			x	x								
Central	14	Asuansi TI		x		x		x				x				x	x		x						
	15	Cape Coast TI				x		x				x				x	x		x						
Western	16	Kikam TI				x		x				x			x	x	x								
	17	Takoradi TI														x	x								x
Ashanti	18	Kumasi TI	x			x		x		x		x	x		x	x		x	x	x			x		x
Northern	19	St. Joseph's TI (Saboba)				x		x																	
Upper East	20	Bawku TI				x	x	x				x				x	x		x						
	21	Bolga TI			x	x	x																		
Upper West	22	Wa TI				x		x	x																
Total			2	1	7	18	3	18	7	1	2	10	3	1	2	12	13	3	7	3	1	1	1	5

Source: GES, MOE

Table A-4.1.9 Academic background of TI teachers in 1997/98

	Number	Share
Male	798	91.9%
Female	70	8.1%
Total	868	100.0%
Graduate	50	5.8%
Diploma/Specialist	154	17.7%
Other qualifications	664	76.5%
Total	868	100.0%

Source: GES, MOE

4.1.5 GRATIS/ITTU

GRATIS/ITTU (Ghana Regional Appropriate Technology Industrial Service/Intermediate Technology Transfer Unit) was started 10 years ago under a joint CIDA and EU foreign assistance scheme. The idea was taken from a successful case of a Technical Consultancy Centre, started in 1980 by Prof. John Power within the University of Science & Technology in Kumasi. Currently each region has an ITTU, with the total number of ten in the country. (For a more detailed discussion of ITTU, see Chapter 5 on Curriculum.)

In December 1999, GRATIS/ITTU changed its status from a project under the Government of Ghana to a non-profit limited company. However, GRATIS/ITTU will receive funding from the Government for a three year period while it strengthens its commercial activities to achieve financial self-sufficiency. According to its five-year business plan, that should occur by the year 2006. Table A-4.1.10 shows number of beneficiaries by program and service offered by GRATIS/ITTU.

Table A-4.1.10 Programs and services in GRATIS/ITTU

Program/Service	Achievement (1999)		
	Male	Female	Total
Technical Apprentices (1st yr)	70	4	74
2-4th year apprentices	127	7	134
Visiting Apprentices	295	26	321
Textile Trainees (Batik, tie/dye, Weaving)	28	199	227
Practical Attachment	186	22	208
Extension Training	4,102	3,439	7,541
Client Services			
Eng./Mgt. Training			
Business/Market Advice	610	1,828	2,438
Other Client Services	2,226	988	3,214
HPS(Hire Purchase Scheme)	6		6
WC(Working Capital)			
WC for women		175	175
Total	7,650	6,688	14,338
Customer Services			4,036
Total Beneficiaries			18,374

4.1.6 National Vocational Training Institutes (NVTI)

Under the Ministry of Employment and Social Welfare (MESW), National Vocational Training Institutes (NVTIs) have 27 institutes under direct jurisdiction, as shown below. (See, also, Chapter 5 on Curriculum for discussion of NVTI.) The objective of NVTI is to provide skill training for those who have completed compulsory education so as to enable them to get employed by companies or to be self-employed in the labor market. Enrolment at NVTI generally requires only completed junior secondary education. The nature of training is very much skill-oriented, with 25 different courses ranging from automobile and electrical skills to leather works and hair-dressing. To obtain certification of skills through NVTI's training courses, students can choose one of two options, one of which does not require an English written examination for those who cannot write English.

Table A-4.1.11 Year 2000 Programs in NVTIs

1	Asamankase St.Mary's	51
2	Dansoman New Century	278
3	Kanda 31 December	42
4	Takoradi Voc.Trg.Centre	87
5	Abetifi Voc.Trg.Centre	126
6	Chirapatre Kumasi	30
7	PTC(BurmaCamp)Accra	22
8	PTC(Kokomlemle)Accra	231
9	EP Trade Trg.Centre	75
10	Assin Foso VTC	141
11	VTRC Biriwa	272
12	Dormaa VTC	142
13	Gomoa Ada VTC	42
14	St.Basilede's VTC Kaleo	77
15	Kumasi VTC	95
16	Titus Glover Print Sch.	45
17	Nandom Practical Voc.	69
18	St.Annes VTC Nandom	82
19	St. Mary's, Tamale	36
20	Tamale VTC	110
21	Toh-Kpalime VTC	88
22	St.Clare VTC, Tumu	66
23	Winneba VTC	77
24	Yamho VTC	48
25	Caring Sisters	35
26	Nwodua VTC	62
27	Bawku VTC	122
	Total	2,551

1	Automobile Electricals
2	Automobile Mechanics
3	Blocklaying & Concreting
4	Carpentry & Joinery
5	Catering
6	Composing & Printing
7	Dressmaking
8	Electrical Installations
9	Heavy Duty Mechanics
10	Machining
11	Maintenance Fitting
12	Motor Vehicle Body Repair
13	Plumbing
14	Radio & TV Servicing
15	Refrig. & Air Condition
16	Rope & Cane Work
17	Leather Works
18	Tailoring & Dressmaking
19	Weaving
20	Welding & Metal Fabrication
21	Draughtsmanship
22	Bus.Machin/Comp.HD
23	Secretaryship
24	Information Technology
25	Hair Dressing

4.1.7 Integrated Community Centers for Employable Skills (ICCES)

Integrated Community Centers for Employable Skills (ICCES), started in 1987 as part of the Non-Formal Education Division of the MOE, is an organization now under the MESW. Its aim is to train young people in line with the goal of poverty alleviation throughout the country. The objective is also to combat youth unemployment and rural-urban drift and, to contribute to the development of small-scale enterprises among the youth.

ICCES additionally works to promote community involvement in the provision of vocational and viable handicraft training for youth, particularly junior and senior secondary school-leavers and dropouts, as well as illiterates. It also supports communities, especially rural communities, in mobilizing resources s for the establishment and running of the locally-based ICCES centers.

There are now 49 centers throughout the country, training a total number of 3,100 (1,800 males and 1,300 females) for two to three year programs in the following courses:

Table A-4.1.12 Courses offered by ICCES

1	Carpentry and joinery	8	Dressmaking
2	Masonry / Block laying and Concreting	9	Catering
3	Plumbing	10	Hair-dressing
4	Electrical House Wiring	11	Agriculture
5	Electronics	12	Auto-mechanics / Outboard motor repairs
6	Blacksmithing/Welding/Metal Work	13	Batik, Tie & Die
7	Tailoring	14	Rural crafts

4.1.8 Others

In addition to the above 22 public TIs supported by the MOE, there are reportedly about 250 TIs in the private sector. In view of the current economic recession, many of them seem to be faced with financial difficulty.

There are also about 200 NVTIs in the private sector as member institutions, under the Ghana National Association of Vocational and Technical Training Institutions (GNAVTI). However, because of the current economic difficulties, many students cannot pay tuition and many teachers cannot financially exist on their modest remuneration. As a result, some of the NVTIs are currently facing nearly bankruptcy. For example, in Volta region, only 8 NVTIs affiliates are still under operation out of 25 registered regional schools.

Yet an interesting fact in Ghana's private technical education sector is that several other new schools have recently started operation in the field of IT (Information Technology). One of the examples is NIIT, owned by a young Indian businessman in Ghana, who received some start-up funds from IFC (International Finance Corporation). With headquarters in India, NIIT is a global network providing skill-oriented training programs

in more than 30 countries, mostly in developing countries in Africa and Asia. These IT training schools are providing global standard short to long-term programs for one week up to two years. These schools do not typically wish to be registered with the Ministries as TI or NVTI programs, since the global standard education is already appealing to potential trainees in Ghana, etc.

4.1.9 Conclusions

According to an interview to a British consultant recently involved in an EU project in Ghana, this country currently has great capacity to provide technical education. The system, however, is fragmented, of unequal quality, and seems to train many more people than its domestic economy can afford to absorb. This may be true, in view of the fact that even those graduating students from universities and polytechnics, consisting only of the top well-educated 3% of its age group, are not very sure whether they can get reasonable jobs, relevant to their fields of training, after graduation and one year of compulsory national service.

The current situation in Ghana for those well-educated human resources is in stark contrast to the growing economies of Asia, such as Malaysia and Thailand. There, in the 1990's, many foreign investors created extremely high demands in the labor market for locally educated technicians and engineers by offering high salaries, comparable to those in advanced countries.

The world economy has evolved in such a way that only those enterprises with over a certain amount of investments and technologies can participate in the global competition, thus earning enough foreign currencies to provide some positive impact on the national economy. However, in Ghana, there is limited capitalization available. The stock market of Ghana: has only a few million dollars; the industries have limited exporting capacities; and many of the skill-training programs (e.g. TIs, NVTIs, and ICCES) emphasize skills for the domestic market, catering to those who will be employed largely in the informal sector. Thus, tertiary education, both at the polytechnic and university level, has to be considered within the context of the economy. Given the global challenge, the potential role for these tertiary institutions cannot be overemphasized

That role clearly must be to develop the nation's technological base, so that Ghana can compete in the global marketplace. By attracting foreign investors, thus bringing world-class technologies and funds into Ghana, there hopefully can be an expanded capability for the country's domestic industries.

In comparison with the technical education at the polytechnic level in advanced countries, the quality of technical education in Ghana is in general not high enough. This is largely due to inadequate investments in equipment and buildings, low salaries for teaching staff, and uneven management capabilities of some of the administration staff. (However, GRATIS/ITTU has an excellent reputation, because EU and CIDA have been assisting, with a whole spectrum of operations, including strategy building, equipment grants, teaching staff training, marketing and administration.) This underlines the clear necessity of foreign involvement in improving the management of technical education and in transferring technologies (and funds), in general, to Ghana.

4.2 Comparative Analysis of Ghanaian Education with Other Countries.

4.2.1 Basic education indicators among ECOWAS countries

Table A-4.2.1 shows basic indicators among ECOWAS member countries. Ghana has a share of 7.6 percent of all ECOWAS population, 8.8% of all ECOWAS GDP and a 6.7% share of foreign direct investment inflow into ECOWAS. The average GDP growth rate of Ghana is 4.2% since 1990, which is among the top group. For education, the school enrolment ratio was 75 percent at primary level and 60 percent at secondary level in Ghana, which was among the top. Enrolment at secondary level in Ghana is 60%, which is by far the highest of the ECOWAS.

Table A-4.2.1 Comparison of basic indicators among ECOWAS member countries

		Population		Land area	GNP per capita		Life expectancy	School enrolment	
					Amount	Growth rate		Primary	Secondary
		Mid-1998			1998	97-98	1997	95-96	95-96
		(millions)	(%)	(1,000 km²)	(US$)	(US$)	(years)	(%)	(%)
1	Benin	6.0	2.5%	111	380	0.9	53	78	17
2	Burkina Faso	10.7	4.4%	274	240	0.8	44	40	
3	Cameroon	14.3	5.9%	465	610	-4.4	57		
4	Chad	7.4	3.0%	1259	230	1.5	49	58	10
5	Cote d'Ivoire	14.5	5.9%	318	700	-0.2	47	71	24
6	Gambia	1.2	0.5%	10	340	-0.9	53	77	25
7	**Ghana**	**18.5**	**7.6%**	**228**	**390**	**1.5**	**60**	**75**	**60**
8	Guinea	7.1	2.9%	246	540	2.4	46	48	12
9	Guinea-Bissau	1.2	0.5%	28	160	0.2	44		
10	Liberia	3.0	1.2%	96			47		
11	Mali	10.6	4.3%	1220	540	0.5	50	45	10
12	Niger	10.1	4.1%	1267	190	-2.0	47	29	7
13	Nigeria	121.3	49.7%	911	300	1.3	54		
14	Senegal	9.0	3.7%	193	530	-0.1	52	68	16
15	Sierra Leone	4.9	2.0%	72	140	-5.7	37		
16	Togo	4.5	1.8%	54	330	-1.5	49		
	Total	**244.3**	**100.0%**	**6,752**					

		GDP			Value added in industries				
		Amount		Growth rate	Amount		Average annual growth rate	Annual average of net foreign direct investment	
		1998		90-MR	1998		90-MR	90-MR	
		(mil. US$-95 constant)	(%)	(%)	(mil. US$-95 constant)	(%)	(%)	(mil. US& current)	(%)
1	Benin	2343	2.8%	4.5	322	1.3%	4.3	8	0.6%
2	Burkina Faso	2776	3.3%	3.4	735	2.9%	2.6	10	0.8%
3	Cameroon	9233	11.0%	-0.1	2248	8.9%	-4	123	9.9%
4	Chad	1681	2.0%	4.2	274	1.1%	1.1	14	1.1%
5	Cote d'Ivoire	11957	14.3%	2.9	2747	10.8%	4.1	125	10.1%
6	Gambia	429	0.5%	2.5	48	0.2%	0.6	8	0.6%
7	**Ghana**	**7362**	**8.8%**	**4.2**	**947**	**3.7%**	**4.8**	**83**	**6.7%**
8	Guinea	4207	5.0%	4.8	1388	5.5%	1.6	59	4.8%
9	Guinea-Bissau	202	0.2%	1.7	16	0.1%	-0.7	0	0.0%
10	Liberia		0.0%			0.0%			0.0%
11	Mali	2827	3.4%	3.3	565	2.2%	7.6	3	0.2%
12	Niger	2179	2.6%	1.7	370	1.5%	1.4	-1	-0.1%
13	Nigeria	30920	37.0%	3	14005	55.3%	1.7	779	63.0%
14	Senegal	5272	6.3%	2.7	1196	4.7%	3.8	1	0.1%
15	Sierra Leone	731	0.9%	-4.4	156	0.6%	-6.5	14	1.1%
16	Togo	1484	1.8%	1.7	322	1.3%	1.7	11	0.9%
	Total	**83,603**	**100.0%**		**25,339**	**100.0%**		**1,237**	**100.0%**

Source: African Development Indicators 2000, World Bank

4.2.2 Tertiary education indicators among selected countries in Africa and Asia

Table A-4.2.2 shows the performance of the education sector in Ghana by making comparative analyses for tertiary education and public expenditure on education among selected countries in Africa and Asia. The major findings are:

- The number of students at tertiary education in Ghana was 348 persons per 100,000 inhabitants in 1998, which was similar to the numbers in Botswana (403 persons) Cote d'Ivoire (396 persons) and Nigeria (367 persons) in Africa. The number of tertiary students in industrialized countries was 7 to 15 times to that of Ghana. Newly industrialized countries such as Malaysia and Thailand have 2.8 and 6.0 times of that of Ghana.
- 4.6% of Ghanaian young people are estimated to enter tertiary education, which is again on an average with other African countries. In contrast, industrialized countries show 30% to 80%, and Malaysia and Thailand perform 10.6% and 20.1%.

- The ratio of students in science, engineering and agriculture in Ghana is somewhat lower than other African countries.
- For public expenditure on education, 4.4% of GNP is used for education in Ghana, which is much lower than comparable figures for Botswana, South Africa and Togo.
- Ghana spent 19 percent of government expenditure is used for education in Ghana, which is slightly lower than that of Botswana (21 percent) and South Africa (21 percent). The figures in industrialized countries may appear lower than in Ghana, but that is because of stronger participation by the private sector. (In Singapore 23.4% of Government expenditure is for education).

Government of Ghana (GOG) spending on the education sector (including the tertiary level) is comparable with levels of spending of developing nations in Africa. However the level of spending is much lower than that of newly industrializing countries in Asia. Although it is not necessarily a prerequisite of industrialization to strengthen all tertiary education, most successful industrialized and industrializing countries have placed emphasis on higher-level human resource development capability at tertiary level. From the viewpoint of long-term economic development strategy, Ghana urgently needs to develop an efficient and demand-driven tertiary education system, coupled with practical and strategic industrialization policies.

Table A-4.2.2 Comparative analysis of tertiary education indicators among countries

	Tertiary education				Public expenditure on education	
	Number of students per 100,000 inhabitants		Gross enrolment ratio	% of students in science, engineering and agriculture	As percentage of GNP	As percentage of government expenditure
	(people)	(ratio) (Ghana=1)	(%)	(%)	(%)	(%)
Africa						
Ghana	**348**	**1.0**	**4.6**	**18**	**4.4**	**18.8**
Botswana	403	1.2	4.1	24	9.6	20.5
Cote d'Ivoire	396	1.1	4.4	26	na	na
Nigeria	367	1.1	4.1	41	na	na
South Africa	1,524	4.4	15.9	18	6.8	20.5
Tanzania	43	0.1	0.5	39	na	na
Togo	281	0.8	3.2	16	5.6	18.7
Asia						
China	478	1.4	5.7	37	2.3	na
Japan	3,139	9.0	40.3	23	3.8	10.8
Malaysia	971	2.8	10.6	na	5.3	15.5
Singapore	2,522	7.2	33.7	na	3	23.4
Thailand	2,096	6.0	20.1	19	4.2	20.1

Source: World Education Report 1998, UNESCO

APPENDIX

CHAPTER 5 TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING (TVET) CURRICULUM

5.1 Curriculum Structure of the HND Programs

Curriculum structure of the HND Programs are summarized in Table A-5.1.1, A-5.1.2, and A-5.1.3.

Table A-5.1.1 Curriculum structure of the HND Programs (1)

Year-Semester	Mechanical engineering (Plant option)				Electrical Engineering				Radio, TV and Electronic Eng.			
	Course	Theory	Practice	Credit	Course	Theory	Practice	Credit	Course	Theory	Practice	Credit
1-1	Mathematics I	3	0	3	Engineering Mathematics I	3	0	3	Engineering Mathematics	3	0	3
	Applied Mechanics I	3	0	3	Electronics I	3	0	3	Engineering Drawing	1	3	2
	Engineering Drawing I	3	0	3	Electronics Lab. I	0	3	1	Radio Technology	3	2	3
	Workshop Technology I	2	4	3	Thermodynamics(Heating and Cooling)	3	0	3	Electronics I	3	2	3
	Electrical Engineering Principles	2	0	0	Thermodynamics Lab.	0	3	1	Digital Techniques I	3	2	3
	Computer Studies I	2	0	2	Electrical Machines I	3	0	3	Communication Skills	2	2	2
	African Studies I	2	0	2	Electrical Machines Lab. I	0	3	1	Computer Literacy	1	2	1
	Communication Skills I	2	0	2	Engineering Drawing	0	3	1	African Studies	2	0	2
					Network Analysis I	3	0	3				
					African Studies	2	0	2				
1-2	Mathematics II	3	0	3	Engineering Mathematics 2	3	0	3	Engineering Mathematics	3	0	3
	Applied Mechanics II	3	0	3	Electronics 2	3	0	3	Audio Systems	4	2	4
	Engineering Drawing II	3	0	3	Electronics Lab. 2	0	3	1	Television Circuit Techniques	4	2	4
	Workshop Technology II	2	4	3	Fluid Mechanics	3	0	3	Electronics II	3	3	4
	Basic Electronics	2	0	2	Electrical Machines 2	0	3	1	Digital Techniques II	3	2	3
	Computer Studies II	2	0	2	Electrical Machines Lab. 2	0	3	1	Communication Skills	2	0	2
	General Thermodynamics	3	0	2	Engineering Practice	0	3	1	Computer Literacy	1	2	1
	Communication Skills II	2	0	2	Network Analysis 2	3	0	3				
					Network Analysis Lab.2	2	0	2				
2-1	Introduction to Machine Design I	3	0	3	Engineering Mathematics 3	3	0	3	Engineering Mathematics	3	0	3
	Mechanics of Machines I	2	0	2	Communications Skills I	3	0	2	Video Cassette Recorder Principles	3	3	4
	Mechanics of Fluids III	2	2	3	Introduction to computers	0	6	2	Computer Arithmetic and Logic			
	Strength of Materials I	2	0	2	Electrical machines 3	3	0	3	Operations	3	3	4
	Applied Thermodynamics	2	2	3	Telecommunications 1	3	0	3	Computer Architecture and			
	Manufacturing Processes	2	0	2	Telecommunications Lab.1	0	3	1	System Operation	3	0	3
	Plant Maintenance & Works Services I	2	4	3	Measurement & Instruments	3	0	3				
	Instrumentation & Measurement	2	0	2	Power Systems 1	3	0	3				
	Engineering Maths III	2	0	3	Power Systems Lab. 1	0	3	1				
2-2	Machine Design II	3	0	3	Engineering Mathematics 4	3	0	3	Engineering Mathematics	3	0	3
	Mechanics of Machines II	2	2	3	Control Systems 1	3	0	3	Remote Control Systems	3	0	3
	Mechanics of Fluids II	2	2	3	Control Systems Lab. 1	0	3	1	Television Circuits	0	3	1
	Metallurgy	2	2	3	Instruments Maintenance	0	6	2	Video Tape Recording & Playback	4	6	6
	Internal Combustion Engines	2	2	3	Measurement & Instruments Lab.	0	3	1				
	Plant Maintenance & Works Services II	2	2	3	Power System 2*	3	0	3				
	Electrical Power Equipment and Distribution	2	4	3	Power Systems Lab. 2	0	3	1				
					Electrical Machines M'ice	0	3	1				
					Electrical Machines Lab.3	0	3	1				
					Telecommunication 2*	3	0	3				
					Telecommunication lab.2*	0	3	1				
					Communication Skills 2	2	0	2				
3-1	Mechanics of Fluids	2	2	3	Electronics Servicing 1	0	3	1	Business Management I	3	0	3
	Heat Transfer	2	0	2	Business Management 1	3	0	3	Teletext Systems	3	0	3
	Control Systems	2	0	2	Digital Electronics	3	0	3	Satellite and Cable Television	3	0	3
	Management and Organization I	2	0	2	Project I	0	9	3	Analogue and Digital Control	4	0	4
	Energy Sources (alternatives)	2	0	2	Computer Applications Electives	3	3	4	VCR Systems Control	2	0	2
	Plant Maintenance and Works Services III	2	4	3	Power Electronics 1*	3	0	3	Transducers, Machines	3	3	4
	Project Work I	0	15	5	Power Electronics lab. 1	0	3	1	Entrepreneurship	2	0	2
					Telecommunication 3*	3	0	3				
					Telecommunication lab.3*	0	3	1				
					Power Systems 3*	3	0	3				
					Power Systems Lab.3	0	3	1				
3-2	Refrigeration & Air Conditioning	3	3	3	Business Management 2	3	0	3	Business Management II	3	0	3
	Management and Organization II	2	0	2	Entrepreneurship	2	0	2	Television Installations and Servicing	0	9	3
	Accounting	2	0	2	Project 2	0	9	3	Servicing			
	Plant Maintenance & Works Services IV	2	4	3	Fault Diagnosis in Elect	0	6	2	Control Circuits Analysis	4	3	5
	Project Work II	0	15	5	Machines & power Systems	0	3	1	VCR Servo Mechanical Systems	3	2	3
					Electronics Servicing 2 Electives	3	3	4	Computer Peripheral Circuitry and			
					Power Electronics 2*	3	0	3	Machine Code Programming	3	0	3
					Power Electronics lab. 2*	0	3	1	Entrepreneurship	2	0	2
					Telecommunication 4*	3	0	3				
					Telecommunication lab.4*	0	3	1				
					Power System 4*	3	0	3				
					Power Systems Lab.4*	0	3	1				
Total credit hours		98	73	116		98	114	135		96	54	107
Ratio of theoretical and practical training		56%	44%			46%	54%			64%	36%	

Note: Curricula marked * is an elective.
Source: Syllabus of Higher National Diploma, Ministry of Education

Table A-5.1.2 Curriculum structure of the HND Programs (2)

	Civil Engineering				Automotive Engineering				Metallurgy & Foundry Technology			
Year-Semester	Course	Theory	Practice	Credit	Course	Theory	Practice	Credit	Course	Theory	Practice	Credit
1-1	Computer Literacy	2	-	2	Mathematics I	2	0	2	Mathematics	3	0	3
	Communication Skills I	2	-	2	Engineering Drawing I	2	3	3	Engineering Science	2	3	3
	African Studies	-	-	0	Strength of Materials I	2	2	2	Engineering Drawing	3	0	3
	Mathematics I	2	-	2	Mechanics of Machines I	2	2	2	Industrial Safety and Hazards	2	3	3
	Fluid Mechanics I	2	2	3	Thermodynamics I	2	2	2	Metallurgy of Cast Metals	2	1	2
	Soil Mechanics	2	2	3	Mechanics of Fluids I	2	2	2	Computer Literacy	1	2	1
	Site Inspection & Supervision	2	-	2	Workshop Processes and Practice I	2	3	2	Communication Skills	2	0	2
	Building Materials	2	-	2	African Studies	2	0	2	African Studies	2	0	2
	Principles of Land Surveying	2	2	3	Communicative Skills	2	0	2				
					Computer Literacy I	1	2	1				
1-2	Computer Application	2	-	2	Mathematics II	3	0	3	Mathematics	2	0	2
	African Studies	2	-	2	Engineering Drawing II	2	3	3	Applied Mechanics	2	3	3
	Communication Skills II	2	-	2	Electrical Engineering	2	2	2	Engineering Drawing	3	0	3
	Mathematics II	2	-	2	Mechanics of Fluids II	2	2	2	Engineering Science	2	3	3
	Fluid Mechanics II	2	2	3	Mechanics of Machines II	2	2	2	Furnace Technology	2	0	2
	Civil Engineering Construction I	3	-	3	Workshop Processes & Practices II	2	3	3	Mould, Core and Patten Mat.	2	0	2
	Engineering Surveying	2	2	3	Thermodynamics II	2	2	2	Metallurgy of Cast Metals	2	1	2
	Civil Engineering Drawing I	1	2	2	Communicative Skills II	2	0	2	Computer Literacy	1	2	1
					Computer Literacy II	1	2	1	Communication Skills	2	0	2
2-1	Soil Engineering	2	2	3	Materials Technology	3	0	3	Metallurgy of Cast Metals	3	0	3
	Technical Report Writing	2	-	2	Automobile Technology I	2	2	3	Furnace Technology	2	2	2
	Strength of Materials	2	-	2	Internal Combustion Engines I	2	2	3	Casting Production Processes	2	0	2
	Mathematics III	2	-	2	Auto Electrical, Air				Mould, Core and Patten Mat.	2	0	2
	Engineering Hydraulics	2	2	3	Conditioning and Refrigeration	2	2	3	Casting Design	3	0	3
	Civil Engineering Construction II	3	-	3	Principles of Machine Design	3	2	3	Gating and Feeder Design	2	0	2
	Civil Engineering Drawing II	1	2	2	Energy and Environmental Studies	2	0	2				
	Human Relations in				Engineering Maths III	2	0	2				
	Construction Industry	2	-	2								
	Entrepreneurship	2	-	2								
2-2	Civil Engineering Construction III	3	-	3	Automobile Technology II	2	3	3	Metallurgy of Cast Metals	3	0	3
	Engineering Hydrology	3	-	3	Internal Combustion Engines II	2	3	3	Furnace Technology	2	2	2
	Structural Analysis	3	-	3	Automobile Electronics	2	2	2	Plant utilisation and Design	2	0	2
	Highway Engineering	3	-	3	Automobile Maintenance and Repair	2	3	3	Casting Design	3	0	3
	Measurement of Civil Eng. Works	2	-	2	Fuel, Oil and Lubricants	2	0	2	Workshop Technology	2	3	3
	Environmental Impact of				Engineering Maths IV	2	0	2				
	Construction Activities	3	-	3								
	Material Handling	2	-	2								
	Construction Accounting	2	-	2								
	Construction Safety	2	-	2								
3-1	Water & Sewerage Treatment	3	-	3	Workshop Organization and				Metallurgy of Cast Metals	2	3	3
	Project Work I Group Work	1	4	3	Administration I	4	2	4	Casting Design	3	0	3
	Contract Administration & Law	3	-	3	Advanced Automobile Technology I	3	3	4	Furnace Technology	2	2	2
					Management and control of				Plant Utilisation and Design	2	0	2
					Transport I	3	0	3	Casting Production & Evaluation	2	0	2
					Law of Business and Carriage	3	1	3	Failure Defect and Analysis	2	0	2
					Entrepreneurship	2	0	2	Automatic Controls	2	0	2
					Project Work	0	6	2	Project Work	2	3	3
									Entrepreneurship	2	0	2
3-2	Project Work II Individual Thesis	-	6	3	Workshop Organization and				Metallurgy of Cast Metals	2	3	3
	Water & Sewerage Distribution	3	-	3	Administration II	4	1	4	Casting Design	3	0	3
	Structural Design	3	-	3	Advanced Automobile Technology II	3	0	4	Planning for Production	3	0	3
	Entrepreneurship II	2	-	2	Management and control of				Management Studies	3	0	3
					Transport II	3	0	3	Quality Control	3	0	3
					Management Accounting and	3	0	3	Project Work	1	6	3
					Finance Entrepreneurship	2	0	2	Entrepreneurship	2	0	2
					Project Work	0	6	2				
Total credit hours		**90**	**22**	**104**		**92**	**70**	**108**		**97**	**42**	**107**
Ratio of theoretical and practical training		**80%**	**20%**			**57%**	**43%**			**70%**	**30%**	

Note: Curricula marked * is an elective.
Source: Syllabus of Higher National Diploma, Ministry of Education

Table A-5.1.3 Curriculum structure of the HND Programs (3)

Year-Semester	Statistics				Hotel Catering and Management				Science Laboratory Technology			
	Course	Theory	Practice	Credit	Course	Theory	Practice	Credit	Course	Theory	Practice	Credit
1-1	Elements of Mathematics I	3	0	3	Food Production	2	3	3	General Maths	2	-	2
	Descriptive Statistics I	3	0	3	F & B Service	2	3	3	Chemistry I	3	3	4
	Economic Theory	3	0	3	Reception OPT	2	3	3	Physics	3	3	4
	Economic Statistics	3	1	3	ACCT OPT	2	3	3	Biology	3	3	4
	Computer Literacy I	1	2	1	Nutrition	1	3	2	Computer Literacy I	1	2	2
	Communication Skills I	2	0	2	Food Chemistry	1	3	2	African Studies I	2	-	2
	African Studies	2	0	2	Communication Skills	2		2	Communication Skills I	2	-	2
					French	2		2				
					African Studies	1		1				
1-2	Statistical Methods	3	1	3	Food Production	2	3	3	Chemistry II	3	3	4
	Elements of Mathematics II	3	0	3	F & B Service	2	2	3	Electronics & Electricals	3	3	4
	Descriptive Statistics II	3	0	3	Reception OPT	2	2	3	Biochemistry I	3	3	4
	Applied Economics	3	0	3	ACCD OPT MGT	2	2	3	Statistics	2	-	2
	Social Statistics	3	1	3	Nutrition & dietics	2	1	2	Microbiology I	3	3	4
	Computer Literacy II	1	2	1	Tourism	1		1	Computer Literacy II	1	2	2
	Communication Skills II	2	0	2	Food Chemistry	2	2	2	Communication Skills	2	-	2
					Human Relations	1		1				
					Communication Skills	2		2				
					French	2		2				
					African Studies	1		1				
					Computer Literacy	1	2	1				
2-1	Probability I	3	0	3	Food Production	2	3	3	Laboratory Workshop Processes	3	3	4
	Demography I	3	1	3	F & B Service	2	2	3	Biochemistry II	3	3	4
	Sample Surveys I	4	1	4	ACCD OPT	2	2	2	Analytical Chemistry I	3	3	4
	Multivariate Data Analysis	2	1	2	Hotel and Catering Law	2		2	Instrumentation Science and Tech. I	2	3	3
	Survey Research Methods	3	0	3	Tourism	2		2	Microbiology II	3	3	4
	Observational Studies	2	0	2	Food Tech.	2	2	2	Histology	3	3	4
	Statistical Computing I	1	3	2	Computer Literacy	1	2	1	Management & Administration I	2	-	2
					Management Studies	1		1	Law I	2	-	2
					Hotel Fin.Acct.	2		2				
					French	2		2				
2-2	Official Statistics, Systems and				Food Production	3	3	4	Management & Administration II	2	-	2
	Procedures	3	0	3	Function OGT	3		3	Law II	2	-	2
	Probability II	3	0	3	Reception OPT	3	2	3	Instrumentation Science and Tech. II	2	6	5
	Demography II	3	1	3	ACCD OPT	3	2	3	Analytical Chemistry II*	4	6	6
	National Accounts	3	1	3	Project	3	3	3	Biochemistry III*	4	6	6
	Sample Surveys II	4	1	4	Management Studies	2		2	Microbiology III*	4	6	6
	Statistical Computing II	1	3	2	Hotel Fin.Acct.	2		2				
	Project Report	-	6	2								
3-1	Calculus and Matrix Algebra I	3	0	3	Food Production Management	2	3	3	Laboratory Safety	2	-	2
	Statistical Quality Control and				F & B MGT	2	3	3	Entrepreneurship	2	-	2
	Operations Research	5	1	5	Reception MGT	2	2	2	Instrumentation Science & Tech. III	2	6	4
	Statistics for Development and				ACCD MGT	2	3	3	Project Work (Individual Problem)		6	3
	Economic Planning	3	0	3	Project MGT	3	3	4	Analytical Chemistry III *	4	6	6
	Statistical Report Writing	2	0	3	Hotel & Cat. Law	2		2	Biochemistry IV *	4	6	6
	Entrepreneurship I	2	0	2	Hotel OPR Management	2		2	Microbiology IV *	4	6	6
	Project Report	-	6	2	Marketing	2		2				
3-2	Calculus and Matrix Algebra II	3	0	3	Food Production Management	2	3	3	* Project Work (Individual Problem)		6	3
	Agricultural Statistics	3	1	3	F & B MGT	2	3	3	Analytical Chemistry IV *	2	6	5
					ACCD OPT MGT	2	3	3				
	Health Statistics	3	1	3	Project MGT	2	6	4	Biochemistry V *	2	6	5
	Statistical Organization and				Marketing	2		2	Microbiology V *	2	6	5
	Operations	3	0	3	Hotel Personnel Management	2		2				
	Entrepreneurship II	2	0	2								
	Dissertation	-	9	3								
Total credit hours		99	43	109		101	82	123		96	121	144
Ratio of theoretical and practical training		70%	30%			55%	45%			44%	56%	

Note: Curricula marked * is an elective.
Source: Syllabus of Higher National Diploma, Ministry of Education

APPENDIX

CHAPTER 6 MAJOR CONSIDERATIONS FOR THE PREPARATION OF A MASTER PLAN TO STRENGTHEN TECHNICAL EDUCATION

6.1 Lessons from Other Countries

6.1.1 Japan: Technical education and long distance education

(1) Overview of the education sector (See Table A-6.1.1)

The Ministry of Education, Science, Sports and Culture (MOESSC) plays a major role in education in Japan, although other Ministries, such as Ministry of Labour and Ministry of Agriculture, have their own training facilities in relation to their own missions.

The following is a summary:

- Tertiary level technical education under MOESSC consists of Colleges of Technology, Junior Colleges, Universities and Special Training Colleges.
- Colleges of Technology offer 5 year courses after Junior High School and therefore the last 2 years can be classified as tertiary education. There is a bridging programme available for graduates to enter the third grade of universities, if they pass the entrance examination.
- Special Training Colleges, including Miscellaneous Schools, are mostly private and offer various training courses, including technical, vocational, design, cooking, tourism, languages, hairdressing, photography and so on. They offer secondary and tertiary courses. The number of Special Training Colleges alone is over 3,500.
- Enrolment in tertiary education has been increasing steadily for the last 30 years, although the enrolment of elementary, junior and senior high schools is decreasing due to a decline in the population of the younger generations. Enrolment in universities has doubled since 1970, which can be compared to the enrolment growth of "packaged courses" alluded to in the Master Plan, 2.66 times for 19 years.
- The student-teacher ratio of Colleges of Technology is as low as 12.8, because most of the courses are engineering. The ratio in one of the Universities is 18.6. In the Master Plan, these ratios are assumed to be 20 and 15 for existing and pilot packaged courses, respectively.
- The ratio of tertiary students per 100,000 inhabitants increased from 1,345 in 1967 to 2,459 in 1997, which is 1.83 times. The Master Plan targets 1,000, which means 4 times for the 19 years.

Table A-6.1.1 Overall view of the education sector in Japan

	1967		1997		Annual growth
Enrolment					
Kindergardens	1,314,607	5.5%	1,789,523	7.9%	1.0%
Elementary schools	9,452,071	39.8%	7,855,387	34.5%	-0.6%
Junior high schools	5,270,854	22.2%	4,481,480	19.7%	-0.5%
Senior high schools	4,780,628	20.1%	4,371,360	19.2%	-0.3%
Colleges of technology	33,998	0.1%	56,294	0.2%	1.7%
Junior colleges	234,748	1.0%	446,750	2.0%	2.2%
Universities	1,160,425	4.9%	2,633,790	11.6%	2.8%
Special training colleges	1,442,235	6.1%	1,068,942	4.7%	-1.0%
Others	50,013	0.2%	86,444	0.4%	1.8%
Total	23,739,579	100.0%	22,789,970	100.0%	-0.1%
Teachers					
Kindergardens	53,407	5.5%	103,839	7.7%	2.2%
Elementary schools	351,416	36.0%	420,901	31.3%	0.6%
Junior high schools	232,138	23.8%	270,229	20.1%	0.5%
Senior high schools	199,880	20.5%	276,108	20.6%	1.1%
Colleges of technology	2,506	0.3%	4,384	0.3%	1.9%
Junior colleges	13,449	1.4%	19,885	1.5%	1.3%
Universities	66,738	6.8%	141,782	10.6%	2.5%
Special training colleges	47,565	4.9%	52,195	3.9%	0.3%
Others	10,076	1.0%	53,991	4.0%	5.8%
Total	977,175	100.0%	1,343,314	100.0%	1.1%
Student-teacher ratio					
Kindergardens	24.6		17.2		-1.2%
Elementary schools	26.9		18.7		-1.2%
Junior high schools	22.7		16.6		-1.0%
Senior high schools	23.9		15.8		-1.4%
Colleges of technology	13.6		12.8		-0.2%
Junior colleges	17.5		22.5		0.8%
Universities	17.4		18.6		0.2%
Special training colleges	30.3		20.5		-1.3%
Others	5.0		1.6		-3.7%
Total	24.3		17.0		-1.2%
Ratio of tertiary students					
Enrolment of tertiary education	1,407,338		3,102,565		
Population	104,670,000	(in 1970)	126,166,000	(in 1997)	
Tertiary student per 100,000 inhabitants	**1,345**		**2,459**		

Source: Educational Statistics in 1999, Min. of Education, Japan

(2) Educational expenditure in 1997 (See Table A-6.1.2)

The principal features of educational expenditure in Japan can be summarized as follows:

- The role of the private schools in tertiary education is high, in terms of expenditure: 87.8% in Junior Colleges, 57.8% in Universities and 95.1% in Special Training Colleges. There is very limited participation of private schools in Ghana.
- The unit education costs are quite high, US$13,848 /student/year for Colleges of Technology, US$10,485 for Junior Colleges, US$19,482 for University and US$8,168 for Special Training Colleges. In Ghana, the unit education cost for Polytechnics in 2020 was estimated to be US$1,676 in the Master Plan.

- There is only 29% difference in the unit education cost between Colleges of Technology and Universities in Japan. In Ghana, the unit education cost was US$681 for universities and US$306 for Polytechnics in 1998/99, which is 2.2 times.

Table A-6.1.2 Educational expenditure in Japan, 1997

	National school	Public school	Private school	Total
	(Yen million)	(Yen million)	(Yen million)	(Yen million)
Actual expenditure				
Kindergardens	3,055	267,962	703,001	974,018
Elementary schools	18,731	6,656,445	65,047	6,740,223
Junior high schools	17,103	3,947,020	233,026	4,197,149
Senior high schools	7,364	3,480,225	1,276,680	4,764,269
Colleges of technology	78,737	11,593	3,920	94,250
Junior colleges	17,729	51,627	496,968	566,324
Universities	2,033,332	585,935	3,584,287	6,203,554
Special training colleges	580	51,328	1,003,643	1,055,551
Others	14,195	162,346	546,749	723,290
Total	2,190,826	15,214,481	7,913,321	25,318,628
Share among National, Public and Private schools				
Kindergardens	0.3%	27.5%	72.2%	100.0%
Elementary schools	0.3%	98.8%	1.0%	100.0%
Junior high schools	0.4%	94.0%	5.6%	100.0%
Senior high schools	0.2%	73.0%	26.8%	100.0%
Colleges of technology	83.5%	12.3%	4.2%	100.0%
Junior colleges	3.1%	9.1%	87.8%	100.0%
Universities	32.8%	9.4%	57.8%	100.0%
Special training colleges	0.1%	4.9%	95.1%	100.0%
Others	2.0%	22.4%	75.6%	100.0%
Total	8.7%	60.1%	31.3%	100.0%
Average unit education cost for all types of schools				
	(Yen/student/year)		(US$/student/year)	
Kindergardens	544,289		4,502	0.23
Elementary schools	858,038		7,097	0.36
Junior high schools	936,554		7,747	0.40
Senior high schools	1,089,883		9,015	0.46
Colleges of technology	1,674,246		13,848	0.71
Junior colleges	1,267,653		10,485	0.54
Universities	2,355,372		19,482	1.00
Special training colleges	987,473		8,168	0.42
Total	1,110,955		9,189	0.47

Note: Exchange rate: 120.9(Yen/US$)
Source: Educational Statistics in 1999, Min. of Education, Japan

(3) Case study: Nagaoka National College of Technology (see Table A-6.1.3)

In order to observe, at micro level, the conditions of a College of Technology, which offers a 5-year course, like a combined TI and POLYTECHNIC in Ghana, a survey was made of Nagaoka College, located 200 km north-west of Tokyo. This is summarized as follows:

- The student-teacher ratio is 13, which is quite low. 78 teachers and 56 administrative staff take care of 1,046 students.
- They offer rather conventional courses, i.e., mechanical, electrical, electric control, materials, civil engineering.
- Out of 194 graduates, 111 went to universities for further education. They can enter at the third grade in universities. 72 found jobs, from 1,136 offers.
- The self-financing ratio is 15%, since tuition level is rather low, which is US$2,670 /year, including factory tour and textbooks. The tuition fee covers only 17.9% of the actual education cost.
- In cost structure, 73% of all expenditures is on personnel.

Table A-6.1.3 Case study from Nagaoka National College of Technology in Japan (1999)

1. Student and staff

Student enrolment	1,046	
Staff	134	Student-teacher ratio
Teacher	78	13
Administrative staff	56	

2. Finance

			Unit figures
Expenditures	(Yen 1,000)	(US$)	(US$/student /year)
Salary	1,258,286	11,438,964	10,936
Facilities	377,865	3,435,136	3,284
Infrastructure	76,839	698,536	668
Total	1,712,990	15,572,636	14,888
Revenue			
Tuition and exam fee	229,707	2,088,245	1,996
Miscellaneous	29,250	265,909	254
Total	258,957	2,354,155	2,251
Self-financing ratio		15.1%	

3. Courses

		Quota	Duration	Total student number	Graduates	Student employed	Job offer		Further education	Others
		(student)	(year)	(student)			Total	Ratio		
1	Mechanical engineering	40	5	200	38	11	330	30	26	1
2	Electrical engineering	40	5	200	39	17	326	19	19	3
3	Electronic control engineering	40	5	200	34	7	268	38	26	1
4	Materials engineering	40	5	200	45	19	70	4	24	2
5	Civil engineering	40	5	200	38	18	142	8	16	4
	Total	200		1,000	194	72	1,136	16	111	11

4. Student tuition

			1st	2nd	3rd	4th	5th	Total
1	Entrance fee	(Yen/course)	82,500					82,500
2	Basic tuition	(Yen/year)	210,000	205,800	205,800	196,800	196,800	1,015,200
3	Student council membership	(Yen/year)	9,000	9,000	9,000	9,000	9,000	45,000
4	Installment for factory tours	(Yen/year)	48,000	48,000	48,000	8,000		152,000
5	Camp training expenses	(Yen/course)	4,500					4,500
6	School health plan	(Yen/year)	1,700	1,700	1,700	1,700	1,700	8,500
7	Textbooks and other materials	(Yen/year)	58,000	26,000	26,000	28,000	23,000	161,000
	Grand total							1,468,700
	Average yearly payment	(US$/year)	2,670					
	Student contribution to actual education cost		17.9%					

Note: Exchange rate: 110(Yen/US$)
Source: Statistics of Nagaoka National College of Technology

(4) Distance-learning

The University of the Air (UOA) is the only university offering distance education by means of TV and radio broadcasting. UOA is under both MOESSC and the Ministry of Posts and Communications (MOPC). The principal features of UOA are summarized as follows:

- UOA currently has 81,258 students, which consist of 45,848 degree students, while the remainder are non-degree and research students. Enrolment has been steadily expanding since its establishment in 1985. Most of the students are employees or adults.
- There are 6 courses available: Living and welfare, human development and education, social and economic studies, industry and technology, humanities and natural sciences.
- There are 90 full-time academic staff and 250 administrative staff. In addition, UOA utilizes part-time teachers from other conventional universities and so on.
- There are 49 learning centres in each prefecture.
- The following learning methods are available:
    a. TV and radio
    b. Videos or audiotapes
    c. Printed textbooks
    d. Instruction by correspondence (once a semester)
    e. Individual research for graduation (elective)
    f. Face-to-face instruction at learning centres
- Degree students have to complete 124 credits for their Bachelor's degree, which consists of 36 common courses and 94 specialized courses and must include 20 credits by face-to-face instruction. The average course work for those who want to complete a degree course within 4 years is, on a weekly basis, 1) seven 45-minute broadcast programmes, 2) 45-60 pages of printed study materials and 3) one 2.25 hours period of face-to-face instruction.
- With regard to tuition fees, in addition to an admission fee of US$160, tuition is charged at US$40 per credit, which includes textbooks. The use of any facilities in the learning centres is free. So, it costs US$5,120 (= 160 + 40 x 124) for a Bachelor's degree.
- As the overall operational expenditure was US$153 million in 2000 and the tuition revenue was US$42 million, UOA's self-financing ratio was 27%.

6.1.2 Thailand: Technical education and long distance education

(1) Overview of technical education

There are two principal Ministries with responsibility for technical education, 1) Department of Vocational Education (DOVE), under the Ministry of Education and 2) the Ministry of University Affairs (MUA). In addition, several other Ministries have responsibilities in respect of technical education, and they have their own specific management and administrative systems. The following is a summary of the tertiary level technical education system in Thailand.

(2) Government budget for education (see Table A-6.1.4)

The share of the overall educational budget in the government budget has been stable for the last four years. 21% of the government budget is spent for education, out of which 20% is used for tertiary education, which consists of technical colleges under DOVE and universities under MUA. 4% of the GDP is spent for education overall.

Table A-6.1.4 Budget expenditure for education in Thailand

(Billion Bahts)

		1996	1997	1998	1999	Average
GDP	(1)	4684	5205	5076	5002	4992
National budget	(2)	843	944	800	825	853
MOE budget	(3)	133	158	149	152	148
DOVE budget		10	12	11	12	11
Estimated tertiary portion	(4)	3	3	3	3	3
MUA budget	(5)	32	37	33	34	34
Overall tertiary budget (=(4)+(5))	(6)	35	40	36	37	37
Overall education (=(3)+(5))	(7)	165	195	182	186	182
Share						
National budget to GDP	(2)/(1)	18%	18%	16%	16%	17%
Overall education to GDP	(7)/(1)	4%	4%	4%	4%	4%
Overall education to National budget	(7)/(2)	20%	21%	23%	23%	21%
Overall tertiary to Overall education	(6)/(7)	21%	21%	20%	20%	20%

Source: Education in Thailand 1999, Office of the National Education Commission
Thai Higher Education in Brief, Ministry of University Affairs, Thailand
DOVE Statistics 1999, Ministry of Education

Ghana spends 4.4% of GNP for overall education and 18.8% of the government budget is spent for education. So, the share of education in the budget is at the same level as Thailand. However, the share of tertiary education in the education budget in Ghana is 13%, which is much less than 20% in case of Thailand.

(3) Enrolment in tertiary education (See Table A-6.1.5)

The principal features of tertiary education in Thailand can be summarized as follows:

- The role of the private universities is quite high, especially when the situation is compared to enrolment in the public non-open university system (271,848 = 836,880 - 565,032).

- The enrolment share of technical colleges in tertiary education is only 13.7%, which compares to 29% in Ghana at present and a target of 60% in 2020.
- Tertiary enrolment per 100,000 inhabitants in Thailand was 2,062 in 1999, which compares to 250 in 1998 in Ghana and 1,000 in 2020, the target figure in the Master Plan.
- Open universities have a 47% share. The definition of open universities is "universities which do not require an entrance examination for those who completed high school". There are two types of open university, 1) Ramkhamhaeng University, in which students can learn without attending classes, but there is no distance-learning available and 2) Sukhothai-Thammathirat Open University, in which students learn through distance-learning, coupled with schooling. When the enrolment of open universities is subtracted from the tertiary enrolment per 100,000 inhabitants in Thailand, the figure for Thailand is at the same level as the target figure in 2020 in the Master Plan.

Table A-6.1.5 Enrolment in tertiary education in Thailand

(In 1999)

	No. of schools	No. of students	Share of students
University			
Public university	24	836,880	69.7%
Private universities	50	199,629	16.6%
Sub-total	74	1,036,509	86.3%
College			
DOVE	413	165,000	13.7%
Total	487	1,201,509	100.0%
Population in Thailand		58,265,000	
Tertiary enrol. to 100,000 inhabitants		2,062	
Enrolment of Open universities			
Ramkhamhaeng Univ.		355,352	
Sukhothai-Thammathirat Open Univ.		209,680	
Sub-total		565,032	
Share of open univ. to tertiary enrol.		47.0%	

Source: Education in Thailand 1999, Office of the National Education Commission
Thai Higher Education in Brief, Ministry of University Affairs, Thailand
DOVE Statistics 1999, Ministry of Education

(4) Technical education in DOVE (see Tables A-6.1.6, A-6.1.7 and A-6.1.8)

DOVE offers principally 2 technical courses, 1) 3 year certificate courses after junior high school (equivalent to TI in Ghana and 2) 2 year diploma after high school (one year shorter than POLYTECHNIC in Ghana, as shown in Table A-6.1.6). 413 colleges offer various courses, including technical, vocational, agricultural, industrial and community education courses. 18,658 teachers teach 585,000 students, which means a student-teacher ratio is 31.4, which is larger than 21.4 of Polytechnics in Ghana in 1998.

In relation to budget allocation, around half of the budget is allocated for personnel cost, which is much lower than the present figure in Ghana, and is at the same level as the target ratio in the Master Plan. The unit education cost is US$ 458 in DOVE, which is very close to the current one in Ghana of US$ 421.

The above statistical comparative analysis indicates that 1) With regard to technical education, the financial and staff conditions in Ghana are not so disadvantaged when compared to Thailand and 2) With regard to the university system, the education system in Thailand is more developed, because of the higher involvement of private universities and the introduction of open universities.

Table A-6.1.6 Number of students classified by types of courses in DOVE, 1999

(1,000 enrolment)

	Secondary	Tertiary			Total	Share
	Certificate in vocational education	Diploma in vocational education	Higher diploma in technical education	Degree		
	Grade 10-12	Grade 13-14	Grade 15-16	Grade 13-16		
Trade & industry	223	86	1	1	311	53.2%
Arts & crafts	10	1	0	0	11	1.9%
Home economics	25	4	0	0	29	5.0%
Business administration	127	64	0	0	191	32.6%
Agriculture	35	8	0	0	43	7.4%
Total	420	163	1	1	585	100.0%
Share	71.8%	27.9%	0.2%	0.2%	100.0%	

Source: DOVE Statistics 1999, Ministry of Education

Table A-6.1.7 Teacher's qualifications and teacher-student ratio in DOVE

Number of teachers classified by qualification in 1999		
Diploma	2,356	12.6%
Bachelor	14,036	75.2%
Master	2,232	12.0%
Doctoral	34	0.2%
Total number of teachers	18,658	100.0%
Average student-teacher ratio	31.4	

Source: DOVE Statistics 1999, Ministry of Education

Table A-6.1.8 Budget expenditure and unit education cost of DOVE in 1999

	(Million Bahts)	(Share)
Personnel cost	5,632.5	47.8%
Salaries	3,204.2	27.2%
Wages	444.4	3.8%
Temporary wages	145.1	1.2%
Remuneration	1,838.8	15.6%
General expenses	111.7	0.9%
Supplies and materials	1,064.5	9.0%
Public utilities	168.2	1.4%
Equipment	1,319.8	11.2%
Properties and construction	3,196.7	27.1%
Subsidies	241.5	2.0%
Others	52.2	0.4%
Total	11,787.1	100.0%

Unit education cost	20,149	(Baht/student/year)
	458	(US$/student/year)

Source: DOVE Statistics 1999, Ministry of Education

(5) Distance-learning

Sukhothai-Thammathirat Open University (STOU) is the only educational institution offering distance-learning. It was established in 1980. It started with a faculty of Education and is premised upon the need to upgrade teachers. It has been expanding its academic areas into Construction Management, Agriculture Extension, Health Science, Law, Home Economics, Liberal Arts, Economics, Political Science, Communication Arts, Science & Technology and Nursing. The following is a summary of its operations.

1) Teaching methods

Students can learn through a combination of various teaching methods, including the use of TV, radio, videos, textbooks, schooling, industrial attachment, Q&A session by dispatching teachers and telephone Q&A to teachers. Live tutorials using satellite have recently started on Saturdays and Sundays. This service is available only for Thai Language Study at present, but it is planned to expand this to five additional courses in the near future. TV programmes are broadcast every day through two channels, one from 5:30 am to 7: 30 am and another from 6:00 pm to 8:00 pm, totaling 2,550 programmes per year. Over 200 radio programmes, each twenty minutes long, are broadcast weekly, totaling 10,000 radio programmes per year.

2) Learning centres

At STOU headquarters functions are undertaken in respect of administration, development of teaching materials for distance-learning, broadcasting, textbook development/printing and so on, but there are no teaching facilities. However, the following well-organized access facilities for learning are available in major towns:

- 10 STOU Regional Distance Education Centres with classrooms, seminar rooms, libraries
- 80 STOU Corners located in public libraries with printed teaching materials
- 75 Local Study Centres located mostly at high schools in every province
- 7 Regional Study Centres located in universities, mainly for practical training
- 57 Specialized Study Centres, such as nursing and agricultural training

3) Audio visual development

There are 4 TV studios and 6 radio stations in the Educational Broadcasting Production Centre at STOU headquarters, for which about 100 staff are working for camera, light, sound, video edit, maintenance, VTR, radio station and administrative jobs.

To complete one course - for example, economics - the following multimedia teaching materials need to be produced:

For TV programme:

1 course = 8 semesters = 8 x 3 subjects = 24 x 3 videos = 72 videos x 30 minutes

For Radio programme:

1 course = 8 semesters = 8 x 3 subjects = 24 x 10 tapes = 240 tapes x 20 minutes

STOU has around 600 subjects, which need 1800 videos and 6,000 tapes. In reality, some subjects can be used by several courses, so these numbers could be less.

4) Textbook development

The Office of University Press, with 250 staff, is in charge of development, printing and distribution of textbooks and workbooks. STOU faculties develop textbooks, sometimes jointly with faculties from other universities. Textbooks for Bachelor courses are revised by every 5 years, and for Master courses every 3 years.

Each subject has 2 textbooks in most cases, which consist of 1-7 unit part and 8-15 unit part. Since STOU has around 600 subjects, 1200 textbooks plus workbooks are needed. Sales prices of a textbook and a workbook are around 400 Baht and 50 Baht, respectively. So, one subject costs 900 (= (400 + 50) x 2) Baht for books. Teachers who develop textbooks are paid 15,000 Baht per unit.

5) Students and faculties

There are 360 academic and 900 administrative staff working for STOU. Since the enrolment in 1999 was 209,680, the student-teacher ratio was 582. Most of the faculties have teachers who have Ph.D.

6) Finance

Since tuition is 550 Baht/subject and students normally take 2 subjects/semester, the annual tuition is 2,200 Baht/student/year. Since the cost of books is 900 Baht/subject, the annual book cost is 3,600 Baht/student/year. Since the total enrolment is 209,680, the annual revenue can be estimated to be 1,216 million Baht. Since STOU receives 361 million Baht from government budget, the total expenditure would be 1,577 million Baht, which means the unit education cost is 7,523 Baht/student/year or US$ 170 student/year, of which the government support portion is US$ 39 student/year. This indicates that STOU currently operates with 77% self-financing (= 1 - 361/1,577).

The unit education cost for distance-learning was estimated to be US$ 356 student/year in the Master Plan, more than double that of STOU. This is because the initial investment and probably a large-scale capital investment are exempted in case of the above estimation for STOU.

6.1.3 Singapore: Skill development programme and productivity movements

(1) Approaches in the national strategy

The Government of Singapore has adopted two approaches in implementing a national strategy for human resources development (HRD). The first and fundamental thrust was to establish and maintain a sound education system with an early focus on technical and vocational training (TVET). The second thrust was to meet specific training needs. A Skill Development Fund (SDF) was started based on the above strategy in 1979 as a "levy-grant" system to provide training programmes with financial assistance. The SDF provided financial incentives to employers to increase labour productivity by upgrading the skills of employees.

The productivity movement, functioning jointly with the SDF is probably the main reason for keeping Singapore as one of the most favoured and competitive investment locations in the global market. Singapore now rates exceedingly high in terms of global competitiveness.

According to the Competitiveness Index, compiled by the World Economic Forum (WEF) in the "1996 Global Competitiveness Report", Singapore was rated as the most competitive nation in the world. The International Institute of Management Development (IMD) suggests, in the "World Competitiveness Yearbook", that Singapore is in second place in the world, since "Singapore has created a very successful model, characterized by a highly effective Government, a sound infrastructure and a good performance of management".

Furthermore, Singapore has become one of the highest per capita income countries in Asia, with GDP per capita of US$ 21,518 already in 1994. The Business Environment Risk Intelligence, a Washington-based company assessing business risks, rated Singapore workforce as the best in the world for the period 1980-1999. Other data, available from a number of sources in 1999, show that Singapore is one of the most efficient and competitive nations amongst industrialized and emerging countries. The following is a brief synopsis:

Global Competitiveness Report, 1999:

- published by the World Economic Forum (WEF), with information from 59 industrialized and emerging countries;
- quantitative data are indicators of a country's economic performance, technological capacity and infrastructure; and
- responses are sourced from about 4,000 executives in the 59 countries surveyed.

World Competitiveness Yearbook, 1999:

- published by the International Institute for Management Development (IMD), with information from 47 industrialized and emerging countries;
- the data is aggregated over a 5-year period; and
- accuracy is ensured through collaboration with 33 Partner Institutes worldwide.

Singapore was rated top by the Global Competitiveness Report, and second by the World Competitiveness Yearbook.

In its Global Competitiveness Report, the WEF noted: "The Asian financial crisis has had a clear impact on 1998's rankings, but Singapore and Hong Kong retain the top two placings. Both economies continue to be organized around open trade and finance, small government, superb infrastructure, rigorous enforcement of commercial contracts and low levels of corruption." In IMD's view, "Singapore has been less affected than its neighbors by the Asian crisis, but will certainly be impacted by the general slowdown in the region's economic environment."

Ranking	Global Competitiveness Report	World Competitiveness Yearbook
1	Singapore	USA
2	United States	Singapore
3	Hong Kong SAR	Finland
4	Taiwan	Luxembourg
5	Canada	Netherlands

(2) A Nation-wide Skill Development Program

Singapore's SDF is the first, and the most successful, SDF scheme in the world. The basic reason for its success is that the scheme is fully supported by both the Government and the private sector, based on the principle that everyone participates and everyone pays. The second reason is that the SDF is premised upon a market-driven approach. Thanks to SDF, the productivity of industries has improved constantly, since the scheme was established in the private sector and linkages with the private sector and the government became strong. While the institutional arrangement is important, the key ability of the government or the public TVET sector to interpret market signals effectively is also important. The overall efficacy of the TVET system, therefore, depends on the flexibility of the system to adjust to those market signals.

The SDF has been well received by the private sector and now nearly 45% of workers are participating in some kind of skill development training programmes every year, and the number of training places, including in-house, reached over 560,000 in 1998 (16 times larger than 33,000 in 1981).

1) Source of Financing

The Skill Development Levy Act provides the base for collecting -- originally 4%, reduced to 2% in 1985 and now 1% -- of wages of workers whose income is less than a certain level (currently, the wage level for the levy is S$1,500 or less per month). The table below shows the SDF receipts and payments for 1990/91 and 1998/99, as sampled.

	1990/91	1998/99
Total Grant	67.0	88.41

Source: Government of Singapore (1992) Unit: S$ million

The SDF programme included five schemes (in 1998) as shown below.

	Grant Schemes	
(1)	Training Grant Scheme (TG)	92.6%
(2)	Basic Education (primary level) for Skills Training (BEST)	1.1%
(3)	Worker Improvement through Secondary Education (WISE)	2.8%
(4)	Training Needs Analysis (TNA)	3.3%
(5)	Training Infrastructure Development (Curriculum development, etc.)	0.1%

By having this funding scheme, all the companies or individuals participating in this scheme are encouraged to develop, improve and upgrade their manpower skills, so that the employees can earn higher salaries and the employers can get better business opportunities, which in turn can contribute to the total national economy.

The Training Voucher Scheme (TVS) is an initiative to improve convenience for employers to obtain assistance from the SDF and to help ease any cash flow problem, which an employer may face. Currently SDF support is at S$4 per trainee per hour for broad-based training or 80% of the course fee, subject to a maximum of S$8 per trainee per hour for training leading to national / industry-wide certification. An interested company can obtain and file the application form TVS with the training provider, stating its intention to enroll the trainee in the course, and pay the discounted fee (i.e. the unsupported portion of the fee) to the provider. There is no need to apply or claim from the SDF.

The rationale for SDF can be summarized as follows.

1. Industries have incentives/responsibilities to train their employees, since they make profit from their trained employees.
2. Employees are encouraged to receive training, because their upgraded skills will increase their income.
3. The Skill Development Fund will assist the training business to prosper and those educational institutes (polytechnics, for example) will have more customers for TVET.

(3) Productivity movements

1) Labour-driven phase (1960-70s) and economic crisis

An abundant labour force in Singapore had sustained economic growth in labour-intensive industry up to 1970s. However, other countries, especially surrounding ASEAN countries, began to produce the same labour-intensive products and Singapore lost its competitive edge. As a result, a major economic crisis started. During 1973-79, Singapore's economy faced stagnation and many labour disputes.

2) Solution to the economic crisis: the start of the productivity movement

In order to keep its competitive edge in global competition, Singapore identified a solution to raise the productivity of every worker. "To stay ahead, we must keep on improving our skills, knowledge and productivity. Only then can Singaporeans enjoy high and rising standards of living. Hence our heavy investments in education and in the productivity movement".

3) Creating nation-wide awareness (1981-85) - why productivity ?

The first stage of the productivity movement was concerned with promoting production awareness among companies and the work force and establishing the necessary training facilities. The National Productivity Board (NPB) was established in 1981.

The main programmes were:

- National productivity campaign
- Formation of Quality Control Circles (QCCs)
- National Productivity Awards (NPA)

In 1983, Japan agreed to assist the Productivity Development Project (PDP), including the establishment of the Japan-Singapore Institute (JSI) for training. This initiative was also followed by other advanced countries by the German-Singapore Institute (GSI) and the French-Singapore Institute (FSI).

4) Taking action at the workplace (1986-88) - how to improve productivity

The key objective was to keep workers' knowledge and skills adjusted to fast changing technology and ever increasing competition in the global market. To increase participation in the skill development programme by a large number of companies and workers, the Skill Development Fund (SDF) was further strengthened for this objective in 1986.

The major new programmes were:

- Initiatives for re-training of skills of the work force, enabling workers to move up the skills ladder.
- Upgrading of companies' operational efficiency and productivity, through management consultancy to companies.
- Model company project, by means of model companies for six industrial sectors.

5) Fostering ownership (1989 onwards) - making productivity a way of life

Development of a self-sustaining productivity movement, where productivity habits become part of the Singaporean work ethic.

The main programmes were:

- The Productivity Activist Scheme, with a network of 900 key activists.
- Government and private partnership
- The Productivity 2000 Action Plan

6) Achievements of the productivity movement

During the period 1991-95, 60% of Singapore's average economic growth of 7.6% came from productivity growth, equivalent to 4.5%. It is currently firmly believed that the productivity movement certainly brings "Quality of Work" and "Quality of Life" at the same time.

6.1.4 Malaysia: Skill development fund and regional skill development initiative

Malaysia started to face a shortage of skilled workers and competition in the labour-intensive industrial sector in the middle of the 1980s. It was a problem, similar to the one Singapore had faced ten years earlier, due to loss of competitiveness in the major export items (mainly raw materials, such as rubber, tin and palm oil). In this period the manufacturing sector was not strong enough to replace the exports of these conventional products. Under such economic conditions, Malaysia started Skill Development Program and Human Resource Development Fund.

(1) Skill Development Program:

1) 1989-1994

Owing to the Government's strong initiatives to educate and train the young work force for its industrialization in the past 20 years, its literacy level has reached 93% and school leavers entering the job market have at least 11 years of basic education. Under the current Seventh Malaysia Plan 1996 - 2000, the Government has again put high priority on human resource development, with investment of about 15% of total public expenditure. Malaysia now has ten public universities, two government-aided colleges and several polytechnics.

Tackling the problems of shortages of skilled workers and loss of competitiveness in labour-intensive industry, Malaysia started working on the Skill Development Programme (SDP) in late 1989. Having learnt from the successful Skill Development Fund (SDF) programme of Singapore, Malaysia launched its SDP in 1993 to encourage training, re-training and skill-upgrading in the private sector, with the object of attaining the status of a developed country by the year 2020. The Malaysian skills development fund is named "Human Resource Development Fund (HRDF)", enacted under the Human Resources Development Act 1992, which established the Human Resources Development Council in the same year.

HRDF is similar to Singapore's SDF, collecting 1% of wages from employees, matched by the same amount from the Government. In 1992, M$48.9million was collected through the HRDF levy, and the same amount was contributed by the Government to the

fund. Manufacturers who contribute to this fund are eligible to apply for grants to defray or subsidize costs incurred in training their workers. The collected amount for HRDF was M$145million in 1997, but decreased to M$61million due to the economic crisis leading to exemption of the levy for employers in some severely affected industries.

2) National Vocational Training Council and National Occupational Skills Standards

The National Vocational Training Council, under the Ministry of Human Resources, coordinates the planning and development of comprehensive vocational and industrial training programmes. It also develops the National Occupational Skills Standards (NOSS) on a continual basis. To date, there are about 400 NOSS covering basic, intermediate and advanced training levels.

(2) Malaysia's Strategic Focus on Human Resource Development

Malaysia's Vision 2020, for her to become a fully developed nation by 2020, suggests; "Our people is our ultimate resource. Without a doubt, in the 1990s and beyond, Malaysia must give the fullest emphasis possible to the development of this ultimate resource". In the 7th Malaysian Plan (7MP) covering the period 1996 - 2000, the Government's growth strategy was based on capital intensive investment aiming at improvement of labor productivity through human resource development. With the harsh experience in the financial crisis in 1998, the thrusts of the current 8th Malaysian Plan (8MP) has shifted the input-driven growth strategy to knowledge-driven one in order to enhance potential output growth, by accelerating structural transformation with a special emphasis on increasing productivity and efficiency through human resource development.

(3) Penang Skill Development Centre (PSDC)

1) Starting the PSDC and its objectives

At a seminar organized by the American Business Council in September 1987, the problem of skilled manpower shortage for the manufacturing sector in Penang was highlighted. This shortage was further aggravated by the increasingly sophisticated demands of the high-technology industries, as well as the rapid industrialization of Penang and the neighbouring countries.

Under such conditions, the Penang Skill Development Centre (PSDC) was established in industrial estates in Penang in 1989 to pool resources to:

- Upgrade continuously the skill levels of the workforce, in line with technological progress in factory automation and manufacturing processes.
- Raise the educational levels of the existing workforce, to prepare them for the needs of the factories of the future.
- Provide the necessary pre-employment training, to prepare the future workforce for occupational competence.

Objectives in the short-term were to:

- Meet the immediate training needs of its members
- Establish a mechanism to coordinate and utilize resources available from industry and institutions.
- Position the PSDC as the leading training institution in Penang and to be self-sufficient financially.
- Work closely with the State Government and Federal Government on the implementation of the Human Resources Development Fund (HRDF).

The long-term objectives are to;

- Provide pre-employment training for school leavers.
- Promote vocational and technical careers.
- Position the PSDC as a leading training institution in the Northern Region and establish strategic alliances with other training organizations.

The PSDC is Malaysia's first industry-led training institution. This concept has now been emulated by other states and PSDC has become the benchmark. It was a pilot programme, which started operations in 1989 with 16 short training courses with participation of 307 workers. The training capacity had increased to more than 500 short-term courses with 10,500 participants in 1999/2000. Some of the courses are now equivalent to university education with credits.

2) Management Council of the PSDC

At the PSDC, a Management Council was set up, consisting of 11 elected and 4 appointed office bearers and 7 ex-officio members, made up of one representative each from:

- Penang State Government
- Penang Development Corporation (management company of the industrial estates in Penang)
- University Sains Malaysia (USM)
- Standard & Industrial Research Institutes of Malaysia (SIRIM)
- Penang Regional Development Authority (PERDA)
- Ministry of Entrepreneur Development (KPU)
- SMIDEC (Small Medium Industry Development Corporation)

The duties of the Management Council are to:

- Discuss and deliberate on matters pertaining to the management and administration of the PSDC.
- Approve all courses and seminars for implementation.
- Approve expenditures and assist in matters pertaining to the sourcing of courses and seminars.
- Act as the highest authority, in the event of any disputes and decisions.
- Approve membership into the Centre.

The PSDC is administered by an Executive Director, who is a full-time paid employee. The Executive Director reports directly to the Chairman of the Management Council and carries out all daily administrative duties.

3) Training Committee of the PSDC

Under the Management Council, there is established a PSDC Training Committee, with representatives of companies in the industrial estates in Penang, to discuss every quarter changes of curricula, the training needs of industries and the management of PSDC.

The tasks of the Training Committee are to:

i) Prepare a Year Planner/Training Calendar of courses to be conducted at the PSDC.

ii) Monitor the outcome of the Year Planner/Training Calendar and review if necessary.

iii) Evaluate and obtain feedback on the effectiveness of the courses conducted.

iv) Assist the Executive Director to generate revenue for the PSDC.

v) Encourage the sharing of resources among member companies through the PSDC.

vi) Market the PSDC as the leading training centre in Penang and the Northern Region.

The Training Committee has sub-committees to which PSDC members are required to send representatives. Sub-committees define the training needs by meeting quarterly to discuss matters related to training and form the first line of communication between the PSDC and industry.

Annually in November, a training needs analysis (TNA) is carried out. Based on the TNA, a Training Calendar is prepared and presented to the Training Committee for buy-in. The Training Calendar is then presented to the Management Council for final approval.

It is noteworthy that all the corporations in the area, which receive training for their workers at PSDC, pay annual membership fees, donate training equipment and send their workers to be trained there.

4) Membership of the PSDC

There are three categories of membership in the PSDC:

i) Founder Members

Companies incorporated in Malaysia can apply to join as Founder Members by making a one-time payment of RM15,000. The benefits are as follows;

- Can be elected to the Management Council, which deliberates on policy matters and the general directions of the PSDC.
- Preference for employees to attend courses and utilize the facilities.
- Course fees charged at a discount (10-30% less)

ii) Full Members

Companies incorporated in Malaysia can apply to join as Full Members by paying a one-time payment of RM20,000. The benefits accorded to Full Members are the same as those for Founder Members.

iii) Ordinary Members

Ordinary membership is divided into three groups, depending on the head count of the company. Companies incorporated in Malaysia can apply by paying a one-time payment of: RM5,000-15,000 depending on the number of employees, from less than 500 to over 1,500. The benefits accorded to Ordinary Members are as follows:

- The right to nominate members of, and vote in, the Management Council
- Preference for employees to attend courses and utilize facilities
- Course fees charged at a discount (10-30% less)

Following the success of the first skill training centre at Penang, there are now 9 similar skill training centres in operation. They are Johor Skill Development Centre, Malachi, KISMEK (Kodak), Perac Skill Development Centre, Sabah, Sarawak, Negeri Sembilan and Perak Centre, etc.

6.1.5 Australia: Technical and vocational education and training reform

During 1974 - 2000, Australia developed a Competitive and Market-Driven Technical and Vocational Education and Training (TVET) system, through which there have been many changes as a result of increased competition in all aspects of business activity, especially on a global level. Perceptions of lack of international competitiveness in

Australia led to the conclusion that there was a need for a sustained process of reform, in order to be able to respond more directly to market needs.

Over the last 25 years, and more specifically in the past 10 years, industry has participated in the emergence of a national vocational education and training system, predominantly based on a Competency-Based Training (CBT) approach. There has been a recognition that education and training can provide competitive advantages if effectively managed, and a CBT approach has been adopted in post-secondary technical and vocational education and training delivery in a bid to provide increased efficiency and productivity.

Many parties have promoted the need to change Australia's approach to CBT and to foster the development of a national training system. For this to happen there has been an acceptance that training providers (public and private) need to work in partnership in the reform process.

This section is intended to describe major structural initiatives and milestones that have led to the establishment of a training partnership between industry, the government and training providers in Australia over the past two decades.

(1) Stages in the reform process

The process of change within technical and vocational training has mirrored the transformation of Australian industry in a continuing effort to attain global competitiveness. There have been four distinct stages in the reform process:

1) First stage 1974 - 1986

Two major reports were released during this phase. The Cochrane Report ("Australian Labour Market Training Report") examined the need to restructure the workforce through increased skills levels, and ascertain how inequalities could be removed to provide greater employment opportunities. The Report recommended a national labour market training scheme to meet skills shortages. The Kangan Report ("Needs in Technical and Further Education - TAFE") proposed that technical colleges should focus on the needs of the individual for vocationally oriented education, and also that manpower needs of industry should be seen as the major context for courses.. The Kangan Report emphasized the need for lifelong learning, which it stated should strike a balance between vocational and general education and also offer flexible options.

The subsequent Australian Labour Market Report (1985) became the turning point for vocational education and training. It provided significant new pathways for industry to train young people to acquire entry-level skills. For many industries, it provided opportunities to access "on-the-job" and "off-the-job" training that had previously only been open to a narrow range of trade occupations. (In the past, it was only the traditional areas, such as Building and Construction and Automotive etc., which were linked to accredited programmes and apprenticeships. Other rapidly developing areas such as Tourism, Hospitality and Human Services were not yet part of the formal education and training delivery framework).

Key recommendations in the Labour Market Report included:

- Simplification of all Government labour market programmes
- Establishment of the Australian apprenticeship system, to provide structured entry-level training in non-trade areas
- A change of course design and delivery from a mainly "topic" or "subject" orientation to a CBT approach

Essential features of the recommended system included:

- Alignment of training to the needs of industry
- Introduction of CBT
- Provision of education and training programmes in "non-trade" areas
- Increasing training participation rates
- Government and industry-subsidized training participation
- Introduction of the concept of continuing vocationally oriented education to cope with shifting job specifications due to technical and social change

2) Second stage (1987 - 1990)

The Australian Council of Trade Unions (ACTU) and the Trade Development Commission (TDC) sent missions to Western Europe to study and report on systemic reform in TVET in countries such as Germany, Sweden and Switzerland. Subsequent reports stressed that European countries studied were more competitive, because vocational education and training was founded on the principles of CBT. In addition, companies had a substantial stake in the development and delivery of training, which ensured relevance to business and met important social and economic demands.

Key policy aspects, which ensued from the reports, were:

- New demands for skills development at all levels of the workforce
- Provision of a training market, which increased choice and efficiency
- Emphasis on demonstrated competence, rather than time served
- Demand for flexible, broadly based and modular approaches to training
- Greater national consistency in training standards and certification arrangements
- Improved access for disadvantaged groups
- Better articulation between different forms and levels of education and training

ACTU and TDC working parties also stressed the need for a commitment by all stakeholders to work towards a national system, by means of the adoption by all states of CBT and the expansion of coverage to include non-trade areas.

The recommendations were also supported by industrial relations mechanisms, and policies were adopted which facilitated broad banding of occupational classifications, multi-skilling and more flexible working arrangements leading to emphasis on skills acquisition and recognition.

3) Third stage (1990-1993)

This stage mainly involved exploring the infrastructure requirements for a national vocational education and training system. The Training Costs of Award Restructuring Report (1990) examined the role of Technical and Further Education (TAFE) institutes.

The Report suggested that the TAFE system did not have the capacity to satisfy projected growth in demand, and made recommendations suggesting increased private sector contribution. The report proposed that a level of private sector contribution would increase the provision of greater choice, efficiency, responsiveness and flexibility.

The Report also advocated establishment of nationally consistent methods of recognizing, accrediting and monitoring vocational training and introduced the concept of Recognition of Prior Learning (RPL).

The Finn Committee Report recommended supporting TAFE to enable it to fulfill its role. The Report suggested an increase in and redistribution of funding.

The most influential report of the period, from Carmichael's "The Australian Vocational Certificate Training System", recommended a greatly expanded entry-level training system. Targets included:

- Provision of nationally consistent training
- Regulation of the system through State Training Agencies by development of industry training plans and training agreements between employers and trainees
- Adoption of national competency standards and a universal CBT delivery and assessment approach
- Inclusion of general and vocational education
- Universal recognition of training through the establishment of an Australian Qualifications Framework (AQF)
- Pathways to achieve skill outcomes
- Commitment to access and equity

4) Fourth stage (1993-present)

Training reform was primarily to be achieved under the auspices of the Australian National Training Authority (ANTA). ANTA was charged with the task of framing national strategy, based on agreed national goals established by the ANTA Ministerial Council. ANTA is now the single national body responsible for delivering a reformed national training system, and is empowered to facilitate a close nexus between industry