

VOCATIONALISATION OF SECONDARY EDUCATION REVISITED

Edited by
Jon Lauglo and Rupert Maclean



UNEVOC

INTERNATIONAL CENTRE
for Technical and Vocational
Education and Training

**TECHNICAL AND VOCATIONAL EDUCATION
AND TRAINING SERIES**



Springer

VOCATIONALISATION OF SECONDARY EDUCATION REVISITED

UNESCO-UNEVOC Book Series

Technical and Vocational Education and Training: Issues, Concerns and Prospects

Volume 1

Series Editors-in-Chief:

Dr. Rupert Maclean, *UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training, Bonn, Germany*

Professor David N. Wilson, *OISE, University of Toronto, Canada*

Editorial Advisory Board:

Professor Munther Al Masri, *National Centre for Human Resource Development, Al Jubeiha, Jordan*

Dr. David Atchoarena, *Institut international de planification de l'éducation (IIEP), Paris, France*

Mr John Bartram, *Consultant; Formerly of Commonwealth of Learning (COL), Canada*

Dr. András Benedek, *Hungarian Ministry of Employment and Labour, Budapest, Hungary*

Dr. Paul Benteler, *Stahlwerke Bremen, Germany*

Ms. Diane Booker, *Adelaide Institute of TAFE, Adelaide S.A, Australia*

Mr. John Budu-Smith, *Ministry of Education, Accra, Ghana*

Professor Michel Carton, *NORRAG c/o Institut Universitaire d'Etudes du Développement (IUED), Geneva, Switzerland*

Dr. Chris Chinien, *University of Manitoba, Winnipeg, MB, Canada*

Dr. Claudio De Moura Castro, *Faculdade Pitágoras, Horizonte/MG, Brazil*

Dr. Michael Frearson, *Learning Skills Development Agency (LSDA), London, U.K.*

Dr. Lavinia Gasperini, *Food and Agriculture Organisation (FAO), Rome, Italy*

Dr. Peter Grootings, *European Training Foundation (ETF), Torino, Italy*

Professor Norton Grubb, *University of California, Berkeley, USA*

Dr. Dennis Herschbach, *University of Maryland, College Park, MD, USA*

Professor Phillip Hughes, *ANU Centre for UNESCO, Canberra, ACT, Australia*

Professor Moo-sub Kang, *Korea Research Institute for Vocational Education and Training (KRIVET), Seoul, Korea*

Dr. Wanjala B. Kerre, *Moi University, Eldoret, Kenya*

Dr. Günter Klein, *World Health Organisation (WHO), Bonn, Germany*

Professor Jon Lauglo, *Senior Researcher at NIFU STEP, and NOVA, social research institutes, Oslo*

Dr. Alexandre Leibovich, *Institute for Vocational Education and Training Development, Moscow, Russia*

Dr. Phillip McKenzie, *Organisation for Economic Cooperation and Development (OECD), Paris, France*

Dr. John Middleton, *World Bank Institute, Washington D.C., USA*

Dr. Mohan Perera, *United Nations Educational, Scientific and Cultural Organization (UNESCO), Paris, France*

Professor Felix Rauner, *University of Bremen, Germany*

Mr. Trevor Riordan, *International Labour Organization (ILO), Geneva, Switzerland*

Professor Chris Selby-Smith, *Monash University, Victoria, Australia*

Professor Barry Sheehan, *Melbourne University, Parkville, Australia*

Dr. Madhu Singh, *UNESCO Institute of Education Hamburg, Germany*

Dr. Manfred Tessaring, *European Centre for the Development of Vocational Training (CEDEFOP), Thessaloniki, Greece*

Dr. Jandhyala Tilak, *National Institute of Educational Planning and Administration, New Delhi, India*

Dr. Daniel Weinberg, *Centro Interamericano de Investigación y Documentación sobre Formación Profesional (CINTERFOR), Montevideo, Uruguay*

Professor Adrian Ziderman, *Bar-Ilan University, Ramat Gan, Israel*

Vocationalisation of Secondary Education Revisited

Edited by

Jon Lauglo and Rupert Maclean



The World Bank
Africa Region
Human Development Department



A C.I.P. Catalogue record for this book is available from the Library of Congress.

ISBN-10 1-4020-3031-2 (HB) Springer Dordrecht, Berlin, Heidelberg, New York
ISBN-10 1-4020-3034-7 (e-book) Springer Dordrecht, Berlin, Heidelberg, New York
ISBN-13 978-1-4020-3031-4 (HB) Springer Dordrecht, Berlin, Heidelberg, New York
ISBN-13 978-1-4020-3034-5 (e-book) Springer Dordrecht, Berlin, Heidelberg, New York

Published by Springer
P.O. Box 17, 3300 AA Dordrecht, The Netherlands.

Printed on acid-free paper

All Rights Reserved.
© 2005 Springer

No part of this work may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, microfilming, recording or otherwise, without written permission from the Publisher, with the exception of any material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work.

Printed in the Netherlands.

SERIES SCOPE

The purpose of this Book Series is to meet the needs of those interested in an in-depth analysis of current developments concerning various aspects of education for the world of work with particular reference to technical and vocational education and training. The Series examines areas that are at the ‘cutting edge’ of the field and are innovative in nature. It will present best and innovative practice, explore controversial topics and use case studies as examples.

The audience for the Book Series will include policy makers, practitioners, administrators, planners, researchers, teachers, teacher educators, students and colleagues in other fields interested in learning about TVET, in both developed and developing countries, countries in transition and countries in a post-conflict situation.

The Series compliments the **International Handbook of Technical and Vocational Education and Training**, with the elaboration of specific topics, themes and case studies in greater breadth and depth than is possible in the Handbook. The Book Series also augments the various other publications in the **International Library of Technical and Vocational Education**, details about which appear in the introductory section of this volume.

Topics to be covered in the series include: training for the informal economy in developing countries; education of adolescents and youth for academic and vocational work; financing education for work; lifelong learning in the workplace; women and girls in technical and vocational education and training; effectively harnessing ICT’s in support of TVET; planning of education systems to promote education for the world of work; recognition, evaluation and assessment; education and training of demobilized soldiers in post-conflict situations; TVET research; and, school to work transition.

The Book Series **Technical and Vocational Education and Training: Issues, Concerns and Prospects**, and other publications in the **International Library of Technical and Vocational Education and Training** are publications of the UNESCO-UNEVOC International Centre for Technical

and Vocational Education and Training (UNESCO-UNEVOC) in Bonn, Germany.

Those interested in obtaining more information about the Book Series, or who wish to explore the possibility of contributing a manuscript, should (in the first instance) contact the publishers.

TABLE OF CONTENTS

List of Figures	ix
List of Tables	xi
List of Contributors	xv
Preface and Acknowledgements	xvii
Abbreviations	xix
Introduction by the Series Editors	xxi

Part I: Perspectives and Overviews

1. Vocationalised Secondary Education Revisited	3
<i>Jon Lauglo</i>	
2. Setting the Context: An Overview of Secondary Education Reform with Particular Reference to the Asia-Pacific Region	51
<i>Rupert Maclean</i>	
3. Promise and Performance in Vocationalised Secondary Education: Has the Baby Been Thrown Out with the Bath Water?	71
<i>David N. Wilson</i>	

Part II: Country Case Studies

4. Pre-vocational Secondary Education in Botswana	93
<i>Sheldon G. Weeks</i>	
5. Vocationalisation of Secondary Education in Ghana	149
<i>Albert K. Akyeampong</i>	
6. Vocationalisation of Secondary Education: Kenya Case Study	227
<i>Kilemi Mwiria</i>	

Part III: Labour Market Impact

7. Technical and Vocational Education and Training in Mozambique: Better than Its Reputation	309
<i>Jørgen Billetoft and AUSTRAL Consultoria e Projectos</i>	
8. Economic Returns to Vocational Courses in U.S. High Schools	329
<i>John H. Bishop and Ferran Mañe</i>	
Consolidated Bibliography	363

LIST OF FIGURES

5.1	Proportions of practical work and theory in vocational/technical subjects	192
5.2	Educational structure of TVET pre-1987 reform	216
5.3	Content analysis of examination papers for vocational/technical programs for 2001	219
5.4	Structure of the SSS program	221
6.1	Number of schools* offering vocational subjects (2002)	259
8.1	Availability of career-tech in secondary school and upper-secondary graduation rates	335
8.2	Availability of career-tech in secondary school and enrollment of 15–19 yr olds in schools & colleges	336
8.3	Relationship of availability of career-tech in secondary school to reading literacy of 15 yr olds in PISA	337
8.4	Relationship of availability of career-tech in secondary school to mathematics achievement of 15 yr olds in PISA	338

LIST OF TABLES

1.1	Approximate proportion of weekly timetable devoted to vocational subjects in the secondary schools	14
1.2	Estimated costs of a science laboratory and vocational workshops in 5 Kenyan schools (In US\$ equivalent)	27
1.3	Estimated ratios of capital costs per student-place by subject. Kenya 1985 (1 = normal classroom)	28
1.4	Teaching costs per student period for technical subjects and agriculture across three schools in Ghana (Ghanaian ₵)	29
1.5	Ratios of estimated subject cost in Botswana	30
2.1	Countries included in the overview analysis	59
4.1	Development of secondary education in Botswana: 1966 to 2002	99
4.2	Number of students taking practical subjects-COSC/BGCSE-1992 & 2001	108
4.3	Background of teachers (SSS only) by first subject taught 1993 (citizen/noncitizen) (Unqualified in brackets—percentages read across)	111
4.4	Background of secondary teachers (CJSS and SSS) by first subject taught 2002 (citizen/noncitizen) (Temporary teachers in brackets-percentages read across)	112
4.5	Background of secondary teachers (CJSS and SSS) by first subject taught 2002 (citizen/noncitizen) (percentages read down)	113
4.6	Performance in practical subjects in 2001 (COSC/BGCSE)*	117
4.7	Performance in core academic subjects in 2001 (COSC/BGCSE) school certificate examinations*	118
4.8	Costs in Pula in one year for practical subjects compared to academic subjects*	126
4.9	Comparative unit costs for education (Pula, constant prices 1995/1996)	133
4.10	Comparative planned development expenditure for education (Pula, constant prices 1997/1998) during NDP8	134

4.11	Secondary school enrollments 1981 to 2002. Form one, Form four, and total	145
4.12	TSM salaries (Pula) by citizenship and school type	146
5.1	Junior secondary school allocation of periods to subjects per week—1987	170
5.2	An example of typical time allocated to various elective programme subjects in a senior secondary school	171
5.3	Enrollment and enrollment growth rates for JSS and SSS (1987–1997)	172
5.4	Certified technical and vocational teachers for JSS (1995–2001)	173
5.5	Elective programs offered by SSS students in the 1996 WAEC SSSCE	174
5.6	Best subject of JSS students by gender ($N = 241$ for girls; $N = 247$ for boys)	175
5.7	Number of candidates in SSSCE subjects: 2001	176
5.8	Performance of different programme students in SSSCE core maths and core science	179
5.9	Returns to education JSS and SSS, (full method) Ghana, 92 (%)	181
5.10	Residential status of four senior secondary schools (2000/2001)	194
5.11	Recurrent expenditures of programmes per year in four senior secondary schools based on records of expenditure (2000/2001)	196
5.12	Annual total recurrent expenditure and recurrent costs per student by school and programme	199
5.13	Relative recurrent costs per subject	201
5.14	Senior secondary schools with enrollments below 100	203
5.15	Costs per student period for technical and agriculture across three schools	204
5.16	Estimated capital development costs on building and equipment	206
5.17	Estimated costs per student place	206
5.18	Annualization of capital—Swedru school of business and Mfantshipim school	208
5.19	Relative recurrent and capital costs—Mfantshipim school and Swedru school of business	209
5.20	Mfantshipim school science program	222
5.21	Mfantshipim school technical program	222
5.22	Swedru school of business program	223
5.23	General arts program	223
5.24	OGUAA secondary technical school agriculture program	224
5.25	OGUAA secondary technical: technical program	224
5.26	Mankessim secondary technical school agricultural program ...	225
5.27	Mankessim secondary technical school technical program	225

List of Tables

xiii

6.1	Timetable allocation for vocational subjects (2002)	251
6.2	Qualifications of teachers of selected subjects (2002)	255
6.3	Secondary schools summary of vacancies (2002)	256
6.4	Estimated costs of a science laboratory and workshops (US\$) . .	264
6.5	Students entered for the various subjects in the KCSE examination for the top-performing schools in vocational subjects (2001) . . .	268
6.6	Students entered for the KCSE vocational subjects examination (1990–2000)	272
6.7	Distribution of candidates by gender as a percentage of the 2001 KCSE candidates	274
6.8	Distribution of candidates by province and gender (2001)	274
6.9	Vocational subjects offered by the top ten schools in the KCSE (2001)	278
6.10	Mean scores of top-performing students in KCSE (2001) in vocational subjects (industrial education, agriculture, and home science) compared with their performance in english, mathematics, and physics	280
6.11	KCSE performance in all subjects by gender (2000 & 2001)	284
7.1	Composition of tracer sample	316
7.2	Current main activity	318
7.3	Current job by professional field	320
8.1	Effects of upper-secondary vocational share on enrollment rates, completion rates and literacy	339
8.2	The effect of high school courses on employment outcomes. Regression coefficients	346
8.3	Benefits and costs of high school career technical education	352

LIST OF CONTRIBUTORS

Albert Kwame Akyeampong, *Senior Lecturer, University of Sussex.*

AUSTRAL Consultoria e Projectos, Lda, *Mozambican consulting firm.*

Jørgen Billetoft, *Professional Director of Copenhagen Development Consulting Ltd.*

John H. Bishop, *Professor of Human Resource Studies, Cornell University and Executive Director of the Educational Excellence Alliance.*

Jon Lauglo, *Senior Researcher at NIFU STEP and NOVA research institutes, Oslo (was World Bank staff when this volume was prepared).*

Rupert Maclean, *Director of the UNESCO International Centre for Technical and Vocational Education and Training (UNESCO-UNEVOC), Bonn, Germany.*

Ferran Mañe, *Professor of Economics at Rovira i Virgili University, Spain.*

Kilemi Mwiria, *Assistant Minister of Education, Science and Technology, Government of Kenya and Development Consultant, Kimkam Development Consultants (Africa) Ltd.*

Sheldon G. Weeks, *Director, Evaluation Services Team Botswana (BEST).*

David N. Wilson, *Professor of Adult, Comparative and Higher Education at The Ontario Institute for Studies in Education, University of Toronto, Canada.*

PREFACE AND ACKNOWLEDGEMENTS

As developing countries have reaped some success in attempts to achieve the universalisation of primary education, their attention has increasingly moved to cost-effective ways of improving access to and the relevance of secondary education. Whereas secondary education was once viewed as academic preparation for entrance to higher education, over the years greater attention has been given to the relevance of what is taught at the secondary level to preparing graduates for the world of work, in so doing meeting the needs of not only those who go onto higher education but also those likely to enter the labour force direct from secondary school.

This book examines vocationalised secondary education, which is here understood as being a curriculum which remains overwhelmingly ‘general’ or academic in nature, but which also includes vocational or practical subjects as a minor portion of the timetable during the secondary school course. The greater that portion becomes, the more vocationalisation shades into technical and vocational education (TVE), which in terms of time and objectives has vocational preparation as its dominant purpose. The volume focuses on Sub-Saharan Africa, but takes a side-glance at the United States to examine vocationalisation under dramatically more favourable conditions than in African countries. Advocates have held high hopes for vocationalised secondary curricula in developing countries, while sceptics have argued that these hopes have been unrealistic.

In the preparation of this volume, three case studies were initially prepared for the Vocational Skills Development Review, which was carried out in 2002–2003 by the Human Development Department in the World Bank’s sub-Saharan Africa regional department. Major studies were contributed by Kwame Akyeampong on Ghana, by Kilemi Mwiria on Kenya, and by Sheldon Weeks on Botswana. When it was decided to use these studies to launch a book project being undertaken in collaboration between the World Bank, the UNESCO International Centre for Technical and Vocational Education and Training (UNESCO-UNEVOC) and Springer (formerly Kluwer Academic Publishers), we were able to add contributions from two concurrently ongoing

empirical studies: Jørgen Billetoft in collaboration with *Austral Consultores* contributed a chapter on their recent study for the Ministry of Education in Mozambique on the cost and external effectiveness of vocational and technical education and training; while John Bishop and Ferran Mañe made available their analysis of the labour market payoff to vocational subjects in the US high school. Finally, David Wilson extended the coverage through an analysis of the history of vocationalisation.

The views expressed in these chapters are those of each author and not necessarily those of the governments concerned, nor of the UNESCO-UNEVOC International Centre or the World Bank.

The authors and editors wish to acknowledge the courtesy and help given by all persons and institutions consulted in preparing these chapters. We also appreciate the valuable comments on draft sections of the book from Kenneth King of Edinburgh University and Jacob H. Bregman of the World Bank; and we are thankful to the Norwegian Education Trust Fund and the Department for International Development (DFID-UK) for the financial support to some of the studies in this book. We also acknowledge the considerable assistance of Ms Gertrud Auf Der Mauer, and Ms Sharon Kirabo-Steffens in the UNESCO-UNEVOC International Centre, in the preparation of the manuscript for publication.

Washington/Bonn
January 2004

Jon Lauglo and Rupert Maclean

ABBREVIATIONS

AIC	Advanced industrialised country
CJSS	Community junior secondary school
CTE	Career-technical education
IE	Industrial Education
JSS	Junior secondary school
LDC	Least developed country
LIDC	Low income developing country
NIC	Newly industrialised country
PSE	Post secondary education
SSS	Senior secondary school system
SST	Senior secondary technical
TTC	Technical teachers' college
TVE	Technical and vocational education
TVET	Technical and vocational education and training
TVS	Technical and vocational subjects
VET	Vocational education and training
VTC	Vocational training centre

INTRODUCTION BY THE SERIES EDITORS

Work is a major feature in most people's lives. Not only does it provide them with the means of survival in terms of food, clothing and shelter, but also the type of work undertaken by individuals and groups has a major impact on their self-identity, social status and standard of living.

Improving education for the world of work can help increase the real incomes of workers in both the formal and informal sectors of the labour market, provide citizens with more choices in their working lives, help alleviate poverty, and empower individuals who would otherwise be marginalised.

As an important part of education for the world of work, technical and vocational education and training (TVET) has been identified by UNESCO Member States as a priority area within UNESCO's range of programme activities. This is to be expected since there is overwhelming evidence to demonstrate that TVET can play an essential role in promoting sustainable human development and economic growth, with clear benefits for individuals, their families, local communities and societies in general.

However, TVET is currently faced with several important challenges. Some are posed by the displacement of the traditionally-strong focus upon manual work in favour of mental work, or at least the changing mixture of competencies required in the workplace. The boundaries between manual and mental work are fading away, as many traditional forms of work and the respective preparation processes for learning to work undergo changes. In addition, the shift from the Industrial Age to the emerging Information Age, and from localisation towards globalisation, has considerable implications for education and training for the world of work and TVET, as do moves to effectively harness information and communications technologies (ICT's) to improve the reach and quality of delivery of TVET programmes.

A major area of debate at the current time concerns the place and role of TVET at the secondary school level. As pressure continues unabated to reform the secondary school curriculum, to make it relevant in most adequately assisting learners develop life skills for employability and citizenship, much debate is occurring on the extent to which secondary education should become more specifically focused on preparing learners to meet the needs of the labour

market. Traditionally, secondary education has been largely academic in orientation, equipping learners with the knowledge, skills and understandings necessary to go onto further academic study at the university level. However, it is now widely believed that secondary education has considerable value in its own right and for its own sake, and not just as preparation for tertiary studies. Still others believe that secondary education should be substantially re-engineered to prepare learners for effective entry to employment and jobs, and that the secondary education curriculum should therefore be ‘vocationalised’.

The secondary school vocationalisation debate has waxed and waned for nearly 40 years, since the publication of Philip Foster’s *Vocational School Fallacy in Developing Nations* article. The pros and cons of the vocationalisation issue have resonated in the halls of academe, Development Finance Institutions, bi-lateral and multi-lateral technical assistance agencies, and the education and labour ministries of countless countries. While there has been no definitive answer to the ‘to vocationalise secondary education, or not to vocationalise’ the series editors and authors of this volume hope that their contributions will shed additional light on the debate. In the process, we hope that those who must grapple with real-world decisions in the policy arena may gain a better appreciation of the scope and parameters of this debate.

The authors represented in this book on *Vocationalisation of Secondary Education Revisited* examine the rationales for vocationalisation in terms of personal development, socio-political and economic goals; and the serious constraints that exist concerning the vocationalisation of secondary schooling. After an overview which presents different perspectives on secondary education, the emphasis is on the situation in developing countries, with case studies being presented on the situation in Botswana, Ghana, Kenya and Mozambique. By way of comparison, a study is also presented on the economic returns to vocational courses in U.S. high Schools.

The publication of this volume launches the **UNESCO-UNEVOC International Library of Technical and Vocational Education and Training**, and the Book Series **Technical and Vocational Education and Training: Issues, Concerns and Prospects**.

Although this book mainly provides case studies of the vocationalisation of secondary education in several African countries, the lessons learnt have much to offer researchers, policy makers and practitioners working in other parts of the world.

Rupert Maclean, Director of the UNESCO-UNEVOC International Centre,
Bonn, Germany

and

David N. Wilson, Professor at OISE, University of Toronto, Canada

Part I: Perspectives and Overviews

Vocationalised Secondary Education Revisited, *Jon Lauglo*

Setting the Context: An Overview of Secondary Education Reform with Particular Reference to the Asia-Pacific Region, *Rupert Maclean*

Promise and Performance in Vocationalised Secondary Education: Has the Baby Been Thrown Out with the Bath Water?, *David N. Wilson*

Jon Lauglo

1

Vocationalised Secondary Education Revisited

1	Introduction	3
2	Rationales for Vocationalisation	6
3	Previously Noted Constraints	8
4	Aspects of Implementation	11
5	Are Vocational/Practical Subjects Doomed to Lack Attraction?	21
6	Costs	25
7	Learning Outcomes	30
8	Concluding Observations	41
9	References	47

1 Introduction

Vocationalised secondary education refers to a curriculum which remains overwhelmingly general or ‘academic’ in nature, but which includes vocational or practical subjects as a minor portion of the students’ timetable during the secondary school course. Closely related terms are ‘diversified curriculum’ (Psacharopoulos and Loxley, 1985), ‘work orientation’ (Hoppers, 1996), ‘practical subjects’ in secondary schools (Lauglo, 1985), and ‘pre-vocational education’ (education especially designed to be preparatory for vocational education and training [VET]).¹

This book revisits after some 25 years and with a focus on Africa, the theme of an earlier volume (Lauglo and Lillis, Editors, 1988). In that volume, Kazim Bacchus (1988) elucidated how vocationalisation is a policy preoccupation which ‘refuses to go away’ and pointed to reasons why it had been a recurring controversy in developing countries. In the present book, the chapter by Wilson

¹ Compared to VET, the recently coined concept of ‘skills development’ is inclusive of any skills which are useful for making a living—not only those that are transmitted in education and training programmes and not only those that are earmarked for particular occupations or clusters of occupations.

on ‘Promise and Performance’ similarly notes that the theme has been with us since colonial times.

Vocationalisation differs from school-based vocational education and training (VET).² Under VET, a student’s timetable is dominated by practical skills learning and by directly related theory. Under vocationalisation, the bulk of the students’ timetable consists of general education subjects, and the main purpose of their course is general education. *Thus, a distinctive feature of vocationalised secondary education is that vocational subject matter takes only a minor portion of total curriculum time* (typically one-tenth to one-fifth). This allows the student to pursue a sufficient load of general education courses to qualify for higher stages of academic education. The vocational courses do not imply that the student has left the educational path towards higher education.³ Further, under vocationalised secondary education, the student’s weekly timetable is defined within the framework which is common for mainstream secondary education in terms of the total duration of the course and the weekly course load. By way of contrast, VET will often have more weekly contact hours in toto than general secondary education in order to allow needed time for practical exercises in the vocational subjects.

Hybrid cases are technical secondary schools which tend to have more contact hours than general secondary schools, but which also teach vocational/technical courses to substantially greater curricular depth than under the ‘light dosage’ variant which typifies vocationalised secondary education—at the same time as they are preparatory for higher education. However, such hybrids typically constitute a small proportion of institutions within secondary education. Examples would be the technical secondary schools in Eritrea, or the technical secondary schools in Sweden under the old system from the 1960’s—or the technical secondary schools in Mozambique which are included in the tracer study by Billetoft and Austral in the present volume.

The main goal of vocationalisation is improved vocational relevance of education. In practice this has meant practical and vocational *subjects*. But other means could serve this end. A more practical and applied way of teaching general education subjects can also improve the relevance of education for work. Guidance counselling and study visits are other examples. Vocational courses will usually also include some general education objectives. But their main objective is to prepare for work in designated occupations, clusters of

² Like any ‘education’, vocational *education* includes goals of personal development. The learner is in principle the main point of departure. For vocational *training* the main point of departure are the skills to be learned in order to perform specified occupational tasks. In practice the two terms will overlap.

³ Timetabling of optional subjects sometimes blocks this possibility. This happens in some schools in Botswana.

occupations—and more generally for the world of work. The goal of improving such relevance is the most important reason why governments introduce vocationalisation.

Following literature reviews and a small number of tracer studies in the 1980's that yielded discouraging findings on the external effectiveness of vocationalisation,⁴ many international agencies, led by the World Bank, distanced themselves from vocationalisation policies which they previously had favoured and sometimes had induced governments in developing countries to introduce in secondary education. This change of view in the agencies left governments to bear the high cost of vocationalisation from their own very scarce resources. Since the early 1990's the special priority given to primary education has also deflected interest among governments and agencies from investments in secondary education—whether vocationalised or not.

Some developing countries continued to pursue vocationalisation policies in the 1990's. Botswana, Ghana and Kenya are main African examples. In the present chapter, analysis of objectives and implementation issues will draw on case studies of these three countries which were especially commissioned by the World Bank. These studies are substantial investigations in their own right and included as chapters in this volume. They are based on available documentation supplemented by brief visits to schools and consultations with government officials. Time and resources did not permit the inclusion in these case studies of tracer surveys to assess empirically the external effectiveness of vocationalisation. All three case studies examine vocationalisation in its usual 'light dosage' variety (see Table 1.1, below).

In addition the book contains two thematically specialised chapters that draw on new tracer study findings: a study on the external effectiveness of a variety of technical and vocational types of education in Mozambique, and a large follow-up study of U.S. high school students. The findings in these studies turned out to add optimistic nuance to the bleak international record on the external effectiveness of vocationalisation. The U.S. case exemplifies what vocationalisation can achieve under dramatically more favourable conditions than what applies to African secondary schools. However both the technical secondary schools in Mozambique and the 'vocational concentrators' in U.S. high schools should best be seen as 'hybrid cases' between vocationalised education and VET.

⁴ Empirical tracer studies include Psacharopoulos and Loxley (1985) on Colombia and Tanzania, Lauglo and Närman (1987) and Lauglo (1989) on Kenya, and Chin-Aleong (1988) on Trinidad and Tobago. Lauglo and Lillis (1988) include summary reports from some of these studies and a collection of other contributions from the mid-1980's. Coombe (1988) and, more recently, Hoppers (1996) have provided general reviews of the international research and evaluation literature on vocationalisation.

In rich countries where secondary education will include the great majority of youth, models of secondary education that blend general education and vocational training may be affordable and make sense as a way of organising provisions that will cater to the varied needs of an entire age group in some countries. In the ‘Promises and Performance chapter’ in the present volume, Wilson notes a trend in OECD countries towards an increasingly blurred distinction between vocational and general secondary education—a trend which since the late 1970’s has been the object of much policy analysis at the OECD. However, it does not follow that the same institutional models would be appropriate across sharply contrasting conditions as to labour force, educational development, and capacity to finance costly organisational models.

2 Rationales for Vocationalisation

Vocationalisation will have different rationales, depending on the main policy goals. These categories are suggested for such goals: personal development goals, socio-political goals, and economic goals.⁵

Personal Development Goals

Dominant theories of general education point to the ideal of a well-rounded education that can educate ‘the whole person’—that education should develop moral, aesthetic, physical, and practical capacities, not just cognitive knowledge organised in academic disciplines. Practical subjects can have the additional justification that they allow students to learn from more active ‘doing’ than what is typical in academic subjects. Under this perspective, the teaching of practical skills and familiarisation with the ‘world of work’ do not need to be justified only as preparation for specific occupations. They are legitimate parts of general education and to be introduced at ‘age-appropriate’ stage in a person’s progression through the education system, not necessarily only in the last educational leg before labour market entry.

One example is the teaching of handicrafts skills (*sløyd*) in upper primary and lower secondary schools in the Nordic countries, or contemporary design and technology courses in a number of other countries, including Botswana (Weeks, Botswana case study). To be sure, preparation in a general way for the world of work is part of the rationale for such subjects, but the subjects can be valued as *general skills* in practical design and problem solution—not only in

⁵ The categories are close to those used in Carol Coombe’s (1988:3) review for the Commonwealth Secretariat (she refers to earlier UNESCO usage).

work situations but also for private use. Further, education *about* the ‘world of work’ can be valued because it conveys knowledge about an important part of people’s lives, and purports to enable young people to make better informed choices about their future.

Socio-political Goals

A ‘diversified’ curriculum structure can be seen as a means to greater equality of opportunity because it would purportedly cater to a wider range of talents and prepare for a wider range of future activity, than do purely academic curricula. This view has historically been part of the rationale for comprehensive secondary schools in many countries. There is the international influence of the U.S. high school model. But socialist, social democratic, and more generally populist policies on education have also favoured the inclusion of practical and vocational subjects as a means to break down social class barriers and teach respect for manual labour.

Some African countries have historically been influenced by North American or by Soviet models of comprehensive secondary school.⁶ But practical subjects have a more complex history in Africa. Under colonial regimes, Africans struggled in the face of oppressive racial discrimination to gain access to academic education. Practical and vocational subjects were then part of resented racially segregated provisions ‘adapted’ for African subjects (see, e.g., Anderson, 1970, on Kenya; and Wilson in the present volume). After independence, depending on the political orientation of governments, in some countries practical subjects became part of a wider set of measures (e.g., along with a national youth service) intended to ensure that the future educated elite would retain an identification with ordinary working people and to build national solidarity. With passage of time since independence, arguments of this type have become less important for policy making.

Economic Goals

In African countries, the issue at the heart of policy debate on vocationalisation has undoubtedly been ‘economic relevance’. By teaching vocational skills, the hope has been that students would more easily find work when they leave school, and become more productive and trainable. Sometimes, a declared goal is preparation for self-employment. By easing school leavers’ transition to

⁶ Both of these models give legitimacy to vocationalisation—the United States through its emphasis on ‘education for life adjustment’ derived from Pragmatist curriculum philosophy; and the earlier Soviet Union through its concept of polytechnical education.

work, the hope has also been that the prevalence of antisocial behaviour among youth would be reduced.

Carol Coombe (1988) showed that economic goals were the main motives behind vocationalisation policies in Commonwealth countries. The goals included provision of skilled and semi-skilled manpower, reduction of wasted resources caused by weak articulation between education and the labour market, technological literacy, and generally facilitating economic growth and national development. As noted in the Botswana case study, there is also a legacy of rural-centred ideas of development according to which a high rate of migration to town would be a problem in need of an educational remedy.

When curricula and syllabuses have been framed by educationists, personal development goals have been more evident, but these goals have not politically driven the policy interest in vocationalisation or defined the issues in the policy debate concerning vocationalisation. Rather, the recurring question has been whether vocationalised secondary education in fact turns out to be more 'economically relevant' than purely general education, and whether it is affordable. The question of external effectiveness (Is it effective preparation for the labour market?) is much more exclusively important in assessing vocational education and training. Thus, policy debate in African countries has tended to treat vocationalisation as if it could function as a thinly spread form of VET.

3 Previously Noted Constraints

Earlier reviews (Lillis, 1985; Bacchus, 1988; Coombe, 1988; Lauglo and Lillis, 1988; Urevbu, 1988; Hoppers, 1996) point to serious constraints on implementation of vocationalisation in developing countries and question the effectiveness of individual programmes. Below are some of the main issues and problems noted in earlier studies. Some of these constraints will also be elucidated in the chapters of the present volume.

General Constraints

- Vocational or practical subjects tend to have complex tooling-up, staffing, and servicing/logistics requirements—the training and recruiting of teachers; the setting up and maintenance of facilities, equipment, and tools; the supply of materials and consumables; and the implementation of assessment appropriate to practical subjects. Because these requirements in all too many cases have not been met in a minimally adequate way, vocational subjects have suffered from run-down facilities and inadequate pedagogy.
- Compared to academic subjects, most vocational or practical subjects have considerably higher unit costs due to facilities, equipment, materials,

consumables, less optimal utilisation of available teaching loads, and smaller classes.

- Government commitment can be unclear and a planning haphazard (also stressed in the Kenya case study).
- By taking time and other scarce resources away from core general subjects, vocational subjects contribute to curriculum overcrowding which leads to insufficient quality in learning outcomes.⁷
- Sometimes vocational or practical subjects lack attractiveness for pupils, parents, and teachers. Teacher and student morale can be low. (The present review will show that this is no ‘iron law’—there are exceptions to this pattern.)
- Making parents and local communities responsible for equipment and consumables creates uneven implementation and widespread underprovision of basic teaching necessities (this is a theme to be illustrated in the present chapters on Kenya and Ghana).
- Curriculum design often has flaws, e.g., excessive overlap among different subjects, insufficiently logical and systematic progression on taught contents (see the chapter on Kenya).

Constraints on ‘Economic Relevance’

- In severely depressed labour markets, access to jobs will rely on personal contacts and on being at the right place at the right time. Weak links can be expected between vocational courses and access to jobs.
- Vocational subjects will not receive enough time and attention to give credible ‘entry-level skills’—given that they are only minor portions of the total timetable (but the chapters on the U.S. and Mozambique show that external effectiveness can be better when courses are taught to greater depth/more advanced level, under ‘better’ labour market conditions for secondary school graduates).
- Schools mainly providing general education lack incentives and resources to develop the labour market links that would help their students. Schools also lack capacity and incentives to adapt their teaching to skill needs in the labour market.
- It is unrealistic to expect that vocationalised education will directly prepare for self-employment. (strongly confirmed in the Mozambique tracer study in the present volume).

⁷ Of course all subjects take time away from each other, but the insertion of vocational subjects as new curriculum elements make it harder to achieve badly needed quality improvement in existing subjects.

- Good marks from general education may count more than vocational subjects, with employers who think of such marks as a proxy for being ‘bright’, ‘hardworking’, and able to learn on the job. (Bishop and Mañe’s chapter on the U.S. argues that labour market advantage rests on interaction between vocational courses and general education.)
- Access to further training/higher education in the economic sector for which vocationalised subjects purportedly prepare (e.g., agriculture), can place a premium on academic subjects to the exclusion of any recognition for relevant vocational courses. (Kenya has been an exception.)

Constraints on ‘Personal Development Goals’

Earlier evaluative literature has paid little attention to the personal development goals. The following constraints may be suggested.

- The pedagogy in vocational subjects as reinforced by the methods of assessment used, fails to develop problem-solving skills. It places excessive emphasis on memorisation and working to instructions. (Botswana is seeking to solve this problem.)
- ‘Familiarisation’ and ‘orientation’ goals for vocational subjects are too diffuse to give much guidance to what should count as learning.
- ‘Usefulness for private life’ (e.g., for fixing things around the house) may seem like a luxury concern for investment by government when such private benefits would reach only a small minority of youth.

Constraints on ‘Socio-political Goals’

- When only a small minority of youth have access to secondary education, a model school designed to cater for the full range of talents and needs of youth may be inappropriate.⁸
- When vocational course options run parallel to academic ones, social inequality can be reinforced by children of the elite going for the academic options while those from disadvantaged backgrounds gravitate towards vocational subjects (the Kenya and Botswana case studies suggest this may be happening).
- Positive attitudes toward practical work may not be lacking among secondary school students.

⁸ The comprehensive school model also has its problems as a venue for vocational skills training in high-enrollment, economically advanced countries—notably, weak outreach to build responsiveness to the labour market and high costs. See the discussion on school-based training in Lauglo (1993).

4 Aspects of Implementation

Policies Are Mainly Driven by Search for Economic Relevance

In Kenya, vocationalisation on a large scale was chosen in the 8-4-4 reform of 1986, in order to help the transition of secondary school leavers into employment and further vocational training. A practically oriented curriculum was to offer skills for a wide range of employment opportunities. The new system was to ensure that students graduating at every level would have some scientific and practical knowledge that could be utilised for self-employment, employment, or further skills training. There was also some concern with preparing students so that they would better adjust to their domestic worlds. All secondary schools were required to offer vocational subjects (Mwiria, Kenya case study).⁹

In Ghana, a key feature of the 1987 Education Reform Programme was the provision of vocational education at both the 3-year junior and the 3-year senior secondary school level in order to equip students with the skills for paid and self-employment. All junior secondary school (JSS) students were to study a 'pre-technical' subject. Schools would also offer a range of arts and crafts options which were called 'pre-vocational' (Akyeampong, Ghana case study).

In Botswana, policy was framed in a much more systematic and consultative manner than in the other two countries, as part of 6-year rolling plans guided by national education commissions. Attention was paid to '*pre-vocational*' aspects (preparation for subsequent vocational training) as well as to the risks of vocationalisation, and there was cautioning against unrealistic goals. Policy documents noted 'misdirected vocationalisation efforts' elsewhere. The emphasis on vocationalisation has increased over time and more ambitious goals appear to have been declared for it by politicians. In the eyes of the Ministry of Education, pre-vocational education should 'arm students with the skills they will need when they enter the working world' (Weeks, Botswana case study). Agriculture has recently been made part of the compulsory core of the 3-year Junior Secondary School curriculum, and each student must take a second practical subject. In 2-year senior secondary school, more practical and work-related subjects are being introduced as options.

The Botswana government newspaper, Daily News (7 October 2002) reported that President Festus Mogae had the following to say at the 30th anniversary of Manu Senior Secondary School: 'The primary focus of Botswana has been to prepare Botswana for a transition from the traditional agro-based

⁹ Previously such subjects existed only in a small number of junior secondary schools. The 8-4-4 system telescoped the previous system of junior and senior secondary schools into one 4-year course.

economy to an industrial one... [A] diversified and expanded curriculum that includes subjects such as Business Studies, Art [and Design], Design and Technology and Computer Studies would enhance the development of entrepreneurial and employment skills among school leavers’.

Different stakeholders may differ in the goals they perceive for vocationalised education. In Botswana, Ghana and Kenya the main political drive has clearly been to improve the economic relevance of secondary education and ease school-leaver unemployment. However, educators close to the subjects’ history more readily see vocationalisation a legitimate part of general education, rather than judging it as a ‘thin form’ of VET. In the curricula and syllabi objectives that stress general education and personal development and socio-political goals, such as stimulating interest in practical work and concerns with gender equity, are also mentioned (Ghana case study).

Programme Preparation and Resourcing

Botswana, Ghana, and Kenya decided to ‘go it alone’. Financial and technical support from external agencies has not played an important part in the design and implementation of vocationalisation policies during the 1990’s. Otherwise policy formulation and the resourcing differ sharply among the three countries. Kenya and Ghana, are countries where the decision to vocationalise was taken suddenly by the highest political level with little preparation, and where the financing for implementation has been dramatically inadequate. Under the new policy from 1986, Kenyan parents had to meet the costs of setting up workshops and procuring equipment for vocational subjects—which were to be introduced in all schools, through parental and community contributions.¹⁰ In Ghana, at junior secondary level, the assumption was that somehow local resources would be found for equipment and supplies when these subjects were introduced. No extra allocations were made to finance them. By way of contrast, in Botswana, the decision to vocationalise resulted from preparations that included costing of resource requirements. The government in Botswana is financially much better endowed than in Ghana and Kenya and has backed implementation with substantial resources.

Taken together, the three cases show the necessity of systematic planning and of readiness to provide needed resources before embarking upon vocationalisation. Kenya and Ghana evinced dramatic underresourcing and inadequate staffing. In Kenya, the resourcing problems led in 2002 to policy change toward a leaner secondary school curriculum at the expense of some of the vocational

¹⁰ An exception was made for parents in certain arid districts that were politically favoured for expenditure on facilities and equipment.

subjects—changes urged upon the government by some of the external financing agencies.¹¹

Curriculum Structures

In Ghana, Kenya and Botswana, the drive to vocationalise has been strongest at the *junior* secondary level. When offered, vocational subjects at this stage have tended to be compulsory for all students.¹² In Kenya, the present vocational subjects were pioneered in the old junior secondary schools in the 1970's and 1980's—prior to the current 8-4-4 system which introduced a single stage of secondary schooling of four years duration. In Botswana and Ghana, which have two-stage secondary systems, it is in the junior stage that all students must take at least one vocational subject. Since many junior secondary students will leave school rather than continue to senior secondary, the question of relevance of their education for the world of work is especially important. In the upper secondary stage in Botswana and Ghana, vocational subjects are optional but implemented on a large scale. In 1996, about half of the senior secondary students in Ghana offered a vocational/technical subject for the West African Certificate of Education examination.

In contrast to VET in specialized vocational training institutions in these three countries, the vocational subjects constitute only a minor portion of the curriculum in the secondary schools in Ghana, Botswana and Kenya, as shown in Table 1.1.

The countries differ as to provision for computer education. Botswana is implementing basic computer awareness in all secondary schools, with examinable computer studies being offered as an option in the senior secondary stage. In Ghana and Kenya, provisions are confined to a small number of better-off schools, but enrolments have had a high rate of growth in recent years.

Policy recommendations in all three countries show recognition of generic skills.¹³ A 1999 commission in Kenya pointed to the importance of learning to 'communicate better, work in teams with less supervision, use information

¹¹ The donor-funded 1998 Master Plan on Education and Training recommended such change, but was never officially adopted. However, in 2002 the range of vocational subjects offered was restricted. Industrial education subjects and computer studies were dropped, on grounds of cost.

¹² The same pattern applies to economically advanced countries. It is in the junior secondary stage (or higher grades of primary school) that 'practical subjects' can be found in the compulsory common core of the curriculum. Typically their rationale will then stress their general usefulness.

¹³ May be defined as widely useful process skills (e.g., teamwork, communication skills, skills in choice of problem-solving strategies).

Table 1.1 Approximate proportion of weekly timetable devoted to vocational subjects in the secondary schools

	Botswana	Ghana	Kenya
Lower secondary stage	15%	13%	n/a
Upper secondary stage (if vocational option is chosen)	11–22%*	23–31%*	n/a
Single-cycle secondary education	—	—	7–11%*

*Percentage depends on type of vocational course chosen and/or individual schools have some discretion as to timetable balance between general and vocational subjects.

technology to access new ways of doing things, promote entrepreneurship . . . be creative . . . [show] initiative for problem solving' (Mwiria, Kenya case study). But only in Botswana is there evidence of any real effort being made to shift pedagogy toward activity methods and problem solving. One measure is the introduction of a much greater role for continuous assessment. In both Kenya and Ghana, the case studies describe teaching and learning styles in vocational subjects as typified by one-way communication from teacher to student, with heavy reliance on memorisation of vocational theory—although there are individual teachers who seek more innovative ways of teaching practical subjects (Mwiria, Kenya case study).

Workshops, Equipment, Materials

In the absence of minimally adequate workshops, equipment, consumables, and trained teachers vocational subjects easily degenerate into being taught 'theoretically' with inadequate attention to practical skills learning. Ghana and Kenya fit the pattern, but Botswana is a dramatic exception.

Though many schools in Botswana were inadequately equipped in the early 1990's, they were probably better equipped than in Ghana and Kenya. That lead has increased dramatically. At present, Botswana is in the midst of large-scale investments in workshops and equipment for vocational/practical subjects, as well as in other school construction.

Practical subjects have been given a prominent emphasis in the architecture and layout of the junior and senior secondary schools. In the past decade, nearly all schools have been completely rebuilt (an investment unparalleled in Africa). Junior secondary schools have computer laboratories, a block for home economics; a block and machine room for design and technology; a new art room and space for ceramics and sculpture, and so on. Recently, 'pavilions',

with two substantial rooms and storage areas under one roof, have been built at the larger junior secondary schools to provide additional space for design and technology. In the senior schools the new facilities for art and design, home economics, computer studies, and design and technology are among the best in the school.

Since Botswana is a country with a small population, the investment is concentrated upon what internationally is a very small secondary education system. The President announced in 2002 that Botswana would be investing over US\$ 100 million during National Development Plan 9, 2003–2009, to build four new senior secondary schools and invest approximately US\$ 4 million more in each of the 27 existing senior secondary schools.

The Kenyan story is the opposite. From 1986, responsibility for facilities, equipment, consumables, and materials in practical subjects was shifted over to parents as schools throughout the country were to introduce vocational subjects. Previous donor support for technical and industrial variants of vocational subjects in a small number of schools came to an end. Overall, resources for equipment and materials have as a result become extremely meagre, with some variation. Schools run by nongovernmental organisations/religious organisations will sometimes have their own sources of funding and tend to be better equipped than others. Some subjects do not require much capitalisation (e.g., accountancy, business studies, and—when the school has access to suitable land, as many schools do—agriculture). The Kenya case study notes that many schools are reduced to teaching ‘mainly obsolete theoretical knowledge that is the main focus of the national examination system’ without much capacity to teach practical skills. The study refers to lack of books and teaching materials and notes that available teaching materials are of poor quality.

The severe deficiency of workshops and equipment in Kenya for teaching vocational subjects is further illustrated in a recent survey carried out for the Japan International Cooperation Agency by Nishimura and Orodho (1999) of seven secondary schools in five provinces. They noted much variation among schools, but only 13 of 104 teachers surveyed thought the condition of their workshops or laboratories was adequate for teaching.

In Ghana the vocationalisation of junior secondary education was supposed to be achieved without sophisticated facilities and equipment. This problem was largely left to schools and communities to solve; and a recurring criticism has been that most schools lack even the most basic facilities for practical work. Less than a quarter of the junior secondary schools are reported to have the workshop facilities and capacity for delivering the vocational options in the curriculum. No special funding from the government is earmarked for vocational subjects (Akyeampong, Ghana case study). In the senior secondary schools there is

similarly widespread lack of basic equipment for effective technical/vocational education.

To conclude: of these three countries, only Botswana is providing most schools with minimally adequate facilities and equipment for teaching vocational subjects.

The Supply of Teachers

All three countries have severe problems in staffing vocational subjects. In Kenya, apart from home science, there is a general shortage of teachers trained to teach vocational subjects. This is especially true for agriculture and commerce. Lack of staff with needed skills has constrained the expansion of computer applications.¹⁴

Following the introduction in 1987 in Ghana of pre-vocational subjects at the junior secondary level, the Ministry of Education had hoped that neighbouring schools could share specialist teachers and that extensive use could be made of local artisans. It was found that timetables were not flexible enough to accommodate teachers moving from school to school, and that the use of artisans as teachers reduced the attractiveness of the JSS concept of vocational education in the eyes of many parents. The artisans also lacked the necessary pedagogical skills to teach to large student groups and to teach the skills according to curriculum objectives and standards (the Ghana case study). Teacher training for vocational subjects has accordingly been expanded. At present, there are 10 teachers colleges preparing for the teaching of vocational subjects, but teacher shortages are said to be common in rural areas. A trained teacher would also have problems teaching the wide range of craft/vocational subjects that are supposed to be offered in the junior secondary schools. No institution is designated to train teachers in vocational subjects for senior secondary schools; and schools largely rely on untrained teachers.

In Botswana, there is a severe lack of *local* teachers trained to teach vocational subjects (apart from agriculture and home science). However, the government has had the financial resources to recruit teachers extensively from abroad in order to meet this shortage. This is of course an expensive solution. In computer applications Botswana is relying on in-service supplementary training of mathematics and science teachers, but the present installation of equipment in all secondary schools and the starting up of teaching has been slowed down because of staffing shortages.

¹⁴ Recent data from the Teachers' Service Commission shows that shortage of trained teachers is not unique to vocational subjects. The problem is only modestly more serious for agriculture, commerce, and computer studies than it is for English, mathematics, and certain natural sciences.

In-service support becomes especially important when teachers are not well trained. Yet, the Kenyan case study notes that professional support for vocational teachers is extremely limited. By way of contrast, the Botswana case study notes considerable in-service support and retraining by means of workshops (Weeks, Botswana case study).

The three case studies confirm earlier impressions that lack of teachers with specialist skills to teach the subjects, and lack of in-service professional support, are prevalent constraints on implementation of vocational subjects.¹⁵ Shortage of trained teachers of vocational subjects also characterises the situation in a relatively small number of technical secondary schools in Mozambique. Only in certain donor-supported subject enclaves has there been a systematic effort to train such teachers.

Uneven Starts in Teaching ICT Skills

ICT skills may be seen as part of vocationalisation and as geared to a small but growing niche in the modern sector. Information and Computing Technology (ICT) allows the teaching of skills (keyboard skill, word processing, spreadsheets) which are found in the most advanced parts of commerce and industry. But ICT can also be a tool for learning and communicating more generally in secondary schools. The World Links Project, which connects secondary schools in many countries with each other, is an example.¹⁶ For teaching science, ICT has potential as an alternative to laboratories. In schools that are short of teaching and learning materials, there is a role for ICT as a tool for accessing supplementary sources. Basic skills in computer applications will also increasingly be required of students in higher education.

In highly advanced economies computer applications have widespread importance throughout vocational education (see Bishop and Mañe's study on the United States in this volume). In many African countries where 70–80% of the labour force is in the informal economy, the demand for computer application skills in the labour force will likely be much lower for the foreseeable future, but the demand will increase at a high rate and the question in African education is not whether computing skills need to be taught, but at what scale and stage of education teaching of ICT skills should be introduced.

The present country case studies can give scant guidance to lessons for introducing ICT in secondary schools in Africa because ICT technology in the schools is very rare in Kenya and Ghana. In Botswana its major large-scale

¹⁵ Spreading such subjects 'thinly' across a large number of schools is bound to make for inefficient use of scarcely supplied specialist teachers.

¹⁶ Website: <http://www.world-links.org/english/>

introduction is also too recent (as of 2003) for any lessons yet to have been drawn from its introduction.

In Kenya, ICT has suffered a recent setback due to lack of resources. Computer studies was launched in 1996 as an examinable subject in secondary education. The topics taught in this course are computers and their components, use of computers, basic computer concepts, word processing, programming, fundamentals of spreadsheets, application areas, databases, networks, data communications, and the impact of computer technology on society. According to guidelines, physical facilities should include a computer laboratory/classroom, at least one computer for every two students and one printer to every four computers, printing stationery, blank diskettes and storage for diskettes, and software appropriate for the curriculum. All computers should be IBM compatible.

Such requirements are unattainable by most Kenyan schools. Only privileged private schools and established provincial and national schools might be in a position to offer this course to their students. The few less endowed schools that offer this subject largely depend on donations of usually obsolete models of computers, which are housed in poorly built computer laboratories or in a small section of a normal classroom. The lack of qualified teachers, of maintenance technicians, and of electricity, and the relatively high cost of the needed equipment, account for the fact that only 2% of the schools that register candidates for the Kenya Certificate of Secondary Education (KCSE) offered this course in 2001. However, computer studies is not the most expensive subject in terms of needed facilities and equipment. A subject like home economics requires a greater investment if set up according to guidelines (see Table 1.2).¹⁷ But computer studies has a high cost on consumables (e.g., electricity, maintenance)—a type of expense that hard-strapped schools are hard put to meet.

As part of the recent steps to consolidate the range of vocational subjects offered in secondary schools, the Government decided that starting it would stop offering computer studies, industrial education courses and one of the business courses (typewriting with office practice) from 2003.¹⁸ The withdrawal of computer studies has been contentious because it is argued that ICT is crucial

¹⁷ Nor is computer studies the most expensive course to mount in Botswana in terms of unit cost (see Table 4.5)—even when the estimate took account only of examinable course work without including the use of resources for more superficial “computer awareness” teaching (see also Table 4.8 in the Botswana case study).

¹⁸ This particular business course is expensive to mount; a school has to have a typewriting workshop, at least one typewriter to two students, computers for those schools that can afford them, and appropriate stationery. Where schools use electric typewriters, a reliable supply of electricity is a must. As a result, this subject is offered by only 3% of all the schools that registered students for the KCSE examination in 2001.

for future participation in the global economy. The enrollments, though low, had grown fast (25 in 1998 to 1,113 in 2001). There are also well-endowed private schools that have been successful in their course development (the Kenya case study points to Strathmore College in Nairobi as an example).

Some individual well-endowed senior secondary schools in Ghana are beginning to set up computer laboratories to promote computer literacy among students—particularly in business programmes. The eventual introduction of ICT has been recommended, but so far, no official syllabus has been issued; and introduction would require expenditures that the current arrangement for funding senior secondary programmes would not be able to support.

Again in sharp contrast to the two other countries, Botswana has launched large-scale introduction of ICT teaching in its secondary schools at both the junior secondary and the senior stage. Botswana distinguishes between computer awareness (non-examinable) and computer studies (examinable). Whether these subjects in terms of curriculum grouping are treated as part of mathematics and science, or as practical subjects, varies from school to school. The will to implement is demonstrated by the Ministry of Education's commitment to equip all computer laboratories by the end of 2002 and that, in addition, some other practical subject departments will get their own computers (such as art and design, design and technology, and home economics) (Weeks, Botswana case study). Schools are having difficulty replacing antiquated hardware and some are unable to spend their funds on time because they failed to cope with the tendering process. As of September 2002, access by staff to computers at most secondary schools was still very constrained. The schools had been provided with facilities for computer laboratories, but the process of procuring and installing equipment was still ongoing. The curriculum and syllabuses were still in the making.

The pioneering work in Botswana will be something for other African countries to watch, though few other African countries will have the financial resources for education that are at the disposal of the Botswana government. One early lesson is that lack of qualified teachers can remain a major obstacle even when equipment and facilities can be provided. Especially in junior secondary schools, staffing of ICT teaching will remain a major challenge given the large number of students who are to get some exposure and learn very basic skills as part of 'computer awareness' (which is to be taught to *all* students).

Assessment of Learning

In Ghana and Kenya the final assessment of student performance in vocational subjects relies nearly exclusively on external examinations. Written

exam papers carry much weight. In Botswana, there has been a shift towards continuous assessment.

In Kenya, where vocational subjects are electives, students do a practical project in the vocational subjects which counts for 10% of their final mark. Ninety percent of the mark depends on performance in the national examination. The absence of physical infrastructure and equipment in many schools drives the focus of the examination strongly toward theoretical contents in what should be a practical subject, and much of the theory tested is memorisation of factual material rather than ability to interpret and apply. These features of the examination tend to reduce what should mainly be learning of practical skills, to memorisation of facts.

In Ghana, in most subjects, there is a mix of theory papers and other assessment forms—‘practical paper’, practical examination, or in some cases practical projects carried out over a longer period. However, very few problem-solving questions are found in the exams. There is emphasis on knowledge and understanding of subject matter, insufficient attention to practical skills; and little official recognition of newer assessment approaches such as criterion-referenced assessment or portfolio-based assessment.

Ghanaian teachers rely directly on examination syllabi from the West African Examinations Council or on previous examination questions for clues on what to emphasise in teaching of vocational subjects. Course syllabuses are not widely available; and not all topics examined in the West African Examinations Council (WAEC) syllabi for senior secondary school are found in the syllabi in vocational subjects.

Botswana has previously gone much further than the other countries toward giving weight to practicals and is strengthening this trend. Up to 50% of each student’s final grade will be made up of marks on practical tasks and of the student’s individual project. Continuous assessment will count toward final assessment (Weeks, Botswana case study) and research projects/practicals, which are projects carried out by students and portfolios of their work, are to count strongly in that assessment, with procedures depending on the subject concerned. For example, in food and nutrition as part of home economics, the individual project (or portfolio) counts 30% toward the overall grade, two practical tests add up to 20%, and a final exam counts 50%. The individual project (or portfolio) is in turn assessed as follows: presentation 5%, task analysis 10%, planning 10%, investigation and research 30%, realisation/model/design 20%, communication 10%, and self-evaluation by the student 15%. Problems in the implementation include lack of teacher skills and lack of available reference materials to support the new methods of teaching and assessment.

The case studies show great variation as to how assessment techniques give recognition to practical skills. Botswana has progressed the furthest in this regard and Kenya the least. In Kenya and Ghana, there is still heavy reliance on pen-and-paper exams that mainly test memorisation of facts in the vocational subjects.

5 Are Vocational/Practical Subjects Doomed to Lack Attraction?

It has been claimed that vocational subjects lack attraction for students and their parents because white collar work carries more status and vocational subjects are not perceived to lead to good economic prospects (Foster, 1965; Urevbu, 1988). Often, vocational subjects are perceived by people outside these fields as mainly suitable for the academically less able, compared to purely academic secondary education. Is such 'lack of attraction' a problem under the conditions of scarce education and training opportunity that characterise the condition of youth in sub-Saharan African countries?

Kaluba (1986) noted the select character of technical secondary schools in Zambia (about one-third of their curriculum was vocational) and showed that practical industrial arts subjects were popular with students also in purely academic secondary schools. Wright (1988) reported similar findings from Sierra Leone. More specialised vocational training *can* be more select in its intake than academic secondary schools. In Eritrea today (see Annex 2 in World Bank, 2002) the technical secondary schools—which are about one-half vocational in terms of curriculum time (but which also qualify for university entry)—have much lower drop-out and repetition rates than purely academic schools, in part because they have an *academically more select* intake of students.¹⁹

Also in economically advanced countries, there is no iron law that relegates academically low-performing students to vocational subjects. In Norway during the 1980's, the *average* grade point was typically higher among students entering the academic line of study in the post-compulsory part of the school system,

¹⁹ This does not mean they are successful in all other respects. Students are dissatisfied with the quality of the technical courses and since these courses do not count in the examinations, they concentrate their efforts in the final year very much on their academic courses. Though students entering the labour market have few problems finding work, most students go to higher education but then without being given preferential treatment in access to technology courses because of their technical school background. Thus, in most cases they are unlikely to make use of their 'technical courses' from secondary schools in their career.

than among students entered vocational lines, but the *minimum* grade point average needed for entry was lower in the academic line.

Kenya

In the mid-1980's, the technical secondary schools in Kenya (about one-third vocational) were on par with general secondary schools of high status in attracting academically select students from primary schools (Lauglo, 1989). Similarly, in most of the academic secondary schools offering Industrial Education subjects, students who chose these vocational subjects as an examination option were *academically* outperforming purely 'academic' students in mathematics (Lauglo, 1985; Lauglo and Närman, 1987). The same research found strongly positive views of vocationalisation among parents—according to a special survey carried out in 13 of the schools covered in the study (Lauglo, 1985:42–48).

With the cessation of donor support and the thin spreading of vocational subjects across the entire system of secondary education (as part of the 1986 structural reform), attitudes may have changed. The vocational subjects are severely under-equipped and usually taught by teachers who lack adequate training. The Kenya study observes that 'it is increasingly clear to the more informed Kenyan parents that the post-graduation success of their children has little to do with the acquisition of vocational skills in a context of a depressed economy where employment opportunities are shrinking every year', and that the policy of making parents financially responsible for the cost of workshops and equipment caused loss of attractiveness of these subjects to parents and students—so that students who do well academically rarely take vocational subjects today. The impression gathered by the case study is not uniformly bleak, however. There are individual instances of schools where vocational subjects such as metalwork, home science, and woodwork are adequately equipped and well taught, and then these subjects can be quite attractive to students. One would also expect computer studies to attract student interest.

A recent survey of students and teachers in five (out of eight) provinces by Nishimura and Orodho (1999:48–51) showed that vocational subjects were more popular among students than among teachers, and that 34% of the students (out of a sample of 193) put down either agriculture or another vocational subject as their 'best liked'. They were also asked to state their opinion about the usefulness of vocational subjects. Forty-eight percent of the secondary school students (compared to only 6% of their teachers out of a sample of 104) thought these subjects were necessary and important.

A subject will be attractive to students when they think they have a good chance of doing well in it—passing the exam and getting a good grade. Since

many schools have a high failure rate, the urgency of the need to do well is great. Students will shun subject options in which they think they likely will fail and gravitate toward those in which they hope to do well. Are vocational subjects popular among students only when they are perceived as ‘soft options’?

In the mid-1980’s, the Industrial Education subjects in Kenya were definitely not perceived by teachers and students as soft examination options (Lauglo, 1985). The Kenya case study records the impression from 2002 that students see some vocational subjects as relatively easy to pass and do well in, and thus as a chance to boost their grade point average. This may matter more in Kenya than in some other countries, because vocational subjects towards the grade point average for higher education admission, and for certain studies in higher education confer extra points. It is likely that vocational subjects in Kenya *became* soft options in the 1990’s when vocationalisation was introduced on a mass scale. Nishimura and Orodho (1999:49) conclude from their 1999 survey that the teachers would state that the lack of basic learning/teaching facilities in school has made the teaching of vocational subjects a mere joke—and that ‘students do not have to struggle to pass’.

Botswana

The Botswana study confirms the impression that students shun courses in which they think the chance of passing is low by reporting that enrolment in design and technology, and in fashion and fabrics declined in schools where O’level results had been poor the year before. The study further notes that attractiveness will also depend on what other subject options a vocational course can be combined with. If vocational subjects can only be combined with the less demanding variants of science (at some schools in Botswana), they will tend to be perceived by students and parents as suitable for the ‘less able’.

Ghana

A frequent worry among vocational staff who were interviewed in the four schools covered in the present Ghana case study was that vocational subjects are seen by students and non-TVE teaching staff as suitable mainly for academically weak students. A study by Ampiah (2002) of attitudes among JSS students to different school subjects found that vocational subjects rarely ranked among the best liked subjects, especially among boys. The Ghana case study pointed to some differences among vocational programmes in the academic calibre of their students. Agriculture tended to recruit students of lower academic calibre than did ‘technical programmes’.

Regardless of the relative attractiveness of vocational subjects in the eyes of others, what matters more is the commitment of those who take these subjects and of their teachers. Relatively low status vis á vis academic subjects need not be much of a problem when opportunity for any kind of education and training is scarce. King and Martin (2002:18) report from a survey of seven highly select senior secondary schools in Ghana that those who were enrolled in vocational programs had supportive attitudes toward their choice. Students were asked to indicate the two school subjects ‘that would help you in the work you want to do’. It was found that they nearly always picked the subjects that were at the heart of their specialisation—also when their specialised stream was vocational.

In general, earlier research and the present case studies converge in supporting the conclusion that there is no iron law of ‘low’ attractiveness of vocational subjects. Even when such subjects may be seen as suitable for the ‘less able’ in the eyes of others, these subjects can have committed students and be taught by committed teachers. Nor is there an iron law that says that vocational subjects lack attraction to academically well qualified secondary students. When vocational subjects can be combined with a sufficient load of academic subjects to make students eligible also for further academic education, they can have attraction as ‘something to fall back upon’—as a means to hedge one’s bets on continuing higher up the educational ladder. Such attraction will be boosted when vocational subjects are well taught and well equipped, and when they are perceived to give advantage for opportunities in the future.

In those cases when vocational courses tend to be seen as inferior to academic courses *within* secondary education, it does not follow that *vocational education and training* more generally need suffer from *insufficient* attractiveness. When any kind of educational opportunity is very scarce, vocational courses can be more than ‘attractive enough’ to stimulate interest among the great number of youth looking for opportunity. In the late 1980s, the competition to get into national vocational training centres in Tanzania was exceedingly great though the entering trainees may well have preferred to go to general secondary education.²⁰ In 2002 a post-O’level vocational training course in Botswana with space for 180 trainees was advertised and received 18,000 applicants.²¹ The lesson is twofold: there is no iron law which says vocational courses are always less attractive to their clientele than the purely ‘academic’ courses to which the vocational courses serve as alternatives. Second, inferior attractiveness of such courses in the eyes of students who go elsewhere is not necessarily a problem. What matters is whether vocational courses are in strong enough demand to attract learners who will be well motivated and competent at their learning tasks

²⁰ Lauglo (1991).

²¹ Personal communication from Sheldon Weeks.

and interested in using their skills in the labour market afterwards, if given the opportunity.

Gender Inequity

All three countries have gender biases in their vocational enrollment. Boys gravitate towards subjects that are associated with traditionally male occupations: building and construction, and mechanical workshop subjects. Home economics is nearly exclusively taken by girls. Other subjects already have a degree of mixed recruitment, notably business subjects/office skills and agriculture which also are subjects that schools frequently offer. It is noteworthy that in Kenya, enrollment in computer studies is fairly well gender balanced.²² Differences among subjects as to gender balance will partly be due to supply, e.g., single sex schools offering only certain options. Or they reflect gender biased demand: each sex being swayed by sex roles when choosing among the available options. The country cases studies report no action to mitigate gender biased enrollment patterns, though mention may be made of gender equity concerns in the syllabus objectives (at least in Ghana).

6 Costs

Unit costs per student class hour will vary among subjects, depending especially on class size, facilities and equipment required, and consumables expended. For example, for vocational classes cost is driven up when teaching is conducted in half-classes for pedagogic and/or safety reasons. Since most vocational courses require such teaching in 'half-class' groups while most academic courses do not, and since most vocational courses require more equipment and consumables than academic courses, a rule-of-thumb estimate is that the unit cost in vocational courses will be at least twice that of the generality of academic courses, but sometimes the ratio is much higher. Around this trend will be important exceptions, e.g., accountancy may be much the same cost as mathematics, agriculture if taught to a full class can be cheaper than laboratory science—in a secondary school that has the land to begin with.

In his analysis of curriculum costs of Industrial Education subjects in Kenyan secondary education in the 1980's, Cumming (1985, 1988) noted that in addition to such variation among subjects, there is very substantial variation in unit costs among schools in the same subjects. Some of this reflects differences in capitalisation costs but there is also much variation among schools in efficient

²² Kilemi Mwiria suggests that girls are given an added impetus to take computer studies because this subject is a prerequisite for access to modern-sector secretarial occupations.

utilisation of facilities and available teaching resources. The findings produced by our country case studies will reinforce these earlier conclusions. Vocational subjects are as a group more expensive than academic subjects, and there can be very great variation among schools.

Kenya

Table 1.2 below sets out 2002 cost estimates in Kenya from five school sites visited by Mwiria during the Kenya case study, costing one facility from each site. Costs of teaching, of books, and of examining would be in addition to these figures. Cost per student-place is high for these vocational subjects compared to a standard classroom or a science laboratory. Older estimates of unit capital costs for a greater range of vocational subjects are available for Kenya. Table 1.3 shows estimated cost-relativities for the early 1980's, when donors helped finance facilities and equipment for technical subjects in Kenyan secondary schools. It is based on Ministry guidelines for construction and equipment costing as applicable at that time. The figures show cost relativities among some of the then-existing subjects, when depreciated capital costs per student-place in a regular classroom is set to 1.²³ Table 1.2 and Table 1.3 should primarily be seen as illustrative of the great range in unit cost among different subjects, both in the early 1980's and at present. There are some differences in the estimating procedures used. In addition comes the variation among schools which is not shown in these tables. The five subjects which in 1984 had the highest development costs are those which the Ministry recently has decided to phase out.

Computer studies (not offered in 1984) is also being closed. The Kenya study notes that in a public school the average costs for computer studies would be about half of the cost for the private high-cost school in Table 1.2. If so, the unit cost of computer studies in public schools would not exceed the cost of woodwork and home economics. As noted earlier, the cost of providing facilities and equipment in Kenya falls upon the parents, leading both to much dissatisfaction with costly subjects and many inadequate facilities. It is not surprising that agriculture and commerce/accountancy often are chosen. These are cheap options.

Less than optimal use of expensive facilities is a source of inefficiency in vocational subjects. Using exam entries at 11 schools to class sizes in the pre-examination class, Mwiria (Kenya case study) noted distinctly small class sizes

²³ The cost of land was not included for agriculture. Expenses on consumables were not included. These relativities are exaggerated, since the cost of desks was not part of the baseline costs of a regular classroom.

Table 1.2 Estimated costs of a science laboratory and vocational workshops in 5 Kenyan schools (in US\$ equivalent)²⁴

Subject	Cost of building workshops (1)	Cost of Equipment (assumed usable for 5–10 years) (2)	Consumables (yearly) (3)	Student-places (based on exam entries) (4)	Estimated cost per student-place (5-year period) (5)	Cost relativity per student-place (classroom = 1) (6)
Computer studies (private high-cost school, Nairobi)	20,000	25,000	2,000	17	553	15.8
Home science (public, low-cost school, Bungoma)	40,000	25,000	500	22	600	17.1
Woodwork (public school Nairobi),	25,000	10,000	1,000	19	379	10.8
Science lab. (chemistry) (public school, Meru)	30,000	10,000	1,000	90	91	2.6
Standard classroom (Kiambu)	5,000	1,500	200	40	35	1

Source: Mwiria, Kenya case study.

Notes: (1) 1 US\$ = 78 Kenyan Shillings as of June 2002; (2) The estimates for the computer facility are for a top-of-the-line private school. The average cost in a public school would be about half of the cost of this high-cost private Nairobi school; (3) Construction and equipment costs are on average 10% higher in the rural than urban areas; and (4) A woodwork workshop (if using basic hand tools) is much cheaper to set up and maintain than workshops for other industrial subjects.

²⁴Source: Ministry of Education, Science and Technology and school-level data (5 schools) (2002).

Table 1.3 Estimated ratios of capital costs per student-place by subject. Kenya 1985 (1 = normal classroom)

Agriculture (simplest structure)	1.1
Agriculture (more permanent structure with fitments)	2.0
Accounts/commerce	2.5
Science	3.8
Domestic science	5.6
Typing/office practice	5.7
Power mechanics	9.5
Woodwork	10.0
Electricity	14.0
Metalwork	14.5

Source: Lauglo (1985): Table XII-4; using data supplied by Cumming (1985).

of vocational subjects, smaller than in science courses. While the mainstream sciences enrolled an average of at least 30 candidates for the KCSE examination, vocational subjects—except for commerce and to some extent accounting—enroll fewer than 20 candidates and in some cases fewer than five. Thus, the Kenyan experience indicates that not only are vocational subjects expensive to develop ‘per student-place’, but the volume of such places available in a school could be made better use of. Inefficient use of ‘places’ has been a problem for some time in the Kenya system. Looking at the actual use in the schools in comparison with the utilisation norm worked out by the Ministry of Education, the 1985 study of Industrial Education in Kenya (Lauglo, 1985) concluded that these expensive facilities were considerably underutilised during the school week, especially so in small schools.

Ghana

The Ghana case study collected cost data from four senior secondary schools. At the senior stage these courses are optional. Great variation among schools in teaching cost was noted, reflecting class size. Class size will be a function of total enrollment, the timetable, and the choice probabilities. The Ghana study noted that vocational courses sometimes will be undersubscribed in small senior secondary schools, thus driving up unit recurrent cost in such institutions. Table 1.4 below illustrates the very great variation among both subjects and schools.

For two schools it was possible to estimate total unit costs per year, inclusive of annualised capital costs. It is interesting to note that the difference in total

Table 1.4 Teaching costs per student period for technical subjects and agriculture across three schools in Ghana (Ghanaian ¢)

Subjects	Teaching cost per student period		
	Mfantshipim school	Mankessim school	Oguaa school
Building technology	4,723	1,898	22,289
Technical drawing	16,572	1,898	22,289
Woodwork	58,205	—	66,869
Metalwork	48,702	1,898	n/a
General agriculture	n/a	8,816	8,426
Crop horticulture	n/a	9,780	8,426
Chemistry	604	8,412	n/a

Note: ¢ = US\$ 0.0001 as of 12.16.02; n/a: not applicable.

Source: Akyeampong, Ghana case study: Table 5.15.

unit costs among different curriculum programmes was mainly due to recurrent costs (Akyeampong, Ghana case study: Table 5.19). The total unit cost of the technical (vocational) programme was in this case more than three times the unit cost of the general education arts program. For comparison, the general education science programme was more than twice the unit cost of the arts programme. However, there was not much difference between the business programme and the arts programme—if anything the business programme was in this case cheaper! Both are taught to ‘large classes’.

Botswana

In Botswana, the estimate indicates that agriculture is a relatively low cost vocational subject, while fashion and fabrication is highly expensive (mainly due to differences in class size). If an annual student-place English is used as the measure rod, Table 1.5 shows what the cost ratios might be for other subjects.

Among these subjects in Botswana, class size vary greatly. ‘Normal’ class sizes in main academic subjects are about 40 students. The size for the subjects in Table 5.5 ranges from close to ‘normal’ in the case of science (35) and agriculture (30), to intermediate in the case of design and technology (20) and computer studies (20), to less than ‘half-classes’ in the case of food and nutrition (16) and fashion and fabrication (12). A mix of pedagogic considerations and safety safeguards lies behind these smaller class sizes in vocational subjects.

Since costs of vocational subjects usually are distinctly ‘high’, with some exceptions, it is important to assess the cost implications of decisions to invest

Table 1.5 Ratios of estimated subject cost in Botswana (1 = normal classroom for, e.g., English)

Mathematics	1.1
Science (lab)	1.4
Agriculture	1.4
Design and technology	2.6
Computer studies	3.4
Food and nutrition	3.1
Fashion and fabrication	4.0

Source: Weeks, Botswana case study.

in such subjects—not merely facilities and equipment and other tooling-up expenses (e.g. new teacher training), but also the long-term recurrent costs which can be daunting when subjects are taught to small classes. As will be noted below, research on the labor market benefits of vocationalised secondary education is very scanty (and granted, the assessment of benefits should not only focus on economic pay-off when there are other educational objectives). But in any weighing of the overall worthwhileness of introducing vocationalised secondary education, cost analysis is relevant even when no attempt is made to quantify the benefits. One could ask what would quantified benefits *need to be* to justify the estimated greater cost, and is it reasonable to assume such levels of benefits?

7 Learning Outcomes

Little information is available about what is learned in vocational subjects. Pass rates are available to indicate roughly the rate of minimum satisfaction of learning requirements within each subject, and how schools compare in this regard. In Botswana, in 2001, there was a dramatic variation *among* vocational subjects with regard to pass rate and the rate of ‘Credit’ awarded. Such variation is also found among academic subjects, and it does not seem to be generally ‘easier to pass’ in vocational subjects (Weeks, Botswana case study, Tables 4.6–4.7). If an exam is well designed, such rates will indicate something about whether students meet what the examiners think are standards of adequate performance, but they will convey little information about the extent to which the objectives of vocational subjects are achieved, especially when assessment is not criterion referenced.

The work under way to map the quality of learning outcomes in Southern Africa, the Southern Africa Consortium Monitoring Educational Quality (SACMEQ) has yet to address vocational subjects. Testing of criterion-referenced performance objectives could be developed but would require that

curricula also were stated in terms of such objectives, and it would still leave process goals rather elusive. Any direct measures of what is learned were not available to the case studies.

Do Attitudes Need Improving, and Does Vocationalisation Improve Them?

The few empirical studies that have examined secondary school students' occupational aspirations and expectations in African countries find no pattern of aversion to practical or technical work though obviously students will work with better pay and job security within a given 'practical' or 'technical' occupational sector. Nor did Foster's (1965) now classical study from Ghana in the late 1950's show much lack of interest in practical/technical work. Rather, the problem facing secondary school students then was a lack of realistically available opportunity to obtain such work (in contrast to a career in primary school teaching for which the opposite was the case). The same finding was made in Kenya in the early 1980's (Lauglo and Närman, 1987). But in contrast to Foster's claim regarding Ghana that curriculum change will not affect attitudes (an inference for which he had no direct evidence), the Kenyan finding indicated that curricula *can* change attitudes. Substantial donor support for vocational subjects (workshops, equipment, technical assistance) in the Kenyan case may have given these subjects a strength that helped make such effects possible. Both for Kenya in the 1980's and for Ghana in the late 1950's, one could however argue that there was no need for subjects to be introduced in order to help bring about 'attitude change'—what was lacking was opportunity in practical and technical occupations.

There is very little recent research on these issues. Very few secondary students in Kenya would prefer to join the informal economy immediately after school, according to Nishimura and Orodho's recent study (1999:55). On the other hand, 44% of 193 students surveyed at the seven secondary schools in their sample did indicate that their plan/preference was to 'join a vocational and technical training institution' and another 8% indicated 'join an agricultural institution'. Thus, favourable attitudes to vocational and technical education and training after secondary school, and to subsequent work in technical occupations, are quite common.

Industrial Education (IE)

Attitudes to work will be shaped by perceptions of the labour market, but these perceptions are not precise—they are through a glass darkly. The great majority of parents of students who took IE subjects in the Kenyan secondary

schools of the early 1980's had high expectations for the labour market value that 'industrial education' subjects could have for their children (Lauglo, 1985, Chapter VII). But unfortunately tracer studies showed that this optimism was not borne out.

Given the great problems that secondary school graduates in sub-Saharan African countries have in finding a livelihood, or opportunity for further education and training (which typically is their strong first choice), one would expect 'lack of interest' in practical or technical work to be a major problem. As argued in Foster's (1965) classical paper some forty years ago, the problem as perceived by graduates themselves is now as it was then, lack of opportunity.

Does Vocationalisation Lead to Interest in Self-employment?

Research in Ghana by King and Martin (2002), which is discussed in some greater detail in the Ghana case study, indicates that vocationalisation can play a part in developing mental readiness among secondary school students to make a living by entrepreneurship and preference for working in the private sector. Self-employment, when it does occur, tends to come after years of experience from first having been employed by someone else and benefiting from skills, capital, and contacts gained during employment. Among those few graduates who in the very short run become self-employed, self-employment is typically in the informal economy and then an option of last resort for those unable to get a modern sector job. This is well documented in the present chapter on Mozambique. But the Ghana findings suggest that vocational subjects can stimulate an interest in eventually becoming self-employed—given the kind of opportunity structure that students now perceive in Ghana.

Sheldon Weeks notes about Botswana that the transition to self-employment usually follows working for one's parents or relatives on their land or in their business (formal or informal). Under such circumstances, there will often be a long wait before a person becomes self-employed by taking over the family farm or business.²⁵

It is an open question whether taking vocational subjects in secondary school will make future entrepreneurs more successful—even if such subjects may have motivating effect—at least in the short term. More schooling is probably generally helpful for entrepreneurship, even if self-employment in the informal economy is perceived as a livelihood of last resort. Lane and Peresson (2000) in a study from Madagascar found that micro-entrepreneurs with higher levels of education were more successful in their business than those with less schooling.

²⁵ Comments from Sheldon Weeks on draft text.

Does 'Enterprise Education' Help Prepare Entrepreneurs?

A review has recently been carried out by Farstad (2002) on enterprise education. It involved field studies in Botswana, Kenya and Uganda and focused on entrepreneurship education offered to students in schools or specialised vocational training centres.²⁶ The review describes the structure and contents of enterprise education. In preparation for enterprise there is manifest case including such skills as keeping accounts, marketing, costing of jobs—and other basic elements of business arithmetic.

Teaching *about* enterprise can of course also be part of social studies. But the teaching *of* enterprise seems to require that it be tied to some specialized technical skill e.g., craft, retail business, farming. The review shows that enterprise education targets students and trainees in specialized pre-employment vocational education and training rather than in vocationalised secondary education.

In the case of vocationalised education there will necessarily be less time to include such skills; and there will be less depth of technical skill to which entrepreneurial education could be tied, than in specialised vocational training. Regretably, no findings could be located by Farstad regarding the outcomes and impact of such education in vocational training either—at least not in the African context, neither could any analysis of cost be located.

Is There a Labour Market Payoff?

What may work well in a buoyant labour market will not be generalisable to a depressed labour market. Conversely, bleakly pessimistic conclusions about weak external effectiveness of skills training under severely depressed labour market conditions, may understate the potential of skills training in countries with better market conditions. What might work well in a pilot stage with few schools, need not work if the market is flooded when seemingly successful skills training is introduced in a much greater number of schools. For skills training to ease transition to work a certain threshold of quality and level of skill is likely to be needed. What may work well for vocational education and training may not work for thinly spread vocationalisation. In general, whether a given type of skills training eases transition to work or is generally externally effective (boosting pay and productivity) will depend on market conditions and on the level of skill acquired.

²⁶ Farstad's study was commissioned by the Human Development Department of the Africa Region of the World Bank, as part of the Regional review of vocational skills development.

Since studies requiring specialised expertise and frequently also considerable expense (tracer studies) are usually needed to assess impact, research on the labour market benefits that derive from particular curriculum combinations in school is internationally rare. Few studies have been done in Africa. Many of those that made use of fairly large samples may now begin to look dated. Most of them have been done in the context of extremely depressed labour markets. Those that have sought to gauge the labour market impact of the kind of ‘light dosage’ skills training which typifies vocationalisation have consistently shown disappointing results.

Psacharopoulos and Loxley (1985) carried out a tracer study in Tanzania (and Colombia) that compared students from mildly vocationalised tracks of secondary education with students from purely academic tracks. Estimating the internal rate of return to investment, they found lower returns to the vocational tracks than to the academic ones. In addition (and more convincingly to skeptics of rate-of-return analysis) they found that the vocationalised courses conferred no advantage over academic ones in obtaining employment.

Närman and Lauglo conducted a tracer study on graduates in 1986 from five Kenyan technical secondary schools which had a mainly academic curriculum but with one-third of the timetable devoted to theory and practice in technical subjects (71% response rate, $N = 480$) (Närman, 1988b; Lauglo, 1989). When traced approximately one year after graduation, only 15% of the graduates had either continued to “relevant” further training or found a job for which their technically biased secondary education could be said to have been broadly preparatory. Eight out of ten were either continuing to further general education (39%) or they were unemployed and looking for either work or some opportunity for further education or training (42%). Only one person was self-employed. None had obtained an apprenticeship even though preparation for apprenticeship was one of the declared objectives of this type of school.

The study of Kenyan Industrial Education (IE) subjects included a tracer study that reached more than a thousand students (71% of the target sample) 27 from junior secondary schools. IE gave even less time for vocational subjects: three to five periods per week. The results from the tracer study were disappointing. After one year, roughly four-tenths were continuing in academic education. Roughly four-tenths remained unemployed. Only 5% had secured further training of a kind for which the IE subjects were broadly relevant (Lauglo and Närman, 1987). In the IE study it was also possible to compare those who had taken industrial education for four years with those who had only two years exposure and those who had no IE. Having had some IE (or having had more IE) did not help ease the transition to work as compared to those who had no IE. However, the IE studies did show a wide range of episodic and private use of skills acquired—e.g., ‘fixing things’ at home and helping friends or neighbours,

but no impact in terms of finding employment (let alone self-employment). A three-year tracer study was also conducted (Närman, 1988a) on the same sample. Again, there was no association between greater previous exposure to IE subjects and having a job. More worryingly, the overall percentage of those who had neither found work nor been able to continue in school had not declined since the one-year tracer.

In the IE studies, the quality of school credentials (passing the exam, the grade/mark obtained) did not seem to improve a person's chance of finding work (Lauglo and Närman, 1987). Under such general labour market circumstances, it is hardly surprising that IE failed to make a difference. One would think that in labor markets with staggeringly high rates of youth unemployment, such as Kenya since the early 1980's, finding a job of some regularity will depend strongly on networks and sponsorship, thus making credentials count for little.

These disappointing findings contrasted with the high optimism that Kenyan students and parents actually had about the usefulness of skills acquired in IE, as 'something to fall back on' in order to make a living. Apparently parents and students can have quite unrealistically optimistic ideas about what gives advantage in the labour market. The finding of optimism among students is echoed in a recent survey of students still in school in Kenya by Nishimura and Orodho (1999:50). Their study included samples of students and teachers from seven secondary schools in five provinces. Students were found to be strikingly more optimistic than their teachers in their judgment as to whether their vocationalised curriculum prepared them well for the world of work. A clear majority of students gave favourable ratings in this respect. However, eight-tenths of the teachers disagreed—and thought the curriculum gave little or no such preparation. Most teachers also noted that the vocational subjects ended up being too 'theoretical' to give adequate preparation for the world of work—reflecting what must be their frustration with inadequate conditions for teaching these subjects.

Under more favourable labour market conditions, and when skills are taught to greater depth (more aptly seen as vocational education than merely as 'vocationalisation'), the prospects are better for adequate external effectiveness. Chin-Aleong (1988) conducted a study in Trinidad-Tobago when there was brisk demand for skilled workers in that country. Vocationalised secondary education that included a minor portion of the timetable failed to have any clear effect on the chance of finding employment, but more specialised training in comparable areas of skill did improve the prospects of employment. Similarly, a study in Eritrea by Atchoarena and Tekie (1997), which was also conducted at a time (1996) when demand for skilled labour was brisk, showed high transition to 'related work' among graduates from technical secondary schools (which devote about 50% of curriculum time to vocational subjects).

Another quite successful example are the ‘technical schools’ at lower and upper secondary levels in Mozambique which are examined, along with other provisions, according to the tracer study reported in the chapter by Billetoft and Austral Consultores in the present volume. In spite of natural catastrophes and pervasive poverty, the modern sector in Mozambique has shown ten years of dynamic growth; and there are wide spread impressions of persistent shortages of labour at the high-skill end of the labour market. In spite of many weaknesses evinced in low internal efficiency, the technical schools achieve surprisingly good labour market absorption for graduates, also in private sector employment. Among the graduates from different types of technical secondary schools, the tracer study found that hardly anyone was overtly ‘unemployed’. Even if informal sector self-employment were considered as hidden unemployment, very few are not either working or studying—3 years after they left school. (For more details see the chapter in the present volume, and Austral Consultores, 2003.)

The Mozambican technical schools of the Ministry of Education follow a timetable with more hours in toto than what is found in the general secondary schools which run parallel to these technical schools. The technical schools devote 30–40% of curriculum time to vocational subjects. In addition, most students obtain a period of workplace attachment in business and industry, organised by their school. In terms of ease of absorption in the labour market, the most successful type of technical school is at the upper secondary (‘medio’) level. Its courses are of 3 and a half years duration, inclusive of the workplace attachment, as compared to two years in the academic upper secondary schools. As of 2002, the objective was to increase further the share of time being devoted to technical subjects in the technical schools.

The three country case study countries (Botswana, Ghana and Kenya) uncovered no new tracer studies. In 1994, the Revised National Policy on Education in Botswana called for tracer studies, but no study has been done. Five (of 27) senior secondary schools had once been part of the Education with Production movement which was strong on outreach and community involvement. Next to nothing is left of this earlier outreach today. Rather, there is a shift to greater emphasis on guidance and counselling, but there is no evaluative information about how such services are functioning. Nor do the country case studies of Kenya and Ghana report any outreach activities by schools to cultivate labour market links.

The Ghana case study notes that the ‘economic relevance’ argument for vocationalisation is assumed to be valid by many persons close to schools. This was the case for the overwhelming majority of senior secondary teachers interviewed by the study. However, there has been no empirical study to check the economic relevance of the vocational courses.

The Kenya case study notes the impression that top students in computer and business studies find good employment even while still enrolled in secondary school, and that some of those who join university do part-time work in ICT.

To conclude: So far no tracer study has shown that vocationalisation implemented on a large scale in developing countries confers any advantage in access to employment (let alone self-employment) under conditions of highly depressed labour markets for youth. The examples which seem to work decidedly better are from labour markets in which the demand for skilled work is buoyant, and the better working provisions involve a greater concentration of skills teaching than that which typifies vocationalised secondary education. It is reasonable to interpret the Mozambique findings in support of such a conclusion.²⁷ This is not to say that these ‘better examples’ are satisfactorily ‘successful’. For example, the Mozambique technical secondary schools have very low internal efficiency, so that the graduates who get jobs are a minority of survivors among those who entered the courses; and the output from the technical schools is very small compared to the mainstream of secondary schools. To ensure adequate labour market responsiveness and good use of training resources institutional measures are likely to be required.²⁸

What Can Vocationalisation Achieve in a Rich Country under Favourable Conditions? The Case of U.S. High Schools

The U.S. high school may be instructive as to whether the limitations noted in African countries would also apply under decidedly more favourable circumstances. The U.S. high school is vastly better resourced than secondary schools in African countries; and the labour market of course much more favourable for its graduates. The U.S. high school is also one of few ‘northern’ systems with a body of research on the labour market impact of vocational courses. Research in the 1970’s and early 1980’s presented on the whole a pessimistic picture on vocational courses in the U.S. high school. At the time, that pessimism may also have contributed to international skepticism among economists of education about investment in school based-vocational courses. Caution against ‘light dosage’ vocationalisation has been borne out by further research in the U.S. But recent research shows positive payoffs to ‘stronger dosage’ of technical–vocational courses—parallel to findings in some African studies mentioned above.

²⁷ A limitation in that study is lack of comparable figures on labour market absorption among graduates from academic secondary schools.

²⁸ See Johanson and Adams (2003) for a discussion of overall VET strategies, and Atchoarena and Delluc (2003) for a discussion of recent innovations in school-based VET in sub-Saharan Africa.

For those who entered the labour market after high school in the 1970's rather than continuing their education, early research seemed to find little or no labour market benefits of having had exposure to vocational courses. There was then one major exception: office practice skills led to higher income—but only for girls, not for boys (Meyer, 1982). There was a large labour market for such office skills, but it was strongly gender structured. The nature of these skills has changed over time (computer applications is now essential), but schools have all along been in a good position to teach basic office skills because mode of teaching, equipment, materials required to teach such skills is relatively compatible with the 'logic' of mainstream general education subjects. U.S. research suggests, however, improvement over time from these earlier cohorts from the 1970's to cohorts coming out of the high schools in the 1980's and more recently.

A research review by Bishop in 1995 showed positive labour market payoffs across a wide range of vocational skills—for *the more advanced vocational skills courses*, and positive economic returns to office skills were now evident also for males (Bishop, 1995:60–66). However, the review noted that the connection between vocational courses which students take in high school and the work which they later find can be loose and that payoffs can hinge on the student being able to obtain a 'training-related job'.²⁹

The most recent findings on the external effectiveness of the U.S. school are presented in Bishop and Mañe's chapter in the present volume, along with a literature review on the U.S., and their comparative analysis. Their findings are based on a large set of longitudinal data from a national follow-up survey of students in high school between 1988 and 1992. Using regression analysis, they found no economic benefit of introductory *level* vocational courses. But those who had trained for specific occupations by taking advanced 'careers-technical' courses, were decidedly more successful in the labour market. Compared to those who only had taken 'academic' courses or a combination of academic and personal interest courses, persons who had taken advanced vocational courses spent more time in employment, got better jobs and earned more than students who did not take such courses; and the estimated benefit–cost ratios for advanced courses were high. To explain the 'improvement' in results over what studies from 1970's and early 1980's had indicated, Bishop and Mañe

²⁹ This problem is not unique to vocationalised secondary education. It also applies to vocational education and training. Findings on vocational training systems widely thought to be 'advanced' suggests that when vocational training is provided on a mass scale, it will have relatively loose couplings with the students'/trainees' later work. In the 1980's, roughly half of those trained in school-based vocational training in Sweden, or in apprenticeship-based training in Germany, would, a couple of years after their training, have jobs that were not even broadly training-related (Lauglo, 1993).

point to rising demand for higher skill levels, improvement in the quality of courses, and schools having become more proactive in outreach to employers. No special ‘demand drive’ mechanism has been put in place by state governments in the United States, in order to ensure a degree of automaticity in the demand-responsiveness of the schools.

Since the bulk of vocational courses in the U.S. high school are organised within mainstream secondary schools, the U.S. findings shows that there is no international iron law which dooms vocational courses taught in a mainly ‘general’ school, to dismal labour market payoff. But it should also be noted that the high school students undertake their vocational courses with a substantially better grasp of general education skills (e.g., in Mathematics and Science according to the Trends in International Mathematics and Science Study (TIMSS) study) than what is the case for students in vocationalised secondary curricula in sub-Saharan Africa, something which will make a difference for the skill level one can aspire to, and for the delivery of vocational courses. One might also expect that the ratio of vocational unit costs to general education unit costs will be lower in economically advanced countries, so that the ‘greater expense’ deterrent is less an impediment to introducing vocational subjects in these countries than in developing countries.³⁰

Does Vocationalisation Lead to Related Further Training?

In sub-Saharan African countries, educational careers are severely constrained by lack of access and insufficient means to bear the direct and indirect cost of education. But the will to overcome such barriers is strong. The Mozambique tracer study found that among those who were in full-time employment, 3 years after graduation from a school or training centre, nearly one quarter said they were also in the process of continuing their studies—usually in evening courses.

At transfer to the upper secondary level in the Mozambican system, a high proportion continue in the technical specialty they have previously pursued at lower secondary level—if they continue at all. This is especially so for graduates of commercial schools (85% of those who continue), and least so for

³⁰ Because of the very much higher teacher salary levels in economically advanced countries, the share of cost that is attributable to facilities, equipment and supplies will probably tend to be greater (and the relative cost share of teaching inputs will be less) in sub-Saharan African countries. An extreme example of low cost share of teaching (and high cost of consumables!) was a donor supported vocational training centre in Tanzania at which the annual teaching salary and the annual electricity bill were at roughly the same level (Lauglo, 1991). However in developing countries too, normally the dominant expense of vocational subjects is the teaching cost (see e.g. the estimates in Table 4.8 in the chapter by Weeks on Botswana).

those coming from agricultural schools (only 50%). The rate of continuation to a similar technical specialty in higher education is not known, but likely to be quite low simply because of the sharper competition among those qualified, to enter higher education. Further, in highly competitive selection processes, good grade point averages can drive out other criteria such as whether an applicant has taken vocational courses at a lower level which have a bearing on the field concerned.

In Zimbabwe, Bennell and Nyakonda (1992) carried out a 1990 follow-up of the cohorts who since 1980 had graduated from vocationalised secondary education programmes at St. Peter's Kubatana secondary school. Shortly after Independence, opportunity was opening up for young Africans in many fields which previously had been closed to them. At the time, the vocationalised secondary programme was an effective (but very expensive) way of gaining favourable places in rapidly growing training queues for craft and technician apprenticeship. Half of the early 'vocational' graduates succeeded in obtaining access to such training. But these effects were not sustainable as access to apprenticeship became much more competitive. Later in the 1980's, as the competition became sharper, having a background from a technical course ceased to give advantage (p. 61).

Unlike many other African countries, Kenya gives extra points for relevant vocational courses at selection to technical courses in higher education. Other things being equal, a good grade in Business Studies counts extra for admission to a degree course in Commerce, and Industrial Education subjects give extra points for admission to engineering courses, etc. In addition, exam grades in vocational subjects count alongside other subjects, toward the minimum total point of examination scores needed for university access (Mwiria, Kenya case study). These features help boost the attraction of vocational options to students.

In Botswana, the colleges of education try to take performance in vocational subjects into consideration when they screen applicants for teacher training specialties in the same subject areas. On the other hand, the college of agriculture pays little or no attention to performance in agriculture from secondary school, preferring instead to go by marks in the natural sciences, English, and mathematics. Nor does the Faculty of Engineering at the University of Botswana give any special recognition to marks in design and technology—except for choosing among applicants who are equal in all other relevant respects.

In Ghana, vocational subjects at senior secondary level do not count towards admission to 'related fields' in higher education. In the secondary school curriculum vocational subjects are often paired with a less demanding science course which in effect bars access to higher education.

In Eritrea, graduates from technical secondary schools have a good chance of continuing to higher education compared to students in other schools, but

only because of the strong performance which these students tend to have in academic subjects. The vocational subjects the students have taken are accorded no importance at selection to higher education. In fact though vocational subjects constitute about $\frac{1}{2}$ of the curriculum time at these schools, they are not even externally examined and will thus not contribute to the grade point averages considered by e.g., the university.³¹

In general, vocationalised secondary education will rarely function as a stepping stone towards higher education studies in the same technical speciality. Kenya has been an exception among sub-Saharan African countries.

A case for giving extra admissions points to applicants with a relevant background from vocational courses would depend on whether students with such a background perform better in technical subjects as compared to other students in these subjects. Empirical research on this question seems to be lacking. The impressions from Tanzania is that graduates of technical secondary schools initially may have such a performance advantage in engineering courses, but they are overtaken by others with stronger foundations in science and mathematics.³²

8 Concluding Observations

Learning practical skills can be justified as part of a well-rounded general education. Such skills can also have their uses in private lives (e.g., agriculture, handicrafts, domestic science, accountancy).

All three country case studies underline the vocational relevance of what they variously call ‘key skills’ (Botswana), communication skills (Kenya), or generic problem-solving and creative skills (Ghana). These are neither occupation-specific skills in terms of their labour market relevance, nor are they developed in any particular subject. The follow-up study from the United States argues that labour market payoff of vocational skills is enhanced when there is simultaneous stress on minimum requirements to achievement in key general subjects.

Exposure to vocational subjects can stimulate interest in the types of work for which the subjects are broadly preparatory. Further, there is no iron law that says that vocational subjects are doomed to be unattractive to their clientele. However, the key question is not ‘interest’ but whether this type of education

³¹ Selection to the engineering faculty occurs after a first foundations year at university, and is entirely based on grades achieved in that year. Other forms of further technical education that are not part of the university may, however, give extra consideration to the graduates from these secondary schools—like Kenya in the early 1980’s, where some special consideration was given to the relatively ‘heavily vocationalised’ technical secondary schools (35% of the curriculum)—at admission to certain forms of technical–vocational further training.

³² Personal communication from Richard Johanson (consultant to the World Bank).

help school leavers find a livelihood; and does it make them more economically productive?

Governments that have pursued vocationalisation policies since the 1980's have not commissioned impact studies, but the studies which have been conducted in developing countries in the last couple of decades have failed to show that the kind of secondary school vocationalisation which affects a small proportion of the student's total curriculum—e.g., 10–20% of curriculum time, gives any advantage in finding work in the context of severely depressed labour markets.

Recent tracer study findings from Mozambique shows that when labour market demand for skills is strong *and* when vocational skills training is pursued in considerable depth as indicated by the time devoted to it, labour market absorption of those who survive in technical secondary school all the way to graduation, can be quite good.³³ However, the curriculum of these schools give much greater concentration of vocational subjects (30–40% of curriculum time) than the 'light dosage' which typifies vocationalisation. In contrast to seeking to introduce vocational subjects throughout a national system, Mozambique runs only a small number of technical secondary schools. The importance of sufficient concentration also applies to rich countries. New findings on the labour market payoff to vocational courses in the U.S. high school show that advanced courses are needed; elementary courses confer no labour market advantage.

Justifying practical courses as preparation for technical education at higher education level, or as preparation for apprenticeship, tends to be unrealistic. Only a very small proportion of students taking practical courses will later follow such routes unless special selection mechanisms are established to ensure a link.

Enrollment in some vocational courses strongly reflects traditional gender stereotypes. Examples are industrial arts subjects and subjects related to house-keeping.

The majority of vocationalisation variants are much more costly per student class-period than mainstream general education subjects, because of smaller classes and greater expense on facilities, equipment, and consumables. Regrettably, cost implications have rarely been analysed when policy decisions have been made in favour of vocationalisation. Unit costs are driven up by small teaching groups. Unless a vocational course can be taught to a full class of students, its unit cost usually will exceed an amount twice the cost of nonlaboratory academic subjects—often the ratio is much higher. But certain vocational

³³ Regrettably, there is no comparable information in Mozambique on labour market absorption of graduates from purely academic secondary schools.

subjects are typically much less costly, largely because they are taught in large classes and require little investment. Business studies and (when a school already has land) agriculture are examples. Because they are much more affordable than other vocational subjects, they are more commonly offered by schools.

There are major shortcomings in developing countries' capacity to finance and implement vocationalisation. Vocational subjects in Ghana and Kenya have been very severely underfunded, and the studies on these countries are pessimistic about their effectiveness. On the one hand, policies were driven by the political desire to make schools more 'relevant' for economic life and by the conviction that this should be achieved by introducing vocational subjects 'in all schools'. On the other hand, implementation has been constrained by high costs and greater logistics complexity than other subjects. What was supposed to teach practical skills all too often has ended up being reduced to 'theory teaching'.

In Botswana the government is in a much better position than in other African countries to finance and implement vocationalisation; and it has chosen to make major investments. However, this strong political commitment is not accompanied by studies to assess the impact achieved.

A Case for Caution

Policy on vocationalisation should be rooted in what schools are able to achieve. It must also be rooted in assessment of resource requirements—not just the financing of subjects (which in most cases are costly) but also the human and organisational resources needed to mount subjects which have demanding staffing and logistics needs.

In rich countries where the full age group continues in school beyond the primary stage, the case for organizing provisions in a unified way in the same locality will be strong. When compulsory education is raised to include the secondary stage, or part of it, there will be an especially great need to cater for the full range of career and education prospects which an entire age group has at this stage in their life. Practical courses which may be vocational in a general way, find a clear justification under such conditions. Economically advanced countries which can bear the high cost, sometimes have also chosen to include specialised vocational education and training in their upper secondary stage. This trend has been closely correlated with the growth of mass secondary education. It is not an organisational model which ever has characterised systems where only a minority of the age group continues in school beyond primary education. Other economically advanced countries organise basic vocational

education and training in specialised institutions—parallel to the upper stage of secondary education.

In my judgement, the degree of institutional integration of vocational training with the mainstream of the secondary system, which may be advisable for countries with well-functioning and well-resourced secondary school systems *that enroll the great majority of youth*, make little sense in systems which enroll a modest minority of the age group, which are in urgent need of quality improvement in core general education subjects, and in which financial and human resources needed to develop and sustain vocational subjects are much scarcer than in economically advanced countries.

Though vocationalisation is a complex issue which inescapably will be a matter of judgement, it is hard to see a strong case for putting vocational subjects high up on the priority list for the development of mainstream secondary schools in sub-Saharan countries. The main reasons for skepticism are:

- Economic relevance has been the driving political rationale. But findings show that a light dosage of vocational skills as typically taught under vocationalisation policies, will not give labour market advantage, let alone serve as a basis for self-employment.
- If justified on other grounds, vocational subjects (e.g., at lower secondary level) must be weighed against the urgent need to improve the quality of language and mathematics.
- Vocational subjects are costly and complex. They tend to get run down when donors disengage, in developing countries.
- The teaching of vocational skills that are demanded in the labour market can more easily be organized in specialized institutions which have vocational education and training as their main purpose.

What Subjects to Choose?

Here are some questions relevant for deciding what subjects to offer if it is decided to introduce practical/vocational subjects:

- What is the scale of potential work opportunities in the occupational segment for which the subject would be broadly preparatory? What entry-level skills are needed for those jobs? How fast is the demand likely to grow? It is not enough that the occupational segment be a 'large' one. What would the opportunities be for secondary school graduates?
- Other uses of the subject than those connected with specific occupations?
- What are the practicalities of obtaining needed facilities, equipment, consumables?
- How to recruit, train and keep good teachers?

- What are the estimated capital and recurrent costs as compared to other subjects?
- How to ensure a reasonable balance between females and males?
- How compatible are the pedagogic requirements of the subject with the existing 'teaching logic' in the schools?

Business and Agriculture are the two most commonly offered subjects in the countries covered in the country case studies in this volume. This is not accidental.

Business subjects may seem optimal when examined in light of these questions. The occupational segment is large, with skills practised at various levels. When taught to large groups—which they usually are, business subjects are not expensive. However, the challenge is to develop contents and ways of teaching which can stimulate entrepreneurial dispositions and behaviour. No recipe is offered for this in the present volume. Much attention should be given to developing and trying out innovations in this area.

Agriculture may seem like a good fit in several respects. It is typically taught to large classes and at low cost (when schools have land). Agriculture is a very large economic sector in most African countries. There is also the private use which many secondary school graduates will have of growing their own food, keeping some domestic animals etc.). But as shown in the Mozambique tracer study by Billetoft and Austral Consultores, jobs in agriculture may be quite limited for secondary school graduates. Further, the structure of farming and the general function of select secondary education may be such that few secondary school leavers return to the land to farm for their main livelihood.

It is not essential that all schools should offer the same options. Better use can be made of scarce human and financial resources if schools are allowed to specialise.

General Implementation Advice

In implementing any practical subjects, it will be important to

- Implement systematically (as in Botswana) rather than by attempts to do so precipitously (as was the case in Ghana and Kenya)
- Promote practical problem solving
- Give substantial emphasis to continuous assessment
- Avoid gender biases in overall provision
- Analyse and weigh cost implications before going to scale
- Evaluate learning outcomes and impact

A Special Case for ICT Skills

In economically advanced countries, computer applications are increasingly important for vocational skills training across a range of other skill areas, and as shown in the study in the present volume by Bishop and Mañe. Because of the importance of ICT in the global economy and because of the spread of computer applications as a tool for communicating, the question in African education is not *whether* computing skills need to be taught, but *how soon* it will be affordable and practicable to teach such skills in secondary schools, and *in what way* ICT skills should be introduced.

Viewed as vocationalisation, ICT applications have the advantage of increased relevance across a widening range of occupations in the modern sector. Computer applications may at present be used in a very small occupational niche, but it is a fast growing one. It is also a niche for which secondary and higher education are broadly preparatory. ICT equipment allows the teaching of various commercially oriented programmes (keyboard skills, word processing, spreadsheets), and ICT will increasingly also be a tool for basic information retrieval in higher education.

A long-term view is needed for the development of ICT applications in the secondary schools of most African countries. At present there are many constraints that need to be overcome before mass introduction is possible: lack of electricity, high costs when electricity is provided, high costs of software, problems with maintenance of equipment, and the use of Internet being barred by lack of adequate telephone connections and by high telephone charges. Even when facilities and equipment can be afforded, the case of Botswana shows that lack of qualified staff has been a major constraint on introducing ICT teaching in the schools. In the short run, the trying out of ICT teaching in a small number of secondary schools should be encouraged even if large scale introduction is not yet possible. Since the teaching of computer applications is a specialty of private proprietary computer schools, there is a strong case for public-private partnership in developing the teaching of ICT applications in the secondary schools. There is a need for international sharing of experience with organisational models for such cooperation.

Botswana may be the only country in sub-Saharan Africa that has embarked upon system-wide implementation of computer education in public secondary schools. It uses a two-pronged approach of 'computer studies' and 'computer awareness'. African countries can learn by staying informed about the Botswana experience, e.g., how to cope with cost, maintenance, and staffing constraints?

Process Skills Matter

When occupation-specific skills are taught, the intention is only to prepare for work in designated occupations. One of the reasons why vocationalisation is so problematic is the looseness of connection between learning such skills in a secondary school and the type of work which a person some years later will be doing. On the other hand, the usefulness and value of capacities which *generally* are 'economically relevant' will not be confined to specific occupations. If these capacities can be successfully taught, the chance of their being put to use are much greater than in the case of occupation-specific skills. It is easy to point to a number of such capacities which are widely acclaimed as being highly relevant for working life. Examples are initiative, drive, mental alertness, responsibility, creativity, ability to solve problems, being able to work collaboratively. It is also widely recognised that such generic capacities may not mainly be 'taught' at school; personal dispositions and upbringing in the home and community will play a large part. But school work and social life at school can be organised in ways that enhance such capacities, rather than discouraging their development. In addition to these process skills, good skills in language and arithmetic have generalised economic relevance. All these skills and capacities are valuable for further education and for life in general. Therefore, the task of improved economic relevance of secondary education will largely coincide with the general task of improving the quality of that education, not mainly in terms of its 'content' but in terms of its generic educational value across different chunks of taught content and discrete skills.

9 References

- Ampiah, J.G. (2002). *Attitude of junior secondary school boys and girls towards science*. Institute of Education, Cape Coast, Ghana: University of Cape Coast.
- Anderson, J. (1970). *The struggle for the school. The interaction of missionary, colonial government and nationalist enterprise in the development of formal education in Kenya*. London: Longman.
- Atchoarena, D. and Delluc, A. (2003). *Revisiting technical and vocational education in sub-Saharan Africa*. Paris: International Institute for Educational Planning.
- Atchoarena, D. and Tesfa, M.T. (1997). *Skill development and labour market study in Eritrea. Report of the Tracer and Enterprise Surveys*. Asmara: Ministry of Education (in collaboration with International Institute for Educational Planning, UNESCO).
- Austral Consultores (2003). *Study of cost and external efficiency of technical and vocational education in Mozambique*. Maputo: Ministry of Education, National Directorate of Technical Education. [Document translated from the original: *Estudo de custo e eficácia externa do ensino técnico e profissional em Moçambique*.]

- Bacchus, K. (1988). The political context of vocationalization of education in the developing countries. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education. An international perspective*. (31–44). Oxford: Pergamon.
- Bennell, P. and Nyakonda, D. (1992). The vocational school fallacy revisited: the post-training experiences of secondary technical school graduates in Zimbabwe. *Education with Production*, 9(1), 53–68.
- Bishop, J. (1995). *Expertise and excellence*. Working Paper 95-13. Ithaca, NY: Cornell University, School of Industrial and Labor Relations.
- Chin-Aleong, M. (1988). Vocational secondary education in Trinidad and Tobago and related evaluation results. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education. An international perspective*. (293–334). Oxford: Pergamon Press (in association with the Swedish International Development Association).
- Coombe, C. (1988). *Survey of vocationally-oriented education in the Commonwealth*. London: Commonwealth Secretariat.
- Cumming, C.E. (1985). The contribution of cost studies. In C. Cumming, M. Davies, K. Lillis, and B. Nyagah (Eds.), *Practical subjects in Kenyan academic secondary schools. Background papers*. (77–107). Stockholm: Swedish International Development Cooperation Agency (SIDA). Education Division Documents No. 22.
- Cumming, C.E. (1988). Curriculum costs: vocational subjects. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education. An international perspective*. (293–294). Oxford: Pergamon Press (in association with the Swedish International Development Cooperation Agency).
- Farstad, H. (2002). *Integrated entrepreneurship education in Botswana, Uganda and Kenya*. Report of a study commissioned by the World Bank. Oslo: National Institute of Technology. (Revised draft. September 2002). Retrieved January 15, 2004, from <http://wbln0018.worldbank.org/HDNet/HDdocs.nsf/0/3e6ed3a030821e3085256b84005a7237?OpenDocument>
- Foster, P. (1965). The vocational school fallacy in development planning. In C.A. Anderson and M.J. Bowman (Eds.), *Education and economic development*. Chicago: Aldine.
- Hoppers, W. (1996). *Searching for relevance: the development of work orientation in basic education*. Paris: International Institute for Educational Planning. Fundamentals of Educational Planning No. 52.
- Johanson, R.K. and Adams, A.V. (2003). *Skills development in sub-Saharan Africa*. Washington, DC: World Bank. Human Development series, sub-Saharan Africa Region.
- Kaluba, L.H. (1986). *A Tracer study of grade 12 graduates from David Kaunda and Hillcrest secondary technical schools*. Lusaka: University of Zambia. Educational Reform Implementation Project.
- King, K. and Martin, C. (2002). The vocational school fallacy revisited: education, aspiration and work in Ghana 1959–2000. *International Journal of Educational Development*, 22(1), 5–26.
- Lane, J.I. and Peresson, J.P. (2000). *Skills development in Madagascar: background and potential approaches*. Washington: The Urban Institute. Unpublished paper prepared for the World Bank.
- Lauglo, J. (1985). *Practical subjects in Kenyan academic secondary schools. General report*. Stockholm: Swedish International Development Cooperation Agency. Education Division Documents No. 20.
- Lauglo, J. (1989). Technical secondary students in Kenya: Origins, achievement and destinations. *Prospects*, 19(3), 409–426.

- Lauglo, J. (1991). *Vocational training in Tanzania and the role of Swedish support*. Stockholm: Swedish International Development Cooperation Agency. Education Division Documents No. 48.
- Lauglo, J. (1993). *Vocational training: analysis of policy and modes*. Paris: International Institute for Educational Planning.
- Lauglo, J. and Lillis, K. (Eds.). (1988). *Vocationalizing education. An international perspective*. Oxford: Pergamon Press (in association with the Swedish International Development Cooperation Agency).
- Lauglo, J. and Närman, A. (1987). Diversified secondary education in Kenya: the status of practical subjects and their uses after school. *International Journal of Educational Development*, 7(2).
- Lillis, K. (1985). Constraints on the implementation of diversified curricula: a review of experience in developing countries. In C. Cumming, M. Davies, K. Lillis, and B. Nyagah (Eds.), *Practical subjects in Kenyan academic secondary schools. Background papers (77–107)*. Stockholm: Swedish International Development Cooperation Agency (SIDA). Education Division Documents No. 22.
- Meyer, R. (1982). Job training in the schools. In R. Taylor, H. Rosen, and F. Pratzner (Eds.), *Job training for youth*. Columbus: The National Center for Research in Vocational Training, Ohio State University.
- Närman, A. (1988a). *Practical subjects in Kenyan academic secondary schools. Tracer Study II (Three-year follow-up)*. Stockholm: Swedish International Development Cooperation Agency (SIDA). Education Division documents No. 39.
- Närman, A. (1988b). Technical secondary schools and the labour market. Some results from a tracer study in Kenya. *Comparative Education*, 24(1).
- Nishimura, M. and Orodho, J.A. (1999). *Education and vocational and technical training and employment: designing projects that link education and vocational training and employment in Kenya*. Nairobi: Japan International Cooperation Agency (JICA.)
- Oxenham, J. (1988). What do employers want from education? In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education. An International perspective*. (69–80). Oxford: Pergamon Press (in association with the Swedish International Development Cooperation Agency).
- Psacharopoulos, G. and Loxley, W. (1985). *Diversified secondary education and development: evidence from Colombia and Tanzania*. Baltimore: Johns Hopkins University Press.
- Urevbu, A.O. (1988). Vocationalizing the secondary school curriculum: the African experience. *International Review of Education*, 34(2).
- World Bank (2002). *Eritrea education and training sector note. Report No. 24448-ERI*. Washington: Human Development I, Africa Region.
- Wright, C. (1988). Curriculum diversification re-examined. A case study of Sierra Leone. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education. An international perspective* (115–136). Oxford: Pergamon Press (in association with the Swedish International Development Cooperation Agency).

Rupert Maclean

2

Setting the Context: An Overview of Secondary Education Reform with Particular Reference to the Asia-Pacific Region

1	Introduction: The Importance of Secondary Education	51
2	Secondary Education and Youth at the Crossroads	53
3	Some Current Issues and Concerns Regarding Secondary Education	54
4	Secondary Education in the Asia-Pacific Region	58
5	Conclusion	67
6	References	68

1 Introduction: The Importance of Secondary Education

The reform, strengthening and upgrading of secondary education is one of increasing world-wide concern. This is particularly the case for least developed and developing countries, those going through a period of rapid transition and countries in a post-conflict situation. Nowhere is this concern greater than in the vast and diverse Asia-Pacific region which is home to 63% of the worlds population of six billion people, and 71% of the world’s total number of illiterates (UNESCO, 2002).

The good news is that since the 1950’s an increasing number of countries have been successful in expanding their education systems, as they are successful in moving towards achieving Education for All (EFA) and the universalisation of primary education. However, this has at the same time resulted in a significant increase in upwards pressure on expanding gross enrolments in secondary education, since there has been a significant increase in participation rates at the secondary level since 1990. This has been particularly beneficial for girls, with a reduction in gender disparities in most countries (UNESCO, 2002). However, as access to secondary education has expanded, its overall

quality has often been in decline, since resources have been stretched thin and systems have become more inefficient. In many countries secondary education has become the weakest link in the education chain.

There is widespread agreement as to the need for a fundamental re-thinking of the role and place of secondary education as part of the re-engineering of education systems. Countries recognise the priority of secondary education as an indispensable link in the whole education system: for example, between primary and higher levels of education. It is also an area of particular importance for youth in preparing them for the world of work and to become fully functioning and effective citizens. At the **World Education Forum** in Dakar (2000) the matter of what happens after primary education was raised as being an important issue in a number of regions where secondary education is now regarded as being part of basic education. At the Dakar Forum, a Roundtable on 'After Primary Education: What?' discussed the reform of secondary education curriculum.

Important problems are emerging which require the strengthening and upgrading of secondary education. For instance, there is an urgent need to address the problem of the sudden, overwhelming increase in the number of qualified applicants for secondary education. Providing access to secondary education is a more difficult and complex process than is the case for primary schooling since it is in secondary schools that subject-specialisation begins. There are also an even larger number of stakeholders for this level of education, whose views need to be accommodated, than is the case for primary education. Secondary education is also generally more expensive than is primary schooling.

In the Asia-Pacific region, despite the trend of an expansion of secondary education enrollments over the past 50 years in developing countries, Gross Enrolment Rates in secondary education in (2003) vary enormously between countries: from 23% in Cambodia to 100% in the Republic of Korea. There are also millions of out-of-school secondary school aged youth. Many of these young people cannot be accommodated by existing facilities. In other cases they have no access to, or interest in undertaking secondary education, for a variety of reasons such as economic poverty, living in an isolated location or feelings of alienation. This problem is greater for girls than for boys, and for those living in South Asia compared to those in Eastern Asia/Oceania.

Major regional and international conferences, such as the 1998 International Conference on Education organised by UNESCO's Asia-Pacific Centre for Educational Innovation for Development on 'Secondary Education and Youth at the Crossroads' (UNESCO, 1999), and the 'International Expert Meeting on General Secondary Education in the Twenty-first Century: Trends, Challenges and Priorities' (UNESCO, 2001) held in China, have repeatedly stressed the urgent need to upgrade, diversify and expand education at the secondary level.

This is essential to adequately respond to the concerns and emerging challenges due to rapid changes in societies, globalisation and the changing nature of work.

A major difficulty facing governments, educational policy makers and practitioners, is the general paucity of good quality, comprehensive and relevant research data to provide concrete guidance on best practices to adapt for secondary education reform. There is also a lack of comparative research data, which maps developments in secondary education reform in the Asia-Pacific region, compared to other parts of the world, and between countries in Asia-Pacific, and so provides useful benchmarks for comparative purposes.

2 Secondary Education and Youth at the Crossroads

Youth who are living in what for many is a turbulent, rapidly changing world need values-orientated anchors, and the knowledge, skills and understandings, to enable them to find effective ways of coping with the tensions, pressures and contradictions that are apparent in their societies, and in their daily lives. When it comes to examining the renovation, renewal and diversification of secondary education, with particular reference to meeting the educational needs of youth, the Report of the independent International Commission on Education for the Twenty-first Century, *Learning: the Treasure Within*, (UNESCO, 1996), referred to as the Delors Report, raises some important matters and provides a helpful conceptual framework for analysing and guiding the content, organization and management of secondary education reform and the education of youth.

In Chapter 6 of the Delors Report, in a Section titled ‘Secondary education: the crossroads of life’, the authors note:

Many of the hopes and criticisms aroused by formal systems seem to focus on secondary education. On the one hand, it is often regarded as the gateway to social and economic advancement. It is accused, on the other hand, of being inegalitarian and not sufficiently open to the outside world and, generally, failing to prepare adolescents not only for higher education but also for the world of work. In addition, it is argued that the subjects taught are irrelevant and that not enough attention is paid to the acquisition of attitudes and values. It is now generally recognized that, for economic growth to take place, a high proportion of the population has to have received secondary education. It would thus be useful to clarify what secondary education needs to do to prepare young people for adulthood.

The view of learning as a process that continues throughout life leads us to reconsider both the content and organisation of secondary education. The requirements of the labour market create a pressure owing to which the number of years of schooling tends to increase.

And later, the authors of the Report note:

... the principle of lifelong education should open up wider possibilities of self-fulfillment and training after basic education, for example allowing adults to return to the formal system. Clearly, serious consideration of secondary education cannot be separated from thinking about the educational opportunities afforded to adults. The idea of 'education-time entitlements' that can be used throughout life can help; focus policy makers on the practicalities of further educational opportunities for people who interrupted schooling in youth: possibilities include study leave, recognition of skills already acquired, certification of non-formal learning experience and bridges between various educational streams.

Secondary education can thus be linked in the context of life-long education to three major principles: diversity of courses, increased emphasis on the alternating of study and professional or social work, and attempts to improve quality.

In this chapter a brief overview is provided of main issues and concerns regarding the reform and development of secondary education in various parts of the world. A more detailed analysis is then provided of what is known about strategic issues and policy analysis of secondary education in the Asia-Pacific region.

3 Some Current Issues and Concerns Regarding Secondary Education

A review of the research and related literature on secondary education reveals that a number of key issues and concerns are emerging regarding the renewal and diversification of secondary education and the education of youth, which many countries are seeking to address (Maclean and Caillods, 2002). Put briefly, these are:

Secondary education for all? As was stressed at the World Education Forum in Dakar (2000), in an increasing number of countries basic education is being redefined to include secondary education, at least at the middle school (junior secondary) level. For many secondary education is now regarded as part of basic education and EFA.

Expanding access: As countries achieve universal primary education there is a pressure to increase the opportunities for access to post-primary education for the larger number of individuals completing primary education. World-wide, in terms of enrolment ratios, secondary education is the fastest-growing sector of formal education. This issue is also discussed by Weeks in the 'Practical Subjects' section in this volume.

Reducing drop-out and repeater rates: In many countries, rising enrolments are accompanied by an increase in academic failure, as evidenced

by high rates of repeating and drop-out. For example, every year almost a third of pupils in Latin America repeat a grade, which wastes valuable human and financial resources. Action is being taken to overcome this problem through such means as the reform of teacher training, financial assistance to students and their families, and innovative experiments in group work, team teaching and the use of the new information and communication technologies. Reference to this issue is also made by Billetoft and AUSTRAL Consultoria e Projectos in the section 'Drop-outs'. It is further reflected upon by Bishop and Mane in the section headed 'Are High School Completion Rates Higher When Students Take Career-Technical Education Courses?' in this volume.

Equity: There is an increasing emphasis on ensuring that all sections of society, regardless of their gender, socio-economic background, race, ethnicity or geographical location have an opportunity for access to a high quality secondary education. One reason is that if some of those who complete primary education are denied access to a high quality secondary education, then equality of opportunity and equity will be denied. Equity, particularly gender equity, is focused on by Lauglo and by Mwiria in separate chapters in this volume.

Quality assurance: All are concerned to ensure that expanding access to secondary education is not at the expense of the quality of programmes. In fact there is an increasing realisation that access and quality are different sides of the same coin, since if access to primary education is expanded without this education being relevant and of a high quality then high drop out rates will persist, which in turn undermines the move to expanding access and reduces the internal efficiency of systems. In addition, it is important to develop effective systems for monitoring/evaluating the learning outcomes achieved, both to measure the success of the programmes mounted and also to provide feedback information, which can contribute to improving the programmes offered. Quality assurance also draws attention to teacher effectiveness, and the importance of offering a reward structure that enables the most talented and appropriate to be recruited into the occupation, and for them to be provided with career-long professional development. Weeks, Akyeampong, Mwiria, Billetoft and AUSTRAL Consultoria e Projectos, in this volume, address the topic of assessment as a specific aspect of quality assurance.

Improving the relevance and effectiveness of the content of secondary education: There is a need to improve the relevance of the content of secondary education with regard to both curriculum and teaching methods to accommodate the changing needs of both society and individuals to meet the challenges of the 21st century. An important concern

being addressed is that the content and approaches of secondary education should not mainly be seen as a preparation for those who plan to go onto university, but should also meet the non-academic needs of those who do not have higher education aspirations. Weeks, Billetoft and AUSTRAL Consultoria e Projectos, in this volume, explicitly study the cost-effectiveness of secondary education.

With regard to curriculum content more needs to be done to improve the effectiveness of the bridge between education and the world of work, including a greater stress on enterprise education and what has come to be called 'the vocationalisation of secondary education'. For example, marginalised youth need short-term skills training that leads to income generation. There is also a view that curriculum content should address key social concerns, issues and life skills in areas such as civics education and health, with particular reference to education about HIV/AIDS and drug abuse. In addition, the matter of values education is moving higher up the agenda of educators around the globe, a fact that needs to be reflected in the content of secondary education.

By improving the relevance of the content of secondary education it is believed that this should help to reduce the problem of student drop-out and improve both the internal and external efficiency of secondary education.

With regard to **teaching methods** there is a need to move away from mainly using those approaches which stress teacher-centred methods and rote learning to utilising a greater repertoire of more learner-centred teaching and learning approaches which foster the development of intelligence, creativity, lateral thinking and independent learning. Teaching approaches also need to place greater emphasis on the tools for seeking and processing knowledge than on the actual knowledge itself.

Importance of good teachers: All countries accept that teachers are the cornerstone of educational development and that (as the Delors Report puts it) 'good schools require good teachers'. In addition, teachers are at the forefront of the process of educational reform, since the quality and effectiveness of any education system ultimately depends on the quality and nature of the interaction that occurs between learners and their teachers. A major problem exists in many countries concerning attracting the most suitable, talented people into the occupation of secondary school teaching since those who have the qualifications and qualities to become good secondary school teachers are precisely the ones who are most in demand by other industries, since they are likely to be university graduates or to have other post secondary qualifications. To enable the quantitative expansion and qualitative improvement of secondary

education to occur, there is a demand for greater numbers of high quality recruits into the occupation of teaching. Much more therefore needs to be done to provide a reward structure and incentives package to attract (and keep) suitable individuals in secondary school teaching. The importance of good teaching is also stressed by Lauglo in his section on 'Assessment of Learning' and by Weeks in 'Staffing Constraints' in this volume.

Utilizing most effective modalities for delivery: There is widespread agreement on the need to adopt a wider range of delivery systems in addition to conventional schools, in order to reach those who are currently unreached such as low-income groups, those in remote areas, street children and the like. Formal education systems should be reinforced by non-formal practices and various modes of delivery such as distance education. In the case study by Mwiria in this volume, the matter of effective modalities for delivery is addressed in more detail.

Effectively harnessing existing and new Information and Communications Technologies (ICT's): Many are exploring ways of cost-effectively utilising the new information and communication technologies to improve access to and the quality of secondary education. This is not just for those attending conventional schools and classrooms (with regard to, for example, the use of computers and the internet) but also to harnessing the new information technologies (such as satellite communications) to reach those in remote areas who want access to secondary education. The handling of ICT in the context of secondary education is expanded upon by Lauglo, Weeks, and Mwiria, in this volume.

Financial considerations: The expansion and qualitative improvement of secondary education cannot be realised without adequate financial support and so the finance of secondary education is an issue of crucial importance. The provision of secondary education is generally more costly than is the provisions of education at the primary level (particularly where this secondary education includes technical and vocational education), and there are considerable pressures in many countries to expand the provision of secondary education. A number of matters are being considered in this regard such as private versus public funding of secondary education and ways of ensuring that limited resources are put to the best possible use so as to improve the internal efficiency of this level of education. Lauglo, Weeks, Akyeampong, and Mwiria, in their contributions to this volume, pay attention to the financial considerations involved.

4 Secondary Education in the Asia-Pacific Region

Attention will now be directed more specifically to an examination of the particular situation in countries in the Asia-Pacific region concerning secondary education.

Over the past four decades, large amounts of government and private finance have been injected into a variety of developments related to secondary education. The Asian Development Bank, as a significant financial contributor to such developments in the region over this period, commissioned in 1994 the Asia-Pacific Centre of Educational Innovation for Development (ACEID), UNESCO Bangkok, and the Colombo Plan Staff College for Technician Education (CPSC), Manila, to undertake a comparative survey of developments in secondary education (Asian Development Bank TA#5546: Regional Study on Secondary Education in the Asia-Pacific Region: Strategic Issues and Policy Analysis). Although this study is several years old, it is reported upon here because it is a unique study, being the first (and—to date—only) Asia-Pacific regional inter-country comparative review of secondary education over a relatively lengthy period (1960–1990). In addition, the findings from this study have not been widely published; and the author of this chapter was the team leader for this ADB study.

This comprehensive, comparative survey of secondary education provided information about alternate patterns of secondary education in the region and about implications for the future development of that education. The research was directed at educational planners, country level policy makers, politicians, members of non-government organisations interested in sponsoring a quality secondary education, bilateral and international agencies, and major donor and lending agencies, including their technical staff and senior management.

Data for the study were obtained through commissioned case studies in seven selected countries (Bangladesh, Indonesia, Republic of Korea, Pakistan, Philippines, Sri Lanka, and Thailand), from the review and analyses of secondary education in the Asia-Pacific region using international and national consultants, discussions with representatives from countries in the region and an examination of various publications on secondary education. These data provided the bases for a comparative analysis of the effects of alternative patterns and strategies for secondary education development in the region. The study was a large scale one, being conducted by two international consultants, fourteen national consultants, and several UNESCO-ACEID consultants.

A total of 17 developing countries in Asia-Pacific were included in the overview analysis. In addition to countries used for the detailed case studies referred to above, other countries surveyed were Afghanistan, Bhutan, China, India, Lao PDR, Malaysia, Mongolia, Myanmar, Nepal, and Papua New Guinea. The 17 countries included in this overview were grouped according to the

Table 2.1 Countries included in the overview analysis

Large population, low income, high potential countries	
China	India
High technology exporting countries	
Malaysia	Republic of Korea
Middle income industrialising countries	
Indonesia	Pakistan
Philippines	Sri Lanka
Thailand	
Low income industrialising countries	
Bangladesh	Mongolia
Myanmar	
Subsistence agricultural countries	
Afghanistan	Bhutan
Lao PDR	Nepal
Papua New Guinea	

classification developed by the Asian Development Bank for its major review publications *Education and Development in Asia and the Pacific* (see Table 2.1).

The Asian Development Bank study (ADB, 1995) was not published for wide circulation. Instead it was used as an internal discussion paper and strategy document for determining future Bank policy regarding secondary education reform, and in the Bank's dealings with countries in Asia-Pacific regarding loan applications for secondary education. The findings of the ADB study, which are published here, have been updated, drawing on recent sources such as paper presentations at the UNESCO-ACEID International Conference on 'Secondary Education and Youth at the Crossroads' (UNESCO, 1999) and recent reviews of latest developments in secondary reform in the Asia-Pacific region (e.g. International Bureau of Education, 2000b; Wilson, 2000; Journal of Educational Change, 2001).

In essence, based on the ADB overview analysis and the case studies undertaken, the following may be said about key trends in secondary education in the Asia-Pacific region for the countries surveyed for the ADB study.

Structure and Participation

There is a great diversity across the Asia-Pacific region with respect to the structures of secondary education, enrolments, and retention rates in secondary education. Whilst primary education may be offered for 3 (or up to 8) years, secondary schooling may be offered from 4 or more, up to 8 years, in the various

countries. Thus primary plus secondary education may occupy from 10 up to 13 years, depending on the country. In eleven countries surveyed secondary education is not compulsory but in another six it may be so for 3, 4 or 5 years. Generally there is a lower and upper state in secondary schooling, with a smaller proportion of students enrolled in the latter. However, there are also 'points' in these structures where a higher proportion of males and/or females may discontinue.

The absolute magnitude and growth rates in Gross Enrolment Ratios vary across countries. By and large subsistence agricultural countries (Afghanistan, Nepal, Papua New Guinea, Lao PDR and Bhutan) are low in both; for high technology exporting ones (Malaysia, Republic of Korea) the magnitude is between 57–87%, with an increase in growth since 1980; while for low income industrialising countries (Bangladesh, Myanmar, and Mongolia) the magnitude is between 17 and 24%, with a modest growth since 1980. Apparent retention rates have increased to 80% in the high technology countries since 1980 and have been consistently low (12 to 15%) in the subsistence agricultural countries, with a decline since 1984.

Although there have been remarkable increases in the secondary education population in countries experiencing rapid expansion in population, many still have a long way to go to raise their Gross Enrollment Ratios. Furthermore, there have been declines overall in vocational secondary education enrollments and great variations in the growth of primary schooling, with some countries experiencing an increase and others a decrease.

There are variations in participation rates in the different educational structures which suggest interactions between the structure and the participation. But there are many subtleties which remain to be teased apart in order to understand the phenomenon.

Financing

There has been a growing commitment across the region to secondary education over the past forty years. Even so, the relative share of GDP which goes to education is low in the Asia-Pacific region compared to many parts of the world. About 3.2% goes to education currently, of which about a third is allocated to secondary education, and there appears to be scope to lift both these proportions.

Whilst it is the case that the proportion of GDP allocated to education has risen (albeit unevenly) across the countries there is also great diversity regarding the means of financing education (for example, from tuition fees or from the private sector) and a great diversity regarding the capacity of countries to finance further expansion in secondary education. Tuition fees contribute about 18% of unit costs to public sector secondary education, and private sources can also

help, but the implications of the latter sector's involvement are not clear. The greater involvement of the private sector is a matter for further consideration and resolution. At present, due to a complex interplay of factors, there are great variations between countries as to the contributions the sector makes to secondary schooling.

Multilateral banks and funds are providing increasing funds for education in the region and generally there has been a greater use of loans for educational purposes. In recent years the region has received about half of total lending for education from multilateral banks and funds. The Asian Development Bank has supplied about 26% of this amount.

Some questions yet to be resolved are: how to finance more effectively expansions in secondary education, with particular reference to lower secondary; and how to finance the greater participation of females. There is also the issue of the greater use of private sector funding for secondary schooling and the concomitant matter of the control and quality of that schooling.

Access and Equity

Although there has been a three-fold increase in secondary enrolments over the past forty years (1960–2000), there is unequal access to this level of school for females, persons with disabilities, and members of various societal or racial sub-groups. The proportion of females in secondary education has increased; although it is lower than that for primary. It is highest in the high technology exporting countries such as Malaysia and the Republic of Korea (where it is approaching 50%) and lowest in the low income industrialising ones such as Bangladesh, Myanmar and Mongolia (about 27%). In subsistence agricultural countries (Nepal, Papua New Guinea and Lao PDR) there have been significant gains since 1985 with the proportion now at about 37%.

The female retention rates, though a fraction lower than for primary retention, vary from between 80 to 90% for the high technology exporting countries (Malaysia, Republic of Korea) to about 10% for the low income industrialising ones (Bangladesh, Myanmar, Mongolia). A higher proportion of females than males participate in secondary education which contains teacher education.

Whilst there has been a decline in female drop-out rates throughout secondary education, there is a lower proportion of females in the final years of secondary. There can also be peaks in female drop-out after first year, at about the transition point from lower to upper secondary or just prior to entry into the final secondary year. There are inter-country variations.

There is currently little statistical information to enable clear comparisons between rural and urban populations regarding access, although inequities appear to exist across countries. There is also very little data about the relative access for religious, racial and disabled sub-groups.

Internal Efficiency

A major policy question concerns the extent to which the additional resources allocated to secondary education have, or are, being efficiently used.

Assessments about the internal efficiency of secondary education involve judgements about whether the desired educational output has been maximised given certain levels of resourcing. Some of the indicators include the cost of the education provided, expenditure per student, proportion of per capita GDP, student teacher ratios and drop-out or wastage rates.

The expenditure on secondary education in the Asia-Pacific region is comparable to that of other developing countries in the world. Although there are some differences between countries, the costs of secondary education, however, are about twice that for primary, but only 25% that for tertiary. There has been a substantial increase over the past twenty years in the level of public expenditure per student but at the same time administrative costs have increased proportionately from about 5% to 18% of recurrent costs. Of total expenditure the recurrent budget accounts for about 80%, and capital works 20%. Teachers' salaries take about two-thirds of the recurrent education budget.

Generally student teacher ratios have declined since 1980 to below 20:1 in the majority of countries. School sizes on the other hand can vary from about 300 to 1,100 which also affects student teacher ratios and the range of curriculum offerings for students. Although due caution must be exercised when comparing the costs of private and public school, generally it is the case that expenditure in private schooling is less than that on public schooling. Furthermore, technical and vocational education costs are about 5 or 6 times more than those for secondary education.

Wastage or drop-out rates and repetition rates vary across the region from low and almost negligible to high. At certain points throughout secondary education peaks can occur in the drop-out rates. In some countries repetition rates reach 13% of a grade enrollment. However, there has been a diminution in the wastage rates since the early 1980's. There is a greater likelihood than previously that a student will complete secondary education. But with respect to output, it is not yet completely clear what it is that students have gained as a result of their attendance at secondary school.

Quality Assurance

This is difficult to measure but there are indicators related to curriculum, teaching and teacher education, educational assessment, organisation and management, and education policies, that can be used.

All countries accord a high priority to curriculum reform and believe the curriculum should be responsive to emerging needs. Curriculum Development Centres have been established to help with this and the number of relevant school texts has increased. There are, however, still calls for more and better quality texts, additional curriculum courses to meet new emerging needs, research on curriculum, and for a constant, sustained review and modification of curricula. Flexibility of the curriculum is needed to suit a rapidly changing world, new teaching areas are also necessary. Curricula need relevance and balance.

The teaching-learning process needs much improvement with more student participation, the use of teaching aids and better quality textbooks and teaching materials. Research in secondary education is insufficient and is a weak point in school systems.

Definite steps have been taken to meet the great demand for teachers but more are still required. As teachers are the key to a high quality secondary education the quality of their training needs to be upgraded, revised and modernised. This must also occur with regard to their conditions of service, status and salary.

Countries have taken account of the universities' requirements for selection and so, as a consequence, there is a predominance of examinations in secondary education. Student assessment needs reform, and the place for national examinations revised. Since there are fundamental questions about the reliability and validity of these, there are calls for a greater variety in the forms of student assessment including continuous assessments set by teachers and for standardised testing. Concomitant calls are for training programmes to upgrade teachers (and others') competencies in test construction, administration, and interpretation.

The importance of educational policies, management and good organisation have been acknowledged throughout the region and changes have occurred in all three areas. Most countries have overarching educational plans and national co-ordinating and advisory bodies, although some are not very active. Devolution of authority, decentralisation, and the privatisation of schooling are occurring with varying degrees of success. More attention must be directed to rationalising decentralised structures, and to monitoring, evaluating and fine tuning what is occurring with respect to privatisation, decentralisation and the devolution of authority. Management training programmes are required, as is the installation and greater use of computer systems to assist with management. There is a trend for increased decentralisation but communications within such systems is weak especially training for administrators and managers of the system. Countries need to pay special attention to management at the classroom level.

External Efficiency

Continuing efforts are needed by countries to ensure that students are provided with curricula and learning experiences that are relevant to the economic and social environments they are about to enter.

The countries lack systems for providing advice and counselling for students about their educational and employment expectations. In the East Asian region there is strong evidence that rising levels of educational attainment have had a positive impact on economic growth. Most countries experience the phenomenon of educated unemployment. Much can be done to reorient curricula and student advisory services to reflect more the realities of the labour market. It is also observed that the per student costs of vocational programmes are higher than for general secondary in countries with diversified curricula.

Regional Views on Issues and Policy Options

There was a high degree of common concern on the themes identified by the ADB study, speakers at the ACEID conference (UNESCO, 1999), and in recent publications about secondary education reform in the region (IBE, 2000b; *Journal of Educational Change*, 2001), on, for example, curriculum deficiencies including deficient links to the world of work, on equity of access, teacher shortages and teacher quality, private sector involvement in secondary education, decentralisation and management, non-formal secondary education, assessment and examinations. To be more detailed, the broad areas for further attention, even though advances have occurred in each, may be summarised as follows:

- Further improvement in access to education and in gender equity, but with due care to ensure that there will not be a decline in the excellence of secondary education as a consequence;
- Decentralisation of decision making about the curriculum, improvement of curriculum and associated textbooks, strengthening of the links between curriculum and industry and the world of work, and greater use of English for instruction whilst retaining the national language;
- Reviews of the structure of secondary education;
- Reviews of the systems of examinations and assessment;
- Greater decentralisation, devolution of authority, and privatisation of schooling;
- Greater, and more frequent, monitoring and evaluations of changes in schooling and to its administration;
- Clarification of the roles of administrative and policy-making bodies;

- Quality training programmes for educational administrators and supervisors;
- Revisions of policies and practices with respect to financing education; and
- Revision, upgrading and improvement in the quality of teacher education/training.

Technical and Vocational Education at the Secondary Level

There have been some impressive developments in Technical and Vocational Education and Training (TVET) in the region, but many of these developments have also been uneven. TVET, which consists of a diverse range of courses, including the trades, is usually offered at upper secondary levels and beyond, lower secondary being only for general vocational skills and for providing an awareness and appreciation of the world of work to all students. There is a general desire within the region for the further development of TVET (but not in ways where there would be a demise of agricultural education); for the better integration of TVET into lower and upper secondary; for better partnerships to be developed between the public and private sector with respect to TVET; for a review of TVET financing; for more formal and non-formal TVET courses; and, for there to be a greater number of revised, upgraded and modernised training programmes for TVET teachers.

With the restructuring of industry, secondary education TVET needs reorienting, curriculum revision, new technology-oriented courses, removal of obsolete curriculum materials and the modernisation of equipment and teaching-learning materials. Strong school-industry links need to be established.

Donor agencies, in view of their significant contributions in the past, need to assist countries in the regular updating of existing facilities to enable them to continually serve the requirements of industry and also be in a position to spearhead industrial structuring.

The restructuring of TVET will take into account curricula, resources, teachers, assessment and examinations, and certification, school-industry links, non-formal TVET options and the involvement of the private sector.

Future Matters for Consideration in the Asia-Pacific Region

Although the foundations of secondary education in the region are firm there is still much to be done to achieve the vibrant, rich, high quality education desired by the countries. There are a number of matters, not mutually exclusive, to be considered, accorded a priority, and resolved, as deemed

appropriate by planners, policy makers and donors. They include the ones listed below. Most have been named explicitly by the countries. Three, 'educational indicators', 'benefit monitoring' and 'research' were not, although they are implied.

These matters may be clustered into broad groups: those dealing with education personnel; with teaching, learning and curriculum; with assessment; with research and innovation; with women and girls; and, with the inter-relationship of finance and policy.

Briefly, the matters for consideration include:

- Effective ways of developing the potential and expertise of the human resources involved in secondary education (for example, teachers, principals, administrators, managers and supervisors) through training and other programmes. This human resource development also involves considerations about recruitment and conditions of service;
- The devolution and decentralisation of authority in secondary education and various associated matters such as the degree of school autonomy, communication within the system, monitoring management and leadership, and leadership and management training;
- The specification and greater use of educational indicators at the institutional, system and regional levels to provide reference points for management (including management to the school and classroom), planning, policy and financing. Countries will require assistance in specifying and defining their relevant indicators, in establishing data banks, and in determining ways of disseminating and sharing information throughout their systems and between countries;
- Benefit monitoring will help to ascertain whether persons or groups actually benefit from particular educational policies and can also involve determination of the most cost-effective ways to ensure anticipated benefits;
- Alternative modes for delivering secondary education, including non-formal means, the use of modern communications technologies and the vernacular as well as English as the medium of instruction;
- Innovations in curriculum with particular attention to: basic education to cater for the majority; environmental and preventative education programmes; values and ethics; linkages between school-industry-world of work; and, technical and vocational education;
- Relevant curriculum resources such as national textbooks, and other learning materials (including low cost and no cost teaching/learning materials) in the vernacular;
- Alternative models of assessment including internal assessment procedures by teachers, modifications of present practices, assessment training programmes, and the role of item banks and standardised testing;

- The extent to which research is to be fostered to provide reliable information to inform innovation, management and policy; the topics to be addressed by that research (for example, the effect of socio-cultural factors on schooling, the impact of school/class size, and factors affecting school drop-out and repetition rates); and, the role of research in monitoring the extent to which individuals or members of sub-groups are actually benefiting from secondary education. The adoption of innovation methods is also very limited.
- Ways of increasing the access of women and girls, and members of other societal, generally minority sub-groups (disabled, rural, ethnic/racial, religious) to secondary education. Matters to be considered include revision of curricula, provision of Learning Centres, teacher development, and financial support. While increasing attention has recently been given to the participation of females, similar levels of interest and support is required for improving the education of such groups as minorities, the disabled and those living in remote areas.
- Major considerations are the levels of financing to sustain a quality education which is sustainable over the long term, the monitoring of the trends in education costs, and the interactive effects of policies with respect to drop-out or wastage rates, student–teacher ratios (class sizes) and private financing of education on government budget allocations for a quality secondary education.

5 Conclusion

The matters examined in this chapter are ones to which governments, educational planners and policy makers, in particular, must assign priority. But setting priorities is a complex process and the resultant orderings will vary from country to country depending upon the intricate interaction between societal, cultural, economic, educational and political forces. Nevertheless, the priorities are important as they determine educational policies and the allocation of material, human and monetary resources.

With respect to several of the matters, for example, educational indicators, item banks, data bases and standardised testing of competencies, a number of the countries in the region would benefit from further technical assistance, through grants, to help them establish a base on which they could subsequently build and support from their own budgets.

A matter to be considered by donor agencies is the provision of seeding grants for technical support for particular purposes. This may imply that the agencies will expand their role in providing technical assistance with corresponding changes in their budgets for this purpose.

Agencies could help countries to establish databases regarding the competencies of students at different levels of schooling; and, strengthen the countries' research capabilities in secondary education. It is also essential that personnel be trained in order to sustain competency testing and to ensure the indicators be used effectively. Assistance could also be provided through cultural exchanges or inter-country visits whereby delegates become acquainted first hand with each other's educational achievement, educational centers of excellence and exemplary practices.

With regard to the Asia-Pacific region there are firm foundations to secondary education. Much has been accomplished in the last four decades. But, as this chapter has shown, there is still a great deal to be done to put into place the vibrant, rich, diverse, relevant, high quality and innovative secondary education desired by countries in the region. Resolutions, and especially actions, on the issues mentioned above, by members of the audience to whom the article is directed, will contribute to the realisation of that desire.

The challenges are great, and numerous, but the future for secondary education in the Asia-Pacific region appears bright and full of promise.

6 References

- Asian Development Bank (1988). *Education and development in Asia and the Pacific*. Manila: Asian Development Bank.
- Asian Development Bank (1995). *Secondary education in the Asia-Pacific region: strategic issues and policy analysis*. Unpublished report prepared by the UNESCO Asia-Pacific Centre of Educational Innovation for Development (ACEID), Bangkok, and the Colombo Plan Staff College for Technician Education (CPSC), Manila, for the ADB. Authors: Rupert Maclean (team leader), PPGL Siriwardene, Richard Tisher and Phil McKenzie.
- Journal of Educational Change* (2001). Special Issue on 'Educational Change in Asia'. Guest editor: Rupert Maclean. Volume 2, Number. 3. Dordrecht: Kluwer Academic Publishers.
- Maclean, R. and Caillods, F. (2002). *Overview of UNESCO activities regarding the renewal and diversification of secondary education*. Unpublished internal discussion paper. Paris: UNESCO.
- National Institute for Educational Research (1995). *Reorienting secondary education in Asia and the Pacific*. Tokyo: National Institute for Educational Research.
- UNESCO (1996). *Learning: the treasure within*. Report to UNESCO of the International Commission on Education for the Twenty-first Century. Chaired by Jacques Delors. Paris: UNESCO.
- UNESCO (1999). *Secondary education and youth at the crossroads. Asia-Pacific Centre of Educational Innovation for Development*. Bangkok: UNESCO.
- UNESCO (2000). *World education report: the right to education*. Paris: UNESCO.

- UNESCO (2001). *International experts meeting on general secondary education in the twenty-first century: trends, challenges and priorities*. Final Report. Paris: UNESCO.
- UNESCO (2002). *EFA global monitoring report*. Paris: UNESCO.
- UNESCO International Bureau of Education (2000b). *Prospects: Quarterly Review of Comparative Education*, Number 115. Special Issue on '*Education in Asia*'. Guest editors: Victor Ordonez and Rupert Maclean. Geneva: IBE.
- Wilson, J.D. (Ed.) (2000). *Snapshots of primary and secondary education in Asia-Pacific*. Bangkok: UNESCO.

David N. Wilson

3

Promise and Performance in Vocationalised Secondary Education: Has the Baby Been Thrown Out with the Bath Water?

1	Introduction	71
2	Disincentives from the Colonial Era	72
3	Post-independence Developments	74
4	What Went Wrong?	77
5	Policy Shift from Vocationalisation to Strengthening ‘General’ Education	82
6	A Re-conceptualisation of Vocationalising Secondary Education	83
7	Conclusion	87
8	References	88

1 Introduction

The reasons cited for the demise of many educational institutions in developing nations have often been the wrong ones. This chapter suggests that the same phenomenon may have cast aspersions upon the vocationalised secondary school. It is questioned (a) whether the original notions remain valid, (b) whether adequate financial and human resources have been sustained during the development of these schools, and (c) whether aid donors’ expectations were realistic.

Upon attaining political independence the vocationalisation of secondary education held considerable promise for colonies and protectorates in the early 1960’s. This chapter examines the outcome of initiatives to vocationalise secondary education in these developing nations and describes the widespread failure of these projects. It is ironic that many nations continue to promote the vocationalisation of secondary education. For example, Botswana (Wilson, 2002) and Swaziland in Africa and the small island nations of the South Pacific have been the latest proponents of this policy (Jowitt, 2000). In addition, several

writers on *globalisation* have recently advocated vocationalisation of secondary education as a strategy to train human resources capable of competing internationally (African Regional Consultation, 1998; Bennell, 2000).

Moreover, Bennell (2000) pointed out that during the 1990's 'school curricula (particularly at the secondary level) have been progressively vocationalised in both the AICs [advanced industrialised countries] and the NICs [newly-industrialised countries]'. He then noted 'in the LIDC [low income developing country] context, however, the World Bank and other leading donor agencies are urging governments to focus on the provision of general (academic) education at both the primary and secondary levels'. This dichotomy between policy and practice in developed and developing nations demands examination in depth.

The notion of vocationalisation of secondary education appears to have had greater appeal to LIDC policy-makers than to students and their parents. During the past four decades of international development, we have learned a great deal about successes and failures of reforms to educational systems (Wilson, 1996). In general, it is highly likely that a combination of parental and student preference for 'academic' secondary education, and resource constraints in some countries proved fatal to some of these initiatives (Wilson, 1974; Sifuna and Shindu, 1988). In particular, the lack of adequate resources to construct, equip, staff and maintain quality secondary vocational education, plus the lack of an adequate support infrastructure also contributed to their demise (Hallak, 1990; Maclean and Kamau, 1999). It is hoped that this examination proves to be useful in the planning and implementation of future educational system reform policies.

2 Disincentives from the Colonial Era

The history of vocational education in formal school systems has been prominent in nearly every nation and the historic struggle concerning the relevance of vocationalising education continues in the post-Fordist, New Information Age. Shacklock, Hattam and Smyth (1998) re-examined 'vocationalising the school curriculum' in Australia from the perspective of 'the process of implementing the key competencies'. They situate their examination 'as part of continuity' the 'historical struggle over the place of vocational education in the school curriculum'. As poignant as this history has been in developed nations, perhaps the greatest debate has been in developing nations. This debate can be directly attributed to the introduction of vocational initiatives during the Colonial Era.

It would be helpful to examine the historical differentiation between so-called 'academic' and 'vocational' education. In pre-history, these distinctions

did not exist as parents and elders imparted relevant knowledge and spirituality to their children. As hunting and gathering societies evolved into sedentary agricultural societies, specialisation into distinct religious leaders, teachers, and trades-people, such as builders, armourers, potters, tailors, etc. took place.

While in some cultures separate *castes* developed for specific trades—e.g., in India the *patel* caste of leather workers—while in what became ‘western’ cultures separate *guilds* developed in the fabrication and commercial fields. Each specific group, caste, guild, etc. designated certain persons as educators/trainers, often called *meister* (or master) to supervise the learning of new entrants to their field, known as *apprentices*. In contrast, training for the clergy mainly comprised a shaman, priest, rabbi, imam, or guru, who instructed a group of students. The former group evolved into the skilled trades, while the latter evolved into the ‘formal’ educational systems we know today (Wilson, 2004).

These dual educational and training heritages were introduced into their sub-Saharan African colonies by the European colonial powers: Great Britain, France, Germany and Portugal. A historical examination of the introduction of vocational education during the Colonial Era is necessary to understand how such programmes were perceived by those who entered them, and more importantly perhaps, the perceptions of their parents. Unfortunately, sometimes these perceptions were negative, due to (a) the earlier use of vocational courses as a ‘second-class’ education for the children of the colonised while providing an ‘academic’ education to the children of the colonisers; (b) vocational and agricultural labour reported to have been used as punishment for students; and (c) rewarding graduates of ‘academic’ secondary schools with ‘white collar’ employment. More than any other factors, it is likely that these perceptions proved fatal to vocationalisation of secondary education.

The historical context was examined by using the notion of the transfer of institutions from one cultural milieu to another. It was explained that:

Implicit in this notion is the premise that, while the structure of the transferred institution may remain relatively intact, in the new milieu its function undergoes important transformations. Such transformations often merge certain implicit functions of the transferred institution with functions derived from traditional institutions of the receiving society (Wilson, 1974:18).

The concept of *syncretism*, i.e., the reconciliation of conflicting perceptions, appears to take place, albeit over time. The transferred institution passes through the ‘filter’ of traditional institutional perceptions. The new institution, then, may be treated in its new milieu as if it were a substitute for,

rather than a replacement of, the displaced traditional institution (Wilson, 1974:18).

The negative perceptions were sometimes reinforced in the transferred ‘academic’ boarding schools, during the Colonial Era, by the reported use of manual labour in the fields and workshops as punishment for students who failed to meet the expectations of their teachers. (Touré, 1965:131, Mackenzie, 1997:207). In such instances, ‘ruralized education is often seen as synonymous with second-class education’ (Wallace, 1997:119).

The vocationalisation of secondary education in Kenya appears to have received the most attention in both published and unpublished (‘fugitive literature’) materials. Sifuna and Shindu (1988) summarised the indictment of technical and vocational education in Kenya, noting that:

In the colonial days, black Africans were excluded from ‘academic scholarship’ and were limited to rural and industrial manual education (vocational and lower-level technical education) for service to the white settlers. It was also heavily influenced by evangelisation, driven by the need for minimal literacy to read scriptures. Thus, at the time of independence, black Africans rushed to throw off the ‘shackles’ of vocational education to receive the academic and higher-technology and training from which they had been systematically denied previously.

Eisemon indicated that the Colonial government in Kenya ‘fared no better in its efforts to promote technical training’ when ‘the first government technical school was opened at Machakos during the First World War and a second was built at Waa, south of Mombasa in 1921 which taught carpentry, masonry skills, and tailoring, subjects thought by colonial educators to be “in touch” with rural requirements’ (1988:42). Unfortunately, in vocationalising education urbanisation and modernisation appear to have ‘trumped’ rural development and vocational education. In short, an ‘academic’ education became valued for its potential to award participants with upward mobility while vocational education by and large did not.

3 Post-independence Developments

Following the attainment of political independence in the 1960’s, education became perceived as the *panacea* that could guarantee the bright future of both individuals and their country. This ethos promoted the widespread expansion of the limited educational infrastructure inherited from the former colonial powers. This expansion was biased against vocational and technical education for the following reasons:

- It was considerably cheaper to construct ‘academic’ educational facilities than vocational and technical facilities.
- The ‘supply’—both national and expatriate—of ‘academic’ teachers was greater than the availability of TVET teachers, and this included foreign volunteers.
- Training large numbers of ‘academic’ teachers was considerably cheaper than training vocational and technical teachers.
- The supply of ‘training consumable materials’ was considerably cheaper for ‘academic’ than vocational and technical programmes.
- Repair and maintenance requirements—and costs—were significantly less for ‘academic’ institutions and the repair and maintenance infrastructure was poor.

Sifuna (2001) argued that independence ‘failed to alter the colonial economic structures, with their educational systems continuing along the Western models and paradigms that have little relevance to African development’. He also asserted that ‘the initial gains made following decolonisation . . . disappeared, resulting in economic and social stagnation and in a good number of cases disintegration through civil strife’.

This author noted ‘it has been demonstrated that the very participation of a student in formal education significantly alters his (sic) occupational attitudes and aspirations’. ‘Students’ occupational attitudes have reinforced the historical arts bias of the secondary schools. This has made difficult the transition to a higher participation in scientific and technical programmes’ (Wilson, 1974:21). Since these programs are less popular, they receive the less academically capable students and their failure rates are significantly higher. During the decade following political independence the increasing demand for replacement of expatriate administrative personnel more than compensated for the initial expansion of the supply of arts-trained high school and university graduates (Wilson, 1974:22).

[Those] who obtained, and currently occupy, these positions of status and prestige provided models for the next cohorts of students. However, the administrative positions to which many of the current students aspire have long since been filled. Positions requiring scientific and technical qualifications (particularly in agriculture) remain understaffed (Wilson, 1974:22).

McLean and Kamau (1999) wrote that early in the formative years of the newly independent country, a more academic curriculum was preferable to a vocational and technical education for historical reasons. However, unemployment of persons with academic education forced the rethinking of the educational system (p. 10).

Atchoarena and Delluc pointed out that in sub-Saharan Africa, many pupils leave school before they are able to choose technical and vocational education.

'For this reason, countries such as Ghana, Senegal and Swaziland have decided to incorporate a measure of vocational content in general education programmes at the primary or lower-secondary level, in order to ready young people for wage employment or self-employment if they do not continue their schooling' (Atchaorena, 2001:34).

The new 8-4-4 education system [in Kenya] was implemented specifically to meet the needs of a more vocationalised curriculum at all levels of education (elementary, secondary, and tertiary). Pupils in the later years of the primary school cycle had opportunities to learn eleven courses in vocational and technical education. The secondary school cycle . . . offered even more opportunities (p. 10).

Ngome (1992) pointed out the historical paradox 'after independence, the same vocational education that was rejected during the colonial era has been embraced again as a measure of curbing school leavers' unemployment' (p. 14). Bi-lateral and multi-lateral aid agencies initially favoured the vocationalisation of secondary education, largely due to its perceived economic benefits. Hallak (1990) noted that 'the largest part' of financial aid in the 1970's and 1980's went 'to vocational and technical education'. He indicated that 'between 1980 and 1986, general secondary education in . . . sub-Sahara [Africa] received US\$10 per student annually; for vocational/technical it was US\$200 per student' (p. 279).

Psacharopolous and Woodhall (1985) noted 'an assumption underlying many manpower forecasts is that vocational education helps to satisfy manpower needs, whereas general or academic education does not.' Psacharopolous and Woodhall also suggested that 'past estimates of future manpower requirements were overoptimistic at the planning stage'. World Bank education projects from 1962 favoured technical and vocational education, noting that:

Education should be related to work and environment in order to improve, quantitatively and qualitatively, the knowledge and skills necessary for economic, social and other development (Psacharopolous and Woodhall, p. 5).

Chinyamunzore (1995:128) observed that 'the inclusion of technical/vocational curricula in general education has been seen by many nations as the vehicle to solve economic and social problems, in other words, the problem of underdevelopment'. Jowitt (2002:12) indicates that these options are currently attractive to the governments in the Pacific Island Countries (PICs) of Melanesia, Micronesia and Polynesia. Noting the disquiet that 'a large amount of money is currently being spent on formal tertiary education' to educate 'a small elite', she argues that 'education should take into account labour market needs'.

Hallak (1990:10) documented the magnitude of the explosion in enrollment in Least Developed Countries (LDCs) that took place between 1960 and 1980, following the attainment of political independence. He noted that 'primary

school enrolment increased by 106%' while 'enrolment increased by 280% at the secondary level, and 346% at the tertiary level'. He attributed this explosive expansion to the fact that:

Many developing countries gave the highest priority to developing skilled human resources through rapid expansion of secondary and higher education. Hallak also indicates that 'rapid expansion brought problems of increasing costs and low quality that assumed crisis proportions in many countries in the 1980s.' Chinyamunzore (1995:128) indicated that 'balancing of the requirements of general education, vocational/technical and occupational education has been the main problem presented to planners'.

Mokhtar and colleagues (1999) suggest undertaking pilot projects. They cite the DUOQUAL project undertaken by more than 10 European countries which they believe should be emulated by developing countries. The essence of the project is to integrate vocational and general education at the upper secondary education level (16–19 year olds), immediately after compulsory education, in order to improve the occupational flexibility of graduates. The project comprises different schemes (depending on the existing vocational and training systems of the countries involved) with various degrees to which vocational and general education academic subjects are integrated i.e. different degrees of work orientation (practical training): low, medium and high. The programmes lead eventually to certification in the form of a combined 'matriculation and vocational certification' as an expression of a 'double qualification'. There are a number of recommendations that if implemented can lead to a significant improvement in vocational and technical education (p. 5).

4 What Went Wrong?

Some writers have questioned the expansion of formal education in LIDCs upon premises of educating high-level human resources for a 'modern' economy. When 'three to ten percent of their working population are employed for wages in the modern market economy sector [and] the remaining 90 to 97% are engaged in subsistence agriculture... the student output... have found it increasingly difficult to obtain jobs in the monetised economic sector of their countries' (Wilson, 1974:21; Thompson, 1981:298). Foster (1965) critiqued what he labelled 'the vocational school fallacy in development planning' in his study of education and social change in Ghana.

It was also noted 'planners predicated expansion of the educational system upon an assumed growth rate of ten percent per annum in the wage-paid labour force. This was culpably optimistic!' 'The development of one system (the educational) was tied to expected developments in another (the labour force)... and

its expansion continued as planned even when all available growth indicators showed that the second system was performing exactly opposite to what was required' (Wilson, 1974:21).

Bennell (2000) concurred with this assessment some 26 years later, noting that 'only a small proportion of the economically active population in LIDCs is in formal sector wage employment (typically 10–20%).' He also noted that 'this share is declining in most countries as a consequence of liberalisation policies' (p. 8). Similarly, Thompson (1981) stated 'the fundamental problem is that merely to train young people in vocational skills will not of itself create employment opportunities' (p. 298).

Psacharopolous and Woodhall (1985) wrote that 'the main rationale for diversified secondary schooling and the introduction of vocational and pre-vocational courses has been to increase the economic relevance of schooling'. They concluded that in Tanzania 'technical specialization yields a substantial increase in vocational skills, but requires more resources per pupil'. They also asserted that 'the decision to introduce a diversified secondary curriculum cannot be justified solely on the basis of internal efficiency,' and that 'external efficiency . . . must also be considered' (p. 234).

The World Bank (1991) estimated that TVET capital costs were five or six times the cost of 'general' educational facilities and that recurrent, or operating, costs were twice as costly (p. 86). Vocationalised secondary education costs are likely to be similar in magnitude, while recognising that cost structures vary for different TVET and vocational subjects.

These views were strengthened by a series of cost-benefit studies undertaken by World Bank and other economists who suggested that the rate-of-return on investment in 'academic' secondary education was greater than the return to vocational and technical education. Hallak (1990) wrote that 'some criticism has been directed at the methods used for calculating rates of return on investment in education, and there is of course difficulty in generalising results coming from different countries'. It is also questionable what kinds of policy advice can be supported by rate-of-return studies.

For example, some of this policy advice was critiqued in a meta-study undertaken in Indonesia which found that there had been five rate-of-return studies undertaken over time in Indonesia and that the differential between the lifetime earnings of 'academic' (*SMA*) and STM (*Sekolah Teknik Menengah*, secondary technical) students had narrowed to a differential that was only slightly larger than the margin of error likely for such studies. The author concluded that these findings suggested insufficient support to justify a policy recommendation to scale down the expansion of STMs (Wilson, 1990).

McLean and Kamau (1999) concluded that 'Kenya's . . . vocationalized curriculum appears to have borne little fruit, in part because the government did

not anticipate the costs of the changes. As a result, over ten years later, almost no schools were equipped to offer the required practical components of the curriculum in vocational and technical areas'. They also observed 'the image of vocational and technical education has not yet recovered from [this] tainted image' (p. 3). Kenya's foremost technical–vocational educator, Kerre (1995:3), listed the major challenges facing TVET and vocational secondary education in Africa:

- The need for political stability
- Low status for TVET
- Changing needs of societies
- Shortage of teachers
- Lack of accessibility by the handicapped, poor, girls and women
- Lack of co-operation with enterprises

Kerre also recognised that 'no amount of education and training will be sufficient to provide gainful employment without specific government policies aimed at creating an enabling environment for business and industry'. In 1987, Kerre cited three problems causing serious constraints in the schools for vocational and technical education:

- Facilities
- Equipment and materials
- Insufficient and poorly trained teachers (p. 42)

Kenya Technical Teacher's College (KTTC)

Muya (1993) attributed the failure of the 8-4-4 system of vocational secondary schools in Kenya to costs and also to the lack of planning. McLean and Kamau (1999) toured the Kenya Technical Teacher's College (KTTC) and observed that the workshops were 'virtually unused' because technical courses were no longer offered. They judged this to be the result of 'a shortage of qualified faculty and the age of the equipment in the workshops', rather than the KTTC Dean's explanation that there was a 'shortage of hostels' to accommodate students. They also noted that the 1989 annual output of 190 teachers, cited by Ayot (1989), fell 'far short of demand' (p. 8).

These observations suggest that the *promise* of vocationalised secondary education in LIDCs was derailed by the inability or unwillingness of these nations to provide the resources necessary to maintain them. In short, this *promise* was not sustainable, due to economic and political factors. LIDCs are not totally to blame for this because the donors of vocationalised secondary schools and other TVET facilities may not have properly considered the ability of the recipient

nations to sustain these expensive-to-maintain institutions. Increasingly, development economists are examining the *implementation capability*, *absorptive capacity*, and *sustainability* of projects involving technology, especially TVET and vocationalised secondary education.

Atchoarena and Delluc (2001:40) wrote that ‘the low proportion of technical and vocational education in general secondary education is partly due to the public’s attitude towards this branch, which is usually regarded as leading to low-status occupations (“parity of esteem issue”). Moreover, the pupils who enrol in this kind of education are considered to be those who have failed in general education. The result is a contradiction between the generally negative image of technical and vocational education and the strategic role it is supposed to play in the race for international competitiveness, particularly in the new age of globalization’.

Hallak (1990) described the 1980’s as ‘a period of worldwide declining growth in real public spending on education’. He attributed this to ‘difficulties on the part of the receiving country in meeting the recurrent costs of the new educational facilities or services initiated by externally funded projects’ (p. 281). He also noted that ‘in low-income countries, primary education expenditure per pupil, which was already very low (about US\$ 40) in 1980, declined to less than US\$ 30 by 1986. At the secondary level, where low and lower middle-income countries spend about the same per student, troubled governments moved quickly to make cuts’.

Hallak (1990) also questioned:

If, for lack of laboratories, workshops, equipment and expensive specialised trainers, the curricula of a vocational school is little more than a pale copy of those in the prestigious academic schools, will more money, better equipment, and better-trained staff be sufficient to make it more vocationally oriented? (p. 93)

When vocationalised secondary schools were operating efficiently and effectively, it was noteworthy that they achieved success and attracted students. An evaluation found that in prestige programmes at The Accra Technical Training Centre in Ghana (a secondary-level vocational education institution) overqualified students were applying for spaces in several areas, perceived as prestigious by students, e.g., Office Machine Repair. Although the admission criterion was possession of a Middle School Leaving Certificate, many O-level and A-level graduates were applying for these technical and vocational programmes (Wilson, 1977). As far as is known, this was the first documented instance of the *reverse transfer* phenomenon in a LIDC, which ironically was also first reported in the U.S.A. in the 1970’s. Reverse Transfer in AICs concerns the enrollment of university graduates in diploma-level community college programmes in order to obtain credentials more likely to secure employment (Wilson, 1999).

One of the reasons that the ATTC was deemed ‘successful’ was that it developed and maintained two-way relationships with Ghanaian business, industry and commerce. This meant that employer participation in curriculum development resulted in ATTC graduates possessing skills valued by their employers. It was concluded that this ‘transferred’ secondary vocational school had put down ‘roots’ and become part and parcel of Ghanaian society, because former graduates were sponsoring their own employees at the ATTC. In short, there was a *market* for the ATTC output (Wilson, 1977). Hallak (1990) also stressed that ‘the effectiveness of the training . . . depend(s) on the quality of the relationships between schools and employers, and between them and the government authorities’ (p. 127).

Hallak (1990) adds another factor to those which contributed to the diminution of quality in vocationalised secondary education. Teacher quality in many nations is maintained by means of school inspection. However, Hallak questions ‘if, for lack of transport, supervisors are unable to supervise’ what is the impact upon quality? (p. 93) Mndebele and Mkhonta (2002) also address the role of school inspectors in vocational secondary education in Swaziland. They observed that ‘effective quality inspection is the result of a wise combination of four factors’ (p. 5):

- The kind of person who serves as the Inspector
- The school environment relating to the inspection
- Technical know-how of the Inspector
- The quality of planning carried on with effective inspection

Their study ‘recommended that a vocational inspector in-service education programme be mounted for incumbent inspectors of all practical . . . subjects’ (p. 14). It is not difficult to speculate that the lack of properly-trained school inspectors in many LIDCs likely also contributed to the desuetude [discontinuance/disuse] of vocational secondary education.

Another, less-well-explored aspect of the demise of vocational secondary education concerns the disincentives implicit in examination systems. Hallak (1990) suggested examinations should be redesigned to give extra credits for vocational subjects taken than to academic ones or the success of vocational secondary education might be in jeopardy (p. 143). Successful vocational secondary schools in Malaysia and Indonesia were examined comparatively and it was found that in both nations one aspect of the success of these schools was the development of vocational examinations and certificates for secondary school graduates. Moreover, these certificates also provided access to post-secondary education—mainly in polytechnics—for vocational school graduates (Wilson, 1991). Chinyamunzore (1995) indicated that Zimbabwean vocational

secondary students sit both the 'O' level examination and a Vocational Skills Certificate (NFC).

5 Policy Shift from Vocationalisation to Strengthening 'General' Education

The spotty record of vocationalising secondary education in LIDCs during the 1970's and 1980's led to a shift in policy at both the donor and recipient levels in the 1990's. This shift was accompanied in several bilateral aid agencies by the retirement of many technical educators who had facilitated the 'transfer' of TVET systems to LDCs. In many instances, in LIDCs retirees were also not replaced, and often less-well-qualified teachers were assigned to teach vocational secondary subjects.

Following the 'hand-over' of vocational secondary schools in many LDCs by bilateral aid agency personnel, it became necessary for Ministries of Education to fully provide for recurrent costs for equipment maintenance, purchase of training consumable materials, technical-vocational teacher training and upgrading, facility maintenance and repair or replacement of equipment by means of capital reserve funds.

Often, these important attributes of quality vocational secondary programmes were beyond the financial means of most LIDCs and 'deferred maintenance', assignment of less-well-qualified teachers, run-down of stocks of training consumable materials, and other 'short cuts' quickly eroded the quality of these institutions. Higher Industrial Secondary Schools in Sudan were found to have been significantly affected by most of these conditions (Wilson, 1997b).

In two evaluations of Canadian vocational secondary and vocational secondary teacher training project institutions, it was recommended that the Canadian International Development Agency (CIDA) provide either post-project assistance with equipment, materials and technical teacher training, or add new project phases to ensure the maintenance of quality. The former strategy was adopted by CIDA for the Accra Technical Training Centre (ATTC) in Ghana and the latter at The Kenya Technical Teachers' College (KTTC) (Wilson 1976, 1983).

Several authors advocated a different approach to vocationalisation of secondary schools, the *upward differentiation* of specialisation to either senior secondary schools or post-secondary institutions. For example, Fisher (1993) argued for 'a late selection, high participation, integrated curriculum' instead of 'an early selection, low participation, differentiated curriculum'. McLean and Kamau,(1999) noted that this shift was consistent with the policy change

of the World Bank (1991) as it shifted its priorities from prevocational courses and secondary vocational training to strengthening general education. They claimed that such a shift was reflective of ‘an emerging international consensus about the high costs of vocationalisation and the relative failure of school-based vocational programs to achieve their intended goals’.

In contrast, The Asian Development Bank continued to focus upon secondary and post-secondary vocational training until 1998 when its education sector policy paper was revised. It appears that this ‘emerging international consensus’ took some time to percolate from Washington to Manila.

Bilateral and multilateral aid agencies have provided and continue to provide aid to the countries of sub-Saharan Africa for the purpose of improving the quality of their technical and vocational education. Traditionally, such aid may be in financial, technical, physical or human form (Atchaoena, p. 59).

6 A Re-conceptualisation of Vocationalising Secondary Education

Kerre (1990) suggested that a ‘national conceptualization of the role of technology and national development [and] a clearly defined and articulated vocational and technical training system that responds to the needs of society, industry and individuals’ was needed in Kenya.

In 1995 he and Kwende identified three policy options for Kenya:

- TVE offered as a separate system with its own separate institutions
- TVE offered alongside general education in the same institutions
- An integrated system in which TVE curriculum is a requirement for all learners

These policy alternatives reflect the convergence noted in developed and newly-industrialising nations that is taking place in ‘academic’ and technical curricula for secondary schools. It was asserted that quality technological education must be based upon a firm foundation in mathematics, science, language and an understanding of the nature of technology (Wilson, 1997). Shacklock, Hattam and Smyth (1998) also cite ‘the need for a convergence of general and vocational education’. Their assertions are grounded in the fact that ‘Australia now has the smallest manufacturing sector, relative to the size of the economy, in the OECD’. Gray and Herr (1998) and Finch and Crunkilton (1999) also assert that a convergence is taking place between ‘academic’ and ‘technical’ curricula in North America.

Shacklock, Hattam and Smyth (1998) assert that in order to make schooling in Australia ‘more relevant to the demands of the workplace’ key competencies

must be included in the ‘mainstream curriculum’. They noted that what makes the key competencies such a potent vehicle for advancing the vocationalising of the curriculum is the collapse of the general-vocational divide being written into the conception of key competencies; and that what has been crafted in the case of the key competencies is a discourse in which vocational education no longer means training in particular occupational categories, but aiming for a more abstracted, undifferentiated worker-citizen able to bring a set of generic competencies to any vocation.

Both socially critical educators and advocates for vocationalising the curriculum argue for reforms based on a disdain for the theoretical, abstract, (sorting and selecting for university) academic curriculum.

Hallak (1990) addressed the conundrum faced by many LIDCs with regard to investment in vocationalised secondary education and other TVET institutions. In a footnote, he wrote that:

It is fashionable today for planners to reject requests for investment in technical/vocational education and training on the grounds of: (i) high unit costs; (ii) low effectiveness; (iii) lower social rates of return than the more academic branches. One cannot disagree with the validity of the arguments, although the rate-of-return approach has been questioned. But then what is the alternative? (p. 154)

It may well be that there is no choice but to improve the effectiveness of whatever system of technical/vocational training exists.

This writer asserted that the twin impact of *globalisation* and *technological modernisation* necessitates the education and training of *knowledge workers*, who are able to use logical-abstract thinking to diagnose problems, research and apply knowledge, propose solutions, and design and implement those solutions, often as a team member. One of the effects of globalisation has been the increasing convergence between academic and vocational education. This is increasingly reflected in policy, practice and curriculum development (Wilson, 2001:21). It was also noted that:

The education and training of knowledge workers requires different educational policies, facilities, curricula and above all, teachers. Teachers must be transformed from ‘those who impart knowledge to those who facilitate learning.’ Curricula must be transformed from mechanisms to deliver facts into mechanisms to promote and facilitate learning and thinking.

Curricula has been in transition from its Industrial Age ‘mix’ of 50% theory and 50% practical to one that is 80% theory and 20% Information Age. This shift from a *manipulative* to a *cognitive* focus accompanies the convergence... of academic and vocational secondary and TVET curricula (Wilson, 2004).

Draxler and Haddad (2002) added that *knowledge*, ‘both basic and applied, is being generated very quickly and is growing exponentially’. They

noted ‘more new information has been produced within the last three decades than in the last five millennia.’ On the basis of these observations, they forecast that ‘we should be poised for dramatic technological advances and breakthroughs in the macro frontiers of the universe on the one hand, and microscopic secrets of the human body on the other hand’ (p. 3). These prognostications strongly suggest that LIDCs can ill afford to ignore the need to re-conceptualise and re-structure vocational secondary education, if only to be competitive participants in an increasingly global economy and society.

It is highly likely that the early initiatives to vocationalise secondary education were too ambitious in the respect that they tried to develop a viable system in a short period of time. To counter this, Hallak (1990) suggests development of complex systems through multi-phase projects. One specific example is ‘the introduction of changes in existing primary and secondary curricula to streamline transitions between education and work’ (p. 135). He cites ‘the pre-vocational studies which a number of Asian countries have introduced into the curricula’.

In the initial phases, the countries called upon the bulk of the [teaching] profession to introduce only such changes in practice as the average teacher could be expected to manage with in-service training and supervision that they could realistically be offered.

This writer asserts that a ‘cross-curricular approach’ should ‘infuse common themes in as many curricular areas as possible’. The education and training of *knowledge workers* must be built at the primary and secondary levels ‘upon a firm foundation’ which ‘should include provision of a sound understanding of mathematics, science, technology and communications skills’ (Wilson, 2004). Instead of ‘compartmentalising knowledge, technology affects all aspects of life and necessitates a broader understanding of what technologies are, how they work, how they have been applied to real-world problems, and how they affect our lives’ (Wilson, 1997).

Bennell (2000) also stressed that ‘the distinction between ‘education’ and ‘training’ is becoming increasingly outmoded and the secondary school curriculum is being increasingly vocationalised in order to ensure that’ basic skills and ‘core competencies’ are acquired (p. 4).

In a more rhetorical tone, Sifuna (2001) asserts that ‘the twenty-first century is an important turning point’ and that African countries:

Have to take control of their own destiny and follow the kind of development that is endogenous to their settings. They need to be inspired by the initiatives launched within their own countries by local communities and in other less industrialised countries outside the umbrella of international prescriptions and scouting, which meet the needs of the marginalised groups and replicate them for further development. Structured international

packages should be resisted in favour of international cooperation that responds to the countries' own designed development strategies. Education should take the lead in the transformation process. (p. 36)

These noble objectives will be difficult to attain in the globalised twenty-first century, due to the challenges posed to LIDCs and to their educational, economic and social systems. Bennell (2000) observed that:

The contrast with the human resource situation in the majority of LIDCs is stark and very worrying. The attainment of higher education for all in the advanced industrial countries (AICs) is a more likely outcome by 2015 than the attainment of universal primary education of a reasonable quality in all developing countries.

On the demand side, the rapid globalisation of the world economy is generating massive demand for internationally acceptable and negotiable academic and vocational qualifications both among individuals and the corporate sector.

Faced with this uphill struggle—or 'the law of the moving target' that this writer coined some years ago—the re-vocationalisation of LIDC secondary educational systems to meet these challenges may well be unattainable. The reasons for doing so remain viable and important, but the resources available to implement such policies and plans are not likely to become available.

One developing nation that has pursued a different path is Botswana, which has used earnings from its diamond and copper mineral resources to transform its society. It was indicated that the Government of Botswana has also endeavoured to 'generate employment opportunities for its increasing numbers of educated citizens' by means of 'a system of loans and grants to Botswana to start their own enterprises.' The Financial Assistance Policy (FAP) has been used in conjunction with investment in the social infrastructure, including vocationalised secondary education. This policy has been to provide ten years of Basic Education to the Junior Certificate (JC) level. Priority in National Development Plan 8 (1997/98 to 2002/3) was given 'to the expansion of Technical-Vocational Education and Training (TVET) in order to meet the nation's economic and development objectives for the 21st century' (Wilson, 2002:30).

This expansion is to be effected by the establishment of new vocational secondary programmes under the Ministry of Education at the secondary (foundation certificate) and tertiary (advanced certificate) diploma levels. The goal is to develop *outcomes-based modularised programmes* that will educate flexible, adaptable, multi-skilled and trainable youth destined for employment in *both* the formal and informal sectors of the economy, as well as providing an open, progressive means to access further and higher education and training (Wilson, 2001:30).

7 Conclusion

Has the baby been thrown out with the bath water? The first response to this rhetorical question is that, like the opposite direction taken by bath water in drains located in the northern and southern hemispheres, there is a partial north-south division noticeable in the vocationalisation of secondary education. However, while vocationalisation appears to be increasing in developed and newly-industrialising nations—including some in the southern hemisphere—in the least-developed nations vocationalisation of secondary education has not fared well for several important reasons.

The reasons for the failure of vocational secondary education in LIDCs appear to have more to do with parental and student attitudes, failure of governments to provide adequate financial and material resources, laxity in curriculum modernisation, not keeping curricula relevant to the needs of business and industry, the decline of professional vocational teacher training, deferral of facility and equipment maintenance, the decline of effective school inspection and failure to provide trained professional vocational subject inspectors. Changes in multi-lateral and bi-lateral donor policies have also significantly affected the vocationalisation of secondary education in LIDCs.

However, in those developing nations where adequate resources have been made available, teachers trained in vocational subject areas, curricula kept current with global trends, facilities and equipment given adequate resources, and vocational subject inspection standards preserved, it appears that effective vocational secondary schools have been developed and maintained. One salient lesson learned from three decades of experience is that sustainability is a continuous process. If standards and maintenance are allowed to 'slide', then the effectiveness of vocational secondary schools may erode and the confidence of employers may dissipate. In short, a high-technology infrastructure is a high-maintenance endeavour.

It is highly likely that thorough initial human resource studies, diligent attention to policy formulation and planning, adequate funding, effective implementation—including proper construction, provision of relevant equipment, and provision of necessary training consumable materials—relevant vocational teacher preparation—including in-service training—and effective subject inspection make a difference between success and failure. For example, this writer argued for World Bank project finance of basic planning, implementation, vocational curriculum development and teacher education in Lebanon, instead of the finance of the desired new facilities that would duplicate efforts of other donors (Wilson, 1997b). Conditions observed in existing vocational schools suggested that building an effective foundation for vocational

secondary education was the most sustainable course for action. It is hoped that future vocational secondary projects are conceived with similar rigour.

The initial questions may be answered: (a) the original notions for vocational secondary education are considered to remain valid; (b) adequate financial and human resources were not sustained and this contributed to the failure of many vocational secondary institutions; and (c) donor's expectations were not realistic in terms of the sustainability of these institutions.

8 References

- African Regional Consultation (1998). *Final report: African regional consultation in preparation for the second international congress on TVE*. Nairobi: Retrieved January 15, 2004 from <http://www.unevoc.unesco.org/events/ev9811n1.htm>
- Atchoarena, D. and Delluc, A.M. (2001). *Revisiting technical and vocational education in sub-Saharan Africa: an update on trends, innovations and challenges*. Paris: International Institute for Educational Planning.
- Ayot, H.O., M.M., Patel, D.M., Kiminyo, W.O., Orwa, J., Okech, G. and Godia, G. (1989). *A study report on technical and vocational education in Kenya*. Nairobi: Ministry of Manpower Development and Employment. Quoted in McLean and Kamau (1999).
- Bennell, P. (2000). *Human resources development and globalisation: what should low income developing countries do?* London: Think Piece for the White Paper on Globalisation and Development.
- Chinyamunzore, N.N. (1995). *Devolution and evolution of technical/vocational education curriculum in Zimbabwe*. IDATER95 Loughborough University of Technology.
- Draxler, A. and Wadi, H. (2002). *Technologies for education: potentials, parameters, and prospects*. Paris and Washington: UNESCO and The Academy for Educational Development.
- Eisemon, T.O. (1988). *Benefiting from basic education, school quality and functional literacy in Kenya*. Oxford: Pergamon Press.
- Finch, C.R. and Crunkilton, J.R. (1999). *Curriculum development in vocational and technical education*. Toronto: Allyn and Bacon.
- Fisher, G. (1993). Against vocationalism: the case for a late selection, high participative South African school system. *Education with Production*, 10(1), 77–100.
- Foster, P.J. (1965). *Education and social change in Ghana*. London: Routledge and Kegan Paul.
- Gray, K.C. and Herr, E.L. (1998). *Workforce education*. Toronto: Allyn and Bacon.
- Hallak, J. (1990). *Investing in the Future*. Paris: UNESCO IIEP and Pergamon Press.
- Jowitt, A. (2002). Reconceptualising labour markets in the South Pacific. *Journal of South Pacific Law*, 6(2), 1–15. Retrieved March 15, 2004 from <http://law.vanuatu.usp.ac.fj/jspl>
- Kerre, B.W. (1990). Technology education and world development: challenges and opportunities for Education in Africa. *The Journal of Technology Studies*, 16(1), 40–46.
- Kerre, B.W. (1995). *Technical and vocational education in Africa: a synthesis of case studies*. Dakar: UNESCO-UNEVOC International Project on TVE, UNESCO Regional Office at Dakar.
- Kerre, B.W. and Kwende, T.G. (1995). *Towards a Managerial View of Technical and Vocational Education in Africa*. Dakar: UNEVOC-UNESCO International Project on TVE. UNESCO Regional Office at Dakar.

- Manning, S. Dually oriented qualifications: a knowledge base related to the LEONARDO projects. Retrieved January 15, 2004, from <http://www.b.shuttle.de/wifo/duoqual/qual.htm>
- McKenzie, C. (1997). Missionaries and the literature of missionary education: myths and misapprehensions. In J. Lynch, C. Modgil and S. Modgil (Eds.), *Education and development: tradition and innovation*. London: Cassell.
- McLean, G.N. and Kamau, D.G. (1999). Human resource development and vocational and technical education at Kenyatta University, Kenya. Paper presented at the *European Conference on Educational Research*, Lahti, Finland. Retrieved March 15, 2004, from <http://www.leeds.ac.uk/educol/documents/00001203.htm>
- Mndebele, C.B.S. and Mkhonta, S. (2002). *Ensuring relevance and quality in the delivery of high school vocational education: the case of Swaziland*. Kwaluseni: University of Swaziland.
- Mokhtar, G.A., Zaky, A.A. and El-Faham, M.M. (2002). The need for better standards of education at the technician level in developing countries. Retrieved January 20, 2004, from <http://www.asee.org/international/INTERTECH2002/172.pdf>
- Muya, W. (1993). *Changes in the 8-4-4 system fail to realise objectives*. Nairobi: Sunday Nation, pp. 16ff.
- Ngome, C. (1992). *Vocationalisation of education in Kenya: factors that have influenced policies and practices in the colonial and post-colonial period*. Nairobi: Kenyatta University, Department of Educational Foundations (Mimeographed).
- Psacharopoulos, G. and Woodhall, M. (1985). *Education for development: an analysis of investment choices*. New York: Oxford University Press.
- Shacklock, G., Hattam, R. and Smyth, J. (1998). Enterprise education and the construction of teachers' work: exploring the links. Sturt: Flinders University School of Education. Paper prepared for *The Australian Association for Research in Education Conference*, Adelaide.
- Sifuna, D.N. and Shindu, J.O. (1988). *Education with production in Kenya: a state-of-the-art review*. The Hague: Centre for the Study of Education in Developing Countries.
- Sifuna, D.N. (2001). African education in the twenty-first century: the challenge for change. *Journal of International Cooperation in Education*, 14(1), 21–88.
- Standards of education at the technician level in developing countries*. Retrieved January 20, 2004, from <http://www.asee.org/international/INTERTECH2002/172.pdf>
- Touré, S. (1965). Education and social progress. In L.G. Cowan, J. O'Connell and D. Scanlon (Eds.), *Education and nation-building in Africa*. New York: Praeger.
- Wallace, I. (1997). Building better learning systems through the development of formal/non-formal linkages in agricultural and rural education. In J. Lynch, C. Modgil and S. Modgil (Eds.), *Education and development: tradition and innovation*. London: Cassell
- Wilson, D.N. (1974). Towards an anthropology of educational planning in developing nations. *Educational Planning*, 1(2), 18–28.
- Wilson, D.N. (1977). Evaluation as a component of the educational planning: a case study—the Accra Technical Training Centre. *Educational Planning*, 3(3), 20–33.
- Wilson, D.N. (1990). The deleterious consequences of premature rate-of-return studies on LDC education policies: an Indonesian case. *Canadian and International Education*, 19(1), 32–49.
- Wilson, D.N. (1991). Reform of technical–vocational education in Indonesia and Malaysia. *Comparative Education*, 27(2), 207–221.
- Wilson, D.N. (1992). *An international perspective on trainer competencies, standards and certification*. Toronto: Ontario Training Corporation.
- Wilson, D.N. (1996). *Reform of vocational and technical education in Latin America*. Washington: Inter-American Dialogue PREAL (Program to Promote Educational Reform in Latin America and the Caribbean), Occasional Paper No. 2.

- Wilson, D.N. (1997a). *Reform of technological education*. Toronto: Ontario Ministry of Education and Training. Reform of Secondary School Curricula.
- Wilson, D.N. (1999). A new wrinkle in planning post-secondary education in Ontario: B.A. degree holders enrolling in colleges of applied arts and technology. *Educational Planning*, 12(2), 3–22.
- Wilson, D.N. (2000). Technical–vocational education and training. In D. and A. Poonwassie (Eds.), *Fundamentals of adult education*. Toronto: Thompson Educational Publishers.
- Wilson, D.N. (2001). Reform of TVET for the changing world of work. *Prospects*, XXXI(1), 21–37.
- Wilson, D.N. (2002). Botswana: a different path towards development. *Educational Planning*, 13(2), 23–33.
- Wilson, D.N. (2004). The education and training of knowledge workers. In J. Zadjia (Ed.), *International handbook on globalisation and education policy research*. Dordrecht: Kluwer Academic Publishers.
- Wilson, D.N., Brown, G.M., Otieno, A.V. and Ngugi, L. (1983). *Final report: Kenya technical teachers' college evaluation*. Toronto: David N. Wilson Consultants, Ltd.
- Wilson, D.N., Desjardins, R.Q., Park, I., Noi, P.C., Ennim, E.K. and Bentil, J.C. (1976). *Final report on the evaluation project: the Accra Technical Training Centre*. Toronto: David N. Wilson Consultants, Ltd.
- Wilson, D.N., Demetriou, V., El-Rashidi, R., Peresson, J.P., Gikas, G., Dib, E. and Jellinek, S. (1997b). *Project appraisal document on a proposed loan to the Lebanese Republic for a vocational and technical education (VTE) project*. Washington: The World Bank.
- World Bank (1991). *Vocational and technical education and training: A World Bank policy paper*. Washington: The World Bank.

Part II: Country Case Studies

Pre-vocational Secondary Education in Botswana, *Sheldon G. Weeks*

Vocationalisation of Secondary Education in Ghana, *Albert K. Akyeampong*

Vocationalisation of Secondary Education: Kenya Case Study, *Kilemi Mwiria*

Sheldon G. Weeks

4

Pre-vocational Secondary Education in Botswana

1	Executive Summary	93
2	Introduction	94
3	Secondary Education in Botswana.....	95
4	Vocationalisation in Botswana: A Literature Review	102
5	Practical Subjects in Botswana in 1992	107
6	Staffing Constraints	110
7	Practical Subjects in 2002.....	112
8	Cost of Running Secondary Education and Practical Subjects	131
9	Discussion.....	135
10	Acknowledgements	141
11	References.....	141
12	Appendix 1: Secondary School Enrollments 1981 to 2002	145
13	Appendix 2: TSM Salaries (Pula) by Citizenship and School Type.....	146

1 Executive Summary

As populations grow, and the number of students attending secondary schools escalates, the need for relevant and appropriate courses for students who finish 12 years of education, but are unable to continue to any tertiary institution, becomes perceived as being more urgent.

Botswana, combining political stability and democracy since independence in 1966, has been an example of planned and sustained growth to the rest of Africa. Yet Botswana has resisted the full vocationalisation of its secondary schools. In 1992 only 6,400 students took the Cambridge Overseas School certificate. Except for Agriculture, which 45% of the students took, the other nine practical subjects were taken by from 814 to only 14 students each.

The senior secondary school (SSS) system has grown immensely. The number of students in Forms Four and Five had in 2001 grown by 2.68 times, while participation in the 10 key practical subjects had increased from 2.98 to 39 times since 1992 depending on the subject. Sixty-five percent of the Form Five

students were now taking Agriculture, Commerce, Design and Technology, Art and Food, and Nutrition had all expanded significantly. The number of teachers nearly doubled during these years; but for practical subjects the increase was more dramatic and was coupled with extensive training and localisation. Over 23,000 students took the new Botswana General Certificate of Secondary Education (BGCSE) in 2001, of whom 16,500 were in the nation's 27 government senior secondary schools. The University of Botswana was able to enroll approximately 3,400, or only 15%, of these in August 2002.

What is the place of practical subjects in Botswana's secondary schools today? It might be assumed that as the proportion of students who can continue their education to the next level declines, the demand for practical subjects and vocational-related education will increase. What has actually happened? What subjects are being taken in the new millennium in the schools and with what results?

This paper examines the literature on vocationalisation and assesses the status of practical subjects, issues of assessment, school organisation, staffing, the high cost of vocationalisation, poor guidance and counselling, and the absence of support systems for vocational graduates.

Is Botswana continuing to be successful in preparing the school leaver for the world of work? What are the lessons to be learned from Botswana?

2 Introduction

Vocationalisation-Definition: The term vocationalisation refers to efforts by schools to include in their curriculum those practical subjects that are likely to generate among students some basic knowledge, skills and dispositions that might prepare them to think of becoming skilled workers or to enter manual operations. The inclusion of practical or industrial arts subjects especially in the curriculum of secondary schools as part of a programme of general education is considered an essential element in the vocationalisation of education. (Bacchus, 1988:31)

This paper explores the history of the development of secondary education in Botswana in the context of the policy issues related to vocationalisation and in a comparative context. Its focus is on the place of practical subjects in senior secondary schools and in the context of development and change in Botswana.

A number of key issues will be examined: the popularity and availability of practical subjects; changes in policy over the years; the reliance on performance in practical subjects as a criterion for admission into tertiary institutions; and the impact of rapid expansion on practical subjects.

For the purpose of this paper the 10 key practical subjects are Agriculture; Commerce, Principles of Accounts, and Business Studies; Design and

Technology; Computer Studies; the Home Economics subjects of Food and Nutrition, Fashion and Fabrics, and Home Management; and Art (now Art and Design). Though most senior secondary schools have a division of practical subjects, they may organize them differently from school to school. Commerce may be grouped with the 'Humanities and Social Science' or the core subject of English and the related subjects of literature, history, development studies, cultural studies, geography, environmental studies, religious education, and Setswana. Computer Studies is usually grouped with the 'sciences'-Mathematics, additional maths, Single Science, Double Science, and Triple Science (more commonly called Pure Science as students take Chemistry, Physics, and Biology). Agriculture is also often perceived as a science subject. It will be demonstrated that the hierarchy of subjects in the secondary schools has a profound impact on both practical subjects and the future careers of students.

3 Secondary Education in Botswana

Background to Botswana

Botswana is an independent republic in Southern Africa that achieved its independence in 1966. It is landlocked and contains 582,000 square kilometres, but its population density in 2002 is only 2.92 people per square kilometre for 1,700,000 people. Urbanisation was rated at 45%. At independence Botswana was estimated to have 450,000 people, the majority living in rural and remote areas or in small agro-towns (headquarters of the various Tswana chiefdoms). By the census in 2001, 22% of the population was living in urban areas and 23% in the 10 main agro-towns. The major growth areas have evolved around mines (Jwaneng, Letlhakeng and Orapa, Sowa Pan and Selbi-Phikwe), the town of Lobatse, the city of Francistown, and the capital Gaborone. Some of the traditional villages near these major centres have grown up to tenfold every decade. Botswana is said to have the fastest growing urban areas in Africa.

At independence Botswana was one of the poorest countries in the world. Its wealth resided in livestock and limited potential for tourism. Then in the early 1970s diamonds were discovered. These have provided the foundation for rapid growth ever since. General political stability and freedom from corruption have facilitated sustained development. Until 1994 Botswana was one of the 'Front-line States' opposed to apartheid in South Africa. Growth, fuelled by government spending, has occurred in most sectors of life, including education.

In 1966 there were 1,531 students in secondary schools. By 2002 Botswana had achieved an enrollment in Forms One to Five of 153,593 students. Botswana's population in 36 years expanded 3.8 times, while its secondary

school enrollment increased 100 times! This is a good indication of how rapid social change and development has been in Botswana.

Secondary Education

The objective of secondary schooling has been to provide an educated populace capable of both entering further education and/or joining the labour force as workers sufficiently qualified to benefit from further training on the job.

Secondary education follows seven years of primary schooling. Forms One to Five were first offered in five-year secondary schools. With the introduction of community junior secondary schools in the mid-1980's, Forms One and Two were taught there (providing nine years of basic education) and the senior schools taught Forms Three to Five. Following the second National Commission on Education (NCE) in 1993 and the Government White Paper in 1994 on a Revised National Policy on Education (Botswana, 1993, 1994), Form Three has been moved to the junior secondary schools and the senior schools have been able to increase their enrollments by one-third. This change has also eliminated what was perceived as a wasted year of 'shopping around' in Form Three (where students were allowed to experience a variety of subjects before selecting their course of study for Forms Four and Five). It also reduced the per-student costs, as junior secondary schools are cheaper to run than senior secondary schools, particularly in the main practical subjects of Agriculture, Art, Home Economics, Design and Technology, and Business Studies. In the junior schools, if Computer Awareness is taught, it is not examined (by June 2002 only 51 of 206 junior schools had received their computers and not all of these had teachers for the subject).

Continuity between junior and senior secondary school cannot really be achieved because approximately 20 examinable subjects are offered in Forms Four and Five (students are normally examined on seven to nine of them). In the junior schools only nine subjects are examined at the end of Form Three on the Junior Certificate, but theoretically up to 15 subjects are available (not all schools have the staff to teach all the optional subjects). The students in Forms One must take as core subjects English, Mathematics, Integrated Science, Setswana, Social Studies, and Agriculture. The optional subjects divide into 'general' subjects—where the choice is between Moral or Religious Education, Physical Education, and Music—and practical subjects where the choice is between Business Studies, Home Economics, Design and Technology, Art (not all general and practical subjects are offered in some schools). As noted above, students in junior schools may also take Computer Awareness (if available), but are not examined in it. Business Studies in Form One divides into commerce and office procedures and commerce and bookkeeping/accounts in Forms Two

and Three. A pattern is emerging that students who have taken a practical subject in junior school prefer not to continue it in senior school, instead wanting to learn something new, perhaps because they have found the subject difficult, or not been challenged by it (art, if enjoyed, could be the exception to this). The implications of this will be considered below.

In the senior schools the syllabus allows for up to 10 practical subjects to be offered. These are Agriculture; Design and Technology (with the separate subjects of Woodwork, Metalwork, and Electronics phased out in the mid-1990's); three separate subjects under Home Economics—Food and Nutrition, Fashion and Fabrics, and Home Management; Art, which became Art and Design in 2001; Computer Studies; and three commerce subjects—Principles of Accounts, Commerce, and as of 1999 the new subject of Business Studies. Of these 10 practical subjects only five (Agriculture, Design and Technology, Commerce, Food and Nutrition, and Art and Design) are currently taught at all senior secondary schools. The major constraint in the provision of the other five subjects at the school level is a combination of limited facilities and a shortage of teachers to teach the subjects.

SSS students are divided into three groups. This streaming has a significant impact on what students take as practical subjects and their success in those subjects. How streaming is carried out differs from school to school. Students are streamed in Form Four according to their preferences *and* their performance on the Junior Certificate. The best students are streamed into Pure or Triple Science (15% of the Form Fives in 2001); the next best into Double Science, and the weakest students into Single Science (54% in 2001). Students doing Pure Science usually are not able to take any practical subject, but when their programme or an 'overload' allows it, they usually excel in that subject (the students at Mater Spei school are an example of this).

The Pure Science stream also tends to do better in English and Mathematics. While 6% of the Form Fives failed (F, G, or U) English on the BGCSE in 2001, only 25% achieved a Credit or better (C to A*). The failure rate in mathematics in 2001 was a disturbing 42%, but 25% earned a Credit. Mathematics is the Achilles' heel of the whole system. Students who cannot do well in mathematics also tend to have trouble with subjects such as principles of accounts.

With the introduction of BGCSE, there has been a major reform of the syllabus across all subjects with the introduction of individual research projects (like in Design and Technology). An example of this is the change in Art to become Art and Design, with a 10-hour examination and a different approach to the portfolio requiring more research and problem solving on the part of each student. This approach has been refined and introduced into all practical subjects: for example, in Food and Nutrition in 2000, Fashion and Fabrics in 2001, and Home Management in 2002 (though in commerce, students can still

take an examination paper instead of doing a project). Whereas in the past continuous assessment in practical subjects counted for approximately 20% of the Cambridge result, under the new BGCSE it represents half the final mark.

Developments since Independence

Education has achieved the highest rates of expansion of any government service since Independence. Major changes have come fast, and the sector is still evolving rapidly. The accomplishments have been dramatic, and at the same time the problems have been monumental. There is probably no other government sector from which the public expects and demands more, and no other sector for which the rapid rate of population growth poses larger problems. (Botswana, 1988:89)

In 1976 there were 15 aided and 17 private secondary schools. Following the high priority given to establishing the government community junior secondary schools, most private junior schools were absorbed. In 1991 there were 146 community junior secondary schools and 23 senior secondary schools with 48,572 students in the community junior secondary schools and 19,595 in the senior secondary schools. There was space for only 31% of the 1991 Form Two leavers in senior secondary schools in 1992.

By 2002 the transition rate between Form Three and Form Four was 50.8% (35,761 students in Form Three in 2001 and 18,177 in Form Four in 2002). The proportion of unqualified teachers in the secondary schools had started to go down, but because of rapid expansion these second-level institutions still rely on untrained or temporary staff to fill vacancies as teachers.

Table 4.1 is about the government (and grant-aided) sector of education. There is in 2002 a thriving private sector. The rapid growth and expanded output of junior secondary schools has caused a demand for places in Form Four. In 2002 there are 51 private senior secondary schools in Botswana. Botswana has 43 Brigades; they also provide further vocational training to junior secondary school leavers, but their capacity cannot meet the demand. In 2002 there are 70 registered private vocational training centres in Botswana. For an earlier study of private vocational training see Weeks et al. (1997).

Commissions 1977 and 1993

Before Independence Botswana had an 8-3-2 structure. This was changed to 7-3-2 on the eve of Independence, presumably to reduce the cost of primary education. During the transition year Standard 5 and 6 pupils were promoted to Standard 7. The 7-3-2 structure was changed to 7-2-3 in 1986 as an interim step to a 6-3-3 structure following the recommendations of Education for Kagisano (Mautle and Weeks, 1993).

Table 4.1 Development of secondary education in Botswana: 1966 to 2002

Year	1966	1976	1986	1991	2002
Population (000s)*	450	712	1,131	1,357	1,700
Secondary (jr & sr)	—	32	73	169	233
Form 1–5 schools**					
Enrollment	1,531	13,991	35,966	67,167	153,593
Teachers	—	664	1,619	3,516	6,856
Teacher:student ratio	1:21.0	1:22.2	1:19.1	1:22.5	—
Untrained***	—	29%	26%	13%	16%

Sources: 1966: Republic of Botswana (1977): Education for Kagisano; 1976: Education statistics, central statistics office (Gaborone: government printer, December 1976); 1986: Education statistics, central statistics office (Gaborone: government printer, October 1987); 1991: Annual report of the educational management information system (EMIS) indicators of efficiency (Gaborone: Ministry of Education, April 1992); 2002: Figures from Teaching Management Services, Ministry of Education

* Estimates (there was a census in 1971, 1981, 1991, and 2001).

** In 1991 this included 23 senior schools; in 2002, 27 senior schools.

*** In 2002 there were 1,099 “temporary teachers” in secondary schools.

The Policy Framework

The development of secondary education in Botswana has occurred within the context of six-year rolling plans (called National Development Plans or NDPs). The current plan, NDP8, ends in 2003. These plans have been guided by key educational policy frameworks established by NCEs followed by White Papers on National Policy on Education. The first NCE was held in 1977 and the second in 1993, and the Revised National Policy on Education (RNPE) was approved by the government in 1994 (Botswana, 1977, 1993, 1994).

1977 and 1979-first National Commission on Education

In 1977 the structure of the education system was seven years primary, three years junior secondary, and two years senior secondary followed by four years of university education (7 + 3 + 2 + 4). The 1977 commission wished to raise basic education from seven to nine years and establish a 7 + 2 + 3 system leading to 6 + 3 + 3. In 1985 the government began implementing improved access to Form One and by 1988 Form Three was transferred to the senior schools; there were then 23 (government and government-aided). The 1977 commission reiterated that: “The purpose of the schools at all levels will be to prepare children for useful, productive life in the real world. They should

have the basic skills of literacy, numeracy and the knowledge that will make them self-reliant later in life, whether they continue full-time schooling, study on their own, find employment, or become self-employed' (Botswana, 1977:3). There was a 'Supplementary Report of the National Commission in Education' (Botswana, 1979; Weeks, 1993). It favoured a three-year junior secondary on the grounds that two years was too short to achieve its objectives.

The first Commission recommended that in senior schools students should not take more than one practical subject. They believed that to take more than one practical subject might disadvantage a student when it came to tertiary selection. Practical subjects were offered as 'options'. The exception to one practical subject took place at Lobatse Senior Secondary School where a "Technical Wing" was developed and students were fully 'vocalionalised' and might take up to four practical subjects (Weeks, 1997).

1993 and 1994- second National Commission on Education

The second Commission and the RNPE re-affirmed the need to return to the 7 + 3 + 2 structure for the system. The second Term of Reference (out of seven) called for the Commission to 're-examine the structure of the education system and recommend a system that will guarantee universal access to basic education, whilst consolidating vocationalising the curriculum content at this level' and in Terms of Reference number four specifically called for the Commission to 'study the various possible methods of student streaming into vocational and academic groups at senior secondary level' (Botswana, 1993:v).

The second NCE, responding to the critique that the secondary schools are not doing enough to vocationalise, that they are too academic, comments:

However, in terms of international trends it could be said that Botswana enjoys the advantage of having a senior secondary curriculum, which may be regarded as contemporary among middle-income developing countries as it has not suffered from, misdirected 'vocalionalisation' efforts. The trend among middle-income countries is that emphasis should be placed on cognitive development, language, Mathematics, and Science at the secondary level. **Training for employment should begin after education. Botswana is therefore correctly aligned in concentrating on the academic disciplines.** At the same time the key workplace-related subjects like Commerce and Design and Technology are being introduced. (Botswana, 1993:172; emphasis added)

The NCE Recommendation 32 was as follows:

Junior Certificate Curriculum: six core subjects (English, Setswana, social studies, mathematics, integrated science, design and technology); computer awareness; between two and four optional subjects drawn from practical studies (home economics, agriculture, commerce, principles of accounts, office skills) and general studies (development studies,

religious and moral education, art, music, physical education, and a third language); one co-curricular activity (clubs or sport); the Department of Curriculum Development and Evaluation should develop new syllabi for these courses. [RNPE increased minimum 10, maximum 11 subjects, with eight core subjects, including agriculture and religious and moral education. Development studies was removed-to be taught under social studies.] (Weeks, 1995:87)

The RNPE recommendation that in the junior secondary schools Agriculture be taught and examined as a core subject has been implemented. In addition each student must take a second practical subject drawn from Art, Home Economics, Design and Technology, and Business Studies. Art was moved from being clustered with Moral and Religious Education and Physical Education to be one of the four practical subjects. This change provided better articulation between Art in the junior secondary schools and Art and Design in the senior secondary schools.

In the senior schools Recommendation 42 was in 12 parts and is summarised below:

Pre-vocational Orientation in Senior Secondary Schools: to facilitate the orientation of schools to the world of work; the localisation of the examinations; the assistance of the Curriculum Development Unit in the development of practical and business subjects (syllabi and materials), and to emphasise integration across subjects; continuous assessment should be weighted in the final grading of students; there should be more practical and work-related subjects in the curriculum; management structures should be strengthened; links between the school and commerce and industry should be established; the research unit should conduct regular tracer studies of school leavers to assist career guidance and curriculum development; all senior secondary school teachers should acquire computer literacy and the supply of an adequate number of computers to schools is required; practical and business subjects in senior schools should build on what will be taught in junior schools in the future; all teachers should receive training in guidance and counselling and exposure to commerce and industry at Teacher Training Colleges; the reliance on expatriates should be reduced; adequate budgets for practical and commercial subjects are required; supervisory staff need to be retrained to achieve an orientation to the world of work; revitalise guidance and counselling at the schools (office, reduced teaching load, dedicated classroom, relevant material); practical subjects clubs and clubs that support work should be encouraged. (Weeks, 1995:88)

The goal of preparing senior secondary students for the transition to further education and training, and for working life, is to be achieved by providing them with a sound general education, coupled with strategies which develop their awareness of the world of work, particularly through guidance and counselling. (Botswana, 1993:175)

Recent Developments

Following the acceptance of the RNPE in April 1994, the Ministry of Education established a body to oversee the implementation of all the new policies.

In 1999 it reported on its work (Ministry of Education 1999). Both successes and problems of implementation are discussed frankly in this document.

One major shift in what is happening in the secondary schools has come with the phased introduction of the BGCSE (a localised Cambridge Overseas School Certificate) beginning in 1999. This was point 42(a) in the NCE report as summarised above. The impact of these changes and progress on implementing all 12 parts of Recommendation 42 will be discussed in more detail below.

4 Vocationalisation in Botswana: A Literature Review

A survey of the literature on vocationalisation indicates that it tends to fail for a variety of key reasons (see, for example, Foster, 1965, Weeks, 1970, 1976, 1989, 1991a, 1991b, 1997; French, 1977; Vulliamy, 1981; Davies, 1985a, 1985b; Heyneman, 1985; Lauglo, 1985a, 1985b, 1992; Lillis, 1985; Psacharopoulos and Loxley, 1985; Crossley and Vulliamy, 1986; Crossley and Weeks, 1986; Chisman, 1987; Jennings, 1987; Coombe, 1988; Chin-Aleong, 1988; Hoppers, 1988; King, 1988a, 1988b; Lauglo and Lillis, 1988; Lauglo and Närman, 1988; Psacharopoulos, 1988; Wright, 1988; Achola and Kaluba, 1989; Bennell and Nyakonda, 1991; Jones, 1992; Watson, 1994; Mudariki and Weeks, 1995; Mudariki, 1997; Lewin and Caillods, 2001; van Rensburg, 2001; King and Martin, 2002).

Vocationalisation is defended and justified based on a number of expectations, including that it

1. Will be cost effective and facilitate economic development by developing skills, through training people to replace expensive expatriates;
2. Will equip youth to return to their community or villages ('back to the village' syndrome) where they would become engaged in self-employment or job creation in the informal sector;
3. Would help to solve the 'time bomb,' the spectre of the unemployed school leaver who joins the revolutionary opposition; and
4. Would serve to stem urban drift.

Politicians want to use vocational education to solve problems that are not educational, such as unemployment (Bacchus, 1988). It has been observed that in the United States vocational education persists because it is good politics, because it is visible and politicians are seen as doing something about youth unemployment (Wilms, 1988:91). Politicians make an assumption of double deficiency and planners—formal education is deficient because the schools are perceived as failing to equip pupils, while the pupils are deficient because they are perceived as finishing school without any skills (Saunders, 1988:156). This

leads to the false expectation—if only youth had skills all the problems would be solved. That academic education may be the most ‘vocational’ is ignored, even though Philip Foster has argued this point beginning nearly 40 years ago (Foster, 1965, 2002; King and Martin, 2002).

The major issues as they relate to Botswana as identified in 1993 are summarised as follows (Weeks, 1997):

1. Parental aspirations: Parents prefer to send their children to academic schools (this is demonstrated by a significant proportion of Botswana parents who can afford paying for private schooling in Botswana, South Africa, and Zimbabwe). Those who are well-to-do and in the professions have benefited from academic schooling. This and the demand for more places in formal secondary schools are the main reasons for the decline of Swaneng Hill and related innovations (van Rensburg, 1974, 1992).
2. Teacher resistance: Teachers are not convinced that the role of the school is to provide job-related skills. They feel less competent to provide vocational training as required by the world of work. Head teachers are more concerned about their examination results than other criteria of success.
3. High cost of vocationalisation: Technical education is expensive in terms of both buildings, equipment, and teachers. Many governments lack the political will to divert scarce resources to benefit a minority. As a result, in most cases, schools that try to vocationalise are poorly constructed, equipped, and staffed for vocationalisation. Unfortunately this is also the case in Botswana where there have been adequate resources.
4. Employer resistance: Employers tend to look down on the products of vocational education as inferior—they prefer to train them themselves on the job (the schools are seen as being out of touch with the realities of business and the world of work).
5. Absence of support systems for vocational graduates: Rarely are adequate support systems mounted for graduates of practical or vocationally oriented schools. For example, in Zimbabwe, there is a shortage of land for those who opt to go into farming (banks and other lending agents are not prepared to finance school leaver projects). The informal sector quickly becomes saturated with school leavers with limited skills and workers retrenched from the modern sector. Parents and their children do not see any advantage in taking vocational subjects since they do not enhance one’s opportunities in either the formal or informal sector.

Evidence from Kenya, Sierra Leone, Tanzania, Zambia, and Zimbabwe confirms the above general comments on the failure of vocationalisation in Africa, and studies in Colombia, Papua New Guinea, and elsewhere reveal the same picture (see references listed above). Some experts have argued that

resources are better utilised in extending and improving general education and thus producing a better and trainable work force for commerce and industry. It is claimed that employers are in a better position to train workers for the skills they require than formal school systems.

Financial Constraints

The economic value of vocational education as a panacea for the ills of structural unemployment can be challenged. (Psacharopoulos and Loxley, 1985:28)

One of the main problems found in most countries militating against the successful implementation of vocational projects is that of inadequate financing for buildings, equipment, and teachers. This has resulted in many of these programmes assuming a 'barefoot' approach to vocational education (King, 1988a). In nearly every study, the unit cost per student for technical subjects is higher than for academic subjects (Cumming, 1985, 1988). Heyneman suggests that because of the high costs involved in implementing vocationalisation, Ministries of Education in developing nations should give serious consideration to reducing or even eliminating workshops from secondary schools and instead expand educational opportunity by increasing the number of secondary places. This is better than keeping vocationalisation 'as it is and so experience continued implementation problems, continued decline of educational quality, and continued ceilings on enrolment levels resulting from the high secondary unit costs' (Heyneman, 1985:288). It is often forgotten that workshops for practical subjects generally are unable to accommodate more than 20 students while academic classrooms easily accommodate up to 45 students—this tends to immediately double the per-unit costs of vocational education compared to the academic model. Examination costs for practical subjects are two to four times more expensive per candidate when compared to academic subjects—the high cost of meaningful practical assessment of vocational education is also a serious constraint (Chisman, 1987:40–42).

The litany of constraints on equipping vocational programmes has remained consistent for years: equipment is costly and hard to get (Malawi); it breaks down because teachers are not trained to use it properly (Gambia); it is difficult to keep up-to-date with the latest technology, and maintenance is either nonexistent, poor, or costly (Australia, Malawi, Mauritius, Trinidad and Tobago). Appropriate support materials are lacking (Maldives, Bangladesh) as are electricity for workshops and an efficient transport system for delivering materials (Fiji). Zambia comments on the difficulty of securing infrastructure for rural schools' productive work component: water, land, transport, and tools of an appropriate design and cost. (Coombe, 1988:24)

The World Bank (Jones, 1992), in its post-1980 strategy, cautions developing nations, warning them against jumping on the bandwagon of diversification.

World Bank policies changed significantly in the 1980s (World Bank 1991). There are three key reasons given for this:

1. The high costs of vocationalisation;
2. Unrealistic employment objectives; and
3. Expensive educational facilities that end up being underutilised because they cannot keep up with changes in the economy and the demand for skilled labour.

Diversified secondary school is a questionable method for training large numbers in specific vocational skills. (Heyneman, 1985:286)

Cost-effectiveness

One method that has been used to judge 'cost-effectiveness' is tracer studies of students who have completed practical courses. Many of these have been carried out in the developing world, yet they have one common finding: graduates of practical programmes tend to try to shift into academic training (Psacharopoulos and Loxley, 1985; Chisman, 1987; Lauglo and Lillis, 1988; Jones, 1992). There exists no positive relationship between the skill students have acquired and its utilisation (Coombe, 1988). Those students who have had some exposure to vocational subjects, within a mainly academic curriculum, are found to have no advantages over other job seekers. A definite hierarchy exists in the relationship between types of practical courses and their cost-effectiveness—the less expensive (Agriculture, Commerce, and Home Economics) tend to be the more cost-effective, while the more expensive (Electronics, Mechanics, Metalwork, and Woodwork) are less cost-effective. A course is less cost-effective when people end up in further studies or occupations that bear no relationship to their initial training.

Vocationalisation

At a minimum vocationalisation is the introduction of practical subjects into schools, for example, agriculture, commerce, design and technology, and home management—a move away from purely traditional, academic subjects. Vocationalisation can go beyond this to include integration between practical and academic subjects, learning from self-reliance activities, and learning through clubs and societies. In some cases the whole school is looked at as a productive enterprise, offering a variety of experiences from administration through to technical production. (Mudariki and Weeks, 1995:A12-2)

The tension involving the development of secondary schooling in Botswana has been between the pressures to achieve full vocationalisation versus opting for only providing some pre-vocational education through a limited number

of practical subjects. The debate, which is an old one, was reformulated in the 1960's by Philip Foster as 'The vocational school fallacy in development planning' (1965). I tackled his thesis in the context of educational reform in Papua New Guinea, arguing that Foster's analysis did not apply to all vocational training, and that the claim that the most 'vocational' education was academic schooling had become the 'Foster Fallacy' (Weeks, 1976). The 'Foster Fallacy' has been reviewed recently by King and Martin (2002). In their analysis they conclude:

Foster's message today as in 1963 remains relevant for any attempts to use schools to deliver massive changes in attitude and aspiration in the absence of any parallel initiatives in the larger economic environment. (p. 24)

King and Martin (2002) give Foster the last word:

I must add that I am personally in favour of attempts at more diversified types of curriculum and school systems for **pedagogical** and **educational** reasons. Don't expect such changes to influence the realities of the labour market... it is simply hypocritical to talk about more "practical" training in African schools when most are so poor that they can't even afford a few nails and hammers at best! (p. 25)

In 1993 eight different approaches to vocationalisation or diversification were identified (Mudariki and Weeks, 1995:A12-4)

1. Introduction of 'biases' or practical subjects in academic high schools;
2. Comprehensive high schools with streaming;
3. Technical high schools;
4. Cluster high schools;
5. Integrated work-study schools;
6. Development of clubs and societies with practical orientation;
7. Production units in schools; and
8. Second-chance training for mature school leavers through vocational training centres.

This study found that the introduction of practical subjects or 'biases' in secondary schools tended to not lead to significant skill acquisition; instead it was supported, even if poorly implemented, because it was assumed it provided students with an orientation to other pursuits besides white collar jobs.

Vocationalisation can be linked to 'experiential education,' or learning by doing. Practical education is seen as enhancing learning and promoting cognitive development (Box 6 in Coombe, 1988). School production units in Zambia have had the objective of developing self-reliance, discipline, leadership, and positive attitudes to work and closing the gap between mental and manual work, but since they were introduced by Presidential decree in 1975 they have, in most

schools, failed to achieve their objectives (Achola and Kaluba, 1989). Many governments justify attempts at promoting practical education on the grounds that they are developing a more relevant and self-reliant form of education than that inherited from the colonial masters (Lauglo and Lillis, 1988). The objective is to provide skills for the development of the formal and informal sector. Diversified secondary education becomes the foundation for further education or training in different areas-it is assumed that the best of those students who complete practical courses will go on to higher levels of vocational or technical training. The tragedy of the situation worldwide is that these goals, though noble sounding, are rarely achieved, even though a wide variety of approaches to achieve these objectives have been developed and tried.

After two decades of implementation the promises of vocationalisation appear to be largely unfulfilled. Indeed, it now seems that vocationalisation might, after all, be simply an illusion which it is too costly to pursue and unlikely to yield the expected outcomes. Yet the lure of vocationalisation still persists in most African countries. (Wright, 1988:116)

5 Practical Subjects in Botswana in 1992

Botswana, compared to many other developing countries, is a 'resource rich' nation, and though it has been riding a number of booms and busts, the overall situation is one of 'sustained development'. Botswana has not experienced the structural readjustment policies that have devastated other developing countries, yet resource constraints still exist and vocationalisation has suffered as a result. Botswana has been in a position to pay for what it wants. Aid donors have also, as elsewhere, been interested in vocationalisation. In spite of all this, the development of practical subjects up to 1992, in secondary schools, has been under-resourced, inadequately maintained, and poorly planned and implemented, and has suffered from many of the same constraints found in other countries in Africa. For the relevant literature on Botswana see Hinchliffe et al., 1988; Hinchliffe, 1990; Kann et al., 1988; Mansell, 1991; Mudariki, 1997; Mudariki and Weeks, 1995; Botswana, 1992; Salkin, 1992; Tempest, 1992; van Rensburg, 1974, 1992, 2001; and Weeks, 1997.

In 1992 the author studied the vocationalisation of secondary schools at the request of the second National Commission on Education 1993 (Mudariki and Weeks, 1995). The case studies of 11 senior secondary schools in Botswana revealed that the situation in the schools, when one examined the limited 'vocationalisation' that had occurred so far through the implementation of practical subjects, was far from ideal. The schools faced staff shortages, lack of adequately trained and motivated teachers, a dependence on expatriate instructors, poorly planned and equipped facilities, and a general lack of support from

administrative hierarchies both within and outside the schools and in society in general. In 2002 the situation has improved, but the same problems have been found to still be present (this will be considered in detail below).

The number of students in senior secondary schools who were able to study practical subjects in 1992 was limited, and though **considerable progress** has been made, was still limited in 2001. In Table 4.2 what had been achieved in the senior secondary schools in 1992 is compared to the achievements a decade later, by 2001.

Table 4.2 Number of students taking practical subjects-COSC/BGCSE-1992 & 2001

Subject	1992		2001		Change
	Number	Percent	Number	Percent	Percent +/-
Agriculture	2,891	45.1	10,732	64.9	+ 371
Art (art & design)	640	10.0	2,464	14.9	+ 385
Commerce	730	11.4	6,979	42.2	+ 956
Principles of accounts	374	5.8	2,002	12.1	+ 535
Food & nutrition	821	12.8	2,390	14.5	+ 291
Fashion & fabrics	215	3.4	953	5.8	+ 443
Home management ⁺	123	1.9	532	3.2	+ 432
Computer studies*	14	0.2	547	3.3	+ 3907
Design & tech.**	176	2.7	3,671	22.2	+ 2086
Business studies ⁺⁺	—	—	306	1.9	—
Technical drawing [@]	782	12.2	—	—	—
Woodwork [@]	684	10.7	—	—	—
Total taking PS	7,450		30,576		+ 410%
Total form five	6,406		16,524		+ 258%
Average taking PS	1.16		1.85		

* One school in 1992; 14 schools in 2001.

** Five schools in 1992; all 27 senior secondary schools in 2001.

+ = Fourteen schools in 2001.

++ = Three schools in 2001.

@ = Technical Drawing and Woodwork (also electronics and metalwork which were only taught at one school) were phased into Design and Technology.

COSC/BGCSE = Cambridge Overseas School Certificate/Botswana General Certificate of Secondary Education.

Sources: Department of Secondary Education, 1991 and 1992 COSC Reports; 2001 Examinations, Research and Testing, Ministry of Education.

Between 1992 and 2001 the number of students in senior secondary schools taking the COSC/BGCSE rose by 258% (from 6,063 to 16,524). The increase in enrollments in all 10 practical subjects was greater than for academic subjects. Between these years the number of students taking a number of practical subjects increased dramatically, particularly in the practical subjects given priority: Agriculture increased 371%; commerce, 956%; Principles of Accounts, 535%; Food and Nutrition, 291%; Fashion and Fabrics, a course which students have not done well in, rose by 443%; Home Management, 432%; and Art (now Art and Design), 385%. Woodwork, Metalwork, Electronics, and Technical Drawing were discontinued (they were absorbed by Design and Technology). This picture is shown in Table 4.2.

Table 4.2 also shows us the proportion of students in 1992 and 2001 who were able to take practical subjects. While in 1992 Agriculture led with 45% of the Form Five students, the other practical subjects ranged from only 0.2% to nearly 13%. In 2001 Agriculture was taken by 65% of the students, Commerce by 42%, and Design and Technology by 22%. The other subjects ranged from 3.2 to 14.9% enrollment. By 2001 the senior schools had expanded and had new buildings and equipment and more practical subject teachers; but targets, as we will see in the discussion further on, have not been met, as there were still shortages, which the system is working hard to overcome.

In addition Table 4.2 demonstrates the commitment to expand the provision of practical subjects in the senior secondary schools. Whereas the number of students in the 27 schools taking the final examination has grown by 258%, those taking practical subjects have risen by 410%. In 1992 there were facilities and staff for an average of 1.16 students to take any practical subjects; by 2002 this had risen to 1.85 (or nearly two practical subjects to a student).

The ability of students to take any practical subjects is constrained by the number of schools that offer the subject. For example, the subject of Home Management requires a demonstration flat—in 1992 of the seven schools where students (only females) took Home Management, not all of them had proper demonstration flats. In 2001 Home Management was taken at 14 of the senior schools. In 2002 the schools were introducing the new Home Management syllabus, and it was the intention of the Ministry of Education that all 27 senior schools would offer Home Management, but incomplete facilities and a shortage of teachers was undermining this objective. These problems should be resolved in the next few years and then all senior schools would be able to offer Home Management.

Even when a practical subject is offered at all schools, as is Food and Nutrition, the number of students that can take it is constrained by staff and facilities and the popularity of the subject. Poor examination results seem to cause students to avoid a subject, if they can. In 1992, the average in Fashion and

Fabrics was 36 students per school—when the schools have between 1,000 and 1,600 students. In the 1992 COSC Fashion and Fabrics was taught at 17 schools, but one school had 52 students taking the subject, while at the other 16 the average was 10 students to a class. In 2001 and 2002 Fashion and Fabrics was experiencing some resistance from students and small classes of 8 to 12 students, instead of the required 20, were observed. This will be considered in more detail below.

The Home Economics classrooms are limited in the number of students that can work in them at a time (in 1992 there were generally eight stoves for Food and Nutrition, or space for 16 students, but frequently not all the stoves were functional). In the new facilities that have been built in the past few years the new classrooms for Food and Nutrition have 14 stoves (but by 2002 not all of these new classrooms have been fully equipped). The staff and facilities were available for more students to take Fashion and Fabrics, but this time the numbers were constrained by the ‘reputation’ of the subject as noted above. The results were not uniform in 2001 across the 24 schools taking the subject: three schools had no failures; seven schools had up to one-third failures.

6 Staffing Constraints

Overall statistics from the Ministry of Education Department of Secondary Education for March 1993 (for first subject taught, excluding nonteaching heads and teachers on leave and teachers for which there was no information) demonstrate the dependence then on expatriate teachers to cover practical subjects—see Table 4.3.

For the teachers whose first teaching subject is Accounts (Commerce, Principles of Accounts, and Economics), Agriculture, Art, Design and Technology, and Home Economics, 51% were noncitizens, compared to academic subjects (English, Mathematics, Science, Setswana, Social Studies, and Religious Education) where only 34% of the teachers were noncitizens. Though this information is not complete (not all teachers were covered, and second subjects taught were ignored) and is therefore not reliable, it does demonstrate the trend and the problem. Agriculture (58%) and Home Economics (64%) were in 1993 subjects that were more localized than the other practical subjects. The number of unqualified teachers in practical subjects is limited, with 64% found teaching Agriculture (16 out of 25)—while of 88 unqualified teachers required to fill vacancies, 72% are in academic subjects. It is impressive that of 162 teachers listing Design and Technology as their first subject, only two were unqualified (one citizen and one noncitizen).

Table 4.3 Background of teachers (SSS only) by first subject taught 1993 (citizen/noncitizen) (Unqualified in brackets—percentages read across)

Subject	Citizen	Noncitizen	Total
Practical subjects			
Accounts	2 (1)	9 (0)	11 (1)
Agriculture	102 (16)	75 (1)	177 (17)
Art	12 (0)	30 (0)	42 (0)
Design & tech	51 (1)	111 (1)	162 (2)
Home economics	98 (2)	55 (3)	153 (5)
Total practical	265 (20)	280 (5)	545 (25)
Percentage	48.6%	51.4%	100%
Academic subjects			
	994 (51)	516 (12)	1510 (63)
Percentage	65.8%	34.2%	100%
Grand total	1189 (71)	796 (17)	1985 (88)
Percentage	59.9%	40.1%	100%

Source: Department of Secondary Education, Secondary Teacher Survey, March 1993.

The data for 2002 are not comparable to 1993 because both junior secondary and senior secondary school teachers were now lumped together. But the picture in 2002 is illustrative of what has been accomplished in implementing practical subjects in Botswana (both the supply and retention of teachers). See Table 4.4.

Table 4.4 also shows that there are serious shortfalls in the supply of trained citizen teachers for practical subjects. For example, Design and Technology, if fully implemented, requires $7 \times 27 = 189$ teachers for senior schools and $206 \times 3 = 618$ teachers for junior schools for a total of 807 teachers; but currently we have only 300 qualified citizens, which equals a shortfall of 500 Design and Technology teachers at both levels.

The situation is also serious for Home Economics, as there is still a shortfall of 570 citizen teachers [$5 \times 27 = 135$; $3 \times 206 = 618$; Total 753; have 183, short 570]. Art and Design are short of 172 teachers [$4 \times 27 = 108$, $2 \times 206 = 412$; Total 520; have 348, short 172]. Commerce is the most serious as the system requires 807 teachers but has only 14 citizen teachers. Agriculture requires 807 and has 421, and Computer Studies requires two qualified citizen teachers in each school or 466, but we have only 2 (because Science and Mathematics teachers cover Computer Awareness/Studies).

Table 4.5 shows a different 'take' where slightly different figures are presented (information on temporary teachers is missing). What is important in

Table 4.4 Background of secondary teachers (CJSS and SSS) by first subject taught 2002 (citizen/noncitizen) (Temporary teachers in brackets—percentages read across)

Subject	Citizen	Noncitizen	Total
Practical subjects			
Commerce	14 (17)	41	72
Agriculture	421 (116)	130	667
Art	348 (119)	67	534
Design & tech	292 (65)	163	520
Home economics	183 (73)	43	299
Computer studies	2 (7)	8	17
Total practical	1,260 (397)	452	2,109
Percentage	59.7% (18.8%)	21.4%	99.9%
Academic subjects			
	3,473 (702)	572	4,747
Percentage	73.2% (14.7%)	12.1%	100%
Grand total	4,733 (1,099)	1,024	6,856
Percentage	69.0% (16.0%)	14.9%	99.9%

Source: Teaching Service Management, Secondary Teacher Survey, June 2002.

Note: CJSS = community junior secondary school; SSS = senior secondary school.

this table is that a picture is provided of the difference between junior and senior schools, which is not available in Table 4.4. This table demonstrates that there is greater reliance so far, in absolute numbers, on expatriate teachers in the junior schools when compared to the senior schools (but proportionally the dependence is greater in the senior schools; 22.4% senior to 9.6% noncitizen in the junior schools).

These figures are for 2002 and do not take account of the future growth of the education system which will result in even greater demand for qualified practical skills teachers (and are subject to correction as information on second subjects taught is not available).

7 Practical Subjects in 2002

Pre-vocation preparation has changed the orientation of secondary schools. They should now:

Arm students with the skills they will need when they enter the working world. A Task Force on Vocational Preparation has produced guidelines for the implementation

Table 4.5 Background of secondary teachers (CJSS and SSS) by first subject taught 2002 (citizen/noncitizen) (percentages read down)

Subject	Junior schools		Senior schools		Total
	Citizen	Noncitizen	Citizen	Noncitizen	
Practical subjects					
Commerce	?	?	50	20	70
Agriculture	469	52	67	27	615
Art	25	3	38	15	81
Art & religion	395	57	—	—	452
Design & tech	331	85	68	23	507
Home economics	248	35	59	19	361
Computer studies	—	—	10	5	15
Practical studies	170	35	—	—	205
Total practical	1,638	267	292	109	2,306
Percent practical	35.1%	53.8%	25.9%	33.5%	34.9%
Academic subjects					
	3,024	229	837	216	4,306
Percent academic	64.9%	46.2%	74.1%	66.5%	65.1%
Grand total	4,662	496	1,129	325	6,612
Percentage	100%	100%	100%	100%	100%
Percentage across	70.5%	7.5%	17.1%	4.9%	100%

Source: Teaching Service Management, Secondary Teacher Survey, July 2002 (this table is different from Table 4.4 and does not match it).

Note: CJSS = community junior secondary school; SSS = senior secondary school.

of pre-vocational education in secondary schools. The guidelines emphasise the vocational orientation of all subjects in the curriculum, increased access to practical subjects, foundation skills and guidance and counselling. In addition subjects are being re-packaged into options so that all students will choose at least one creative and one vocational subject. Strategies for the implementation of guidelines have been developed and workshops have been conducted to disseminate information and sensitise relevant stakeholders. (Ministry of Education, 1999:31)

Junior Secondary versus Senior Secondary

Structurally, junior and senior secondary schools are very different. While most senior schools have boarding facilities, the exception being the large urban schools, most junior secondary schools are day institutions with only a few in more remote areas having boarders. Day schools, because students

must generally walk home, are more limited in the type of activities they can offer in afternoons, but this is not perceived as a constraint by staff as students are required to stay at school until 6 p.m. for afternoon study and activities (including sport and clubs or extra study).

Practical subjects in junior schools tend to be more generic, and the syllabus is designed to articulate with that of the senior schools. Home economics divides into three parts in the senior schools, while it is unified in the junior schools. While all students take Agriculture in junior schools, it is an option in the senior schools. Though students should be introduced to individual projects and research exercises in the junior schools, this approach is now more developed at the next level. Art in the junior schools is now taken as a practical option, and is articulated with Art and Design in the senior schools. Business Studies at the junior level should now articulate with the new Business Studies syllabus that is being introduced in all senior schools (it was in only three senior schools in 2001).

The objectives of the junior secondary school curriculum are:

- (a) Proficiency in the use of Setswana and English language as tools of effective communication, study, and work;
- (b) An understanding of society, appreciation of culture, and sense of citizenship;
- (c) The capacity to use computation skills for practical purposes;
- (d) An understanding of scientific concepts and interest in the natural world;
- (e) An appreciation of technology and an acquisition of basic skills in handling tools and materials;
- (f) An understanding of business and everyday commercial transactions;
- (g) Computer literacy;
- (h) Critical thinking, problem-solving ability, individual initiative, and interpersonal skills; and
- (i) Readiness for the world of work. (Botswana, 1993:155–156)

Further information on the objectives for junior and senior schools has already been provided above.

Implementation of the Revised National Policy on Education

The recommendations of the government (Botswana, 1994) have been taken extremely seriously by the Ministry of Education. An implementation unit was established headed by a senior person at the Permanent Secretary level. The 134 major recommendations were diligently pursued (for a summary of them all, see Weeks, 1995). Recommendations Numbers 33 and 42 on pre-vocational

orientation in secondary schools have also been followed with varying degrees of success. These will be examined below in further detail.

The Context: Practical versus Core Academic Subjects

The tension between practical subjects and core academic subjects is not a real problem at the junior schools. As has been noted, all students must take Agriculture and then select an additional practical subject (chosen from Art, Design and Technology, Home Economics, and Business Studies) and an option from Moral and Religious Education, Physical Education, and Music.

When the 50% of Form Four students proceed the next year to Form Five they are expected to continue in at least one practical subject or 'option,' and this now includes Agriculture. Most senior schools require that for students to select a practical subject in Form Five they had to have done it in Form Four. This is intended to achieve articulation and enable some depth, for example by taking Design and Technology for five years. As has been noted above, the streaming of students into the three approaches to Science has significant implications for the development of practical subjects.

Status of Each Subject [Agriculture, Commerce (Three Subjects), Computer Studies, Art and Design, Design and Technology, Home Economics (Three Subjects)]

Practical subjects have been given a prominent emphasis in the architecture and layout of both the junior and senior schools. In the past decade nearly all schools have been completely rebuilt (an investment unparalleled in Africa, and costing hundreds of millions of Pula). Junior schools have computer laboratories (for Computer Awareness, which is not examined; but so far only 51 of 206 junior schools have had computers delivered to their laboratories because there is a severe shortage of teachers, but there is a plan to equip the remaining laboratories by December 2002 and begin a process of in-service training for teachers of Computer Awareness); a Design and Technology and Home Economics block; a machine room for Design and Technology; a new art room and space for ceramics and sculpture; and so on. Recently, 'pavilions', with two substantial rooms and storage areas under one roof, have been built at the larger junior secondary schools to provide additional space for Design and Technology.

In the senior schools the new facilities for Art and Design, Home Economics, Computer Studies, and Design and Technology are among the best in the school. Art has been provided with studios (equivalent to four or five

classrooms and ample space for storage, photography and printing, plus staff offices and displays). Home Economics is in many schools housed in a new two-storey building with staff and storage spaces and at least four classrooms for the three subjects. Design and Technology has also been provided with either a large quadrangle or a massive two-storey building bigger than that provided to Home Economics and including space for a computer-assisted design (CAD) computer room (10 computers each are being distributed in 2002), welding, large work and storage spaces, and sophisticated security against theft. The new computer laboratories for Computer Studies (examined) and Computer Awareness (nonexamined). are usually central and allow for up to 40 computers. All these developments are most impressive.

Unfortunately, contractors have 'absconded' (stopped work) at two senior schools (the contractors have been taken to arbitration, which keeps getting deferred) and are well behind in their schedule at others. At some senior schools where the buildings are finished (for up to two years), equipment has not yet been provided, which has created problems for the teachers using the new spaces; e.g., in Home Economics there are beautiful new laboratories with 14 stoves, but no pots and pans. In Design and Technology, there are large classrooms, but old benches and desks, and no computers for CAD (though they are promised). Teachers have been told to make their own benches and renovate old stools and desks, and a number of weekend workshops have been held to demonstrate how easily this can be done.

The Ministry of Education has provided a position for Head of Options in junior schools and a coordinator for each practical subject. In the senior schools there is a promotional position of Head of Practical Subjects (or Options) with coordinators for each practical subject. Some inconsistency exists as this promotional position in some schools has been won by a teacher from Religious Education or Setswana. This means that an individual who may lack comprehension of the five practical subjects in junior schools and 10 diverse practical subjects in senior schools is coordinating the practical subjects.

Another problem found in the senior schools is what subjects are grouped under the Head of Practical. One school had all 10 subjects under the Head of Department Practical, while another had only Design and Technology and two Home Economics subjects under this supervisor; Art and Design was with Humanities; Agriculture and Computer Studies with Science; and Commerce with Humanities. These alternative arrangements will create difficulties with votes (budgets for ordering materials), communication and potential integration across practical subjects, and so on, as it is preferable to have one head responsible for all practical subjects.

Assessment-Performance in Practical Subjects

The failure rate (F, G, U) compared to the proportion of students achieving Credits A*, A, B, and C across the practical subjects and core academic subjects in the 27 senior schools in 2001 is provided in Table 4.6 and Table 4.7 (missing are the results for D and E, or 'Pass,' which can be calculated by subtracting the other two from 100).

The high failure rates in the last five practical subjects (as shown in Table 4.6) in the schools visited by the author was attributed by staff to a number of key problems: new buildings that have not yet been supplied with equipment; inadequate budgets for materials; new and inexperienced or unqualified teachers; high turnover of teachers; teachers' general lack of understanding of the new independent study/portfolio approach to continuous assessment (a problem that has been accentuated by a lack of leadership in in-service training from the Design and Technology teachers most familiar with these new problem-solving approaches); the general absence of any integration across practical subjects; the dependence on one- to three-day in-service training "workshops" at hotels or Education Centres; and all of the above combined with the general absence of school-based in-service sessions, as found in the sciences (Thijs, 1999). In the three Commerce subjects, students who are weak in mathematics are thought to be failing these subjects. It was also suggested that Business Studies, as a new subject, with the independent study and research, was not fully understood by

Table 4.6 Performance in practical subjects in 2001 (COSC/BGCSE)*

Subject	Number	% Fail	% Credits
Art & design	2,464	0.9	79.1
Design & technology	3,671	2.7	56.5
Agriculture	10,732	4.9	64.3
Home management	532	8.1	52.3
Food & nutrition	2,390	8.9	64.3
Fashion & fabrics	953	15.6	40.7
Commerce	6,976	17.3	49.7
Computer studies	547	19.6	36.2
Principles of accounts	2,002	46.0	30.0
Business studies	306	50.3	17.3

*Percentages read across by subject. COSC/BGCSE = Cambridge Overseas School Certificate/ Botswana General Certificate of Secondary Education.

Source: Examinations, Research and Testing, Ministry of Education, May 2002.

Table 4.7 Performance in core academic subjects in 2001 (COSC/BGCSE) school certificate examinations*

Subject	Number	% Fail	% Credits
Pure science (physics)	2,460	3.5	79.8
Pure science (chemistry)	2,460	5.3	75.9
English	16,548	5.7	24.3
Setswana	16,370	6.6	42.3
Double science	10,252	8.9	45.8
Pure science (biology)	2,460	16.5	62.1
Single science	8,949	40.1	11.4
Mathematics	16,524	42.0	25.8

*Percentages read across by subject. COSC/BGCSE = Cambridge Overseas School Certificate/ Botswana General Certificate of Secondary Education.

Source: Examinations, Research and Testing, Ministry of Education, May 2002.

staff (though in Commerce, as in the Sciences, students can take an examination paper instead of doing a project).

Table 4.7 demonstrates fairly clearly the relationship between performance and streaming into the three science groups. The Single Science students are the ones who are most likely to fail Mathematics and get only Ds or Es in English (70%). They are also the students who are doing poorly in practical subjects. Only one of the 17 schools visited actually calculated their results by streaming and performance. It can be seen that there is a correlation between streaming and performance. In a highly competitive environment, these school leavers who do not do well in English, Mathematics, and their practical subjects are not likely to be sponsored for further training or find it easy to find employment.

How Are the Students Assessed in the Practical Subjects?

In the past, on the Cambridge Overseas School Certificate, only in Agriculture, Art, Design and Technology, and Computer Studies were any credits given to Continuous Assessment in the form of a project (and not more than 20%). The three Home Economics subjects have practical tests that are included in the final assessment but not an individual research project or portfolio. For other subjects the assessment relied 100% on the examination results. Now following the recommendations of the second National Commission on Education, and with the introduction of the new BGCSE beginning in 1999, all practical subjects should have up to 50% of each student's final grade made up of practicals

and the student's individual project. The ability of students to perform in Continuous Assessment and their capacity to research, solve problems, and develop a project will *now* count in their final assessment. These approaches are tied to Botswana's Vision 2016 which sees a new society with the human resources to solve problems, where every student leaving secondary school is empowered to face the world of work.

Teachers in the senior schools see what has happened as the extension of assessment methods in Design and Technology to other subjects. For example, in Home Economics this new approach has been phased in beginning in Form Four in Food and Nutrition in 2000, Fashion and Fabrics in 2001, and Home Management in 2002. Assessment in Food and Nutrition is now based on:

• Two-hour final examination	50%
• Practical Test 1 (end of Form Four)	5%
• Practical Test 2 (end of Form Five)	15%
• Individual project	30%
• Total	100%

The individual project (or portfolio) is assessed as follows:

• Presentation	5%
• Task analysis	10%
• Planning	10%
• Investigation & research	30%
• Realisation/model/design	20%
• Communication	10%
• Self-evaluation	15%
• Total	100%

The problem for Home Economics teachers is that they have not been prepared in their own training to support these new types of student individual projects, and most of them do not have experience with these new modes of assessment. They also say that the school libraries and reference materials currently available do not adequately support student research projects.

What has happened in the assessment of Art in the new syllabus in Art and Design is also illustrative of the changes sweeping across the secondary system in Botswana and the constraints that still exist in the schools.

The syllabus for Art and Design has five 'modules'; Senior secondary schools in Botswana usually teach only three of these. These five are:

1. Critical and historical studies
2. Two-dimension analysis

3. Photography
4. Three-dimensional design: a) Sculpture; b) Crafts; c) Ceramics
5. Painting and Drawing

Modules one and three are generally not taught because the teachers do not have the skills that would enable them to deliver these models. I found only one school where photography was being introduced to the students over three weeks of teaching.

Art and Design now has a 10-hour examination (four parts of 2 1/2 hours each). In the course work and examinations the following are now looked for:

Interpretative and Creative Response

1. Express ideas visually
2. Respond in both individual and personal ways
3. Demonstrate the quality of ideas as seen by interpretation rather than by literal description of the themes
4. Aesthetic judgments

Personal Investigational Development

1. Personal vision and commitment/movement toward competency in Art and Design
2. Research appropriate resources
3. Assess design problems and arrive at appropriate solutions
4. Show the development of ideas in a series of rough layouts or experiments that lead to the final studies

Previously the exam was divided into two three-hour sessions and there was no portfolio (independent research project).

The changes in the JSS syllabus will in the future provide students to the senior schools who have a better grounding in individual work and research. The standard Junior Certificate Design and Technology project should include the following:

1. Cover
2. Contents page
3. Theme page
4. Definitions
5. General analysis
6. Situation
7. Problem

8. Brief
9. Specifications
10. Research (Existing ideas; Intended ideas)
11. Development
12. Working drawings
13. Material list
14. Production plan
15. Making plan
16. Evaluation

Though the name of the programme 'Art' in the senior schools has been changed to Art and Design, some of the other practical subjects have not changed their name to reflect the new content and approaches. Home Management perhaps should be called 'Home Science' and Food and Nutrition should be changed to 'Food Technology' while Fashion and Fabrics is now more like 'Fashion and Design'.

The new syllabus in Agriculture has introduced some new topics-game farming, genetics, biotechnology, and farm machinery (which used to be optional)-while students may select from one of four optional topics: crop husbandry, livestock husbandry, farm machinery, and ornamental horticulture.

Computer Literacy for Staff and Students and Computer Studies

Computer Studies as a subject to be examined at the end of Form Five was first introduced in 1991 at Lotsane Senior Secondary. Because of severe constraints in both staffing and the supply of computers, only 14 schools offered Computer Studies (to 3.3% of the Form Fives) in 2001. During 2002 the remaining 13 laboratories are to be provided with computers and it is anticipated all schools will begin offering Computer Studies as an option in 2003.

The pioneer school, Lotsane, has not done well recently in Computer Studies (50% failed in 2000; 31% in 2001). This is attributed to poor staffing and a high turnover of staff. The Ministry of Education is pushing to ensure that laboratories are established and up-to-date at all schools (for example, Lotsane is still using third-generation Macintosh LC475s). Schools are having difficulty replacing antiquated hardware and some are unable to spend their funds on time because they fail to cope with the tendering process; Lotsane lost P165, 000 that they had been allocated for new computers in April 2002, for this reason.

Computer Awareness (which is not examined) for all Form Fours is a complicated programme if there are from 500 to more than 800 students in the Form. What is achieved at the schools is dependent on the participation of other staff. Teaching Service Management knows of only 10 qualified computer teachers

in all 233 secondary schools. In their absence Computer Awareness is usually taught by staff from Mathematics, Science, or other departments. A syllabus for Forms One to Three and textbooks have been distributed to junior schools. Computer Awareness for Form Four appears to be at the whim (what they know and what they think should be taught) of the teachers who take responsibility for it, though guidelines exist. Student projects in the various practical subjects are rarely 'word processed.' Often just the cover is done on a computer, and then the student may have to get a friend who has mastered the skills to word process it for them.

Staff access to computers at most secondary schools was still very constrained. The will to change in the next few years is demonstrated by the equipping of all computer laboratories by 2002; and the acquisition of computers by some practical subject departments (such as Art and Design, Design and Technology, and Home Economics).

Choice of Practical Subjects

In the junior schools, students have a bit more flexibility and they can do a rank order selection of the practical subjects they would like to take. Numbers are restricted by class size (usually not more than 20 for Art, Design and Technology, and Home Economics) and availability of teachers. Students take a printed form home and they are meant to discuss their choices with their parents or guardian. Choice of practical subjects is also subject to peer pressures, as students want to join their friends when they take a practical subject. However, friendship is independent of both prior learning and academic ability, so this approach to selecting what practical subjects to take causes problems at both junior and senior schools.

While in the junior schools 100% of the students now take two practical subjects, in 2001 in the senior schools (as shown in Table 4.2) an average of 1.85 students were taking two practical subjects, with Agriculture being the most 'popular'.

In the senior schools Form Four students also have a very limited choice. An orientation is usually held during the first two weeks of school, and staff from the various practical subjects try to 'sell' their subject to the students. At all senior schools visited the teachers believed that students who had done a practical subject in junior school wished to change to another subject in Form Four, which was contrary to the policy of continuing in one of the subjects taken in junior school. As has been noted above, most Pure Science students do not usually get to take any practical subject. Some Single Science students may be able to take two practical subjects, like Agriculture and Home Economics, but this is not common.

If it is the students who make the choice, it may happen that young students and poorly educated parents make decisions based on idiosyncratic criteria—perceived ease or difficulty of the subject, personality of the teacher, friendship group. These choices may turn out not to be in their best interests, neither for future studies nor in terms of work opportunities. If it is the school that makes the decision there may be a danger that the choice is made on the basis of teachers available rather than the students' interests and relevance to the local community. (Lewin and Caillods, 2001:299)

Gender Balance

The data was not available, but from observations on school visits it is clear that Agriculture is reasonably balanced, while Home Economics is favoured by females and Design and Technology by males.

Staffing

The situation in 2002 is presented in Tables 4.4 and 4.5. These tables are both unreliable and do not reflect the total situation. There are temporary teachers available to teach practical subjects, but teachers who are qualified to teach one or two subjects often teach another subject (like Computer Studies) because no one else is available. The Ministry of Education has been proactive in trying to recruit short-term contract teachers to fill vacancies: Design and Technology teachers from Zambia and Zimbabwe; Art teachers from Kenya and the UK; Commerce teachers from Ghana and Guyana; Home Economics teachers from Ethiopia, Ghana, Guyana, and elsewhere; and so on.

The staff for junior schools are trained at the two colleges of education, Molepolole and Tonota (see, for example, an article on the training of Design and Technology teachers; Molwane, 1995). The University of Botswana has been training practical subject staff for the senior schools, but only in Home Economics (all three subjects) and Design and Technology. Agriculture teachers are trained at the Botswana College of Agriculture and at the University of Swaziland. In the other subjects, citizens who excel, following training at a College of Education, are often sent overseas to do bachelor's and master's degrees: for example, a Bachelor of Arts in Art at the California Institute of Design and then a Master of Arts in Teaching at Tufts. Design and Technology teachers have also gone to the UK because the University of Botswana's output was considered too small. Some of these teachers have also been sponsored by the government to pursue master's degrees. On their return a few of them have made excellent heads of practical subjects in senior schools.

The University has approved a Bachelor's in Education in Business Studies. This should, in the near future, begin to address the shortage of Commerce, Accounts, and Business Studies teachers in the secondary schools.

Table 4.5 (even though it is not totally reliable) demonstrates that the dependence on expatriate teachers is minimal, as only 5% of 6,612 teachers are found in the senior and 7.5% in the junior schools (the bottom row reading across). These 821 expatriate teachers are found to be mainly (445 of 821 or 54%) teaching academic subjects, particularly in the senior schools where two-thirds are found there (for first subject taught). In the junior school we find a 14% reliance on noncitizens to teach practical courses (267 of 1,905 teachers) compared to 27% in the senior schools (109 of 292 teachers).

Reliance on Expatriates Reduced

A comparison of Tables 4.3 and 4.4 shows that over the past decade the reliance on expatriates has been significantly reduced from nearly 50% in 1993 to 21% in 2002. Further reductions will occur during the next planning period as the output from the two colleges of education and university picks up.

Facilities for Practical Subjects

It has been noted above under 'Status' the tremendous support given to the development and expansion of pre-vocational practical subjects by the Ministry of Education. Where there are problems (like the architects' design of space for practical subjects) it can be traced to inadequate consultation and perhaps the assumption on the part of planners and decision makers that practical subjects can be taught in conventional classrooms that have been slightly adjusted (higher ceilings, improved ventilation, better storage, more power points, air conditioning, and so on). For example, Design and Technology rooms come with labels that contradict the integrated nature of the subject: separate rooms are still being built labelled 'Woodwork', 'Metalwork', 'Plastics', 'Graphics', and so on. The concept of a large, multifaceted, multipurpose workspace is missing. The space provided by the new buildings seems also not to recognise that so much of the teaching is one-to-one (the research, project design, project implementation, the development of the portfolio, and so on). As millions of Pula have been spent on the new buildings, this lack of consultation or provision of what is really needed is frustrating to some staff.

Budgets for Practical Subjects

At the junior schools the practical subjects funds are allocated on a per-student basis, generally P55 for materials each year for each student. This is not found to be adequate, particularly in Art, Home Economics, and Design and Technology.

Budgets or ‘votes’ for practical teaching materials differ from school to school at the senior level. Each school must submit plans and estimates, and then these must be defended. When the funds are allocated they are usually controlled by the Head of Practical Subjects, but may be passed on to the Coordinators to manage.

For example, at one school the votes are as follows: Agriculture, P27,600; Art, P22,000; Home Economics (all three subjects), P24,000; Computer Studies, P30,000; Commerce, Accounts, and all academic subjects draw from a ‘pool’ of P686,700 (called ‘Student Books and Stationery’) while the Science laboratories get P33,900. In addition there is a vote of P31500 for ‘out-of-school activities’ (excursions, which are an important part of practical subject teaching). As another example, the total for practical subjects (only four included) is P81,000, spread across Home Economics, P22,000; Design and Technology, P21,000; and Art and Design and Agriculture, P19,000 each.

At another school, with a well-developed farm, Agriculture gets P120,000 altogether in three votes (materials for student projects; livestock; agricultural tools and equipment). A tractor was donated to the school, but since it broke down the school has been unable to find the resources to repair it and the government has failed to replace it, even though a commitment was made to do so when the tractor was received. This compares to other senior schools where Agriculture gets only P30,000 for all three votes. The profit from all agricultural produce and livestock that schools produce and are sold goes to the government, *not* to the schools (an accounting procedure found in the senior schools, not in the junior schools, which reflects a fear of mismanagement of funds or corruption, and a lack of trust in the school staff). There is also a vote for ‘Exhibitions’, something of particular interest to Art and Design and Technology teachers who want to see their students participate and compete in regional and national events. At some schools no money was voted to this fund in 2002.

A rough attempt to estimate unit costs is presented in Table 4.8 (below). These include the annual cost of materials (votes), buildings and equipment per class, and the salary of one teacher for that class. Estimated average class size is given in column e, and unit cost estimates per ‘student place’ per annum is in the column to the right. It can be seen that English is the ‘cheapest’ subject and Fashion and Fabrics the most expensive (about four times the cost of English).

Articulation between Junior and Senior Schools

There is very little contact between the schools. What articulation is achieved is caused by the process of selection of practical subjects in Form Four, and the structure of the syllabus between the two levels. In junior schools, staff

Table 4.8 Costs in Pula in one year for practical subjects compared to academic subjects*

Subject	a.	b.	c.	d.	e.	(a + b + c + d)/e
	Classroom	Equipment	Materials	Salaries	No. in class	
English	4,800	4,000	1,000	57,304	40	1,677.60
Mathematics	4,800	4,000	1,000	65,021	40	1,870.52
Science lab	9,543	10,000	2,000	57,801	35	2,266.97
Agriculture	5,775	5,000	2,000	60,577	30	2,445.06
Design & tech	11,147	15,000	3,000	60,794	20	4,497.05
Computer st.**	14,903	50,000	5,000	46,643	20	5,827.30
Food & nutrit.	10,279	10,000	4,000	59,095	16	5,210.87
Fashion & fab.	10,279	8,000	4,000	59,095	12	6,781.16

*Cost per classroom based on deprecation over 50 years; for equipment, 10 years; for materials, one year; salaries average for one teacher in each category without leave fares or gratuities. Costs for the Ministry of Education administration of senior secondary schools have not been included.

** Computer laboratories are also used for computer awareness, but this has not been considered.

Assumptions:

- Cost of new buildings in 2001–2002 as provided by the Ministry of Works divided by the number of classrooms and 50 years.
- Estimated cost of equipment averaged for a classroom and divided by 10 years.
- Estimated annual costs of materials for a classroom for one year.
- Teachers' salaries calculated from data in Appendix 2 (number of teachers and senior secondary school salaries allocated for that category). These may be distorted by rank and status (for example, Computer Studies is taught by new teachers who receive lower salaries). Teachers actually teach more than one class, so these figures can only give some rough idea of the relative unit costs for the different subjects (for example, Fashion and Fabrics is approximately four times per student more costly than English).

complain that they wish more happened in primary schools to prepare their students for practical subjects. In the senior schools a similar complaint is made by staff about the standard and orientation to practical subjects achieved in the junior schools. They also claim that the independent study should begin in junior schools, that students should learn research skills at that level, and that they should know how to go out into the community and find information. Students have great difficulty doing literature reviews and knowing how to cite sources and present quotations.

Integration Across Subjects

One teacher said: 'No integration; we do not work together; the core subjects are not reinforced in the practical subjects (or vice versa).' For example, Art and

Design works with textiles, as does Fashion and Fabrics, but they have different students and there is no communication between the staff and students, no in-service sessions, no sharing of ideas. In the new syllabus, Fashion and Fabrics students are to develop 'Mood Boards,' but the teachers seem not to know what these are and they don't ask others (the Art teachers would be more familiar with these Eurocentric approaches in the syllabus). In Computer Studies the students do a fairly elaborate research project and write up their independent study. The theme of most Computer Studies projects involves a small business, yet (usually) none of these students are taking Commerce, and the Commerce students rarely learn from the Computer Studies students or get to use the computers that they use.

All Teachers Exposed to Guidance and Counselling in Teachers' Colleges

The two Colleges of Education are planning to introduce a six-week, five-hour-a-week orientation to Guidance and Counselling for all teacher trainees being prepared to work in junior secondary schools. These 'Guidance Awareness' sessions have in the past been scheduled at the start of the first term in the second year of a three-year programme just before teaching practice. However, usually only two weeks of this syllabus is covered since teaching practice intervenes; and what has been missed is not covered later. This suggests that the Colleges do not take this aspect of their work seriously. At the University of Botswana a number of relevant courses are offered by the Department of Educational Foundations.

Guidance and Counselling

Staff were asked if they were aware of which of their students wanted to make a career out of the practical subject they taught. Those who knew these students usually could refer to ones who wanted to become teachers of a practical subject. Only in Art and Design did a few teachers know of students who wanted to go further in art as a career, usually commercial art. They pointed out that their best students, who were interested in art, were also the best students in the school, excelling in English, Mathematics, and the Pure Sciences. Because they were outstanding students they were open to careers in medicine, law, engineering, and other disciplines, and art would, if possible, become a hobby.

Teachers were critical of Guidance and Counselling in their schools. Career fairs, special sessions, and what was taught in 'G&C' seemed to constitute part of a euphoric picture that was presented to the best students so that they had the gift of choice when it came to their future careers. Little seemed to be done for

the weaker students, except to admonish them to ‘work hard, do well, and then you will proceed’. It was said that there was too much emphasis on HIV/AIDS, safe sex, teenage pregnancy, and warning about the consequences of alcohol and drugs (all negative messages).

In 1999 the Ministry of Education commented on the problems associated with implementing the recommendations of the RNPE with respect to guidance and counselling:

Guidance and counselling is being strengthened in the schools to address the personal, social, educational and vocational/care needs of leavers. All students from primary to tertiary institutions are offered a comprehensive guidance and counselling programme that not only focuses on career guidance but also addresses the total person.

The programme has been held back somewhat by a number of constraints. Implementation has been problematic because a lot of programme coordinators are still not training and the Guidance and Counselling Division does not have the complement of staff. Resources, especially resource and counselling rooms for guidance and counselling, are still lacking in schools . . . [D]ue to the shortage of staff some schools do not offer comprehensive programmes since examinable subjects are given priority attention over guidance and counselling. (Ministry of Education, 1999: 28)

In-service Training and Retraining

In-service training and retraining, as has been mentioned above, seemed to be absent from the schools. Instead, a pattern has evolved over the years where teachers leave their school for workshops at regional Education Centres or at hotels. These workshops tended to last for only one to three days and the teachers claimed they were of limited value. They recommended the development of school-based in-service training programmes, particularly in the more difficult areas such as student individual research and projects; articulation; integration across subjects; reinforcing of learning in core subjects through practical subjects; career counselling; entrepreneurship; and links to the world of work. The Ministry, to help correct these problems, has required the appointment of Staff Development Coordinators at each secondary school. In the future it is intended that these will be promotional positions and include financial incentives.

The changes in the syllabus and new methods of assessment require that those staff that are pursuing ‘best practices’ share their knowledge with other teachers. It is the Design and Technology teachers who tend to excel in the new approaches. They should be used in regular school-based in-service training sessions. For example, most teachers are used to seeing their students in a classroom and then taking their exercise books home to mark overnight. In Design and Technology this conventional approach no longer works. Instead teachers must work continuously with students after hours on a one-to-one basis. They also need to develop teamwork on the part of the students and team teaching by the teachers (again so best practice is communicated to others).

Students in Design and Technology learn the skills of evaluating their own work at each stage and assessing the work of their peers. This also helps to free the staff to devote themselves to more creative and focused work with students on their individual projects.

In 1999 the Ministry of Education commented on the problems associated with implementing the recommendations of the RNPE with respect to in-service training:

Junior and senior secondary in-service training is being merged to ensure that the needs of Basic Education are being met and to reduce overlap. Attempts are also being made to make this training more school based. To this end Staff Development Coordinators have been appointed in all schools. (p. 30)

Clubs and Societies

Most schools visited did not have any clubs or societies operating for any practical subjects. They usually said that they used to have an 'Art Club', 'D&T Club', 'Home Economics Club', 'Computer Club', or 'Agricultural Club', but not any more. They said they were too busy and overworked, so had no time left for clubs. At the junior schools the staff are available in the afternoons to help students with their school work. At one senior school, where the head had blocked any intake into Form Four Art and Design, the two teachers had started an Art Club for the students who missed out on the subject. At another school the Design and Technology Club was the body that organised educational tours, such as taking two busloads of students to visit the Rural Industries Innovation Training Centre 600 kilometres away in Kanye.

Links to the 'World of Work'

These were minimal. The usual contacts outside the schools were through educational excursions to a mine, industry, museum, or some focal point. I was told that funds had been curtailed and that they had not been able to make any trips so far this year.

One junior secondary head commented that 'Practical subjects at the junior secondary level are the fulfillment of requirements. The students who do not go on for further training then idle in the community and do nothing'. Only with proper tracer studies of secondary school leavers would we know how valid this 'received truth' is.

Tracer Studies of Form Three and Form Five Leavers

Though these are called for in the RNPE, I was unable to learn of any that had been carried out so far and were also completed, presented to the government,

and accepted for dissemination. The ‘Tracer Study of Recent Labour Market Entrants’, which was commissioned by the Ministry of Finance and Development Planning in 1997, has never been made public.

Tertiary Entry and Recognition of Practical Subjects

Practical subject staff in the schools had little knowledge of what was happening. Pastoral care departments would help students with their applications. But most students have left the secondary schools by the time they start applying for further training. When National Service (Tirelo Setshaba) existed, they had a Guidance and Counselling section that was very active in assisting participants with their applications to tertiary institutions.

The Colleges of Education, though they receive thousands of applications for a few hundred places each, do try to take into consideration performance in a practical subject, so if a student is applying to do Art, Commerce, Design and Technology, or Home Economics they will consider their performance in these subjects. The best students who have excelled in Pure Science, Mathematics, and English are unlikely to go to a College of Education, and even if they have applied, they usually win a place elsewhere and do not accept their placement in a college of education.

At the Botswana College of Agriculture students applying to study in any field are assessed on their performance in the Sciences, English, and Mathematics and little attention has been paid to the performance in Agriculture in Form Five, even for those prospective students who apply to become agriculture teachers in the schools. The College has been requested to reconsider this stance through the following communication:

Last year 10,732 students took the examination (or 65 percent of the Form V students in the 27 senior schools). Of this group 6.3 percent earned an “A” (including “A*”) or 672 students. This is certainly enough to merit some means of formal recognition in your selection process.

To not formally recognize success in agriculture sends very negative messages about the subject you are meant to be leading the nation in. It also contradicts your mission to train agricultural teachers as it says their efforts are not worth recognition. Please reconsider your position on this. Yes, very few pure science students take agriculture, but I am sure there are double science students out there who do take agriculture and should be recognized.

Maybe more pure science students would take agriculture if it was formally recognized in your selection criteria? (Communication from S.G. Weeks to the Dean, Botswana College of Agriculture, 23 May 2002)

The University of Botswana Faculty of Engineering and Technology has a similar problem when it comes to Design and Technology and admission

to the Faculty and specifically to study to be a Design and Technology (D&T) teacher in the senior schools. They have been requested to reconsider this stance through the following communication:

Of the 16,548 students taking the O'Level exams in the 27 senior school in 2001, only 3,671 (22.2%) took D&T. Of these 6.8% achieved an A+ or A (249 students). It is impossible to know which of these did pure science versus double or single science. Altogether 25.1% (920 students) got Bs and As. I understand MCE [Molepolole College of Education] has a means of recognizing their performance (even though they admit only 300 out of 10,000 applicants). You should check with MCE on their admissions criteria.

Still if a 'carrot' was held out to support the teaching of D&T in the schools (finding a way to consider D&T as part of the entry requirements for FET [Faculty of Engineering and Technology at the University of Botswana]) this would be a significant development for the secondary education system in Botswana. Currently FET trains Design and Technology (D&T) teachers for senior secondary schools, but pronounces their work as irrelevant by ignoring it as a criterion for admission. D&T also doesn't count if you want to become an engineer. Why not? (Communication between S.G. Weeks and the Dean, Faculty of Engineering, University of Botswana, 23 May 2002)

The Colleges of Technology's database on their admissions process tends to report on prior performance in English, Mathematics, and Science for applicants seeking admission from junior schools and senior schools. One college reported that they get 5,000 applications for a course with only 16 to 20 places. The Director of Vocational Education and Training (DVET) reported 18,000 applications for 180 places across the six colleges. Further vocational training beyond junior and senior secondary school is obviously in high demand in Botswana.

The Technical Colleges now recognize that they could ask for specific and relevant prior training and include that information in their form (see Appendices). For example, a course in Fashion and Design failed to ask for performance in Art (Art and Design) or Home Economics (Fashion and Fabrics). A course in Business Studies ignored relevant courses in Commerce and Business Studies in the junior and senior schools. Though it was felt interviews would explore these dimensions of the applicants, it was recognized that the 'carrot' was missing and could easily be included in the application form.

8 Cost of Running Secondary Education and Practical Subjects

It is difficult to separate the costs of secondary education and practical subjects. In 2001/2002 (the fiscal year starts on April 1) it was estimated that P2,469 billion (at P6.5 to the dollar, US\$ 380 million) would be spent on education or 16.65% of a total expenditure of P14,833,944,910 or US\$ 2,282 billion.

By March 31, 2001, P365,977.119 had been spent on secondary education (both junior and senior) which included P2,391,719 for practical subject materials. The budget for secondary education for 2002/2003 has been increased to P435,965,870, of which P2,833,390 (or 0.65%) is for Practical Subjects materials. In addition to this, under the category 'Special Expenditures' are funds that will benefit different practical subjects as follows: agricultural implements P64,070; agricultural show stands, P21,760; graphic design equipment, P250,000; photographic equipment P200,000; and word processors and micro-computers P2,262,000 (a total of P2,797,830). Added to the above this more than doubles the allocation to practical subjects to P5,631,220.

With 153,593 secondary students in 2002, the spending equals P36.66 per pupil, which seems a pittance (and does not reflect the number of students in senior schools who may not take a practical subject). What confounds any attempt to distinguish between allocations for practical subjects and other subjects is the vote for 'student books' which in 2002 is P17,079,210. It is not known how much of this goes to which group of students. If it was spread equally it comes to P111.20 per student. For science across all 233 schools, the vote for laboratory equipment is P300,000 and supplies an additional P472,160.

Because of the way accounts are kept both at the schools and at the Ministry of Education it has not been easy to establish the costs per student in the Sciences compared to practical subjects. In Botswana it would appear that they are treated as equally as possible (the divergence is caused by lower student numbers in practical subjects). A consideration of line items (votes) suggests that the amount spent on practical skills, based on budgets, is only marginally higher than for academic subjects. The real difference in costs comes in class size. The organisation of classes for academic subjects is between 35 and 40; for practical subjects it is meant to be 17 to 20 (though Agriculture can have up to 30 to 35 in a class, and some Home Economics classes have as few as 10 students). An attempt was made in Table 4.8 to calculate these costs. Though the costs are relative (and not totally accurate), the ratios between them is indicated: Science is 1.35 more expensive than English; Agriculture, 1.46; Design and Technology, 2.69; Computer Studies, 3.49; Food and Nutrition, 3.12; and Fashion and Fabrics, 4.06.

An assumption could be made that the per-student costs for a practical subject are twice that of an academic subject, based solely on class size. Artificial 'guesstimates' could be made comparing the two groups, but this has not been done as in Botswana the commitment to practical subjects (even if only two of eight or nine subjects examined) offsets any argument that more students could be enrolled if only academic subjects were taught.

Secondary school salaries (all staff) are expected to consume P32,112,410 (Public Service salaries) and P290,263,572 (Teaching Service Management) in

Table 4.9 Comparative unit costs for education (Pula, constant prices 1995/1996)

Function (Sub-sector)	1984/1985	1989/1990	1995/1996
Primary	501	552	826
Secondary (both)	2,299	2,744	—
Junior secondary	—	2,537	1,860
Senior secondary	—	3,282	2,200
Teacher education*	4,567	6,447	7,850
Nonformal	81	127	307
Brigades	3,139	3,264	5,265
Technical/vocational	9,916	9,212	8,189
University of Botswana	25,352	24,955	17,374

Source: Botswana, 1997: 345.

*TTC two-year certificate cost (the new three-year diploma in 1995/96 costs P8,420).

2002/2003, or P1,889.82 per student. [These figures do not include gratuities and leave fares.] Botswana's salary bill in proportion to the total budget is relatively low in comparison to other countries—for secondary school, it is only 44.2% of the total budget. Even if the additional recurrent costs of teaching smaller classes for practical subjects could be calculated, in the context of what Botswana spends as a whole on education, it is marginal. In Botswana, citizen and expatriate teachers receive nearly the same salary (expatriates tend to get more as they tend to occupy senior positions). The additional costs for employing expatriate staff lie in the gratuity (up to 30%, but taxable) and the cost of airfares to and from their home countries.

The cost per student of running the *whole* secondary school system in 2002/2003 is estimated to be P4,728 (or Ministry of Education and Public Service Management (PSM) P435,965,870 plus Teacher Service Management salary costs of P290,263,572 = P726,229,442 divided by 153,593 secondary students)—because of devaluation and inflation this is not an increase in real terms from 1995/1996; see Table 4.9 below. With 6,612 teachers the crude cost per teacher comes to P109,835.

When separate costs for junior and senior secondary schools have been available, senior secondary costs only marginally more.

In NDP7 (1992 to 1997) P300 million was allocated for capital development in secondary schools. During the plan period over P600 million was actually devoted to development expenditure at this level (which was approximately two-thirds of the budget and six times what the university received). The investment went to build four new senior secondary schools and to begin the expansion

of the junior schools (both in number and to add Form Three and facilities for all six practical subjects). This priority given to the development of secondary schooling has continued during NDP8. See Table 4.10 below.

Botswana spent P600 million on developing its secondary school facilities during NDP7 and at least that much or more during NDP8. Assuming P1,600 million will be spent altogether over 12 years to create capacity for teaching 160,000 students, this averages P10,000 *per student place* or only US\$ 1,538.

In the junior secondary schools the breakdown of capital expenditure in NDP8 was as follows:

The programme involved the construction of 31 new community junior secondary schools and the extension of 172 schools that were already in existence. The estimated cost of the entire programme was P462 million. All schools have been provided with a computer room at a cost of P272,000 each. Schools with at least fifteen classes have been provided with a pavilion which can accommodate a full class for Design and Technology. Additional staff houses are being built so as to ensure that all junior secondary teachers are adequately housed.

P650 million was allocated for upgrading of government senior secondary schools and construction work is underway. Ultimately all the government schools at this level will be upgraded. Virtually all the facilities in the schools are achieving attention. The laboratories, classrooms, hostels, specialists rooms, staff quarters, administrative blocks, internal roads and street lighting will be improved. The absence of an intake into senior secondary schools in 1998 was used as an opportunity to ensure that essential facilities were in order for the increased intake in 1999 [Form Three went to the junior schools in 1998]. (Ministry of Education, 1999:30)

During NDP9 (2003–2009) at least four new senior secondary schools will be built and the expansion and development of the junior secondary schools will continue. This will build on the massive capital development inputs in

Table 4.10 Comparative planned development expenditure for education (Pula, constant prices 1997/1998) during NDP8

Function (Sub-sector)	Development expenditure	Share total %
Primary	413,933,000	21
Secondary (both)	614,435,000	32
Teacher education	176,200,000	9
Vocational training	448,198,000	23
University of Botswana	204,917,000	11
Other*	74,015,000	4
Total	1,931,698,000	100

Source: Botswana, 1997: 378.

*Miscellaneous headquarters costs.

NDP7. Between 2003 and 2009, the government plans to spend 24.3% of the development budget for education on secondary schools, or P900 million (in 2002 prices). The annual recurrent budget for secondary education will go up by 59% to P719 million. It is the intention of the government to achieve an education system that 'will focus on providing programmes that will lead to higher quality of human capacity and productivity in leading to a better quality of life and prosperity for all' (unpublished NDP9 planning document from the Ministry of Education).

9 Discussion

The key constraint operating against the development of practical subjects is the priority given to science subjects. Botswana, as other countries, faces an inherent priority given to academic over practical subjects, and the prestige awarded to science subjects is one example of this. Students are streamed into Pure Science subjects first, then Double Science, and finally Single Science (in 1992 it was called Combined Science).

The combinations open to the students who are perceived as being more capable and who take Pure Science do not usually leave time for any practical subject on the final examination. The students who are deemed to be of lesser ability are then streamed into Single Science and have time to take some practical subjects (usually Agriculture plus one other). The relationship between taking a practical subject and a student's perception of possible occupations is therefore limited.

One indicator that pre-vocational education, or the development of practical subjects in secondary schools, is perceived as being of low priority by others is the neglect of student performance in practical subjects by tertiary institutions. It is a topsy-turvy world: if a student wants to study agriculture in a tertiary institution he or she is best advised not to take agriculture in secondary school because admission to tertiary institutions depends on performance in English, Mathematics, and the Sciences. Unfortunately the same observation applies to all other practical subjects, including Design and Technology, Principles of Accounts, and Art and Design. Currently the six Technical Colleges do not ask specifically for prior performance in relevant practical subjects.

The lessons from Botswana in 1992 and 2002 concerning the development of practical subjects in secondary schools were partially encouraging. Thus far Botswana had avoided the problems faced in some other countries by developing a form of pre-vocational education that has been 'secondarized' (the focus on research and problem solving as part of learning). The emphasis on pre-vocational education is perhaps a blessing in disguise. There are no simple

answers to the problems of the educational crisis faced by developing countries. Each country has to try to tailor its system to suit its own level of cultural, social, economic, and technological development. It is possible to expose students to the world of work in a variety of ways: through clubs and societies, through carefully tailored and executed practical subjects, and through academic subjects where learning is related to the social and economic realities of the society—for example, through English for job interviews, personal budgets, telephone skills, project planning, and dance and drama. Biology can be correlated to horticulture and poultry raising. Commerce can be linked to practical skills for living in communication, mathematics, accounts, and English (with effective reinforcement of learning), and through running trial-demonstration ‘mini-enterprises’.

The problems identified in the Botswana case study demonstrate that even in a context where resources are relatively plentiful, a variety of problems block the effective implementation of pre-vocational education. If pre-vocational skills and orientations are to be taught effectively, they require recognition of the constraints (teacher supply, qualifications, commitment, availability of materials, supplies, equipment and textbooks, resource books in the library, access to computers, and so on) and the development of strategies to remove the constraints. If this cannot be done, it is easier and simpler to focus on academic subjects. One problem that may negatively affect the development of practical subjects may arise from the extensive borrowing from the United Kingdom of syllabus, approaches, and textbooks that are now being used. Though relevant to the subjects and to Europe, they may not be relevant to Botswana and are already creating problems for students and teachers who do not fully comprehend the new syllabi.

To remove the constraints to the full development of practical subjects it is necessary to introduce relevant productive activities; promote integrated learning across subjects; develop teachers trained in management skills; establish links between school and community; encourage leadership tuned to entrepreneurial activity; promote schools that are more exciting, viable institutions rather than mere academic factories; and recognise that schools are microcosms of society—that schools consume and exchange goods and services.

Full vocationalisation (the devotion of more than three to five hours a week to master a trade) of secondary schools is not possible in Botswana, nor has the government endorsed it, but more should be and is being done to make the teaching of pre-vocational practical subjects effective. The route advocated by Mudariki, Education with Production, is the ideal, but whether it can ever become the reality in Botswana is still questionable (Mudariki, 1997; van Rensburg, 2001).

Policy Issues and Constraints

Botswana has invested heavily in developing practical subjects in both the junior and senior secondary schools. In the next two years the round of construction, which has transformed the senior schools into 'new' institutions, will be complete and fully operational. The provision of equipment (particularly computers for departments and sophisticated machinery for Design and Technology) will take longer. Botswana's commitment to implementing its new syllabus and programmes in the practical subjects has required it to continue to import more teachers from outside the country. At the same time the system has moved with all deliberate speed to improve the training of teachers at the Colleges of Education and University of Botswana. New programmes to provide teachers, such as for Business Studies, have been developed and will be implemented.

The major lesson to be learned from Botswana is that where there are extensive resources available to throw at a problem, a great deal can be done; but at the same time more might have been done with less, if the system were better organised. One example of this lesson is the provision of photography equipment (cameras, enlargers, film chemicals, paper, and so on) to both junior and senior schools for Art and Art and Design, though the staff are not yet available who can teach the module. How much has been lost to theft and decay is not yet known. An opportunity was also lost to review the modules for photography when the syllabus was re-organised for the BGCSE; it is still antiquated, and the world-wide shift to 'digital photography' is not in the syllabus.

The 'demand' for practical subjects in the secondary schools is actually not known. In the junior schools, students must take Agriculture and one other practical subject drawn from Art, Business Studies, Design and Technology, and Home Economics. It is not a popularity contest between these offerings but a balancing act between what the school can teach (for example, not all junior schools can offer Business Studies or Computer Awareness) and the allocation of students to subjects (first, second, third, or no choice).

Is Botswana continuing to be successful in preparing the school leaver for the world of work? Perhaps we should ask if Botswana was ever successful in doing this. Certainly not at the junior schools, and perhaps not at the senior schools. Junior secondary leavers have limited opportunities, and with qualification escalation these are shrinking in favor of senior secondary leavers (Molewa, 1995). The secondary schools in Botswana have not been vocationalised. Instead, forms of 'vocational preparation' or pre-vocational practical subjects have been developed and access to them expanded. In the absence of any tracer studies we do not know how much these courses have

helped students to make career choices or prepared them for further training in Brigades, Vocational Training Centres, and Technical Colleges. The staff who teach the practical courses believe that they have helped a minority of their students develop career aspirations and make choices for further training and employment.

The structure of the educational system in Botswana, specifically the return to the three-year junior secondary school, has had unintended consequences of which both the Commission in 1993 and the government in 1994 were not aware (at least in their documents). The three-year junior secondary, with its provision of six generic approaches to practical subjects (Agriculture, Art, Business Studies, Computers, Design and Technology, Home Economics), is cheaper in the long run than the way options have been developed in the senior schools where they are more specialised.

The amount of time students may spend on practical subjects in the senior schools can still vary tremendously. A Pure Science student who is taking one practical subject may be scheduled for only 11% of his or her time (or zero percent if taking no practical subject). It has been noted that the majority of students are now taking two practical subjects on the O'level examination, which would account for 22% of their time (or if they were taking only eight instead of nine subjects, 25%).

Botswana has re-oriented its practical subjects toward an ethos of research, investigation, creative thinking, and problem solving. Even Agriculture, which is usually the least expensive of the practical subjects, is taught this way in Botswana. It is recognised in Botswana that three to five hours a week on a practical subject will not usually lead to the mastery of what is required on the job or in self-employment. This is very different than in other countries where practical subjects are 'sold' to students and parents on the grounds that they will lead to employment, or if no jobs are available, at least to self-employment (King and McGrath, 1999; Lewin and Caillods, 2001). In Botswana the more 'vocational' courses (for example, metalwork, woodwork, and technical drawing) have been dropped from the syllabus.

Lewin and Caillods (2001) note the following on the teaching of practical subjects:

Where they are well organized, adequately resourced and have carefully thought-out curricula complementing the other school subjects, they can make a valuable contribution to life after school. (p. 301)

The Future

Pre-vocational preparation can be defined as a general education that combines knowledge, skills, values and attitudes in a form that prepares learners on how to investigate,

develop and apply concepts learned in real life situations e.g.: the home, community, recreational, social and work environments. Pre-vocational preparation should form a sound basis for further education and training. It should also stimulate innovativeness, problem solving and quality performance in a methodological manner in order to produce self confident learners who would in turn lead successful lives. (Ministry of Education, 1999:20).

After nearly a decade of work to implement the RNPE (Botswana, 1994; Ministry of Education, 1999), the nation remains committed to its experiment in promoting pre-vocational education instead of trying to vocationalise its secondary schools. In a few years from now the mix of new buildings, equipment, and facilities and newer, younger, and better trained teachers will jell to bring about a qualitative change in Botswana's education system. The transformation of the nation's education system should occur during the next six years. There is a commitment to see that it is achieved during NDP9 (2003–2009). Whether the economy will grow and the absorption rate for school leavers expand at the same rate is not yet known. But it is likely that Botswana has achieved 'an appropriate structural and institutional environment' to support pre-vocational education in secondary schools (Foster, 2002:28).

Recommendations

Issues for Schools

1. School-based in-service training: This should be developed further, particularly for the new methods of teaching (student research and projects), and be organised to learn from Design and Technology, where the staff have extensive experience.
2. All 10 practical subjects should be under one Head of Practical Subjects.
3. Dropping of a practical subject by a school: This should not be happening, nor should it be justified on the grounds of previous poor examination results (schools would not teach Mathematics if this was really allowed).
4. Selling of practical subjects (particularly Design and Technology and Fashion and Fabrics): The image of these two subjects, as 'too difficult' needs to be overcome through various ways. This is essential as these two subjects have the highest unit costs, caused by lower enrollments than expected and required.
5. Key skills: These need to be recognised and consciously incorporated into the teaching of practical subjects (as they are now in the Technical Colleges).

Policy for Ministry of Education

1. A clear statement on the philosophy of practical subjects: The reality is the shift to problem solving, research, and individual projects in the new Botswana General Certificate of Secondary Education.
2. A clear policy on clubs for practical subjects so that they are supported and developed at all schools.
3. Further decentralisation to schools to avoid the purchasing in advance of materials and equipment that will not be used (one example is the fiasco with darkrooms and photographic equipment in both junior and senior schools).
4. Equipping new buildings: Demoralisation of staff and students occurs when long delays happen; strategies to avoid delays of up to two years should be in place.
5. Incentives: Each practical subject department should be allowed to manage its own accounts (monitored by the Head of Department practical subject and the Bursar).
6. A clear policy is required on Science and practical subjects (should Pure Science students be required to take at least one practical subject?).
7. Mathematics: The high failure rate might be dealt with by streaming in Mathematics as in Science (a different Mathematics syllabus for single and double science separate from triple science [Pure Science]): such a syllabus should be planned in conjunction with the requirements for Commerce/Business Studies.
8. Integration: This needs to be promoted between practical subjects where they overlap and between core academic subjects and practical subjects (so that skills of Mathematics and English are reinforced by the practical subjects); examples are taken from the practical subjects when teaching the core academic subjects.
9. Projects: Integration is needed so that students may be allowed to do one project for two subjects (if the student and teachers agree and the assessment procedures are appropriate).
10. Guidance and Counselling and practical subjects: Greater recognition of the needs of students who are taking practical subjects.
11. Tracer Studies: They are required (and must be budgeted for).
12. DVET students: More research is required on the relationship between achievement in both practical subjects and core academic courses and performance in colleges. Entrance standards and attainment in Colleges of Education and other DVET courses should be monitored.
13. Tertiary Admissions: The carrot of recognising performance in practical subjects should be considered and their results also included in application forms.

14. Primary Schools: The syllabi in Art and Agriculture should be reviewed so that they are comprehensive over all 12 years of schooling.

10 Acknowledgements

The author wishes to thank all those in the schools visited and the Ministry of Education (both Headquarters and Examinations, Testing and Research) who provided assistance to this study. The historical material is mainly based on two previous studies by the author (Mudariki and Weeks, 1995) and (Weeks, 1997) and the author wishes to acknowledge these prior efforts in full. The author also thanks the World Bank, which covered the costs of the research.

11 References

- Achola, P.P.W. and Kaluba, H.L. (1989). School production units in Zambia: an evaluation of a decade of a presidential experiment. *Comparative Education*, 25(2), 165–178.
- Bachus, K. (1988). The political context of the vocationalization of education in developing countries. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education: an international perspective*. (31–44). London: Pergamon Press.
- Bennell, P. and Nyakonda, D. (1991). *The vocational school fallacy revisited: the employment experiences of secondary technical school graduates in Zimbabwe*. Harare: Department of Economics, University of Zimbabwe.
- Botswana, Republic of (1977). *Education for Kagisano: report of the National Commission on Education*. Gaborone: Government Printer.
- Botswana, Republic of (1979). *Supplementary report of the National Commission on Education*. Gaborone: Government Printer.
- Botswana, Republic of (1988). *The mid-term review of NDP VI*. (Ministry of Finance and Development Planning). Gaborone: Government Printer.
- Botswana, Republic of (1992). *Vocational education and training development plan: a report to the Minister of Education*. Gaborone: Government Printer.
- Botswana, Republic of (1993). *Report of the National Commission on Education*. Gaborone: Government Printer.
- Botswana, Republic of (1994). *The revised national policy on education April 1994: Government Paper No. 2 of 1994*. Gaborone: Government Printer.
- Botswana, Republic of (1997). *National Development Plan 8, 1997–2003*. Gaborone: Government Printer.
- Chin-Aleong, M. (1988). Vocational secondary education in Trinidad and Tobago and related evaluation results. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing Education: an International Perspective*. (293–325). London: Pergamon Press.
- Chisman, D. (1987). *Practical secondary education: planning for cost-effectiveness in less developed countries*. London: Commonwealth Secretariat.
- Coombe, C. (Ed.) (1988). *Survey of vocationally-oriented education in the commonwealth*. London: Commonwealth Secretariat.

- Crossley, M. and Vulliamy, G. (1986). *The policy of SSCEP: context and development*. Waigani: University of Papua New Guinea, Educational Research Unit.
- Crossley, M. and Weeks, S. (1986). Curriculum as an international commodity: dilemmas of relevance change. In *Education as an International Commodity*. Australia and New Zealand Comparative and International Education Society Conference, Brisbane, Australia, 1986, 419–430. Also published in *Directions*. Suva, Fiji, University of the South Pacific, 1987.
- Cumming, C.E. (1985). The contribution of cost studies. In C. Cumming, M. Davies, K. Lillis and B. Nyagah (Eds.), *Practical subjects in Kenyan academic secondary schools: background papers*. (77–107). Stockholm: Swedish International Development Cooperation Agency. Education Division documents No. 22.
- Cumming, C.E. (1988). Curriculum Costs: Vocational Subjects. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing Education: an International Perspective*. London: Pergamon Press.
- Davies, M. (1985a). How is “industrial education” taught? Does the way it is taught promote its objectives? In C. Cumming, M. Davies, K. Lillis and B. Nyagah (Eds.), *Practical subjects in Kenyan academic secondary schools: background papers*. Stockholm: Swedish International Development Cooperation Agency. Education Division Documents No. 22.
- Davies, M. (1985b). A long term tracer study of industrial education students from Nyandarua Secondary School. In C. Cumming, M. Davies, K. Lillis and B. Nyagah (Eds.), *Practical subjects in Kenyan academic secondary schools: background papers*. Stockholm: Swedish International Development Cooperation Agency. Education Division Documents No. 22.
- Foster, P. (1965). The vocational school fallacy in development planning. In C.A. Anderson and M.J. Bowman (Eds.), *Education and economic development*. Chicago: Aldine Publishing House.
- Foster, P. (2002). The vocational school fallacy revisited: education, aspiration and work in Ghana 1959–2000. *International Journal of Educational Development*, 22(1), 27–28.
- French, H.W. (1977). Vocational education and training in Botswana. In *Education for Kagisano: Report of the National Commission on Education. Volume 2: Annexes*, pp. 3–1 to 3–96. Gaborone: Government Printer.
- Heyneman, S. (1985). Diversifying secondary school curricula in developing countries: an implementation history and some policy options. *International Journal of Educational Development*, 5(4), 283–288.
- Hinchliffe, K. (1990). Is vocational training effective? Considerations of some training routes in Botswana. In A. Datta and K. King (Eds.), *Botswana—education, culture and politics*. (139–157). Edinburgh: Centre for African Studies.
- Hinchliffe, K. et al. (1988). *The cost effectiveness of technical and vocational education and training in Botswana*. Gaborone: University of Botswana.
- Hoppers, W. (1988). After training what? Youth training and self-employment in Botswana and Zambia. In *Education, training and work: some Commonwealth responses to youth unemployment*. (181–245. London: Commonwealth Secretariat.
- Jennings, Z.D. (1987). *Work experience programmes in Commonwealth secondary schools*. London: Commonwealth Secretariat.
- Jones, P.W. (1992). *World Bank financing of education: lending, learning and development*. London: Routledge.
- Kann, U. et al. (1988). *Education and employment in Botswana*. Gaborone: University of Botswana.
- King, K. (1988a). *In-service training in Zimbabwe: an analysis of the relations amongst education and training, industry and the state*. Edinburgh: Centre for African Studies, Edinburgh University.

- King, K. (1988b). Evaluating the context of diversified secondary education in Tanzania. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education: an international perspective*. (279–292). London: Pergamon Press.
- King, K. and Martin, C. (2002). The Vocational school fallacy revisited: education, aspiration and work in Ghana 1959–2000. *International Journal of Educational Development*, 22(1), 5–26.
- King, K. and McGrath, S. (Eds.) (1999). *Enterprise in Africa: between poverty and growth*. London: Intermediate Technology Publications.
- Lauglo, J. (1985a). *Practical subjects in Kenyan academic secondary schools: general report*. Stockholm: Swedish International Development Authority. Education Division Documents No. 20.
- Lauglo, J. (1985b). *Technical secondary schools in Kenya: an assessment*. Stockholm: Swedish International Development Authority. Education Division Documents No. 26.
- Lauglo, J. (1992). Vocational training and the bankers' faith in the private sector. *Comparative Education Review*, 36(2), 227–236.
- Lauglo, J. and Lillis, K. (Eds.) (1988). *Vocationalizing education: an international perspective*. London: Pergamon Press.
- Lauglo, J. and Närman, A. (1988). Diversified secondary education in Kenya. The status of practical subjects and their uses after school. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education: an international perspective*. London: Pergamon Press.
- Lewin, K. and Caillods, F. (2001). *Financing secondary education in developing countries: Strategies for Sustainable Growth*. Paris: UNESCO. International Institute for Educational Planning.
- Lillis, K. (1985). Constraints on the implementation of diversified curricula: a review of experience in developing countries. In C. Cumming, M. Davies, K. Lillis and B. Nyagah (Eds.), *Practical subjects in Kenyan academic secondary schools: background papers*. Stockholm: Swedish International Development Authority. Education Division Documents No. 22.
- Mansell, J. (1991). *Vocational education and training in Botswana: a report to the Permanent Secretary, Ministry of Education*. Gaborone: Government Printer.
- Mautle, G. and Weeks, S.G. (1993). Implications of educational structures: a position paper prepared for the National Commission on Education. *Mosenodi: Journal of the Botswana Educational Research Association*, 1(1), 3–6.
- Ministry of Education (1999). *Excellence in education for the new millennium: a comprehensive report on the implementation of the revised national policy on education*. Gaborone: Ministry of Education.
- Mokoti, G.M. (2001). *Design and technology annual report*. Gaborone: Ministry of Education, Department of Secondary Education.
- Molewa, J. (1995). The plight of the junior secondary school leaver in Botswana: and appraisal of the recommendations of the National Commission on Education—1977 and 1993—and other relevant papers. *Mosenodi: Journal of the Botswana Educational Research Association*, 3(1–2), 33–54.
- Molwane, O. (1995). Implications of the national policy on education: reflection on design and technology. *Mosenodi: Journal of the Botswana Educational Research Association*, 3(1–2), 77–83.
- Mudariki, T. (1997). Pro-vocational education and training for secondary school students: a Botswana case study. In K. Watson, C. Modgil and S. Modgil (Eds.), *Educational dilemmas: debate and diversity-quality in education*. Volume 4. (355–364). London: Cassell.

- Mudariki, T. and Weeks, S.G. (1993). Resource restrictions and educational development: implications for vocationalization of secondary education—a Botswana case study. Unpublished paper. *Boleswa Conference*. Roma, Lesotho.
- Mudariki, T. and Weeks, S.G. (1995). *Vocationalisation of senior secondary education—a report for the Second National Commission on Education*. Gaborone: Botswana Educational Research Association. [published in Volume 2 of the NCE 1993 Report, in 1995, pages A12: 1–50].
- Psacharopoulos, G. and Loxley, W. (1985). *Diversified secondary education and development*. Baltimore: Johns Hopkins University Press.
- Salkin, J.S. (1992 September). *Finance and development implications of the Vocational Education and Training Development Plan*. Gaborone: Ministry of Finance and Development Planning.
- Saunders, M. (1988) The ‘Technical and Vocational Education Initiative’: enclaves in British schools. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education: an international perspective*. London: Pergamon Press.
- Tempest, P.J. (1992). Vocational training in Botswana. In S. Seissa and F. Youngman (Eds.), *Education for all in Botswana*. Gaborone: Macmillan Botswana.
- Thijs, A. (1999). *Supporting science curriculum reform in Botswana: the potential of peer coaching*. Den Haag: CIP-Gegevens Koninklijke Bibliotheek.
- van Rensburg, P. (1974). *Report from Swaneng Hill*. Uppsala: Dag Hammarskjold Foundation.
- van Rensburg, P. (1992 September). Education with production. Paper presented at the *Vocational Education and Training Development Plan Conference*. Gaborone: Department of Technical Education.
- van Rensburg, P. (2001). *Making education work: the what, why and how of education with production*. Gaborone: Foundation for Education with Production; and Uppsala, Sweden: Dag Hammarskjold Foundation.
- Vulliamy, G. (1981). *Planning for SSCEP: a case study*. ERU Report 38. Waigani: University of Papua New Guinea.
- Watson, K. (1994). Technical and vocational education in developing countries: Western paradigms and comparative methodology. *Comparative Education*, 30(2), 85–98.
- Weeks, S.G. (1970). Innovation in education: comprehensive high schools in the Western State, Nigeria.’ In *Sociology Conference Papers, 1968–1969 Social Science Conference*. (493–512). Kampala: Makerere Institute of Social Research.
- Weeks, S.G. (1976). *The ‘Foster fallacy’ in educational planning*. Waigani: University of Papua New Guinea. ERU Occasional Paper No. 6.
- Weeks, S.G. (1989 August). *Western Highlands Province: technical high schools. Report to the Provincial Government, Division of Educational Research*. Waigani: National Research Institute.
- Weeks, S.G. (1991a). *Review of Vocational Centre Training in New Ireland Province*. Waigani: National Research Institute. Report No. 66, Division of Educational Research.
- Weeks, S.G. (1991b). *Education working: curriculum extension in Papua New Guinea* [video]. Waigani: National Research Institute.
- Weeks, S.G. (1993). Reforming the reform: education in Botswana. *Africa Today*, 40(2), 49–60.
- Weeks, G. (1995). Executive summary of the Second National Commission on Education’s Recommendations and those of the Revised National Policy on Education. Government paper No. 2.’ *Mosenodi: Journal of the Botswana Educational Research Association*, 3(1–2), 84–102.
- Weeks, S.G. (1997). Anti-vocational education and training for secondary school students: a Botswana case study. In K. Watson, C. Modgil and S. Modgil (Eds.), *Educational dilemmas: debate and diversity-quality in education*. Volume 4. (365–376). London: Cassell.

- Weeks, S.G., Mudariki, T., Motshabi, K. and Malikongwa, D.M. (1997 February). *Survey of private vocational training institutions in Botswana*. Gaborone: Government Printer.
- Wilms, W.W. (1988). Captured by the American dream: vocational education in the United States. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education: an international perspective*. London: Pergamon Press.
- World Bank (1991). *Vocational and technical education and training: a World Bank policy paper*. Washington, DC: World Bank.
- Wright, C.A.H. (1988). Curriculum diversification re-examined. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education: an international perspective*. (115–136). London: Pergamon Press.

12 Appendix 1: Secondary School Enrollments 1981 to 2002

Table 4.11 Secondary school enrollments 1981 to 2002. Form one, Form four, and total

Year	Form one	Form four	Forms one to five
1981	6609	1624	20168
1982	6667	1668	20965
1983	7417	1708	22252
1984	10838	2252	27364
1985	10577	2277	32172
1986	11090	2548	35966
1987	12904	3545	39375
1988	16719	4061	40357
1989	17983	4437	49348
1990	22672	6625	56892
1991	25952	6735	68487
1992	31520	7080	75873
1993	34382	7800	85687
1994	36524	8520	86684
1995	38660	8520	103159
1996	38165	9633	108373
1997	39202	10793	116076
1998	39155	13542	143503
1999	39742	15838	148076
2000	40338	17430	—
2001	40943	17409	—
2002	40219	18177	153593

13 Appendix 2: TSM Salaries (Pula) by Citizenship and School Type

Table 4.12 TSM salaries (Pula) by citizenship and school type

Subject	CJSS		Expatriate		SSS		Expatriate		Total teachers	Total cost
	citizen teachers	Cost	teachers	Cost	citizen teachers	Cost	teachers	Cost		
Agriculture	469	17679384	52	2196144	67	3895848	27	1798452	615	25569828
Art	19	757776	3	114468	38	2110944	15	951156	75	3934344
Art & craft	6	239436							6	239436
Art/religious education	395	14827068	57	2477568					452	17304636
Bookkeeping/ princ. of Accounts					11	571080	5	282156	16	853236
Business studies							2	193632	2	193632
Commerce					39	2022540	13	710040	52	2732580
Computer studies					10	488352	5	211296	15	699648
Design & technology	331	12389328	85	3594900	68	4167264	23	1365000	507	21516492
Development studies					17	906120	2	157896	19	1064016
Economics					1	51732			1	51732
English	565	23097396	94	4148388	142	8094096	46	2679192	847	38019072

General studies	333	13300572	16	786960					349	14087532
Geography					95	5728356	14	1051080	109	6779436
Guidance and Counselling	29	1229268	1	47604	12	1103664			42	2380536
History					63	3681444	5	333276	68	4014720
Home economics	248	9454020	35	1510620	59	3565008	19	1044396	361	15574044
Mathematics	493	19504764	19	884112	108	6733824	53	3734580	673	30857280
Moral education	161	6375708	8	348072					169	6723780
Physical education					3	291420			3	291420
Practical studies	170	6166332	35	1488648					205	7654980
Religious education					39	2131728	8	544368	47	2676096
Science	504	19853028	67	2923488	197	11114832	86	5242968	854	39134316
Setswana	446	17002500	2	96660	160	9466596	2	116688	610	26682444
Social studies	481	19723524	21	921720					502	20645244
Third options	12	542124	1	40968					13	583092
Total	4662	182142228	496	21580320	1129	66124848	325	20416176	6612	290263572

Albert K. Akyeampong

5

Vocationalisation of Secondary Education in Ghana

1	Executive Summary	149
2	Introduction	156
3	Vocationalisation of Secondary Education	157
4	Ghana: A Case Study	164
5	General Objectives of Vocational and Technical Subjects at SSS	182
6	Comparing Costs of Vocationalised Subjects and General Education Subjects	193
7	Capital Expenditure	204
8	Lessons from the Case Study and Recommendations	210
9	Acknowledgements	213
10	References	214
11	Appendices	216

1 Executive Summary

Introduction

Vocationalisation of the African secondary school curriculum has had wide endorsement from organisations such as UNESCO and from African governments. Education policy makers in developing countries often hope that the diversification of the secondary school curriculum would motivate changes in attitudes toward self-employment and further education, and even ease the transition to work. Vocationalisation policy in Ghana has had similar purposes. The broad purposes of technical vocational education (TVE) in Ghana can be broken down into nine objectives:

1. To expose pupils at the Basic Education level to a range of practical activities in the vocational field in order to make them familiar with, and stimulate their interest in, vocational subjects and so give them equal opportunity to choose their future careers in either the technical or general field

2. To equip students who have completed Basic Education with those occupational skills that will enable them to enter into gainful employment in industry and commerce
3. To equip students with the relevant productive and entrepreneurial skills that will prepare them for self-employment
4. To provide trained human resources in science, technology, and commerce, matching supply of skilled labor with demand
5. To provide personnel with the technical knowledge and vocational skills necessary for agricultural, industrial, and commercial and economic development while at the same time paying attention to environmental issues
6. To give training and impart the necessary knowledge and skills to trained manpower leading to the provision of operatives, artisans, craftsmen, technicians, and other middle-level technical personnel
7. To enable the youth to have an intelligent understanding of the increasing complexity of science and technology through systematic exposure to modern technology
8. To encourage the increased participation of women in education, training, and employment in the technical field
9. To provide a sound foundation for further education for those students who may wish to continue their education later in the context of lifelong education (Baiden, 1996:93)

These objectives provided guidelines for the design and development of the TVE curriculum at the secondary school level in Ghana. The first two objectives specifically linked with Basic Education (junior secondary school [JSS] level) pertain to career exposure, career exploration, career choice, and entry into gainful employment. The remaining objectives reflect the dual purpose of diversified senior secondary school (SSS) curriculum: objectives 3, 4, 5, and 6 pertain to employment and economic development while objectives 7 and 9 are general education and further education objectives. Objective 8 addresses social and political problems-access inequality, and equity-and is less visible in the TVE curriculum at the secondary level.

Countries use different approaches to vocationalisation of the general education curriculum. One approach is to have a core curriculum and diversified clusters of elective subjects that include vocational and technical subjects. Ghana uses this approach whereby at the senior secondary level, a student must take four core subjects and three or four electives, several of which are packaged vocational and technical electives.

But TVE can mean different things in different systems. Again in Ghana's mainstream educational system, the term 'vocational' is a label for those instructional areas that consist of visual arts (mainly the handicrafts) and home

economics subjects. The specific subjects so labelled include Leatherwork, Sculpture, Graphic Design, Basketry, Food and Nutrition, and Management in Living. The label 'technical' is used for trade, industrial, engineering-related subjects such as Technical Drawing, Applied Electricity, Auto Mechanics, Metalwork, and Woodwork. Agricultural and business education subjects in the curriculum are not presented under any of the two labels.

The introduction of TVE subjects into the secondary school curriculum started in the mid-1960's, but it was not until 1987 that a comprehensive plan was initiated to make 'vocational education' an integral part of the secondary education system. Severe economic problems from the late 1970's to early 1980's prompted the government of Ghana to launch its Economic Recovery Program with financial assistance from the World Bank and international donor agencies. As an integral part of its plan for economic recovery, the Government initiated the 1987 Education Reform Program (ERP) to reverse the decline in the education system. The decline in the economy, coupled with at the time a government that saw itself as championing the cause of ordinary Ghanaians rather than a minority elite, made vocationalisation widely accepted as one of the key solutions to socio-economic decline. The argument put forward was that education should prepare the youth for work and that providing vocational education at the secondary school level would equip students with the skills for paid and self-employment.

Focus of the Case Study

This case study report provides a general description and analysis of Ghana's efforts at diversifying its secondary school curriculum, and the lessons that might be learnt from this experience. The report focuses on the vocationalisation policy of the 1987 education reforms. A major focus of the case study is the analysis of policy goals that governed the introduction of vocational education into general secondary education and the implementation experiences that followed. Some of the specific issues addressed by the case study are as follows: indications of student interest in vocational subjects; characteristics of students opting for vocational subjects; curriculum aims and objectives; cost of vocational subjects as compared to cost estimates for other subjects; and recurrent teaching cost per student and per class period. Also discussed are the proportion of theory to practice in the examination of TVE subjects and the implications for achieving the objectives of TVE. The final section pulls together the key issues that have emerged from Ghana's experience with vocationalisation and what lessons this experience suggests. Finally the report highlights some positive achievements and the way forward for TVE at the secondary school level.

Issues about costs remain a critical part of the consideration for TVE. In the secondary school sector, vocational subjects must compete with the other subjects, e.g., science, for whatever funds are available for the purchase of equipment and materials for practical subjects. In Ghana, budgetary allocations to basic and senior secondary schools are not determined on the basis of the specific requirements for teaching a particular subject. Allocation is made to districts on a formula basis that lumps all schools together and basically treats all subjects as equal. In total, JSS and SSS receive about 20% and 13% of the Ghana Education Service (GES) sector budget respectively (MOE, 2000). Schools offering practical subjects often levy a fee on the parents of students and this often varies between schools.

The case study explores the nature of cost differences between vocational subjects and general education subjects and for possible factors that might help to explain cost differences within and between senior secondary schools.

Key Emerging Lessons

Some lessons that have emerged from the case study are as follows:

The policy of vocationalisation for the secondary school sector appears to have been too ambitious and implementation of the policy hastily carried out. At the onset of the 1987 reforms, implementation plans were initiated without serious consideration given to the implications of policy for equipment supply and maintenance. For example, the government found it difficult to provide the special funding for equipping JSS workshops and also train sufficient TVE teachers for the JSS level. However, recent statistics suggest that with the designation of 10 teacher training colleges as specially mandated to train TVE teachers, the supply may meet demand at the JSS level. But many of these teachers may not all end up teaching at that level because of a general desire to further their education for the purpose of either teaching at the SSS level or quitting teaching for other professions (Akyeampong and Stephens, 2002).

Vocationalisation at the JSS level was intended to provide vocational *orientation* to students—that is, the intention was not to teach specialised subjects, such as Basketry and Woodwork. But its implementation did exactly the opposite with the introduction of 13 specialised subjects—a clear example of the mismatch often found between policy intentions and what actually gets delivered.

JSS is terminal for many school children in Ghana. This fact is often offered as justification for providing JSS graduates with employable skills, especially for the lower level of the labour market. One estimate of the rate of return to education suggests that JSS is inefficient in preparing terminal graduates

for labour market participation. Some evidence also suggests that it does not prepare most of those who finish JSS to qualify for SSS. The transition rate from JSS to SSS is estimated to be about 35%. On the other hand, the SSS level appears to give higher rates of return, which would suggest the need for strategies to improve the transition rate from JSS to SSS.

Vocationalisation at the SSS level in Ghana had a dual purpose:

- To provide skills for paid or self-employment and
- To prepare others for further education.

These, however, seem difficult to fulfil under the structure and organisation of the current secondary school system. Case study evidence suggests that TVE subjects as part of general education come under the heavy influence of the goals of general secondary education that threatens to corrupt TVE goals. In particular, subject requirements for entry into university exert considerable influence on the combination of subjects schools are willing to offer their TVE students or what students themselves choose to study. The effect of this is that some students are compelled to study subjects that are of little practical relevance to them especially if they continue into further vocational education or training instead of going to university.

The case study strongly suggests that providing TVE in *all* SSS is not a productive strategy, especially considering the capital-intensive requirement of TVE subjects. Furthermore, the number of subjects required for TVE programmes must be scaled down. On the basis of an analysis of TVE examination requirements, it was noted that the workload requirements for the various TVE programme options could vary appreciably because of differences in the number of subjects required in the different programmes. Some TVE students study far more subjects than do their general education counterparts. All general education students study approximately the same number of subjects, which have similar examination time requirements.

TVE subjects are better served by an assessment programme that places more direct emphasis on practical objectives using performance-related tasks. Analyses of SSS TVE examination papers suggest they are driven more by psychometric testing traditions in general education. This is another indication of the corrupting influence of general education goals on TVE when the two operate under the same curriculum umbrella.

A positive achievement of the vocationalised secondary education curriculum in Ghana is the increase in the proportion of students taking TVE subjects at the SSS level. In 1996, for example, about 50% of all SSS students studied TVE subjects. Because of the lack of tracer studies it is difficult to say whether this translates into more terminal SSS graduates entering certain vocations that reflect their specialisation at SSS. But, a study by King and Martin (2002)

does appear to indicate that some students' interest in certain jobs reflect TVE subjects they have been exposed to. However, it is difficult to draw firm conclusions on this matter since labour market signals might be responsible for such interest and not necessarily influenced by the subjects students studied. Indeed, King and Martin also suggested that the nature of the economic environment and what students perceive to be their realistic chances in the labour market might influence student interest in certain jobs.

On the issue of the characteristics of students opting for 'vocationalised education', the case study leads to the following conjectures:

- (a) There might be some association between school type in terms of infrastructure and geographical location, qualifying grade, socio-economic family background, and the calibre of students opting for vocationalised programmes at SSS level.
- (b) The academic calibre of students entering vocationalised programmes varies according to programme type. For example, there is a hint, though from a limited analysis, that less academically able students opt for the Agriculture option than for, say, the Technical option.
- (c) Vocational options are not necessarily 'soft options'. Some high achievers opt for a vocational/technical programme because of their further education aspiration. But this also seems to depend on the school and the calibre of students it is able to attract.

A number of observations can be made on the issue of costs based on the limited sample of four senior secondary schools studied for this report:

- SSS technical programmes tend to require high capital and recurrent investment. For example, compared to the elective science programme, the number of students enrolled in the technical programme tends to be lower, resulting in smaller class sizes compared to science. The effect of this is that investments required per student place for technical subjects are much higher than for science subjects. For business and general arts programme the difference in the number of student places per year is rather small.
- It is not clear what the optimum student–teacher ratio should be for maximum efficiency in running vocational subjects at the SSS level. But clearly, very high enrollments in practical intensive subjects compromise the quality of student learning experiences and outcomes. Besides, low enrollment in some senior secondary schools that offer TVE subjects such as the technical option is inefficient, because the ratio of students per teacher per subject may be too low to justify the investments.

- Wide variations in costs from one school to the other that were observed could be attributed to the following factors: (a) resource availability, (b) intensity of practical activity, (c) enrollment levels, and (d) subject-specific fees charged.

In conclusion, the evidence from the case study suggests that the overambitious nature of policy goals, poor conceptualisation, lack of effective planning and implementation, and inadequate funding have all contributed to undermining any potential benefits that might have been intended by reformers. Vocationalisations of the secondary education curriculum in African, if it is to be viable, must address the following challenges:

- Provide adequate equipment and materials and operate in such a way that ensures that they can be maintained and replaced,
- Provide professional teacher training for TVE teachers to enhance their instructional quality, and
- Ensure levels of student enrollment that reduce the high unit costs of TVE subjects without compromising on the quality of delivery of such programs.

All three are tough challenges that are not easy to overcome, given the evidence from the Ghana case study, and which leads to the following fundamental questions about the introduction of Technical Vocational Education and Training (TVET) at the secondary education level: Is the secondary school context the most appropriate place for specialised TVE, or should a few schools be selected and adequately resourced to operate specialised TVE programmes? Where are most graduates from these specialised SSS likely to go after their secondary education: polytechnics, university, or readily absorbed into the labour market? On the issue of whether only some schools should offer TVE, the case study evidence suggests that certain schools that possess certain characteristics (e.g., high enrollment, better facilities, located in urban setting, capable of attracting students with a stronger academic background) are best placed to offer certain TVE subjects at reduced costs than those that possess fewer or none of these characteristics.

Although the 1987 education reformers saw vocationalised secondary education as providing the opportunity for *all* students to select from a curriculum menu that caters to a wide range of talents, in reality the wide disparities in school facilities and equipment and teacher supply meant that this goal was hardly attainable. Undoubtedly this must raise some questions about pursuing *specialised* TVE at the secondary school level for *all* students when basic inputs for its effective organisation and practice are severely limited.

2 Introduction

This case study report provides a general description and analysis of Ghana's efforts at diversifying its secondary school curriculum, and the lessons that might be learned from this experience. The report focuses on the vocationalisation policy of the 1987 education reforms. Not much has been written about the impact of vocationalised secondary education in Ghana with the result that there is very little documentation on issues pertinent to TVE at that level. Discussions with Ministry of Education (MOE) officials revealed that investment in the technical institute and polytechnic sector is currently of more immediate concern than investment in vocational secondary education—an indication of perhaps growing dissatisfaction with the vocationalised secondary education policies of the 1987 reforms. Ministry officials felt that a few senior secondary schools needed to be specially designated as secondary technical or vocational, with the rest concentrating on providing general education. Furthermore, they argued that this would facilitate special funding of specially designated TVE secondary schools and thus improve their efficiency and effectiveness. A frequent criticism from ministry officials was that the senior secondary sector was still too narrowly focused on university requirements, thus undermining their ability to address the practical goals of TVE.

Some of the information sought by the terms of reference (TOR) of this study was not readily available partly because vocational secondary education had not attracted as much interest as, for example, basic education where several reviews and studies have been conducted. Recent policy literature on TVE in Ghana reflects concerns with the informal and formal vocational schools sector (Japan International Cooperation Agency/MOE, 2001). Also, documentation on implementation stages of vocational policies is difficult to find. Some officials explained that this was because of the highly politicised nature of the 1987 reform implementation that left very little room for critical public debate and discussion.

To address many of the issues required in the TOR, it therefore became necessary to conduct field studies. Four senior secondary schools were chosen for this purpose and data was collected through questionnaires sent to various heads of departments and TVE teachers. School bursars provided data on costs. Informal interviews were also conducted with staff of the selected schools.

A major focus of the case study was the analysis of policy goals that governed the introduction of vocationalised secondary education and some of the implementation experiences that followed. Some of the specific issues addressed by the case study are the following: *indications of student interest in vocational subjects; characteristics of students opting for vocational subjects; curriculum aims and objectives; cost of vocational subjects as compared to cost estimates*

for other subjects; and recurrent teaching cost per student and per class period. Also discussed are the proportion of theory to practice in the examination of TVE subjects and the implications for achieving the objectives of TVE. The final section pulls together the key issues that have emerged from Ghana's experience with vocationalisation of secondary education and what lessons this experience suggests. Finally the report discusses what the way forward might be and mean for Ghana.

3 Vocationalisation of Secondary Education

The Broad Purposes of Vocationalisation

Vocational and technical education is fraught with definitional and conceptual inconsistencies that have resulted in what Strong (1990:45) aptly describes as an 'identity crisis.' The terms 'vocational' and 'technical' take on different meanings, not only across countries but even within the same country, UNESCO definitions notwithstanding. In Ghana's mainstream educational system; for example, the term 'vocational' is a label for those instructional areas that consist of visual arts (mainly the handicrafts) and home economics subjects. The specific subjects so labelled include Leatherwork, Sculpture, Graphic Design, Basketry, Food and Nutrition, and Management in Living. The label 'technical' is used for trade, industrial, and engineering-related subjects such as Technical Drawing, Applied Electricity, Auto Mechanics, Metalwork, and Woodwork. Agricultural and business education subjects in the curriculum are not presented under any of the two labels. UNESCO definitions, on the other hand, distinguish between 'vocational' and 'technical' in terms of level of training and the relative combination of skill training, related sciences, and general academic education involved. The concept of 'vocationalisation' used in this study embraces those instructional areas traditionally labelled as 'vocational' or 'technical', including Agriculture and business subjects.

Concept of Vocationalisation

Vocationalisation has been a policy issue since manual training or training for the various trades moved from industry, business, and field agriculture to the educational system. It generally refers to the diversification of a previously liberal arts or general academic curriculum of the secondary school to include an increased amount of vocational and technical areas. Countries use different approaches to vocationalisation. One approach is to have a core curriculum and diversified clusters of elective subjects that include vocational and technical

subjects (Chin-Aleong, 1993). In this approach, which Ghana uses, a student at the senior secondary level must take four core subjects and three or four electives, several of which are packaged as vocational and technical electives. The concept of vocationalisation is simple to understand but its purposes are rather complex.

Broad Purposes of Technical Vocational Education

The traditional and universally accepted purpose of vocational education in general has been the provision of occupational skills for employment (Strong, 1990) but with time, vocational education has assumed different meanings and purposes (Pucel, 1990). Demographic, social, technological, economic, and political forces have put pressure on policy makers to keep expanding the purposes and expectations of vocational education. The tone for the expanding expectations of vocational education was set by early leaders of secondary school vocationalisation in the United States when they argued that vocationalisation would make public schools more democratic, extend general education, and provide the vast majority of youth with a reason for continued school attendance (Miller, 1985). Today, the broad purposes of vocationalisation are varied but can be collapsed into a few categories.

About three decades ago, the General Conference of UNESCO meeting in Paris at its 18th session came up with a comprehensive set of recommendations concerning TVE. The recommendations identified three broad dimensions of TVE: (a) TVE as an integral aspect of general education; (b) TVE as preparation for an occupational field; and (c) TVE as an aspect of continuing education (UNESCO, 1979). Objectives were outlined for each of these dimensions. As an integral aspect of general education, TVE is expected to contribute to society's goals of greater democratisation and social, cultural, and economic development. Regarding preparation for an occupational field, the conference recommended the 'diversification of secondary education in the later stages' so that TVE can offer 'to all youth educational options corresponding to their needs' including employment training and preparation for higher education. The Conference further urged member countries to make the expansion of TVE as continuing education a priority objective in order to address the personal and professional development needs of everyone. Any country can prepare a menu of goals and policies for TVE by merely lifting portions of the recommendations, but the danger is that the goals and policies may not be strategic for its peculiar circumstances.

Reviewing vocational education in Commonwealth countries, Coombe (1988:3) identified three broad categories of policy goals: personal goals, social goals, and economic goals. The personal goals pertain to 'the development of

the whole person' for adult life-including physical, moral, spiritual, and ethical aspects. The countries reviewed expressed the social goals of vocationalisation in two forms: (a) providing equality of opportunity for learners with different abilities, talents, and potentials; and (b) reducing cultural and social inequalities by introducing curriculum components that encourage positive attitudes toward work. Coombe found that economic goals were by far the most common policy themes across the countries studied. The economic goals included the provision of skilled and semi-skilled manpower, reducing educational wastage caused by mismatches between education and the labour market, developing technological literacy, and facilitating economic growth and national development.

Coombe's (1988) categories of TVE policy goals reflect the recommendations of UNESCO (1979). Both imply that TVE has other broad purposes in addition to the traditional goal of occupational preparation. UNESCO's Second International Congress on TVE held in Seoul, South Korea, in 1999 reaffirmed the need to integrate TVE into national education systems, not only for its economic contribution but also for its cultural, social, and political contributions. The Congress specifically mentioned individual development, citizenship, equal access, and empowerment of disadvantaged groups as goals for TVE for the 21st century (UNESCO, 1999:37). The Congress acknowledged, *'perhaps the biggest challenge which faces TVE is to coordinate the needs of a general and vocational education through curriculum, pedagogy, and delivery'* (UNESCO, 1999:63; emphasis added).

From a philosophical perspective, education can be viewed as possessing two broad purposes: (a) preparation of the individual for life (education about life); and (b) preparation of the individual for earning a living (Finch and Crunkilton, 1993:8). The two main purposes are not mutually exclusive but rather intersect, and TVE contributes to the two purposes. Education as preparation for life also lays the foundation for post-secondary education while education for earning a living is specialized education, which enables the individual to gain employment and earn income. In line with this philosophy, business educators distinguish between 'education about business' and 'education for business' (Daughtrey, Ristau, and Baker, 1982). Similarly, home economics educators also distinguish between consumer homemaking education (CHE) and occupational home economics (Villafana, 1995). Therefore, the multipurpose nature of TVE has philosophical underpinnings. However, the implementation of the multipurpose philosophy can be problematic, as Ghana's attempts to vocationalise its secondary education system have revealed.

Pucel (1990:168) posed the question, 'If vocational education can accomplish all the goals claimed for it, what would be left for other areas of education?' Though TVE can contribute to the general education of the individual, further

questions may be posed. For instance, to what extent should TVE pursue general education and higher education objectives relative to its primary role of occupational preparation? What should be the right mix of general education and occupational preparation objectives at the secondary level? Finally, can TVE successfully accomplish general education objectives without sacrificing its primary mission? These are some of the critical questions that must be addressed in the vocationalisation of the secondary school curriculum.

The Specific Objectives of Vocationalisation

Objectives derive from goals and purposes and may be stated at different levels of specificity (Kibler, Barker, and Miles, 1970:20). At the broadest or programme level, objectives resemble goals and purposes. System-level objectives outlined for vocational education in the secondary school tend to be somewhat broad but greater in number than goals. In Ghana, for example, the purpose of TVE at the secondary school level is stated as follows:

The purpose of technical and vocational education at the non-degree level is to provide young men and women with skills training (in addition to general education) in order to enable them fulfil the country's technical manpower needs including self-employment up to middle level in the field of industry, business, and agriculture. (Baiden, 1996:93)

This broad purpose has been broken down into nine objectives:

1. To expose pupils at the Basic Education level to a range of practical activities in the vocational field in order to make them familiar with, and stimulate their interest in, vocational subjects and so give them equal opportunity to choose their future careers in either the technical or general field
2. To equip students who have completed Basic Education with those occupational skills that will enable them to enter into gainful employment in industry and commerce
3. To equip students with the relevant productive and entrepreneurial skills that will prepare them for self-employment
4. To provide trained human resources in science, technology, and commerce, matching supply of skilled labour with demand
5. To provide personnel with the technical knowledge and vocational skills necessary for agricultural, industrial, commercial, and economic development while at the same time paying attention to environmental issues
6. To give training and impart the necessary knowledge and skills to trained manpower leading to the provision of operatives, artisans, craftsmen, technicians, and other middle-level technical personnel

7. To enable the youth to have an intelligent understanding of the increasing complexity of science and technology through systematic exposure to modern technology
8. To encourage the increased participation of women in education, training, and employment in the technical field
9. To provide a sound foundation for further education for those students who may wish to continue their education later in the context of lifelong education (Baiden, 1996:93)

The first two objectives specifically linked with Basic Education pertain to career exposure, career exploration, career choice, and entry into gainful employment. Objectives 3, 4, 5, and 6 pertain to employment and economic development while objectives 7 and 9 are general education and further education objectives. Objective 8 addresses social and political problems-access inequality, and equity.

Specific objectives of TVE may be classified as *trainability* or *employability* objectives (Coombe, 1988). *Trainability* objectives aim at laying cognitive and affective foundations that will facilitate future skill learning, occupational versatility, occupational adjustment, and adaptation to new technologies. These objectives will include exposure to scientific and technological understanding and the development of work values, problem-solving, and creative thinking skills. *Employability* objectives, on the other hand, aim at preparing students for entry into employment immediately after school. Thus, such objectives will emphasise the acquisition of occupation-specific skills for paid or self-employment. Of the specific objectives for Ghana, the seventh and the ninth objectives appear to fall in the category of trainability. The majority are *employability*-related. However, there is yet another interpretation of employability.

When secondary school vocationalisation in the United States came under scrutiny in the 1980's, the Committee on Economic Development (CED), an independent organization with influential business executives and educators as members, argued that *employability* should not be confused with *vocationalism*. According to the CED, employability '*requires problem-solving skills, command of the English language, self-discipline, and the ability to acquire and apply new knowledge*' (Phelps and Cole, 1988:8, emphasis added). Similarly, the Workplace Basics study (Carnevale, Gainer, and Meltzer, 1990) also revealed seven groups of basic skills that employers want; the skills include communication skills, adaptability skills (problem-solving and creative thinking), group effectiveness skills, and influencing skills. These and other similar findings led to the 'back-to-the-basics' movement and the re-thinking of the nature and objectives of vocational education in the United States.

Perhaps now is the time in Africa to seriously examine what vocationalisation of the secondary school curriculum has actually achieved and whether there is the need to re-think some of its objectives and goals. This report is an attempt to tell Ghana's story of TVE at the secondary school level and what the problems, causes, and consequences have been, and finally what the experiences point to for future policy.

Vocationalisation of the Secondary School Curriculum: Some Key Questions

Vocationalisation of the African secondary school curriculum has had endorsement from organizations such as UNESCO. In their report on the state of education in Africa, UNESCO stated that its activities '... should aim at including vocational subjects in general education curricula to facilitate the young generation to obtain generic technological knowledge and key pre-vocational skills' (UNESCO Regional Office for Education in Africa, 1995:29). Despite such optimistic claims, the benefits of diversifying the secondary school curriculum remain unclear. Some questions about it still remain:

- Does diversification of the secondary school curriculum actually enhance opportunities for more students to study vocational and technical subjects, and if so, what appears to be the motivation?
- Are the characteristics of students who study technical and vocational subjects (TVS) any different from other general arts and science students, and if so, what can we attribute the differences to and why?
- Generally, TVS require more instructional and practical time. Will the subjects be allotted sufficient time to satisfy their practical goals?
- Methods of assessing TVS, especially the form of assessment used in examinations, could exert negative backwash effect on the way TVS are taught; assessment forms may corrupt intended objectives of TVS. What lessons are to be learned from the impact of general education assessment practice on TVS teaching and assessment?
- Do technical and vocational students suffer any discrimination in competition for access to further education or training? In particular, how have university admission policies influenced the selection of elective subjects by TVE students?

These questions are addressed in this report.

Education policy makers might hope that the diversification of the secondary school curriculum will motivate changes in attitudes toward self-employment and further education, and even ease the transition from school to work. Foster's

(1965) study of middle school students' aspirations toward vocational occupations in post-colonial Ghana had suggested that formal schools were ineffective in changing attitudes toward employment and self-employment. Foster produced these results at the dawn of Ghana's emergence as an independent state when the socio-economic, political, and educational conditions were much different from today. For one thing, the school curriculum of the 1960's was not as diversified as today.

This report very briefly examines a more recent study of Ghanaian secondary school students' aspirations and attitudes to work undertaken by King and Martin (2002) to draw some preliminary conclusions about the possible effect of diversification on students' attitudes and aspirations in relation to paid and self-employment. In addition, the report examines whether there are any indications that vocationalisation of the secondary school curriculum eases transition to work. Although direct empirical evidence based on tracer studies was not available, it was possible to examine indirect evidence to reach some tentative conclusions on the issue.

Issues about costs remain at the heart of the debate about TVE. In the secondary education context, vocational subjects must compete with the other subjects, such as science, for whatever funds are available to purchase equipment and materials for practical skills development. Budgetary allocations to basic and senior secondary schools in Ghana are not determined necessarily on the basis of specific subject requirements. They are allocated to districts on a formula basis that lumps all schools together and treats all subjects as equal. In total, JSS and SSS receive about 20% and 13% of the GES sector budget respectively (MOE, 2000). Thus, vocational subjects do not enjoy special financial consideration as might be expected in the case of purely vocational or technical institutions. This raises the question about whether schools make special provision in their budget plans for the special needs of vocational and technical subjects, and if so, who pays for this. It is important, therefore, to determine the nature of cost differences between vocational subjects and general education subjects and also examine the possible factors that might help to explain the differences in subject costs.

Finally, whether or not vocational and technical teachers have the requisite teaching qualifications to handle the subjects competently is of great importance. But even more important is whether the education system is capable of producing enough of such teachers to meet demand.

In conclusion, there is little doubt that TVE in the secondary school context would face peculiar challenges. Some of them have been enumerated above. This case study report analyses some of the experiences, challenges, and achievements of this vocationalisation effort.

4 Ghana: A Case Study

Background and Context

Ghana is a low-income country, with a population of about 18 million of whom 34% live below the poverty line.¹ Per capita income in 1997 was US\$ 370 (\$1790 purchasing power parity). Population growth averaged 2.7% between 1990 and 1997, and over 44% of Ghana's population is under 15 years old. Coupled with a low average income per head, this puts a strain on public provision of resources for education, health, water, and sanitation services. Most of the population lives in rural and semi-rural areas—63 percent—and agriculture provides over 60% of all employment. Life expectancy at birth is 57 years. Adult illiteracy is estimated at 36% and is greater among women than men—47% compared with 24% (World Bank, 1998).

Since the introduction of Ghana's economic reform program in 1983, its annual growth has been higher than in most other countries in sub-Saharan Africa, averaging 4.3% between 1990 and 1997 (World Bank, 1998). Ghana has adopted the goal of becoming a middle-level income country by 2020 based on the experience of countries that have made the successful transition to sustainable economic growth through promotion of human resource development.² Investment in human resources, through the expansion and strengthening of basic education, is a central feature of Ghana's economic and social development strategy to accelerate economic growth and reduce poverty.

Since the 1950's Ghana has made a number of attempts to reform the education system put in place by the British colonial administration, driven by the desire to make it more relevant to her needs as a developing country. Following independence from Britain in 1957, the government of Ghana's strong commitment to developing human resources was consolidated by the 1961 Education Act that made education free and compulsory at the basic level. By 1970 Ghana had one of the most highly developed education systems in West Africa (EIU, 1997:16).³

The late 1970's and early 1980's, however, saw a sharp economic decline during which GNP per capita fell by 23 per cent between 1975 and 1983. The real value of government financing for education fell sharply from 6.4 per cent of GDP in 1976 to 1.4 per cent

¹ The poverty line is based on two-thirds of average income set by the Ghanaian Living Standards Survey in 1988.

² See *Ghana Vision 2020*, Government of Ghana, 1995.

³ Recurrent government expenditures on education averaged 24% of the total recurrent budget in the early 1970s, substantially higher than the average figure of 17% for other West African countries.

in 1983, and resulted in near collapse of the education system. Teachers were not paid promptly, there was little supervision or inspection, schools were in disrepair, and there were inadequate textbooks and instructional materials. (Nti, 1997:5; World Bank, 1996:2)

The severity of Ghana's economic problems peaked in 1983 at which time the government of Ghana launched the Economic Recovery Programme with financial assistance from the World Bank and international donor agencies. As an integral part of its plan for economic recovery, the government initiated the 1987 ERP to reverse the decline in the education system. A key feature of the 1987 ERP was the diversification of the secondary school curriculum to include technical and vocational subjects. The decline in the economy, coupled with, at the time, a government⁴ that saw itself as championing the cause of ordinary Ghanaians rather than a minority elite made vocationalisation widely accepted as one of the key solutions to socio-economic decline. The argument put forward was that education should prepare the youth for work and that providing vocational education at the secondary school level would equip students with the skills for paid and self-employment.

Prior to 1987, the Ghanaian education system consisted of a six-year primary cycle; a four-year middle; a seven-year secondary (the first five years leading to the 'O' level certification and the last two leading to 'A' level); and a three- or four-year tertiary. It was the norm for tertiary students to have spent up to 17 years on pre-university education. This system had been criticised because it was considered too academic and because it did nothing to raise the importance of vocational education as a tool for self-employment.

Structure of Pre- and Post-1987 TVE in Ghana

TVE had been emphasised in the education system in Ghana since the colonial era. It started with the missionary schools where children were given training in the various trades, such as carpentry, masonry, and blacksmithing. The 16 principles of education proposed by Sir Gordon Guggisberg, Governor of the Gold Coast (Ghana's name before independence) between 1914 and 1927, called for the provision of trade schools with technical and literacy education that would equip young men to become skilled craftsmen and useful citizens (McWilliam and Kwamena-Poh, 1975). This resulted in the opening of four government trade schools in 1922. But these schools were taken over during

⁴ The government in power at the time of the reforms was a revolutionary socialist government that had made it their particular ambition to make Ghana's education system more equitable and responsive to issues of employment and economic development. Thus they had the political will to initiate what was clearly a significant ideological change in pre-tertiary education in Ghana.

the Second World War for war purposes. After the war, efforts were made to make vocational and technical education an integral part of the education system but based on a separate track system of vocational and general education. The introduction of technical and vocational education subjects into the secondary school curriculum started in the mid-1960's but it was not until 1987 that a comprehensive plan was initiated to make 'vocational education' an integral part of the secondary education system.

The structure of Ghana's TVET pre-1987 reform is shown in Appendix 1. Before the 1987 education reforms, secondary schools offered mainly general arts and science subjects. A limited number of TVE subjects were offered by a relatively small number of schools. Generally, general education subjects were the prerequisite subjects for further education at the university level. Middle school students who were unable to make it to secondary school could enter technical institutes after which they could pursue further training at the polytechnic level. Provision was made, however, for technical institute graduates to proceed to the polytechnic level to undertake two-year diploma courses. Those who excelled in the diploma programme were given the chance to study for a bachelor's degree. The post-1987 education system placed technical institutes much lower than secondary schools. Besides, the 1987 education reforms made access to university by graduates of technical institutes virtually impossible (see Appendix 1).

Under the 1987 education reforms, Ghana's basic education cycle was changed to six years of primary and three years of junior secondary schooling, followed by a three-year senior secondary cycle and a tertiary sub-sector comprising polytechnics, universities, and professional training institutions such as teacher training colleges. At the JSS level, the reforms introduced a pre-vocational skills programme made up of 12 discrete subjects and a pre-technical skills programme made up of 5 discrete subjects. Pre-technical subjects included the following: Woodwork, Metalwork, Block Work/Brick Work/Plastic Designing and Making, and Graphic Communication. Pre-vocational subjects comprised the following: Graphic Design, Picture Making, Textiles, Basketry, Bead Making, Sculpture, Sewing, Paper Craft, Catering, Leatherwork, Gourd and Calabash work, and Pottery and Ceramics. All JSS students were expected to study the five pre-technical subjects but could choose to study two or three pre-vocational skills subjects. The immediate challenge that this change posed was how the education system was going to train enough teachers to teach all the newly introduced subjects.

Some features of the new system are worth pointing out briefly. First, all students are now exposed to pre-vocational and pre-technical subjects as early as the junior secondary level. JSS is intended to have a dual purpose: (1) to prepare students for further secondary education and (2) to prepare terminal

JSS graduates for low-level paid employment or self-employment. It was also envisaged that some terminal JSS students would enter the nonformal technical and vocational sector for apprenticeship training.

Policy Goals and Implementation Experiences

The diversification of the secondary curriculum was much more extensive at the SSS level than at the JSS level. There was virtually no consultation with important stakeholders such as teachers, schools, and parents as to the nature and objectives of vocational secondary education. The reforms were politically motivated, and at meetings where certain education policies were being shaped, opposing views were often not welcomed or tolerated. The government at the time was a military government—the Provisional National Defence Council (PNDC) headed by Flight Lt. Jerry Rawlings. Economic and education reform was strongly driven by a socialist ideology theme and, coupled with a dictatorial political climate, the agenda for educational change was left in the hands of a powerful few. The underlying goal of the education reform was greater equality of opportunity for all school-going children and the provision of a pre-tertiary education system that favoured practical vocational and technical subjects. A sense of urgency was associated with the education reforms, leading to the process being rushed.

Basically, the curriculum at the JSS level was designed to promote literacy and numeracy and to impart appropriate knowledge of culture and practical skills. Thus, policy statements emphasised the development of hands-on practical experience in technical and vocational skills. Among the conditions for the establishment of the JSS were:

- The construction of workshops to enable practical work to be performed
- The supply of basic hand tools and materials
- The recruitment of technical and vocational skills teachers (TED/GES, 2001)

Capital funding for starting the reforms covered curriculum design, teacher training, in-service training, orientation courses, basic equipment, textbooks, and other training materials. A lot of the training had been rushed, often lasting not more than two weeks at a time, and materials were not sufficiently produced. For example, because of the shortfall in vocational and technical teachers for JSS at the early stages, some mathematics teachers were encouraged to enroll for two-week orientation courses to teach pre-vocational and pre-technical skills. Therefore these were not the best-prepared teachers to give the teaching and learning of vocational subjects a good beginning. Finding teachers for all 12 JSS pre-vocational and 5 pre-technical subject areas was particularly

difficult. Initially, only one training college training was designated to train technical teachers for the JSS. By 1991 12 more teacher training colleges had been specially designated as vocational and technical institutions to train more teachers for the JSS. Until recently, pre-vocational and technical student teachers specialised in only four subject areas, which meant that many JSS did not have trained teachers for certain pre-vocational and technical subject areas.

Originators of the reforms expected that itinerant teachers and local craftsmen would be employed to fill in the shortfall in qualified teachers. The MOE moved quickly to change this policy when schools presented budgets for the remuneration of the hired teachers, which, though lower than what regular teachers receive, were not factored into the national education budget. Apart from the widespread abuse of hiring local craftsmen leading to unplanned huge wage bills, the MOE argued that paying these craftsmen would kill community initiative in supporting the development of JSS (MOEC, 1988). The ministry recommended instead that 'a situation of goodwill should be maintained between school and community to enable local artisans to give occasional demonstration of their skills to schools without necessarily asking for cash payments' (MOEC, 1998:2). Part of the ideology of the reforms was that communities would make voluntary contributions to the development of community junior secondary schools and thus somehow it was felt, rather naively, that services rendered would be voluntary. Furthermore, the Ministry suggested that 'schools which are clustered together on the same compound may . . . have some teachers moving from one school to the other to handle subjects of their specialisation' (MOEC, 1988:2). The problem with this arrangement was that timetables were not flexible enough to accommodate teachers moving from school to school. The use of local artisans in teaching only reinforced public suspicion that JSS pupils were being trained to become local artisans and carpenters (MOEC, 1988), which further reduced the attractiveness of the JSS concept of vocational education in the eyes of many parents. Another drawback to using local artisans was that they lacked the necessary pedagogical skills to teach large student groups and teach the skills according to curriculum objectives and standards.

At the early stages of the reform, Local Implementation Committees (LICs) were established in school communities to facilitate the development of JSS. One of the tasks of LICs was to supervise the construction of JSS workshops for practical work. Although a layout and dimensions of the recommended JSS workshops had been developed, some communities went ahead and put up rather complex and expensive structures that were not necessary (MOEC, 1988:3). The basic requirement for the construction of the workshops was a '*single all-purpose workshop with workbenches designed to accommodate all practical lessons*' (p. 3). Initially, schools had been encouraged to use existing

facilities in the communities while workshops were being built. But this is based on the assumption that such workshop facilities already existed in the local community. There is no evidence of a mapping exercise to identify the kind of facilities in the communities that could be used by junior secondary schools.

Later the Ministry of Education and Culture (MOEC) changed this directive because, as it put it, ‘to use workshops which are far from the schools . . . would use up too much instructional time and may encourage truancy and absenteeism’ (p. 3). To justify this shift in policy the MOEC argued that the curriculum for basic technical and vocational skills had been designed in such a way that sophisticated facilities and equipment were not necessary. Yet still, a persistent criticism of the JSS vocational concept has been that most schools lack even the most basic facilities for practical work. Recent estimates from the Ministry of Education reveal that less than one quarter of junior secondary schools have workshop facilities and the capacity to deliver the vocational options in the curriculum (MOE, 2000).

It is obvious from the way the MOEC made policy and changed it almost immediately when problems arose with implementation that the implications of certain policy directives had not been carefully weighed. Enthusiasm for vocationalisation of the JSS curriculum was not equally matched with the ability to set up the appropriate implementation structures, train the required teachers within a reasonable timeframe, and appreciate the cost implications of providing and sustaining JSS workshop facilities.

As was earlier pointed out, a key assumption of the integration of pre-vocational and technical skills with the general academic curriculum particularly at the SSS level was that products of such an education unable to further their education would be able to use their knowledge and skills for self-employment. Some opponents of diversification of secondary education in Ghana have criticized this assumption for two main reasons. First, it is argued that because vocational and technical subjects do not attract *special funding*, schools have had very little equipment and consumables to adequately fulfill the objectives of vocationalisation. Second, it has also been argued that vocationalisation has detracted from time that should be spent on the basic requirements of literacy, numeracy, and writing, considered as foundational for employment and further education (MOE/National Council for Vocational Education and Training, 2000). In reality, however, the JSS pre-technical and vocational skills were allotted three periods a week each, constituting only about 13% of instructional time in a week (see Table 5.1). This does not appear to be excessive time. But the point of the criticism may be that the number of periods per week for basic subjects, such as mathematics and English, could have been increased were it not for the introduction of pre-vocational and pre-technical skills. How

Table 5.1 Junior secondary school allocation of periods to subjects per week—1987

Subject	Periods
Mathematics	6
English	6
Science	4
Ghanaian language and culture	4
Agricultural science	3
Pre-technical skills	3
Pre-vocational skills	3
Religious and moral education	3
Social studies	3
French (optional)	4
Life skills	2
Music and dance	2
Physical education	2
Total	45

much of a difference that would make in improving basic literacy and numeracy is open to debate.

Table 5.1 shows the recommended timetable for JSS at the beginning of the reforms that all schools were expected to follow in spite of the cost and staffing requirements of the new practical subjects. In 1994 an Education Reform Review Committee (ERRC) was established to review the 1987 education reforms. The Committee recommended a reduction in the number of externally examinable subjects from 13 to 9. Music and Dance, Life Skills, and Physical Education were to be taught but examined internally. Technical Drawing was also introduced to the list of pre-technical subjects. These changes took effect in 1996.

The Diversified SSS Curriculum

The SSS curriculum comprises a set of core subjects compulsory for all students and three elective subjects selected from one of four programmes. At the beginning of the reforms the following six subjects were the core subjects: English, Mathematics, Agriculture and Environmental Science, Life Skills, Ghanaian Language, and Social Studies. This number was reduced to the following four by the 1994 ERRC: English, Mathematics, Integrated Science

Table 5.2 An example of typical time allocated to various elective programme subjects in a senior secondary school

Subject	Periods
Science (physics, chemistry, biology, maths/technical drawing)	28
Technical (technical drawing, physics, maths, applied electricity/metalwork)	28
General arts (e.g., geography, economics, french, maths)	28
Visual arts (general knowledge in art, graphics, ceramics, Economics/French)	28

(Science and Agriculture), and Social Studies (formerly Life Skills, embracing Economics, Geography, History, Government, etc.).

Table 5.2 shows that all subjects are allocated the same number of periods per week—7 periods per week for each subject. Time set aside for technical subjects in the technical programme is 50% and for vocational subjects in the visual arts program, 75%. For science elective programmes, 75% of time is allocated to science subjects and 25% to technical drawing. Similarly, in elective general arts 75% of time is allocated to general arts subjects and 25% to elective maths.

A significant feature of the diversified SSS curriculum is the opportunity it offers students studying different programmes to select from a menu of general education subjects considered foundational in their programme. Thus, for example, Agriculture programme students could select one or two elective science subjects, or French. Similarly, Technical Program students could select one of two subjects, namely, Mathematics (elective), Physics, or French. The 1994 ERRC also introduced Technical Drawing at SSS and made it compulsory for all students in the technical program. The committee also recommended that each SSS student should select at least one vocational activity that would be studied once a week as part of the normal school timetable. Some of the suggested activities included Bead Making, Basketry, Book-craft, Ceramics, Computer Literacy, Poultry Rearing, and Textile Design. But these recommendations have yet to be fully implemented in most senior secondary schools in the country. Given the expansions in the regular curriculum with its associated increased workload for both teachers and students, coupled with the problem of insufficient equipment and tools, it was unrealistic to expect that schools would devote time to more practical activities and subjects.

SSS programme designers intended that Agriculture, vocational, and technical subjects would prepare students not only for the world of work but also for further education. Problems arose when the universities considered some of the SSS students not sufficiently prepared for university study. The universities were especially unwilling to admit SSS Agriculture graduates because they considered elective science as more appropriate foundation for agriculture programs at the university. The National Education Reform organized in 1999 to review the achievements of the 1987 ERP drew attention to this problem but concluded that the problem was a reflection of a ‘... deep gulf in official thinking about the aims and objectives of second cycle of education, and the deep attachment of the public to academic and liberal education perpetrated by the old type secondary schools’ (MOE, 2000:16–17).

Supply and Demand of Vocational and Technical Teachers

Overall, the reforms produced an increase in the actual number of pupils enrolled in secondary schools. In the 10 years since 1987, JSS enrollment has grown by an average of 3.7% and SSS 3.5%. But as Table 5.3 shows, growth in enrollments has been uneven and sometimes negative.

As of 2000 there were 6,829 junior secondary schools in the country: 6,084 public and 755 private schools (MOE, 2000). This represents a significant

Table 5.3 Enrollment and enrollment growth rates for JSS and SSS (1987–1997)

Year	JSS		SSS	
	Number	Growth rate	Number	Growth rate
1987/88	610094		153284	
1988/89	608690	−0.2	154477	0.8
1989/90	625018	2.7	167640	8.5
1990/91	569343	−8.9	199260	18.9
1991/92	605760	6.4	235962	18.4
1992/93	644976	6.5	257355	9.1
1993/94	676182	4.8	245897	−4.5
1994/95	690558	2.1	209190	−14.9
1996/97	738057	6.9	199028	−4.9
1997/98	755162	2.3	—	—
	Overall	2.5		3.5

Source: National Education Forum—Ministry of Education (1999a).

Table 5.4 Certified technical and vocational teachers for JSS (1995–2001)

Year	Technical	Vocational	Total
1995	611	262	873
1996	494	269	763
1997	472	380	852
1998	584	1,369	1,953
1999	808	1,670	2,478
2000	993	1,254	2,247
2001	1,635	1,635	3,270
Total	5,597	6,839	12,436

Source: Institute of Education University of Cape Coast Examination Statistics.

increase compared with an initial estimate of less than 200 at the start of the reforms. With the increases in enrollment and number of JSS has come the need to produce enough teachers to teach pre-vocational and pre-technical skills at the JSS level.

Statistics on the number of pre-vocational and technical teachers for both JSS and SSS are not readily available. Nevertheless, if a conservative estimate of about 13,658 teachers is chosen (based on the assumption that each JSS gets two teachers for pre-vocational skills and pre-technical skills) then the current training system seems adequate for producing the required number of teachers. Even at a 5% estimated attrition rate for JSS teachers (Akyeampong, Furlong, and Lewin, 2000) this prognosis seems reasonable. But in reality, there are serious shortages of teachers, particularly in rural Ghana. Available statistics of qualified (certified) pre-vocational and pre-technical teachers show that from 1995 the 10 designated vocational and technical training colleges produced 12,436 teachers (see Table 5.4 below). In 2001, both pre-vocational and pre-technical subjects were made compulsory for all student teachers in the 10 training colleges; hence the significant increases for that year. Before then, students in the 10 designated training colleges were able to study only either pre-vocational or pre-technical as their elective subject.

Although the 1987 reform indicated that pre-technical and pre-vocational skills subjects were meant to serve as *orientation* toward certain skills that might be further developed after graduation from JSS, in practice this became highly specialised technical and vocational programmes (5 in technical and 12 in vocational). Immediately, huge logistical and teacher supply problems and teacher training challenges were created. To start with, the training given to JSS pre-vocational and -technical teachers did not match the kind of subject

specialisation required for teaching pre-vocational and -technical skills at the JSS level. The 1994 ERRC acknowledged this problem and consequently recommended that the teacher training curriculum should give more emphasis to problem-solving methodology by integrating skills in technical and vocational study. In a memorandum to the ERRC, Amenuke et al. (1994) recommended the adoption of an activity approach to vocational education based on three broad areas: *designing, making and evaluation*. This recommendation was accepted and introduced in the curriculum of the 10 teacher training colleges.

Currently no statistics on the number of technical and vocational teachers at the SSS level are readily available. The SSS, though, has a peculiar problem. Unlike the JSS, where a number of training colleges were specially mandated to train TVE teachers, no similar arrangements were put in place for the SSS level. Visits to the four schools studied for this report revealed that with the exception of Agriculture, most of the teachers for vocational and technical subjects had no professional teaching qualification. For instance, although the 15 technical teachers in the four schools studied had professional qualifications in their subject areas—mostly the Higher National Diploma (HND)—only one also possessed a professional teachers' certificate in technical education.

Interest in Vocational Subjects and Its Influence on Career Choice

The numbers of students who opt for vocational and technical subjects at the SSS are possibly an indication of the interest students have in such subjects. Table 5.5 shows that about 53% of all SSS students in the 1996 SSS certificate examinations offered vocational and technical subjects. Although we cannot generalise trends in the choice of vocational and technical subjects from a

Table 5.5 Elective programs offered by SSS students in the 1996 WAEC SSSCE

Program areas	Elective programs	Number of candidates	% of Total
General education	Science	28,790	19.4
	Arts	41,051	27.6
Vocational and technical	Agriculture	24,434	16.4
	Business	17,101	11.5
	Technical	11,686	7.8
	Home economics	12,940	8.7
	Visual arts	12,547	8.4
	Total	148,549	

Table 5.6 Best subject of JSS students by gender
(*N* = 241 for girls; *N* = 247 for boys)

Subject	Percentage responses	
	Girls	Boys
English	26.1	13.0
French	3.3	1.2
Science	17.4	28.7
Pre-technical skills	1.2	3.2
Pre-vocational skills	7.1	2.4
Mathematics	17.4	28.7
Social studies	4.1	6.9
Religious and moral education	12.0	6.1
Agriculture science	5.8	7.7
Ghanaian language	5.4	2.0
Total	100.0	100.0

Source: Ampiah, 2002.

single year, nevertheless the statistics do give an indication of the considerable impact in terms of increases in the number of students studying TVE subjects. Agriculture appears to be the most commonly taken vocational subject (16.4%), followed by business (11.5%). In the four senior secondary schools studied there was concern that TVE subjects are often seen by some students and non-TVE staff as suitable for academically weak students—a perception that worried a lot of the TVE teachers we spoke to.

At the JSS level there is some indication that pre-vocational and pre-technical subjects are not very popular with pupils. In a study exploring best subjects of JSS students, Ampiah (2002) found that pre-technical and pre-vocational subjects were ranked among the least liked subjects (see Table 5.6). Students were asked to rank-order subjects they liked best to those they liked least at JSS. Girl students seem to have more interest in pre-vocational skills than pre-technical; the opposite is true for boys. Ampiah's study did not explore specific reasons for the low interest in the two subjects. But, it might be the result of poor instructional facilities and equipment for teaching or simply a reflection of the low aspiration JSS students have toward pre-vocational and pre-technical careers. Ampiah did indeed find a close relationship between JSS students' interest in the subjects and the subjects they rated as useful for the future. The students ranked pre-technical skills as the least useful subject followed by Ghanaian language and pre-vocational skills in that order. It appears

Table 5.7 Number of candidates in SSSCE subjects: 2001

Subject	Boys	Girls	Total
Economics	16,535	14,103	30,638
Elective mathematics	14,794	5,158	19,952
Geography	7,145	3,815	10,960
English	37,856	28,588	66,444
Core mathematics	37,740	28,553	66,293
Physics	10,743	3,255	1,998
Accounting	7,466	4,593	12,059
Ceramics	620	287	907
General knowledge in art	3,250	5,671	9,921
Picture making	1,018	624	1,642
Food & nutrition	229	5,018	5,247
Textiles	1,638	1,853	3,491
Management in living	502	6,419	6,921
Clothing	193	1,687	1,880
Technical drawing	3,393	39	3,432
Electronics	40	1	41
Building construction	1,656	13	1,669
Woodwork	997	7	1,004
Metalwork	653	6	659
Applied electricity	275	7	282
Auto mechanics	196	4	200

Source: West African Examinations Council (WAEC).

from Ampiah's study that introducing vocational and technical subjects very early to Ghanaian pupils does little to promote positive attitudes toward them as important subjects for employment.

West African Examinations Council (WAEC) statistics on the number of candidates who took the Senior Secondary School Certificate Examinations (SSSCE) in the individual subjects provide some indication of subject offerings at school and the preference of students. Table 5.7 shows this for 2001. The table shows clear gender differentiation within subject areas. For example, few girls take the technical options. For girls offering TVE subjects the most subscribed subjects include Technical Drawing and Building Construction. Girls outnumber boys in vocational subjects such as Food and Nutrition, Textiles, Management in Living, and Clothing.

King and Martin (2002) recently surveyed SSS students in Ghana and produced results, which suggested, 'diversification does seem to make quite a

difference to the pattern of pupils' career choices' (p. 9). In particular, self-employment and working for a private firm were the most popular preference of SSS students. Their survey of SSS students also produced the following findings pertinent to the question of whether diversification might bear some influence on interest in certain careers:

- Patterns of choice with regard to working for the private sector might be influenced by where schools are located—whether in affluent urban settings or poor rural settings—or the kind of students attending them. Thus, apart from the possible influence from parental background, the kind of exposure students have in terms of their immediate socio-economic world might exert some influence on vocational preference. Students of the more established urban SSS preferred jobs in private firms to jobs in government. About 80% of students in the more rural SSS looked to the government for employment. The students in their sample studied either technical vocational subjects or general arts/science subjects.
- School-level factors such as the particular elective subjects emphasised in a school appear to contribute to interest in certain careers, although one cannot be sure whether this interest was not shaped prior to entering SSS because of factors such as family socio-economic status. Also, King and Martin's study seems to suggest that generally students picked, as their most valuable subject, subjects that were at the heart of their specialization. For example, students whose elective subjects included Visual Arts, Home Economics, or technical subjects expressed stronger preference for self-employment.
- Realism about labour market opportunities tended to lower aspirations toward self-employment.

A number of interesting implications may be drawn from King and Martin's (2002) study. First, although diversification exposes students to a variety of vocational and technical subjects, it can only be considered as probably one of the important factors that influences attitudes toward self-employment. The nature of the economic environment and what students perceive to be their realistic chances in the labour market also plays a crucial role. This means that if possible, greater interaction between school and the labour market in terms of the curriculum providing space for practical work experience could be fostered to expose students to the needs of the employment sector or the opportunities for self-employment. But the structure and content of the SSS curriculum, particularly the many different subjects students have to study in a particular programme, will make it difficult for such direct linkage with the labour market to be practically managed. This difficulty highlights an important limitation of vocational education in a diversified secondary school curriculum

context; simply, it is not well suited for the kind of learning that closely links schools to labour market needs and experiences. Second, since SSS students are more mature they are more likely than JSS students to understand the realities and opportunities within the labour market. Thus, the introduction of highly specialised technical and vocational subjects at the JSS level can do little to influence attitudes and orientation toward certain labour market jobs. If anything, Ampiah's study suggests that JSS students are more interested in the liberal arts and science.

Characteristics of Vocational and General Education Students

From the survey questionnaire of vocational and technical teachers in the four senior secondary schools studied for this report, some teachers expressed dissatisfaction with the quality of students opting for vocational and technical subjects. According to them, vocational and technical subjects had more or less become a 'soft option'. In the same questionnaire we explored the kind of students, in terms of 'academic ability', that are selected into the various programs offered in the schools. Schools provided information about the minimum qualifying Basic Education Certificate Examination (BECE)⁵ aggregate that it had used for selecting entering JSS students into the various programmes. From the data a pattern of qualifying grades for the various programs was observed. Generally, the vocational and technical programmes accepted lower BECE aggregates (ranging from aggregate 18 to 25), whilst the Science and General Arts programmes accepted higher or better grades (ranging from 6 to 15). But there seems to be some correlation between the type of school and the minimum qualifying BECE aggregate it accepted for a particular program. For example, Mfantshipim, a top academic school in Ghana, set similar qualifying aggregates for its technical and science programmes (aggregate 6–15 for technical and slightly higher, 6–8, for science). Two of the other schools (Oguaa Secondary Technical and Mankessim Secondary Technical) that were established as community-based secondary technical schools after 1987 education reforms set lower minimum qualifying BECE grades for its programmes. Both schools accepted candidates with up to aggregate 18 for their technical programme. The agriculture programme accepted the lowest minimum qualifying BECE aggregate of 25. Although the sample size is too small to draw any firm conclusions, nevertheless such striking differences in the minimum entry

⁵ BECE is the Basic Education Certificate Examinations conducted by the West African Examinations Council (WAEC) for JSS3 students. The best 6 grades are used to provide a student's aggregate score for selection into SSS. The grades range from 1—'excellent'—to 9—'fail.' The highest aggregate score a student can achieve is 6.

Table 5.8 Performance of different programme students in SSSCE core maths and core science

School	Program	Mean grade score	
		Core maths	Core science
Mfantshipim	Technical	4.10	3.40
	Science	5.27	4.86
	General arts	3.48	2.86
	Visual arts	2.04	1.92
St. Augustine	Business	4.35	2.73
	General arts	3.34	2.56
Mankessim	Technical	3.57	4.77
	Agriculture	1.98	1.55
Oguaa	Agriculture	0.50	0.32

aggregate may suggest that school type, location, academic ability, and possibly social composition of students all play an important part in the selection into vocational and technical programmes.

Four schools also provided detailed information about the performance of their SSS students in the 2000/2001 senior secondary school certificate examination (SSSCE) conducted by WAEC. We used the performance in core maths and core science to judge the relative standing of these students in terms of their academic ability. The schools were asked to provide information on the number of students gaining a particular grade in core maths and core science by programme. In the SSSCE the grading scale used is from grade 'A'—the highest grade and equivalent to a numerical score of 6—to 'F'—the lowest grade equivalent to a numerical score of 1. Usually grading of SSSCE follows a numeric scale of 1 to 6, where 1 is the best mark. But for the purposes of this analysis, this numeric scale was reversed. Mean grade score was calculated as the sum of the product of the number of students achieving a particular grade multiplied by the numerical value of the grade, and divided by the total number of students. Thus, a high mean grade indicates a good examination result in core maths or core science for students in a particular programme. Using this simple procedure the analysis sought to compare how well students of the various programmes⁶ performed in core science and core maths (two of the compulsory subjects for all SSS students).

Table 5.8 shows the results of the analysis for four senior secondary schools.

⁶ For TVE programmes each consists of a core set of subjects plus two or three additional subjects from the general arts and science subject areas. See next section for a fuller discussion.

In Mfantsipim School, elective science students performed better in core science than their counterparts in the technical programme, which is not too surprising. Similarly, elective science students performed better in core maths than those in the technical programme. In Mankessim SSS technical students had far superior grades in core maths and core science than their Agriculture counterparts. This appears to correlate well with the minimum entry grades accepted in the two programs in Mankessim. Minimum entry grades were better for the technical program (BECE minimum aggregate 18) than for agriculture (BECE minimum aggregate 25). The results suggest that a relationship might exist between BECE entry grade and performance at the SSSCE. The performance of Oguaa Agriculture students was very poor. Their scores in core maths and science were particularly weak: 0.5 and 0.32, respectively.

General Arts students appear to be better than Visual Arts as seen in their mean grade scores in both core maths and core science. However, business students performed better than General Arts students in St. Augustine's college. St. Augustine is known to offer a good business programme whilst Mfantsipim is popular for its Technical programme.

It is difficult to draw firm conclusions about the academic calibre of TVE and general education students because only four schools were studied. Nevertheless, the results paint a pattern of performance that suggests a link between academic calibre and the type of program into which a student is accepted. It would appear that the better the entry qualification grades for a programme, the better the final learning outcome. In Mfantsipim, where entry qualification grades were higher and similar for both technical and science electives, achievements on SSSCE were similar. Both Mfantsipim and St. Augustine results offer a hint that the type of school could also be an important factor in the performance of students opting for vocationalised options. The mean grade scores in Agriculture appear to confirm the commonly held view in Ghana that many SSS Agriculture students have weak math and science backgrounds. But again, this might possibly be linked to the type of SSS the subject is offered in and the kind of students it attracts.

The analysis leads us to the following conjectures:

- (a) The type of school in terms of infrastructure, teacher quality, and the social composition of students (and family background) may play an important part in the calibre of students entering vocationalised programmes and their exit performance.
- (b) The academic calibre of students entering vocationalised programmes varies according to programme type. There is some indication, although this is based on very limited evidence that less academically able students opt for the agriculture option than for, say, the technical option.

Students in purely academic programs (i.e., general arts and science) tend to have better core math and science grades. But as the analysis of the St. Augustine data suggests, depending on the calibre of students a school is able to attract, it is possible that in some vocational programmes, such as business, students may be academically better than general arts students.

- (c) Vocational options are not necessarily ‘soft options’ and maybe some high achievers opt for vocational/technical programmes depending on what their further education plans are—whether they are aiming for higher education—as well as their career expectations. Achimota School—in the same league with Mfantsipim as a top academic school—offers agriculture as one of its elective programmes. According to King and Martin (2002), when Achimota Agriculture students were asked about their preferred agricultural careers, they mentioned careers such as agricultural economist, agricultural scientist, agricultural engineer, landscape architect, and soil scientist. These are all highly competitive subjects offered at the university, which suggests that these students already think of themselves as capable of entering university to pursue these careers. It would have been interesting to compare the career preference of Agriculture students in less prestigious schools, especially the more community-based post-1987 SSS, with that of well-endowed urban SSS. Given the timeframe for this case study report, it was not possible to explore this.

Rates of Return to Education: JSS and SSS

Analysis of the rate of return to education by level of education in Ghana by Canagarajah et al., 1997, suggests that the SSS level produces a higher rate of private and social return than the JSS (see Table 5.9).

Commenting on these figures, the Human Development Africa Region World Bank report states that ‘The relatively low rates of return to JSS (private

Table 5.9 Returns to education JSS and SSS, (Full Method)
Ghana, 92(%)

Rate of Return	JSS (vs. primary)	SSS (vs. JSS)	Higher (vs. SSS)
Private rate of return	13.5	19.5	9.1
Social rate of return	10.6	14.0	7.2

Source: Canagarajah et al., 1997.

at 13.5% and social at 10.6%) may reflect that JSS not only does not prepare the large number of students who finish JSS to qualify for SSS, but also inadequately prepares them for labour market participation as well. In contrast, the high rates of return to SSS (at 19.5% and 14% respectively) indicate that SSS seems to be functioning as terminal education for entry into the labour market' (Human Development (3) Africa Region, World Bank, 1997:24–35). It is important to restate the point that the 1987 education reformers saw that both JSS and SSS are preparing students for the labour market and for further education.

Creating the conditions for more JSS students to proceed to SSS may be a better strategy if the intention is to improve the quality and quantity of students entering the labour market after SSS. But the reality in Ghana is that not many JSS students are able to further their education to SSS level. Some estimates put the figure at about 47% entering the world of work and the remainder entering technical, vocational, agriculture institutes, or apprenticeship training (MOE, 1999a, 1999b). The challenge that faces the basic education sector is how it can improve the transition rate of JSS graduates to SSS from the estimated rate of about 35% (World Bank, 1996) to something within the region of 50% or better. Unfortunately no empirical studies were found that provide the proportion of students who are able to continue to further education by type of programme pursued at SSS. Neither was there data on those SSS graduates who are able to secure a place in a field of study for which their vocational/technical programme was relevant. The questionnaire used for this study asked TVE teachers to provide an estimate in percentage of where they think most of their students end up—the university, polytechnic, private/public employment, or unemployed. The responses suggest that most TVE teachers *hope* or *believe* their students will pursue further education at university or polytechnic or, failing to do so, enter private/public employment. Of course the reality may be very different.

In the absence of empirical studies, it is difficult to draw firm conclusions about how well both JSS and SSS prepare terminal TVE graduates for the labour market or whether they have an advantage in accessing related higher education programmes. This is an area where clearly some studies are urgently needed to clarify the veracity of the economic goals of TVE since it is often the key argument used by governments pursuing vocationalisation policies to support their request for external assistance and funding.

5 General Objectives of Vocational and Technical Subjects at SSS

In general SSS teachers are supposed to use both the examination syllabuses issued by the WAEC and a teaching syllabus issued by the MOE in teaching.

However, from the survey of the four schools, it was found that most teachers did not have access to the teaching syllabuses that were issued by the MOE in 1990. This was equally true for the vocational and technical syllabi and the academic ones. Consequently, the teachers relied mostly on the examination syllabus and the pattern of questions set by the WAEC to determine what content to teach. This is a typical case of examinations determining what teachers teach and students learn.

The review of the general objectives of the various curricula in this section is based on the teaching syllabi issued by MOE. The general objectives of technical subjects are not included in the discussion. The SSS technical and vocational syllabi were introduced in draft form in 1990 and have since that time never been revised and finalised. Students who opt for vocational or technical programmes are expected to study subjects listed under their programmes as electives, and in addition select one or two subjects in the general arts or science area such as Economics, Physics, elective Mathematics, French, and English Literature depending on the program they are pursuing. For example, students pursuing Home Economics are required to take Economics and/or French as elective subjects. In Holy Child, for example, students taking Business (Accounting option) are required to take Economics and Literature in English as elective subjects. Academic electives taken by vocational/technical students are prescribed by either the curriculum or the school. In fact, in some cases schools do not follow the structure in terms of the electives students are to select. *All SSS students, irrespective of the programme they pursue, take core Mathematics, Integrated Science, Social Studies, and English.*

Appendix 4 shows the official list of technical and vocational subjects that SSS students are required to study.

The number of elective subjects within the vocational/technical programme differs from one course to the other. Business (Accounting option) students are expected to select three elective vocational subjects among Business Management; Accounting; Business Mathematics; and Principles of Costing. Similar elective subjects are available for students pursuing Visual Arts, Business (Secretarial option), and Technical subjects. Home Economics students, however, can study only two elective subjects within the vocational program and add one general arts subject (Economics or French) or an additional vocational subject (e.g., textiles) (see Appendix 4).

The subject options for the various programmes were accepted by the MOE upon recommendation by the 1994 ERRC. What is practiced in the various SSS, however, tends to be quite different from what the official policy stipulates. This is mainly due to limiting conditions in the schools, such as lack of teachers, equipment, and infrastructural facilities. For example, some schools in the Central Region have made elective Mathematics compulsory for Business

students (accounting option) and by this action deny students the opportunity to study Business Mathematics and Principles of Costing. Reasons some schools give for this policy is that certain university courses give preference to students taking elective Mathematics or that there are no teachers to teach the subject. Such changes in the elective subjects offered at schools illustrate the difficulty in ensuring equity for all students under a diversified secondary curriculum. Effective implementation of the diversified school curriculum depends on the capacity of the education system to provide sufficiently qualified vocational and technical teachers and the necessary instructional materials and equipment. Sharp differentials in these inputs, especially between schools in urban and rural areas, also mean that the quality of exposure to practical subjects will be different.

We now discuss the general objectives of vocational and technical programs at the SSS level. Overall, the objectives of the various programmes stress the acquisition of knowledge, comprehension of processes and procedures, and development of practical skills.

Home Economics

Home Economics comprise the following subjects: Management in Living, Foods and Nutrition, and Clothing and Textiles. Management in Living is compulsory for all Home Economics students, and in addition they are to select Foods and Nutrition *or* Clothing and Textiles. Students are then expected to select from four elective subjects—two vocational and two in the general arts area. But, some schools visited in the Central Region restrict their students to General Knowledge in Art and Economics because they have no teachers for Textiles and French.

The general objectives for the Home Economics course as stated in the syllabus are as follows:

1. Equip the individual to develop skills that will enable him/her improve the quality of life.
2. Understand the factors in the family, community, and society that help in meeting basic needs.
3. Recognise the importance of good consumer skills in all areas of life.
4. Apply management skills in all aspects of living.
5. Appreciate the need for healthy living through improved sanitation and environment.
6. Develop skills that will equip students for independent living.
7. Acquire knowledge and develop marketable skills that can be used in later life.

These general objectives reflect the need for cognitive and practical learning experiences. The development or acquisition of practical skills receives particular emphasis in the syllabus (see objectives 4, 6, and 7).

Visual Arts

The Visual Arts programme comprises the following nine subjects: General Knowledge in Art (GKA), Basketry, Ceramics, Graphics Design, Leatherwork, Picture Making, Sculpture, Jewellery, and Textiles. Even though the syllabus stipulates that each of these subjects is a separate elective subject, what pertains in some schools is sometimes different. Officially, all visual arts students are expected to study GKA and then select either Graphic Design or Picture Making in addition. They must also select one subject from the following: Ceramics, Leatherwork, Sculpture, Basketry, Textiles, or Jewelry. However, in some of the schools visited, Economics had been placed on the list of elective subjects for visual arts students. In others, students are obliged to select both Ceramics and Economics as their additional elective subjects. What this means is that some students really have little or no choice in the subjects they wish to pursue as additional elective subjects because of the school's own policy on elective subjects.

General Objectives

1. The primary purpose of the Visual Arts programme is to foster and promote creativity by helping students to think, act, and feel creatively through a variety of art activities using tools and materials.
2. The course demonstrates art activity as an integral part of living.
3. The individual is provided with a variety of vocational and career opportunities so that he/she can develop intense involvement in, and response to, personal visual experiences. He/she will develop interest in vocational activities.
4. To inculcate in the student the need to appreciate the value of his/her own arts so as to arouse pride, confidence, and patriotism in him/her.
5. The course encourages skills in the development of local materials and resources in promoting small-scale and cottage industries.
6. The student will acquire knowledge and understanding of the meaning, significance, and role of art in socio-economic development.
7. The course promotes skills in development of indigenous art technologies, aesthetics, beliefs, values, and attitudes.
8. The student will acquire perceptual and analytic skills through art experience as well as self-expression and communication skills through response to art.

9. Theoretical knowledge, practical skills, and visual thinking in art provide the student with cognitive, psychomotor, and affective modes of development.
10. The course will generate in the student a lasting interest in the arts.
11. The student will acquire competencies in art and apply his/her skills to national development.
12. The student will acquire visual literacy and develop confidence in and understanding of visual relationships in the changing environment.
13. Art activity will develop in the student subjective qualities in harmonising opposing ideas, contradictions, and inconsistencies so as to enjoy healthy relationships.

These objectives focus on developing skills in five areas:

- Skill in the use of local materials and resources in promoting small-scale and cottage industries;
- Developing indigenous art technologies, and strengthening aesthetics, beliefs, values, and attitudes associated with them;
- Developing perceptual and analytic skills;
- Promoting communication skills; and
- Developing basic practical skills.

Theoretical knowledge and understanding are also emphasised. Finally, the visual arts course seeks to provide skills for marketing artifacts and other art products. This can be viewed as an attempt to address issues about self-employment. But from the list of objectives it is not very clear whether the end purpose of visual arts study is for work or higher education.

Introduction to Business Management

The general objectives of Introduction to Business Management in SSS are to:

1. Provide students with an understanding of the Ghanaian economic system and how businesses operate to satisfy the needs and wants of citizens.
2. Foster an understanding and an appreciation of the main functional areas of business management.
3. Equip students with problem-solving skills for dealing with business problems in self-employment as well as paid employment.
4. Stimulate students' interest in business as a career possibility.
5. Lay the foundation for further studies in business management at higher levels.

6. Provide orientation to modern business principles in order to make students efficient workers and intelligent consumers.
7. Inculcate in students business-like attitudes, work habits, and an appreciation of efficiency in the use of resources.

The Business Management programme tries to address the needs of terminal SSS students and those who proceed further to the tertiary education level. Objectives 3, 4, 6, and 7 relate directly to the development of skills, attitudes, and values for self-employment or paid employment, while the first objective highlights the importance and role of business in the local economic sector. These constitute a desire to sensitise SSS students to how businesses operate in ordinary life situations. The objectives also emphasise theoretical knowledge that is useful for students intending to study business-related courses at the tertiary level (polytechnic or university).

Accounting

The objectives of the course are to:

1. Enable students to appreciate the functions and rules of accounting.
2. Equip students with skills for using accounting as a tool for planning, budgeting, and decision making.
3. Prepare students for initial entry into jobs in accounting as accounts clerks.
4. Lay a sound foundation for further study of accounting at higher levels.
5. Equip students with skills for analysing and interpreting financial statements for purposes of making management decisions.
6. Inculcate in students moral and ethical values essential to accountability in financial matters.
7. Inculcate in students positive attitudes toward tax obligations of individuals to the state.
8. Familiarise students with the existence of mechanical and computerised system of financial data processing.
9. Inculcate an appreciation for neatness, orderliness, thoroughness, and accuracy in financial record keeping.

From the statement of objectives it is clear that the accounting course is especially oriented toward practical work situations that require knowledge and skills in accounting (see objectives 3 and 8 in particular). The course also intends to develop values and attitudes necessary for accounting practices (objectives 6, 7, and 9).

Business Mathematics and Principles of Costing

The objectives of the course are to enable the SSS student to achieve the following:

1. Gather, analyse, and ascertain the cost of goods and services with emphasis on practical situations encountered in practical Ghanaian life.
2. Develop skills for using cost accounting as a tool for planning budgeting and decision making in business.
3. Develop awareness in economic use of scarce resources through costing techniques.
4. Appreciate the ethical issues involved in the preparation, presentation, and use of cost information for management decision making.
5. Acquire basic costing principles that will form a firm foundation for further studies in management accounting.
6. Acquire skills relevant to the running of a business enterprise and personal life.

At least three of the objectives are an attempt to lay the foundation for employment in the business sector (objectives 1, 2, and 6). As pointed out earlier, some schools prefer to offer elective Mathematics instead of Business Mathematics and Principles of Costing. But elective Mathematics is a pure Mathematics course that has none of the objectives outlined above and yet, some schools prefer it to Business Mathematics and Principles of Costing. According to one business management teacher, elective mathematics provides a firmer foundation for students intending to further their education in accounting, hence the preference.

University entry requirements are undoubtedly shaping the elective subjects that schools are willing to offer. For example, it is widely known that accounting option students will not be admitted into certain bachelor's degree programmes at the university unless they take elective mathematics. Similarly, technical programmes in the schools we visited have recently included chemistry as one of the elective subjects because chemistry has suddenly become a prerequisite subject for technical students intending to study mechanical engineering at the university. Also some schools have substituted Clerical Office Duties with Economics for Business (secretarial option) students due to university admission requirements. Such developments highlight the challenges of introducing technical and vocational subjects into mainstream secondary education. Because traditionally, secondary school education has been geared toward university education, secondary schools still look to the requirements of entry into university programmes to determine what subjects to offer their students. This puts terminal SSS graduates who constitute the majority at a

disadvantage, as they may have to study subjects that do not serve their self- or paid employment needs. Clearly, the difficult challenge is how secondary education planners can create a curriculum that fully satisfies the requirements of further education as well as those preparing for self- and paid employment after SSS.

In reality therefore, external and internal pressures determine how vocationalisation of the curriculum is enacted in secondary schools. It is simply not a question of student interest and talent. The case study identified *JSS entry grades, availability of teachers, availability of learning materials, and university subject entry requirements* as key factors influencing vocational and technical subjects offered and which combinations of electives are permitted in some senior secondary schools. For instance, some schools are unable to offer certain visual arts subjects because they cannot find qualified teachers to teach, or certain materials and equipment for teaching are not available. In some schools, students are offered vocational and technical subjects when they fail to meet entry requirements for general arts and science subjects. For example, in Mfantshipim the aggregate mark required to pursue the science programme is always higher than that required to pursue the technical programme. Also in Holy Child (a single-sex female SSS), the aggregate required for students to pursue Science and general arts programmes is higher than for vocational and business programmes. In Mfantshipim students who want to pursue the science program must obtain in most cases aggregate 10 to 12 (i.e., 10 to 12 grade ones in the BECE examination). Students who select science but have 7 to 9 grade ones are offered the technical programme instead.

During the visit to Swedru School of Business it was noticed that the school did not have enough typewriters for its typewriting course. Despite the emergence of computers as a tool for secretarial work in the Ghanaian labour market, the secretarial course does not include information processing using the computer. Further investigations in some Central Region schools revealed that either secretarial subject teachers lacked basic training in computer use or schools could not afford to purchase computers for learning. Also, no official syllabus is developed yet for teaching information technology in secondary schools. Although some SSS have acquired computers and built computer laboratories (in the more affluent SSS communities located mostly in urban centres), they are rarely used in direct reference to the content of vocational and technical subjects.

Assessment Issues

The content and format of examinations often exert pressure on classroom pedagogy and student learning behaviour. Because many teachers do not have

access to the vocational and technical education syllabi, some teachers are compelled to rely solely on the WAEC syllabus or the pattern of examination questions for clues on what to emphasise in teaching. The WAEC examination syllabus is itself a trial one and some of the topics it examines were not found in the examination or teaching syllabus. For example, '*realization and revaluation of assets*' is a topic on which questions have been based, but no mention of it is made in any of the business syllabi studied. The main focus of teaching vocational/technical subjects appears to be geared more toward meeting WAEC requirements for students to pass their examinations to do higher courses at the universities or polytechnics.

A critical look at the 2001 vocational and technical subject papers shows the demands of examination questions vary in terms of the number and types of papers (objectives, essay, practical, project work) to be written. Also, the time allotted for each examination paper in some instances varies quite appreciably (see Appendix 2).

The number of papers taken by students in each programme ranges from three to eight. Students offered Business (accounting option) take four to six theory papers (depending on the options selected) making a total of 10 to 15½ hours. Business (secretarial option) students take two or three theory papers totalling between 4½ and 8½ hours. Secretarial students have to take a practical paper that lasts 2 hours 40 minutes. Besides, some of these students also take examinations in general arts subjects (e.g., economics) to satisfy the required number of elective subjects in the programme. Generally, the Business questions cover knowledge/understanding and problem solving (see Appendix 2). The examinations therefore try to identify with most of the program objectives.

For Home Economics, all students irrespective of their elective subjects are examined in three theory papers lasting 7 hours and one practical paper lasting 2½ hours. Management in Living, a compulsory paper, has questions in the knowledge/comprehension domain only with nothing on problem solving.

Visual Arts students have the most work to do in terms of the number of theory and practical papers and the time spent on examinations. In all, Visual Arts students are required to take eight papers comprising five theory papers and one practical paper and undertake two projects (see Box 5.1 for two examples of examination questions asked in the practical paper and project). Total times for theory and practical papers are 10½ hours and 3 hours, respectively. In addition, students spend two months on each project. Compared with other vocational programmes (e.g., business-secretarial option) or other general arts course, the visual arts course is very extensive and demanding. The question this raises is whether in the vocationalisation of the secondary curriculum some programmes are not overloaded due to an ambitious plan to ensure a wide

coverage of vocational areas. It would appear that students studying vocational and technical subjects have much more work to do than students studying general arts and science courses, where the elective subjects are fewer.

Box 5.1 Two Examples of Project Work Task in Visual Arts Programme

Design a curtain suitable for the lounge of the Centre for National Culture. Use not less than two motifs and not more than three colours. (WAEC, SSSCE 2001 General Knowledge in Art 2)

Design and model a decorative lamp stand. The height of the piece should be at least 30 cm. The finished work should be either bisque-fired or glazed. (WAEC SSSCE 2001 Ceramics 3, Project Work)

The technical program has six options. Technical Drawing is compulsory for all technical program students. Students who select Metalwork in addition to Technical Drawing take one theory and one practical examination lasting a total of $5\frac{1}{2}$ hours. Those who select the Applied Electricity or Electronics option, in addition to Technical Drawing, also take one theory and one practical examination, totalling 5 hours. Electronics option students undertake a project that is examined by a visiting examiner. Auto Mechanics students are examined in one theory and one practical paper requiring a total of $4\frac{1}{2}$ hours to complete. Building construction has two theory papers lasting a total of $4\frac{3}{3}$ hours.

Woodwork students appear to do the most work of all technical programme students. The Woodwork examinations require two theory papers and one practical paper lasting a total of 6 hours. Woodwork students also have to undertake a project work that is examined on a particular day by a visiting examiner. Thus, students who study Woodwork and Electronics are the most tasked in terms of study and examination time. Other technical options require less. Also, apart from Applied Electricity and Electronics, which include some problem-solving questions, the rest of the technical options have very few problem-solving questions. Rather surprisingly, building construction has no practical or project component.

Figure 5.1 illustrates the ratio of practical work to theory in terms of time on task for different options selected from the vocational/technical subjects. Different options within the same programme (Visual Arts—option A1 or Home Economics—option A2) have about the same proportion of time for practical examination. Accounting has no practical component (options B1 and B2) while the secretarial course includes practical examinations. In the technical program, however, option D2 has two hours for practical work compared to options D2, D3, D5, and D6, which have three hours of practical work each. Building Construction, as mentioned earlier, requires no practical examination

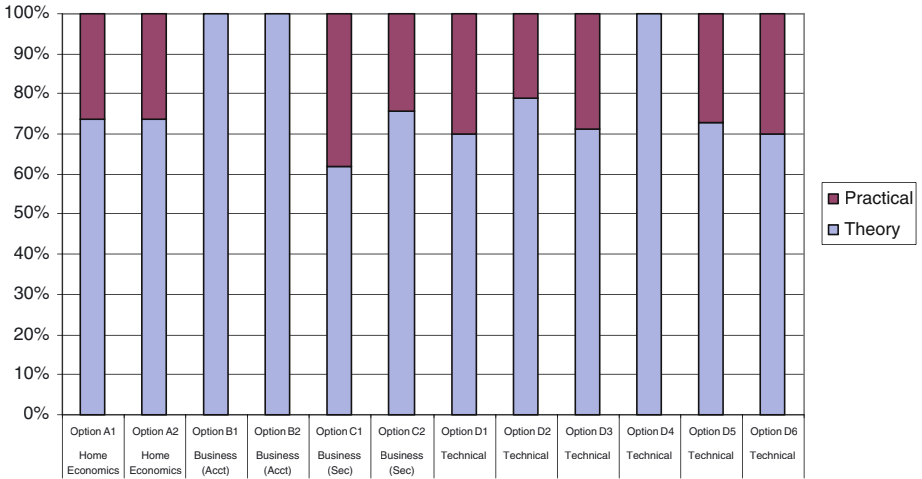


Figure 5.1 Proportions of practical work and theory in vocational/technical subjects

(option D4), while Woodwork requires both practical and project work in addition to theory examination papers.

While many of the objectives of the vocational/technical program emphasize the development and acquisition of practical skills, the final assessment devotes more time to theory than practical work assessment. The exceptions are Visual Arts, Woodwork, and Electronics where students are required to complete a project work within two months. Also, Visual Arts and Woodwork require more practical work assessment than do other vocational and technical subjects.

The methods of assessing learning outcomes in vocationalised courses are similar to those used in the general arts and science courses. The examinations, which mostly employ written formats, assess mainly *knowledge* and *understanding* of subject matter. It would have been better if vocational certification examinations provided clearer indications of the level of skills achieved by the student, as this would serve better some employment requirements. Practical-based assessments such as performance and portfolio assessment techniques that document individual achievement in the development of practical skills over an extended period of time are more appropriate for technical and vocational subjects. For instance, using learning experience assessments to promote the development of practical and professional skills would serve the objectives of technical and vocational subjects better. The indications are that the requirements of further education exert stronger influence on the testing methods used for technical and vocational subjects at SSS.

Performance-based assessments for TVE subjects will be very expensive to manage because of the sheer number of students involved. But with a considerably reduced number of well-resourced SSS this should be possible as the more depth required in assessment tasks can be reliably and validly assessed at reasonable costs. The added advantage of this is that employers with technical/vocational-related jobs will have clearer indications of the quality of SSS applicants, as their certification requirements will provide more in-depth information about skill and knowledge levels attained.

Also, SSS students, many of whom will be entering the labour market after graduation, will be served better if their certification examinations are linked more closely to the characteristics projected to be necessary for performance in real job contexts. But, because vocationalisation of the secondary school curriculum serves a dual purpose—to prepare students for further education as well as equip terminal students with employable skills—it becomes extremely difficult for assessment policy to adequately satisfy both purposes. A decoupling of this purpose might make it possible for performance-based and portfolio assessments strategies to exert greater influence on TVE. Without that, assessments in vocational and technical subjects at the SSS will continue to be influenced by traditional assessment practices.

6 Comparing Costs of Vocationalised Subjects and General Education Subjects

Background of Schools

Since there were no national data on costs specific to vocational and technical subjects at the secondary education level from MOE sources, the study had to generate data from primary sources. Consequently, cost data were directly sought from school bursars and heads of four senior secondary schools in the Central Region of Ghana: Mfantsipim, Swedru School of Business, Mankessim Senior Secondary Technical, and Oguaa Senior Secondary Technical. Two of the schools—Mankessim and Oguaa—can be appropriately labeled senior secondary technical (SST) because of the special emphasis they place on vocational or technical subjects. The other two offer general arts and science subjects in addition to vocational and technical subjects.

Mfantsipim is the oldest secondary school in Ghana established in 1876 and has better school facilities and equipment than the rest. It is one of the ‘elite’ secondary schools that offered technical courses prior to the 1987 ERP and attracts some of the best-qualified JSS graduates. Swedru School of Business, as its name suggests, is a business-oriented SSS established as a private institution

in 1949 but that later became a government-assisted secondary school in 1956. Traditionally, it has been training secondary-level students as typists/clerical officers and accounts clerks for industries and government agencies.

Mankessim and Oguaa were both established as community secondary schools following the 1987 ERP. These two schools were established as community-based senior secondary vocational and technical schools. Of the four schools, Oguaa had the least resources in terms of school facilities and equipment for practical work in technical subjects. The school is housed in temporary structures (wooden pavilion) and fits the profile of many rural senior secondary schools in Ghana where enrollment is low and infrastructure and equipment are inadequate, particularly for practical work.

All four SSS were purposively selected to represent certain characteristic features of senior secondary schools in Ghana. Mfantsipim is a typical urban SSS that has very high enrollment, has reasonably good facilities, and attracts a good number of students from affluent backgrounds. Swedru is a diversified SSS located in a semi-urban area and focuses mainly on business studies. Both Mankessim and Oguaa have characteristics typical of some of the recently established senior secondary schools that lack sufficient equipment and qualified staff.

Table 5.10 shows the residential status of the four schools studied to compare costs between vocational/technical subjects and general arts and science subjects. At Swedru School of Business about 66% of business and general arts students are nonresidential. Mfantsipim has fewer nonresidential students with less than 5% of science and technical students as nonresidential. Mankessim and Oguaa SSTs are purely nonresidential schools. The residential or nonresidential status of schools has important implications for cost analysis of recurrent expenditure, because boarding and lodging costs can make a significant difference to the recurrent expenditure of schools and impact on subject costs.

Table 5.10 Residential status of four senior secondary schools (2000/2001)

School	Programme	Enrollment	Residential	Non-residential
Swedru school of business	Business general	405	141	264
	Arts	135	43	92
Mfantsipim school, Cape coast	Technical	288	213	75
	Science	1500	1,490	10
Mankessim secondary technical	Agriculture	147	—	147
	Technical	123	—	123
Oguaa secondary technical	Agriculture	33	—	33
	Technical	16	—	16

Recurrent Costs of Schools (2000/2001)

All schools depend on grants from the government to run their programmes. But the grants are not determined on the basis of recurrent cost estimates of programmes in a school. Grants reflect size of student enrollment and other efficiency properties such as average salary of a teacher and average teaching load in a district. Schools then receive their grants from the district. Therefore, heads of institutions have to use their own discretion in allocating funds to the various departments to cater to their specific needs. Thus, vocational and technical subjects may or may not receive the level of financing required for maintenance, repairs, and consumables for practical work. Also, the possibility of wide disparities in the allocation of funds for the different programs within and between schools is likely to occur. Table 5.11 shows the recurrent expenditures by program of the four schools in 2000/2001.

It is important to point out that fees paid by parents constitute an essential component of the funds schools need to run the various programs. Total recurrent costs, therefore, are made up of what the state provides (tuition, school equipment, nonteacher costs, etc.) and what students pay.

Teachers' Salaries and Allowances

In the two urban schools, total recurrent expenditure on teachers' salaries and allowances is quite high compared to the other schools. But, in terms of proportion of gross total recurrent expenditure per school, Mfantshipim registers the lowest expenditure on teachers' salaries and allowances. This is about 8.7% of total recurrent expenditure of the technical department. Science department total expenditure on salaries and allowances represents only about 7.5% of the total recurrent expenditure of the department.

But on the other hand, total recurrent expenditure on teachers' salaries and allowances in the post-1987 SSS schools took a large chunk of the total recurrent expenditure of the two programmes in the schools. In Mankessim School, for example, total spending on teachers' salaries in the Agriculture department constitutes about 60% of the total spending in that department. Similarly in the technical department, teachers' salaries and allowances account for 55% of total recurrent expenditure. In Oguaa School, total recurrent expenditures on teachers' salaries and allowances in Agriculture and technical departments were 43% and 36% of total recurrent expenditure respectively. Even though there are fewer teachers in both Oguaa and Mankessim, their salaries as a proportion of the department's total recurrent expenditure are quite high. The salaries of Agriculture teachers also tend to be higher than that of technical teachers simply because the majority of the Agriculture teachers possess professional

Table 5.11 Recurrent expenditures of programmes per year in four senior secondary schools based on records of expenditure (2000/2001)

School	Programme expenses	Government-supplied finance expenses on general operation of school					Parent-supplied finance expenses directly covered by fees from students		Total
		Teachers salaries & allowances ¢	Other emoluments ¢	Boarding ¢	School equipt. & supplies ¢	Nonteacher costs ¢	Students school fees (for feeding, etc.) ¢	Subject-specific fees ¢	
Swedru school of business	Business	75,487,500	150,000	39,480,000	—	—	155,017,500	990,000	275,167,500
	General arts	70,942,500	240,000	12,037,500	—	4,042,500	38,340,000	—	121,635,000
Total		146,430,000	390,000	51,517,700	—	4,042,500	193,357,500	990,000	396,802,500
Mfantsipim school	Technical	73,882,500	—	249,337,500	349,995,000	33,600,000	99,877,500	43,050,000	849,742,500
	Science	239,625,000	—	1744185000	649,995,000	25,200,000	520,185,000	21,600,000	3,200,797,500
Total		313,507,500	—	1,993,522,500	999,990,000	58,880,000	620,062,500	64,650,000	4,050,540,000
Mankessim sec/tech.	Agriculture	27,135,000	—	—	1,200,000	600,000	14,700,000	2,205,000	45,840,000
	Technical	19,260,000	—	—	997,500	802,500	12,300,000	1,845,000	35,205,000
Total		46,395,000	—	—	2,197,500	1,402,500	27,000,000	4,050,000	81,045,000
Oguaa sec/tech.	Agriculture	26,257,500	—	—	—	—	3,090,000	277,500	29,625,000
	Technical	22,117,500	222,975	—	—	7,695,000	1,672,500	127,500	31,835,475
Total		48,375,000	222,975	—	—	7,695,000	4,762,500	405,000	61,460,475

teachers' certificates in addition to qualification in the specialised subject. With the exception of one teacher in Mfantshipim, all the technical teachers are non-professional teachers whose only qualification is HND. Their nonprofessional status means their salaries are lower than that of Agriculture teachers.

Other Emoluments and School Equipment and Supplies

Most of the schools could not provide data on teachers' other emoluments. The MOE in September 2001 directed that schools should not charge additional fees except those approved by the Ministry. Hitherto, such additional fees were being charged and used to pay for extra teaching periods. However, Swedru School of Business provided some information on teachers' earnings for working extra hours outside official teaching time. This amount—¢390,000—represented only 0.1% of total recurrent expenditure of the school. Recurrent expenditure on school equipment and supplies (SES) at Mfantshipim was about 25% of total recurrent expenditure and is an indication of the intensity of practical activity.

Nonteacher Costs

This refers to items of expenditure including fuel and maintenance, repairs, services, and nonrecurrent expenditure specific to the programmes. Again, Mfantshipim registered the highest in nonteacher costs. The head of the Technical department pointed out that frequent machine repairs were responsible for the high expenditure. In both Swedru and Oguaa secondary technical, a lump sum is provided from which the two departments then draw.

Student School Fees (Boarding and Lodging)

Naturally, high residential enrollment means the total student fees will be high. Thus a school's enrollment status is an important variable in the total recurrent expenditure. In Ghana, secondary schools have been traditionally boarding institutions. Swedru School of Business has, in fact, converted some of its classrooms into boarding facilities to increase enrollment. According to the head of business department, once some boarding facilities had been provided, more students were willing to enroll. Lack of boarding facilities could be one of the reasons for low enrollment in nonresidential community schools, which in turn make their programmes on unit cost basis very high and inefficient in terms of student-teacher ratios.

Subject-Specific Fees

Schools often charge subject-specific fees for practical subjects. This amount is intended to be used for purchasing raw materials for practical work. In Mfantsipim there is a significant difference in the amount paid by technical and science students. Each technical student pays ₵150,000 compared to ₵14,400 paid by each science student. In the absence of a detailed breakdown of the expenditure on consumables and other raw materials for a specific programme per year, the subject-specific fees could be used as a proxy measure of what a department spends a year for practical activity. If one accepts this assumption, then the higher the subject-specific fees, the greater the level of practical activity. This could mean that the intensity of practical activity in the technical programme at Mfantsipim is about 10 times that in science. This may be because technical subject areas—e.g., metal technology, technical drawing, applied electricity—require more consumables for practical work than for science subjects. At Mankessim, Agriculture and technical students each pay ₵15,000, and in Oguaa STS each student pays about ₵8000. Again, this might indicate lower levels of practical activity compared to Mfantsipim. At Swedru School of Business, general arts students are not charged subject-specific fees, presumably because they do not engage in practical activity that requires consumables and raw materials. Generally because technical and vocational subjects are practical-intensive, they tend to charge higher subject-specific fees than general arts and science programmes.

Comparing Unit Recurrent Costs⁷

Table 5.12 shows total and recurrent cost per student for the four schools studied for this report.

Juxtaposing the recurrent expenditure per student for the four schools, a pattern of recurrent expenditure is observed. Comparing the enrollment ratio of Mfantsipim and Oguaa to their recurrent ratio reveals that Mfantsipim School enrolls 18 times as many technical students as Oguaa Secondary Technical. But it also spends 26 times as much as Oguaa. This could mean that Mfantsipim makes more intensive use of facilities and spends more on consumables. There are other disparities in expenditure. For example, Mankessim Technical School enrolls 7.7 times as many technical students as Oguaa but spends only 1.1 times as much on recurrent expenditure. Mfantsipim enrolls 2.3 times as many

⁷ Recurrent costs are derived from expenses directly covered by fees from students, expenses on the general operation of the school (e.g., teachers' salaries & allowances, non-teacher costs), and subject-specific fees. See Table 5.11 for how the estimates are arrived at.

Table 5.12 Annual total recurrent expenditure and recurrent costs per student by school and programme

School	Programme	Total no. of students	Total recurrent expenditure ¢	Recurrent expenditure per student ¢
Swedru school of business	Business	405	275,167,500	679,425
	General arts	135	121,635,000	901,000
Mfantsipim school	Technical	288	849,742,500	2,950,494
	Science	1,500	3,200,797,500	2,133,865
Mankessim sec/tech.	Agriculture	147	45,840,000	311,836
	Technical	123	35,205,000	286,219
Oguaa sec/tech.	Agriculture	33	29,625,000	897,727
	Technical	16	31,835,475	1,989,717

Note: All expenditures are in gross total and are based on records of expenditure.

technical students as Mankessim but spends 24.1 times as much on recurrent expenditure. The recurrent expenditures for the Technical programme at Oguaa Secondary Technical and Mfantsipim School are both high, but apparently for different reasons. Nevertheless, the ratios are suggestive of certain levels of inefficiencies.

Recurrent cost per student in the technical programme in Mfantsipim School and Oguaa Secondary Technical is relatively high. In Mfantsipim School, the recurrent cost per student in the technical program is nearly ₵3 million. The recurrent cost per student at Oguaa secondary technical is a typical example of the inefficiencies associated with programmes with very low enrollment, which spent nearly ₵2 million per student. However, one needs to be cautious in drawing conclusions from these figures in relation to cost-effectiveness. It is reasonable to assume that for practical subjects to be productive in terms of practical skills acquired it is better if enrollment was not excessive so that reasonable student-teacher ratios can be maintained for quality practical skill development. Tackling this issue will require that a formula for allocating funds to schools takes into consideration *productive* average teaching load and average stream size to enhance efficiency.

Another observation is that Agriculture and business subjects require relatively less recurrent expenditure than do technical subjects. Business elective subjects, apart from typewriting, have no practical elements (see Appendix 4 for Business programme periods per week); thus they require relatively low recurrent expenditure per student that may even be less than general arts courses (see Table 5.12).

Relative Recurrent Costs per Subject Within and Between Schools

Relative recurrent cost estimates were calculated to ascertain the mean teaching cost, teaching cost per student, and teaching cost per student period. In the calculations made for this section use was made of data described in Appendix 4, which provides figures for periods per week and total teacher periods. The methodology used for the calculations is described in Appendix 3. In order to estimate the mean teaching cost per teacher, the total teaching cost per programme was first estimated. The total teaching cost is the sum total of expenditure on teachers' salaries and allowances, other emoluments, and expenditure specific to the various subjects in a programme.

Table 5.13 shows relative cost per subject between vocational/technical subjects and general arts and science subjects. In Mfantsipim School, the mean cost per teacher period in the technical programme is much higher than in the science programme, except for integrated science. Consequently, technical subjects had high teaching cost per student and high teaching cost per student period. Oguaa Secondary Technical incurred high teaching cost per student and per student period in its technical program. The reason for this high cost is not farfetched. Low enrollment of students per subject—8 students as against 41 woodwork technology students in Mfantsipim, for example—explains the relatively higher costs. Teaching cost per student is generally higher in Oguaa Secondary Technical than in Mfantsipim because of the lower enrollment per subject in Oguaa.

In Mankessim Secondary Technical, the relatively higher enrollment per subject translates to lower teaching cost per student and teaching cost per student period. The student enrollment per subject in Mankessim is 117. This enrollment is much higher than that in Mfantsipim School and Oguaa Secondary Technical. Enrollment in Science at Mfantsipim is very high and as a result the teaching cost per student and per student period is low compared to all the other programmes. Teaching cost per student and teaching cost per student period in Economics was high in Swedru School of Business, because Economics had 3 teachers teaching 144 students (student–teacher ratio of 48:1). In subjects like Geography and History the student-teacher ratio was 144:1 resulting in low teaching cost per student and per student period.

It is quite evident from the above that the levels of student enrollment and number of teachers employed are important factors in determining the levels of recurrent costs. It would also appear that technical subjects in SSS, perhaps because of relatively higher subject-specific fees that are charged (e.g. ₵150,000 as against ₵14,400 in science at Mfantsipim), may at times increase considerably the teaching cost per student and per student period, all other things

Table 5.13 Relative recurrent costs per subject

School	Department	No. of teachers	Average teacher cost ¢	Subject	Mean cost per teacher period ¢	Teaching cost per student ¢	Teaching cost per Std. period ¢
Mfantshipim School	Technical	7	16,704,927	Woodwork	795,472	407,439	58,205
				Building tech.	795,472	162,183	4,723
				Tech drawing	795,472	23,201	16,572
				App. electric.	795,472	222,732	31,818
	Science	21	12,439,153	Metalwork	795,472	340,916	48,702
				Physics	345,532	66,342	691
				Biology	259,149	49,756	518
				Chemistry	302,340	58,049	604
Swedru school of business	Business	12	6,385,625	Integrated sc.	1,209,362	174,148	1,814
				Bus. mgt	331,500	51,300	7,350
				B.maths&cost	248,625	37,050	5,287
				Typewriting	41,400	22,200	3,150
				Accounting	248,625	43,350	6,210
	General arts	9	8,387,426	French	882,886	23,100	3,187
				Geography	441,443	58,245	9,318
				Economics	1,324,330	174,738	27,958
				History	441,443	58,245	9,319
				Fante	882,886	116,491	18,638
				French	882,886	116,491	18,638

continued

Table 5.13 Continued.

School	Department	No. of teachers	Average teacher cost ¢	Subject	Mean cost per teacher period ¢	Teaching cost per student ¢	Teaching cost per Std. period ¢
Mankessim sec- ondary technical	Agriculture	3	7,335,438	Gen. agric	386,075	55,571	8,816
				Animal husb.	386,075	55,571	9,344
				Crop/horticult	386,075	61,128	9,780
				Chemistry	366,771	55,571	8,412
	Technical	5	4,220,606	Metalwork	234,478	36,073	1,898
				Tech. drawing	234,478	36,073	1,898
				Building tech.	234,478	36,073	1,898
				Elective maths	234,478	36,073	1,898
Oguaa sec- ondary technical	Agriculture	3	8,847,594	General agric	294,919	252,787	8,426
				Crop/horticult.	294,919	252,787	8,426
				Animal husb.	—	—	—
	Technical	3		Tech. drawing	365,636	468,084	22,289
				Building tech.	356,636	468,084	22,289
				Woodwork	534,954	936,169	66,869

being equal. Because teachers' rank and professional status, whether trained or untrained, is linked to their salary structure as more and more SSS technical and vocational teachers are able to acquire professional teachers' qualification, the total teaching cost for these subjects could go up considerably. In that case, the estimated teaching costs reported here might even be much higher.

The secondary sub-sector in Ghana is very inefficient in terms of student-teacher ratios (MOE, 2000). A combination of low enrollment and subject specialisation especially where specialist teachers teach fewer students than the stipulated official ratios require creates serious inefficiencies in the secondary school system. In a recent MOE 'policies and strategic plan' for 2001-2003, the Ministry stated its aim to achieve an average ratio of 20 students per teacher per programme at the SSS, but the Ministry did not explain how this was to be achieved. Senior secondary schools with very low enrollment, such as in the case of Oguaa Secondary Technical with student enrollment in the technical department below 20, constitute an unnecessary drain on the education budget.

Because of distance from main population centres, lack of boarding/hostel facilities, staff houses, and underdeveloped facilities, some SSS are unable to attract trained teachers and this has been particularly severe for vocational and technical programs. Recent estimates suggest that about 16% of SSS are currently underenrolled (see Table 5.14 below).

Table 5.15 shows a sample of teaching costs per student period for the same subjects across three senior secondary schools (taken from column 8 of Table 5.13). As the table shows, technical subjects are more expensive to run in Oguaa SSS (about 12 times more than at Mankessim for Building Technology). Metalwork costs about 25 times more to teach per student period at Mfantshipim than at Mankessim. For Agriculture the difference in cost per student period

Table 5.14 Senior secondary schools with enrollments below 100

Region	Total no. of schools	No. underenrolled	Enrollment range
Ashanti	78	13	40-95
Brong Ahafo	52	15	40-89
Central	49	9	32-91
Eastern	73	12	37-90
Greater Accra	40	Nil	Nil
Northern	31	1	97
Volta	68	11	23-90
Western	41	12	37-90
Upper east	20	2	92 & 95
Upper west	16	Nil	Nil
National	468	75	

Table 5.15 Costs per student period for technical and agriculture across three schools

Subjects	School		
	Mfantsipim	Mankessim	Oguaa
	Teaching cost per student period ¢	Teaching cost per student period ¢	Teaching cost per student period ¢
Building technology	4,723	1,898	22,289
Technical drawing	16,572	1,898	22,289
Woodwork	58,205	—	66,869
Metalwork	48,702	1,898	—
General agriculture	—	8,816	8,426
Crop horticulture	—	9,780	8,426
Chemistry	604	8,412	

across the two schools is relatively small—about 1:1. Mankessim appears to be the place where it costs far less per student period especially for Building Technology, Technical Drawing, and Metalwork. Being a nonresidential institution seems to contribute significantly to a lowering of costs. Although Oguaa is nonresidential, its very low enrollment increases unit costs appreciably.

As an elective subject for Agriculture students, Chemistry is about 14 times more expensive than what it costs per student period at Mfantsipim where it is taken as part of elective science. This significant difference in cost might be due again to inefficiencies arising from low subject enrollment, inadequate staffing, and the integration of general and vocational education which allows a number of subject combinations without due cognizance of subject enrollment levels in particular programs.

7 Capital Expenditure

Overview

The sources of funds for capital projects come from the central government or from donor agencies/nongovernmental organizations channelled through

the Ministry of Education. Data on estimated capital development cost on building and estimated capital expenditure on equipment were obtained from school bursars who by virtue of their work are conversant with some estimated costs of capital projects in their school. During visits to schools used for this report, it was realized that while some efforts were made to expand facilities such as classrooms and boarding houses, no effort was made to provide staff accommodation or improve the infrastructure and equipment and materials supply for vocational and technical programs.

Availability of Data

Data on capital expenditure was very difficult to obtain. Most capital expenditures, whether on building or equipment, are determined by the Ministry of Education. Records of such expenditure are not routinely available in the schools. In fact, most schools have very little knowledge of capital expenditure. One Headmaster expressed his personal experience of trying to seek more information about costs relating to a school building project in his school. 'I was threatened with release when I refused to sign a document covering a project because the project was poorly executed and the cost overestimated.' Bursars could not provide very reliable information on capital expenditure but were able to provide what they considered reasonable estimates using current prices.

Derivation of Capital Cost per Student Place

In Swedru School of Business, the business department block could accommodate on average 40 students in a classroom. The cost of this building was estimated to be about ₵210,000,000. It is a basic wooden structure classroom block. The main equipment that the department provided an estimate for was typewriters which were estimated to cost ₵50,400,000. Although Mfantshipim provided capital estimates for its technical and science block it did not provide breakdown costs for the construction and equipping of these blocks.

In annualizing capital costs, the life spans of the building and equipment are often taken into consideration. The life spans of the building were assumed to be 20 years, while that of the equipment was assumed to be 15 years.⁸ Another problem was the consideration of opportunity cost of capital, i.e., the alternative use of capital that could have attracted higher interest and therefore higher returns. However, some economists argue that because Education is

⁸ These figures appear to be low given that Mfantshipim School has buildings over 50 years old which look in generally good condition. The estimated life spans of the buildings provided by the bursars may therefore not be realistic estimates but for illustrative purposes were used for the calculations.

Table 5.16 Estimated capital development costs on building and equipment

School	Programme	Cost on building ₵	Costs of equipment ₵	Total ₵
Swedru school of business	Business	210,000,000	50,400,000	260,400,000
	General arts	70,000,000	—	70,000,000
Mfantsipim school	Technical	750,000,000	450,000,000	1,200,000,000
	Science	1,200,000,000	650,000,000	1,850,000,000

Table 5.17 Estimated costs per student place

	Programme	Number of student	Total costs on building & equipt ₵	Cost per student place ₵
Swedru school of business	Business	405	260,400,000	642,962
	General arts	135	70,000,000	518,518
Mfantsipim school	Technical	288	1,200,000,000	4,166,666
	Science	1500	1,850,000,000	1,233,333

an essential commodity it should not be treated the same way, as one would purchase stocks and bonds from the stock exchange market. In view of this, the annualization of capital was based on the depreciation rate of capital rather than the internal rate of return.

Table 5.16 below shows estimated capital development costs in two of the schools that provided estimates on capital development and equipment.

Table 5.17 shows that the total cost of building and equipment as well as students enrolled was higher in the Business program than in the General Arts program at Swedru School of Business. However, the cost per student place in the business program was just slightly higher than the cost per student place in the General Arts program. In Mfantsipim School, the total cost of capital investment and student enrollment was much higher in the Science program than in the Technical program. But the cost per student place per year in the technical program is over three times that of Science. As earlier pointed out, key factors influencing unit cost per student place are enrollment and its implications for student-teacher ratios. However, practical intensive subjects such as in the technical program risk becoming inefficient and ineffective if enrollments reach levels as high as that of science. The picture emerging is that technical subjects are quite expensive to operate at the SSS level.

Table 5.18 and Table 5.19 shows the various unit recurrent cost and unit capital cost per student in the two schools. In the Swedru School of Business cost per student in the Business program was lower than in the General Arts program. However, in Mfantshipim School the cost of training a technical student was about 30% more than the cost of training a science student.

Conclusions that might be drawn from the cost analysis are as follows:

- The SSS technical program tends to require high capital and recurrent investment. Compared to the elective science program, enrollments in technical program tend to be lower which means that investments required per student place for technical subjects are higher than for science subjects. There is not much difference in the investment required per student place per year between business program and general arts probably because these programs tend to require low capital investment.
- It is not clear what the optimum student-teacher ratio should be for maximum efficiency in running vocational subjects at the SSS level. Nevertheless, very high enrollments in practical intensive subjects compromise the quality of student learning experiences and outcomes. As pointed out earlier in the report, many SSS are underenrolled (some as low as 23). Low-enrollment SSS that offer TVE subjects such as technical tend to be inefficient in terms of the ratio of students per teacher per subject.
- Many well-endowed SSS in Ghana are beginning to set up computer laboratories to promote computer literacy among students. Business programs could do with the introduction of computers especially for secretarial courses. But this will require very high capital and recurrent investments that the current arrangement for funding SSS programs will not be able to support.
- From the schools studied there appears to be no fixed and consistent formula for allocating the number of periods per week between vocational and general education subjects. Generally, all subjects have more theory periods per week than practical periods. In Mfantshipim, science and technical subjects, with the exception of integrated science, had 3 periods of practical a week. In one school, the total number of periods per week allocated to technical drawing was 6 while in another school, the same subject was allocated 7 periods per week. In Oguaa secondary technical general Agriculture was allocated 10 periods per week, but in Mankessim secondary technical the same subject was allocated 6 periods per week.

Wide variations in costs from school to school could be attributed to the following: (a) resource availability, (b) intensity of practical activity, (c) enrollment levels; and (d) fees charged.

Table 5.18 Annualization of capital—Swedru school of business and Mfantshipim school

School	Programmes	Capital invested building equip (¢)		Life span building equip 20 yrs (¢) 15 yrs		Cost per student per year (¢) building equipment	
		Swedru school of business	Business	210,000,000	50,400,000	10,500,000	3,360,000
	General arts	70,000,000	—	3,500,000	—	25,925	—
Mfantshipim school	Technical	750,000,000	450,000,000	37,500,000	30,000,000	130,208	104,166
	Science	1,200,000,000	650,000,000	60,000,000	43,333,333	40,000	28,888

Table 5.19 Relative recurrent and capital costs—Mfantshipim school and Swedru school of business

School	Programme	per-student recurrent costs 1	Estimated capital costs per student per year		Overall unit costs	
			Building 2	Equipment 3	1+2+3	
					¢	\$
Swedru school of business	Business	¢679,425	¢25,925	¢8,296	¢713,646	\$88.4
	General arts	¢900,000	¢25,925	—	¢925,925	\$114.6
Mfantshipim school	Technical	¢2,947,500	¢130,208	¢104,166	¢3,181,874	\$394.0
	Science	¢2,130,000	¢40,000	¢28,888	¢2,198,888	\$272.3

Note: 1 GHC = 0.000123839 USD; 1 USD = 8,075.02 GHC.

8 Lessons from the Case Study and Recommendations

A common justification for vocationalised secondary education in Ghana is that it will prepare the youth for self- and paid employment and thus enhance personal and national economic development. The language of the 1987 education reforms was strong on equity of educational opportunities, reduction of youth unemployment, and reorientation of students to manual work and agriculture. The old secondary education system was considered too elitist and narrowly focused on entry into university. It was often argued that a diversified curriculum would increase the rates of return to the investment in education since it can respond to demands in the labour market more flexibly. But the evidence from the case study suggests that these claims may be simplistic and overstated.

The following are key issues that emerged from the case study.

- The case study did not find empirical studies conducted in Ghana that support the economic benefit argument of vocationalisation of the secondary school curriculum—that it is more efficient and effective for preparing students for paid and self-employment. Many simply assume this to be the case—an assumption that is firmly imbedded in the discourse on TVE in Ghana at both school and policy level. When TVE and general science/arts teachers were asked if they thought TVE students had a distinct advantage over general arts/science students in finding work if both terminate their education after SSS, about 90% agreed with the statement. But at the same time these teachers expressed a keen desire to see many more TVE students proceed to higher/further education after SSS, perhaps reflecting a more realistic understanding of the occupational structure outside school and what type and level of education positions students best for the modern sector of the economy.
- The official recommendation for TVE subject selection, into core and elective components, and what pertains in some schools show how difficult it is to marry general and vocational education. The notion that diversification would provide a range of subjects from which students can choose according to their aspirations and labour market demand is driven more by wishful thinking than an appreciation of the complex link between education/training and demands of the labour market. As evidence from the case study schools indicated, some students are compelled to choose certain subjects because of limiting circumstances beyond their control—e.g., lack of teachers, equipment and facilities, subject combination requirements for entry into university—and not because of talent, interest, or ability. *Diversification has really not given all students equal*

opportunity to study vocational and technical subjects according to their interest and talent.

- Vocationalising the secondary school curriculum was too ambitious and implementation of the policy hastily carried out. At the onset of the 1987 reforms, implementation plans were initiated without serious consideration given to how JSS, for example, were going to be adequately equipped and staffed. With 10 teacher training colleges specially designated for training TVE teachers, the situation of teacher supply seems to be improving, but it is still far from satisfactory.
- JSS is terminal for many school children in Ghana. This fact has often been used to justify the need to provide JSS graduates with employable skills, at least for the lower level of the labour market. Judging from Ampiah's (2002) study, it appears that interest in TVE at the JSS level remains very low which may be an indication that pupils, even at that early stage, are drawn more to a liberal arts and science education for reasons that might be due to how subjects are presented to them or a more realistic assessment of the benefits to their future aspirations.
- It would appear that the dual purpose of vocationalisation policy at the SSS, which is to (1) provide terminal graduates skills for paid or self-employment and (2) prepare others for further education, is nearly impossible to achieve. TVE subjects come under the strong influence of general education goals that might lead to a corruption of the goals of vocationalisation. TVE teachers often complain that university entry requirements for the general arts and science courses exert considerable pressure on the selection of subjects to be included in TVE elective programs. As one head of a technical department put it:
 - *Again chemistry is being used to disqualify technical students from gaining direct entry to pursue mechanical engineering in the University of Science and Technology.*
- Under such circumstances, chemistry could end up as an elective subject for technical program students in one school which sees its role primarily as preparing students for further education than for the immediate world of work. Schools with such inclination may introduce subjects that are simply unnecessary for the terminal SSS student and, in addition, increase the course load of TVE students thus reducing their chances of performing well in exit examinations.
- The case study evidence suggests that instituting TVE in *all* SSS is not a cost-effective and efficient strategy given the capital-intensive requirement of TVE subjects, especially technical subjects. Given this evidence, it is prudent to scale down the content load of TVE programs or even the number of subjects at JSS and SSS level if diversification as currently practiced is to be continued. Greater emphasis should rather be placed on generic

problem-solving and creative skills instead of on highly specialized skills that require expensive and specialized equipment. Apprenticeship training outside the formal school system would do a better job at developing low-level specialized skills—e.g., carpentry, masonry, basket weaving—than locating such training at the JSS level.

- Judging from the examination requirements for TVE students at the SSS level, it is clear that the amount of work required from various options can vary significantly. Some students do far more than others studying courses within the same TVE program. General education students tend not to face this kind of problem. Also, the case study evidence points to the complexities involved in marrying TVE subjects with general education subjects. It is prudent to allow some SSS to specialize in specific programs after a careful consideration of their special circumstances in terms of catchments area (location), efficiency indicators such as enrollment levels, etc.
- Analyses of TVE subject examination papers at the SSS level show that they are driven by the purpose of testing in general education. But, TVE is better served by assessment strategies that emphasize more directly practical objectives. However, the use of more performance-based assessment would be expensive particularly if we are dealing with large student populations. On the other hand, if only a few selected schools specialize in TVE subjects it should be possible to introduce more performance-related assessment.
- One apparent achievement of vocationalisation of secondary education in Ghana seems to be the increase in the proportion of students offering TVE subjects at the SSS level. In 1996, for example, about 50% of all SSS students studied TVE subjects. Because of the lack of tracer studies it is difficult to judge how far this has translated into the kinds of vocations terminal SSS are entering into. However, a clear message from the case study is that the products of SSS and sometimes their teachers see university as their first option.

It is clear from the case study that low-enrollment SSS make TVE subjects particularly expensive. Some of the wide variations in costs between schools could be attributed to the following factors: (a) resource availability, (b) intensity of practical activity, (c) enrollment levels, and (d) subject-specific fees charged.

Vocationalised secondary education in the African context clearly faces several challenges that generally reflect the problems of underdeveloped educational systems. Fifteen years after the 1987 education reforms in Ghana, interest in the vocationalisation of secondary education remains fairly high: all the SSS teachers surveyed for this study called for intensification of vocationalisation policy at the secondary school level because somehow it is good

for national and economic development. But it is hard to find evidence that clearly shows the gains. This continued interest in the intensification of TVE at the secondary level of education appears to be rooted in a general belief that technical/vocational middle level manpower is the key to personal and national socio-economic development. There is a very strong assumption about the important link between TVE and national development. But the evidence, so far, suggests that this is expecting too much of secondary education, and that perhaps technical and vocational institutions and apprenticeship programmes that are well-funded and resourced would be better placed to meet this aspiration and provide a stronger foundation for polytechnics.

There is, however, little doubt at least from the case study schools that TVE subjects have become widely accepted as part of the general curriculum of secondary education, although these subjects, especially the vocational, still play second fiddle to general education subjects in terms of selection standards and student subject preference, particularly at the JSS level. This is probably due to realistic expectations of what students and parents think is the real value of TVE in the employment sector.

Overall, the Ghana case study suggests that implementing a large-scale diversified curriculum in systems with severe resource constraints is not advisable. It is prudent to allow some secondary schools to introduce TVE but with the proviso that they can meet clearly defined cost-effectiveness standards.

At the lower secondary school level (e.g., JSS), advocating for the inclusion of several TVE subjects with the assumption that it will position terminal graduates for self- or paid employment is unrealistic. It is better to reduce the number of TVE subjects at that level and provide education that emphasizes generic and problem-solving skills as the foundation for further training at the “technical institute or apprenticeship training” level.

9 Acknowledgements

I wish to thank Messrs. Luke Akaguri and John Hayfron for their assistance in collecting data for this study and Mr. Joseph Ampiah for his work on the section on technical vocational education (TVE) curriculum at the senior secondary school level. I also thank Dr Henry Akplu, of the Department of Vocational and Technical Education, University of Cape Coast, for his contributions to the sections on ‘Concept of vocationalisation’ and ‘Broad purposes of TVE’.

Special thanks to Dr Jon Lauglo of the World Bank for his patience and thoughtful comments, which contributed immensely to the outcome of this study.

Although the World Bank funded this study, the report does not necessarily reflect the views of the Bank. Any errors of fact or interpretation are the author's responsibility.

10 References

- Akyeampong, F. and Lewin (2000). *Cost and financing of teacher education in Ghana. Multi site teacher education research project*. Discussion paper 20. Sussex: University of Sussex. Centre for International Education.
- Akyeampong, K. and Stephens, D. (2002). Exploring the backgrounds and shaping of beginning student teachers in Ghana: towards greater contextualisation of teacher education. *International Journal of Educational Development*, 22, 261–274.
- Amenuke, S.J., Sackey, J. and Watson, M. (1994). *Technical and vocational education in Ghana*. Document to Review Committee of Ministry of Education, Ghana.
- Ampiah J.G. (2002). *Attitude of junior secondary school boys and girls towards science*. Institute of Education, Cape Coast, Ghana: University of Cape Coast.
- Baiden, F.A. (1996). Technical and vocational education in Ghana. In *The development of technical and vocational education in Africa: case studies from selected countries*. (81–122). Dakar, Senegal: UNESCO Regional Office.
- Canagarajah, S. and Coulombe, H. (1997). *Child labor and schooling in Ghana*. Education. Child labor, returns to schooling series. Washington: World Bank working papers.
- Carnevale, A.P., Gainer, L.J. and Meltzer, A.S. (1990). *Workplace basics: the essential skills employers want*. San Francisco: Jossey-Bass.
- Chin-Aleong, M. (1993). Vocationalizing secondary education. In D. Atchoarena (Ed.), *Policy and planning for vocational education and training*. (141–157). Report of a Sub-regional training workshop. Hastings, Christ church, Barbados, September 20–October 1, 1993.
- Coombe, C. (1988). *Survey of vocationally oriented education in the Commonwealth*. London: Commonwealth Secretariat.
- Daughtrey, A.S., Ristau, R.A. and Baker, R.L., Jr. (1982). *Basic business and economic education: learning and instruction*. 3rd edition. Cincinnati, OH: South-Western Publishing Co.
- Economists Intelligence Unit (EIU) (1997). *Ghana Country Profile, 1997–1998*.
- Finch, C.R. and Crunkilton, J.R. (1993). *Curriculum development in vocational and technical education*. 4th edition. Boston: Allyn and Bacon.
- Foster, P. (1965). *Education and social change in Ghana*. London: Routledge and Kegan Paul.
- Government of Ghana (1995). *Ghana vision 2020*. Accra: Government of Ghana.
- Japan International Cooperation Agency (JICA) and Ministry of Education, Ghana (2001). *The study for development of a master plan to strengthen technical education in the Republic of Ghana*. Accra: Pacific Consultants International.
- Kibler, R.J., Barker, L.L. and Miles, D.T. (1970). *Behavioral objectives and instruction*. Boston: Allyn and Bacon, Inc.
- King, K. and Martin, C. (2002). The vocational school fallacy revisited: education, aspiration and work in Ghana 1959–2000. *International Journal of Educational Development*, 22(1), 5–26.

- McWilliam, HOA and Kwamena-Poh, M. (1975). *The development of education in Ghana*. Accra: Longman Group Limited.
- Miller, M.D. (1985). *Principles and philosophy for vocational education*. Columbus, OH: The National Centre for Research in Vocational Education.
- Ministry of Education (1999a March). *Basic education sub-sector improvement program: implementation progress report 1996–1998*. Accra: Ministry of Education.
- Ministry of Education (1999b). *2000 a decade of educational reforms: preparation for the challenges of a new millennium*. Background paper for the National Educational Forum. Accra: Ministry of Education.
- Ministry of Education (2000). *Policies and strategic plan 2001–2003 for the education sector (pre-tertiary)*. Accra: Ministry of Education.
- Ministry of Education and Culture (1988). *Current issues needing clarification in the junior secondary school program*. Accra: Ministry of Education and Culture.
- NACVET/MOE (2000). *Draft TVET policy framework for Ghana*. Accra: Ministry of Education.
- Nti, J. (1997). *Ministry of Education Report of Consultancy on Organizational and Institutional Analysis*. Accra: Ministry of Education.
- Phelps, A. and Cole, N.S. (1988). Reconsidering vocational–technical education in high schools. In M.B. Griggs, R. Jones and A. Slocum (Eds.), *Proceedings of the Ninth Annual Report. Evans Symposium*, April 28–29. (3–19). Department of Vocational and Technical Education, University of Illinois.
- Pucel, D.J. (1990). The curriculum. In A.J. Paulter Jr. (Ed.), *Vocational education in the 1990s: Major issues*. (157–172). Ann Arbor, MI: Prakken Publications, Inc.
- Strong, M.E. (1990). Administrative leadership in vocational education. In A.J. Paulter Jr. (Ed.), *Vocational education in the 1990s: Major issues*. (139–156). Ann Arbor, MI: Prakken Publications, Inc.
- Teacher Educational Division/Ghana Education Service (TED/GES) (2001). *Report on teacher training colleges that offer technical skills as a subject*. Accra: Ghana Education Service.
- UNESCO Regional Office for Education in Africa (BREDA) (1995). *Education strategies for the 1990s: orientations and achievements*. Report on the state of education in Africa 1995. Paris: UNESCO.
- United Nations Educational, Scientific and Cultural Organization (UNESCO) (1979). *Developments in technical and vocational education: a comparative study*. Paris: UNESCO.
- United Nations Educational, Scientific and Cultural Organization (UNESCO) (1999). *Second international congress on technical and vocational education: final report*. Seoul, Republic of Korea, 26–30 April 1999.
- Villafana, B (1995). Program and instructional development in occupational home economics. In S.J. Olson and S.F. Weise (Eds.), *Perspectives of occupational home economics, Year Book 15, 1995*. (53–72). Alexandria, VA: American Association of Family and Consumer Sciences.
- World Bank (1996). *Basic education sector improvement program, staff appraisal report, Republic of Ghana*. Population and Human Resources Division, West Central Africa Department, Africa Region. Washington, DC: World Bank.
- World Bank (1997). *Ghana education finance: its implications for sector effectiveness*. Human Development (3), Africa Region. Washington, DC: World Bank.
- World Bank (1998). *Ghana education finance: its implications for sector effectiveness*. Draft, Human Development Report 3, Africa Region. Washington, DC: World Bank.

11 Appendices

Appendix 1: Educational Structure of TVET Pre-1987 Reform

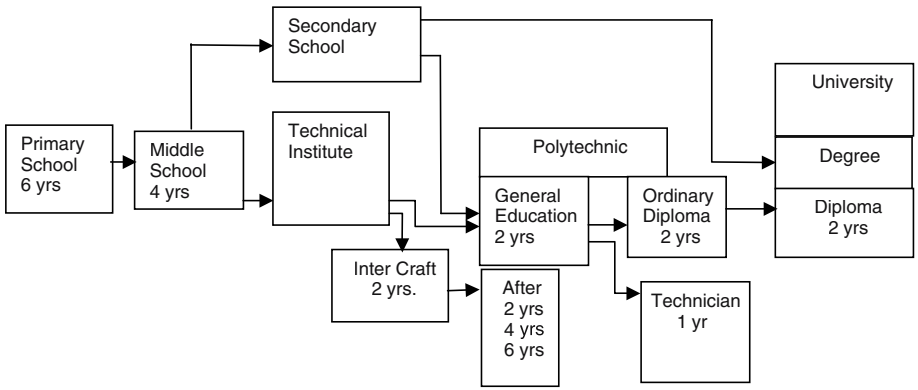


Figure 5.2 Educational structure of TVET Pre-1987 reform

Appendix 2: Content Analysis of Examination Papers for Vocational/Technical Programs for 2001

Program	Subjects	Paper	Nature of questions	Total duration /hours	Questions/sub questions	
					Knowledge/ comprehension	Problem solving
Home economics	Management in living	1	Objectives & essay	1½	70	0
		2	Essay	2½	22	0
	Foods and nutrition	1	Objectives & essay	3	73	0
		2	Practical	2½	0	27
	Clothing and textiles	1	Objectives & essay	3	72	0
		2	Practical	2½	0	7
Visual arts	General knowledge in art	1	Objectives & essay	2½	59	0
		2	Practical	3	0	4
	Basketry	1	Objectives	1	50	0
		2	Essay	3	17	0
		3	Project work	2 months	0	2
	Ceramics	1	Objectives	1	50	0
		2	Essay	3	17	0
		3	Project work	2 months	0	2
	Graphic design	1	Objectives	1	50	0
		2	Essay	3	17	0
		3	Project work	2 months	0	3
	Leatherwork	1	Objectives	1	50	0
		2	Essay	3	21	0

Program	Subjects	Paper	Nature of questions	Total duration /hours	Questions/sub questions	
					Knowledge/ comprehension	Problem solving
		3	Project work	2 months	0	2
	Picture making	1	Objectives	1	50	0
		2	Essay	3	0	2
		3	Project work	2 months	0	2
	Sculpture	1	Objectives	1	50	0
		2	Essay	3	18	0
		3	Project work	2 months	0	2
	Textiles	1	Objectives	1	50	0
		2	Essay	3	17	0
		3	Project work	2 months	0	2
Business (accounting option)	Business management	1	Objectives & essay	2	51	2
		2	Essay	2½	23	0
	Accounting	1	Objectives & essay	3	45	18
		2	Essay	2½	16	0
	Business mathematics and principles of costing	1	Objective test	3	30	20
		2	Essay	2½	5	17
Business (secretarial option)	Business management	1	Objectives & essay	2	51	2
		2	Essay	2½	23	0
	Typewriting	1	Practical	2 hrs 40 min	0	6
	Clerical office duties	1	Objectives	1		

Program	Subjects	Paper	Nature of questions	Total duration /hours	Questions/sub questions	
					Knowledge/ comprehension	Problem solving
		2	Essay	3		
Technical	Applied electricity	1	Objectives & essay	2	37	13
		2	Practical	3		2
	Auto mechanics	1	Objectives & essay	2½	69	
		2	Practical	2		
	Metalwork	1	Objectives & essay	2½	58	3
		2	Practical	3		
	Building construction	1	Objectives & essay	1¾	61	2
		2	Essay	2½	19	1
	Woodwork	1	Objectives	3	50	3
		2	Practical	3		
		3	Project work			
	Technical drawing	1	Objectives & essay	2½	44	9
		2	Essay	2½	0	9
	Electronics	1	Objectives & essay	2	54	13
		2	Practical	3		

Figure 5.3 Content analysis of examination papers for vocational/technical programs for 2001

Appendix 3: Example of Cost Estimation

Costs estimation of technical program in Mankessim Senior Secondary Technical.

$$\begin{aligned} \text{Total Teaching Cost} &= \text{Teachers' salaries \& Allowances} \\ &\quad + \text{Other Emoluments} + \text{Subject Specific.} \end{aligned}$$

$$\text{Total Teaching Cost} = \text{¢}19,258,032 + \text{¢}1,845,000 = \text{¢}21,103,032$$

Average cost per teacher in a department is the total teaching cost in a department divided by the number of teachers in the department.

$$\begin{aligned} \text{Average cost of teaching per teacher in the department} &= \frac{\text{¢}21,103,032}{5} \\ &= \text{¢}4,220,606 \end{aligned}$$

1. Mean cost per teacher period = Average cost of teaching per teacher in a subject times the number of teachers divided by the total teacher period in the subject. Using Metalwork as an example:

$$\begin{aligned} \text{Mean cost per teacher period (metalwork)} &= \frac{\text{¢}4,220,606 \times 1}{18} \\ &= \text{¢}234,474 \end{aligned}$$

2. Teaching cost per student = Total teacher periods divided by the number of students in Metal Work class times the mean cost per teacher period in Metalwork.

$$\text{Teaching cost per student} = \frac{18}{117} \times \text{¢}234,478 = \text{¢}36,073$$

3. Teaching cost per student period (TC per Std)

$$\text{TC per Std} = \frac{\text{Total Teacher Periods}}{\text{Total Student Periods}} \times \text{Mean cost per teacher period}$$

$$\begin{aligned} \text{Total student periods} &= \text{Periods per week} \\ &\quad \times \text{total number of students in the class.} \end{aligned}$$

$$\text{Teaching cost per student period} = \frac{18}{2,223} \times \text{¢}234,478 = \text{¢}1,898$$

Appendix 4: Structure of the SSS Program

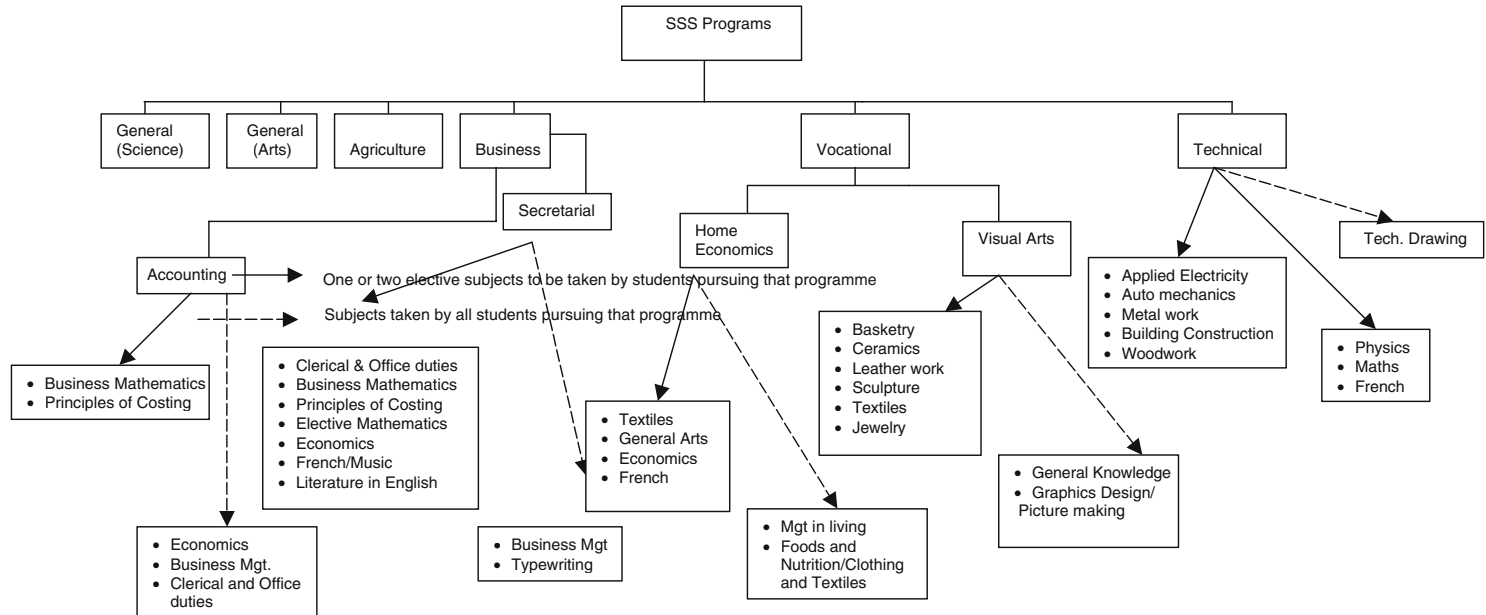


Figure 5.4 Structure of the SSS program

Appendix 5: Timetable (Periods per Week)

Table 5.20 Mfantsipim school science program

Subject	Form	Stream	Periods per week		No. of students		Total periods per Week	Total teacher periods
			Theory	Practical	Theory	Practical		
Physics II	I	12	5	3	40	40	96	288
	II	12	5	3	45	45	96	
	III	12	5	3	40	40	96	
Biology	I	12	5	3	40	40	96	288
	II	12	5	3	45	45	96	
	III	12	5	3	40	40	96	
Integrated Science	I	12	5	1	40	40	96	288
	II	12	4	1	45	50	96	
	III	12	4	1	40	40	96	
Chemistry	I	12	5	3	40	40	96	288
	II	12	5	3	45	45	96	
	III	12	5	3	40	40	96	

Table 5.21 Mfantsipim school technical program

Subject	Form	Stream	Periods per week		No. of students		Total periods per week	Total teacher periods
			Theory	Practical	Theory	Practical		
Woodwork technology	I	1	4	3	13	13	7	21
	II	1	4	3	13	13	7	
	III	1	4	3	15	15	7	
Building technology	I	1	4	3	35	35	7	21
	II	1	4	3	35	35	7	
	III	1	4	3	33	33	7	
Technical drawing	I	2	7	—	36	—	14	42
	II	2	7	—	38	—	14	
	III	2	7	—	31	—	14	
Applied electricity	I	1	4	3	12	12	7	21
	II	1	4	3	10	10	7	
	III	1	4	3	17	17	7	
Metalwork	I	1	4	3	12	12	7	21
	II	1	4	3	10	10	7	
	III	1	4	3	17	17	7	

Table 5.22 Swedru school of business program

Subject	Form	Stream	Periods per week		No. of students		Total periods per week	Total teacher periods
			Theory	Practical	Theory	Practical		
Business management	I	4	7	—	50	—	28	77
	II	4	7	—	50	—	28	
	III	3	7	—	37	—	21	
Accounting	I	4	7	—	50	—	28	77
	II	4	7	—	50	—	28	
	III	3	7	—	40	—	21	
Business math & costing	I	4	7	—	50	—	28	77
	II	4	7	—	50	—	28	
	III	3	7	—	40	—	21	
Typewriting	I	4	7	7	47	40	56	154
	II	4	7	7	40	52	56	
	III	3	7	7	40	40	42	
French	I	4	7	—	28	—	28	77
	II	4	7	—	26	—	28	
	III	3	7	—	25	—	21	

Table 5.23 General arts program

Subject	Form	Stream	Periods per week		No. of students		Total periods per week	Total teacher periods
			Theory	Practical	Theory	Practical		
Geography	I	1	5	—	54	—	5	19
	II	1	7	—	50	—	7	
	III	1	7	—	40	—	7	
Economics	I	1	5	—	54	—	5	19
	II	1	7	—	50	—	7	
	III	1	7	—	40	—	7	
History	I	1	5	—	54	—	5	19
	II	1	7	—	50	—	7	
	III	1	7	—	40	—	7	
Fante	I	1	5	—	54	—	5	19
	II	1	7	—	50	—	7	
	III	1	7	—	40	—	7	
French	I	1	5	—	54	—	5	19
	II	1	7	—	50	—	7	
	III	1	7	—	40	—	7	

Table 5.24 OGUAA secondary technical school agriculture program

Subject	Form	Stream	Periods per week		No. of students		Total periods per week	Total teacher periods
			Theory	Practical	Theory	Practical		
General agriculture	I	1	7	3	14	14	10	30
	II	1	7	3	4	4	10	
	III	1	7	3	17	17	10	
Animal husbandry	I	1	7	3	—	—	10	30
	II	1	7	3	—	—	10	
	III	1	7	3	—	—	10	
Crop/ horticulture	I	1	7	3	14	14	10	30
	II	1	7	3	4	4	10	
	III	1	7	3	17	17	10	

Table 5.25 OGUAA secondary technical: technical program

Subject	Form	Stream	Periods per week		No. of students		Total periods per week	Total teacher periods
			Theory	Practical	Theory	Practical		
Technical drawing	I	1	7	—	8	8	7	21
	II	1	7	—	4	4	7	
	III	1	7	—	4	4	7	
Building construction	I	1	5	2	8	8	7	21
	II	1	5	2	4	4	7	
	III	1	4	3	4	4	7	
Woodwork	I	1	—	—	—	—	—	14
	II	1	4	3	4	4	7	
	III	1	4	3	4	4	7	

Table 5.26 Mankessim secondary technical school agricultural program

Subject	Form	Stream	Periods per week		No. of students		Total periods per week	Total teacher periods
			Theory	Practical	Theory	Practical		
General agriculture	I	1	4	2	40	40	6	19
	II	1	4	2	52	52	6	
	III	1	4	3	40	40	7	
Animal husbandry	I	1	4	2	40	40	6	19
	II	1	4	2	50	50	6	
	III	1	4	3	35	35	7	
Crop/ horticulture	I	1	4	2	40	40	6	19
	II	1	4	2	50	50	6	
	III	1	4	3	30	30	7	
Chemistry	I	1	4	3	40	40	7	20
	II	1	4	2	52	52	6	
	III	1	4	3	40	40	7	

Table 5.27 Mankessim secondary technical school technical program

Subject	Form	Stream	Periods per week		No. of students		Total periods per week	Total teacher periods
			Theory	Practical	Theory	Practical		
Metalwork	I	1	4	2	45	40	6	18
	II	1	4	2	45	45	6	
	III	1	4	2	32	32	6	
Technical drawing	I	1	4	2	40	40	6	18
	II	1	4	2	45	45	6	
	III	1	4	2	32	32	6	
Building technology	I	1	4	2	40	40	6	18
	II	1	4	2	45	45	6	
	III	1	4	2	32	32	6	
Elective mathematics	I	1	4	2	40	40	6	18
	II	1	4	2	45	45	6	
	III	1	4	2	32	32	6	

Kilemi Mwiria

6

Vocationalisation of Secondary Education: Kenya Case Study

1	Executive Summary	227
2	The Introduction and Rationale for Vocationalisation of Secondary Education	235
3	Planning for Implementation and Planning Experiences	239
4	Syllabi Content and Input Requirements	243
5	Teaching Time and Methods of Delivery	251
6	Input Requirements	254
7	STS and Financing of Vocational Education	263
8	Quantifiable Achievements	271
9	Characteristics of Schools and Students	277
10	Assessment Methods and Learning Outcomes	289
11	Main Problems Encountered in Implementation and Lessons Learned	294
12	Some Concluding Remarks	302
13	References	304

1 Executive Summary

Origin and Purpose of Vocationalisation

Interest in vocationalising the secondary school curriculum dates back to the mid-1970's and early 1980's following the recommendations of two government-appointed commissions. However, it was not until 1986 that the current system of vocationalising school curriculum was institutionalised with the implementation of a new national educational system popularly known as the 8-4-4 system. This new structure, which comprises 8 years of primary education, 4 of secondary, and a maximum 4 of university, replaced the former 7-4-2-3 system, comprising 7 years of primary education, 4 of junior secondary, 2 of senior secondary, and 3 of university education. Under the new system the general secondary curriculum was expanded to include a number of practical

subjects that are vocational in nature with the aim of enhancing the transition of secondary school graduates into the world of work as well as opportunities for further training in relevant post-secondary training institutions.

Planning for Implementation and Implementation Experiences

The introduction and implementation of the new system was a rushed political event. The first step in the implementation of the system was preparation of a policy brief and syllabi by the Kenya Institute of Education (KIE). This was followed by a hasty dissemination of the content of the new curriculum. The dissemination was done at a very high level as it involved the highest-ranking Ministry of Education officials, namely the Minister, Permanent Secretary, Director of Education, and other senior officials. To cater to the newly introduced practical and vocational subjects, the government launched a crash in-service training programme for teachers and recruitment drive for additional teachers and school inspectors. As the inclusion of the new practical and vocational subjects required the provision of relevant infrastructure-workshops, laboratories, and books-the government pledged to support the arid and semi-arid areas while other regions of Kenya were asked to provide for their own schools in accordance with the cost-sharing policy. With regard to the provision of books, the government commissioned the Kenya Literature Bureau through the KIE to publish students' books and teachers' guides at affordable prices. Meanwhile, teachers were asked to continue using existing books from the previous system but were to use only those aspects of content that related to the new curriculum.

Syllabi and Input Requirements

The vocational aspect of the secondary school curriculum includes Agriculture, Business Studies, Computer Studies, Home Science, and Industrial Education. Business Studies comprises Accounting, Commerce, Economics, and Typing with Office Practice. The industrial education syllabus includes Building Construction, Drawing and Design, Electricity, Metalwork, Power Mechanics, and Woodwork. In addition to promoting self-reliance, the content of these subjects is aimed at preparing learners for further education and training. Most of these subjects are taught through a combination of theory and practice and as such, practicals are an essential element of their teaching. Agriculture, Computer Studies, Home Science, and industrial courses are allocated an average of three theory and two practical 40-minute lessons each

week, although students and teachers can and often spend more than the allotted time. The business education courses are allocated three to four lessons per week. Most teachers of the industrial courses are trained at three-year diploma colleges while those who teach Agriculture, Business Education, and Computer Studies are trained at the national universities. In addition to limited opportunities for in-service training, teacher shortage is a problem for all subjects but is particularly serious for Agriculture, Accounting, and Computer Studies. The shortage in Agriculture has to do with the fact that this is the most commonly provided vocational subject but its teachers are trained in only one public university. Shortages for business and Computer Studies are related to the market value of persons who could teach these subjects outside of the education system. The other teaching inputs are workshops and relevant equipment such as machinery and hand tools for the industrial courses; pieces of land, plants, seeds, and farming tools for Agriculture; a computer laboratory, computers and printers, printing stationery, diskettes, and appropriate software for Computer Studies; a workshop, cooking equipment, sewing machines, worktops and other tables, refrigerators, and sofa sets for Home Science; a typewriting workshop, typewriters, and appropriate stationery for Typewriting with Office Practice; and a stable supply of electricity for Computer Studies, industrial education, and Typewriting. Since the beginning of 2003, all the industrial courses, Computer Studies, and Typewriting with Office Practice are not offered in Kenya's secondary schools. Their removal from the syllabus has mainly been justified on the basis of the costs associated with teaching them.

Costs of Financing Vocational Education

The cost of teaching most vocational subjects except business studies is on average higher than that of teaching all other subjects including the sciences. These higher costs relate to construction and equipping of workshops and their running costs including consumables and equipment maintenance; the extra cost of training vocational education teachers, many of whom are not maximally utilised; the cost of books, many of which are imported; smaller class sizes; and the additional costs associated with examining practical subjects by the Kenya National Examinations Council (KNEC). The financing of vocational courses is shared between the government and parents. Government pays teachers' salaries while parents meet the costs related to consumables. Parents also pay to have their children taught some vocational courses such as Computer Studies and Home Science. Apart from religious organizations, the rest of the private sector is not involved in financing this curriculum. International donors, most

notably the Swedish International Development Agency (SIDA), contributed to establishing industrial education subjects in 35 public secondary schools.

Quantifiable Achievements

The number of graduates of the vocational courses increased from 201,444 in 1990 when the second lot of 8-4-4 system graduated from secondary to 240,244 in 2001. Available data are not disaggregated by gender. Likewise, the number of diploma-level teachers who teach agriculture and industrial courses has increased from 7,000 to 10,000 between 1990 and 1995 and to 18,000 in 2000. Only about 40% of vocational education graduates have university-level qualifications. Women comprise an estimated 40% of all vocational education teachers. The most popular vocational courses are Agriculture, Commerce, and, to a limited extent, Home Science, which are taught in 96%, 95%, and 24% of all Kenya's secondary schools, respectively. In addition to requiring minimum physical inputs, Agriculture is popular due to its familiarity and applicability in most of Kenya's rural settings. It is not so popular in schools located in or near urban centres. Commerce's popularity has to do with the perceived higher employment prospects associated with this course, which is also the case with Accounting, offered by 23% of all schools. But these subjects are also popular because of the relatively low investment costs involved in their establishment and teaching. Home science has been taught in Kenyan schools longer than most other vocational subjects and, like commerce, has been associated with high employment prospects, particularly in the tourism sector. The least commonly provided courses are the industrial ones, particularly Metalwork, Power Mechanics, and Electricity, mainly because of the costs associated with their setup and maintenance. For the same reason, Computer Studies is offered by only 2% of secondary schools. The small numbers of schools offering Computer Studies is further associated with lack of qualified computer teachers, the cost of purchasing and maintaining relevant equipment, lack of electricity in most rural areas, and limited opportunities for graduates with these skills in the rural areas of Kenya. The extra fees that they are required to pay for this course discourage some students who may also be interested in enrolling.

The popularisation of vocational courses has not materialised. In particular, the industrial courses have not been easy to introduce in most schools. The number of graduates of the industrial courses has decreased from 6,816 in 1990 to 6,097 in 2001. According to teachers, in addition to parents and students no longer having any illusions regarding improvements in employment prospects due to enrollment in these courses, parents and school administrators are discouraged by the higher costs of teaching these courses. The provision of the

relevant teaching/learning facilities for industrial and other courses has largely been left to parents.

Schools and Students

There are regional disparities with regard to the distribution of students who enroll for vocational courses. More students from the Rift Valley enroll for vocational courses than students from any other region in Kenya, perhaps because of the political way in which the system was introduced by a head of state who hails from this region but also because this is the largest of Kenya's provinces.

Within regions, six main factors differentiate between schools where vocational subjects may or may not be popular. Most top academic schools limit their vocational offerings to those subjects that require the least investment in resources and time. Some vocational courses such as Agriculture, Home Science, and Building Construction are more common in rural environments while Computer Studies, Business Studies, and most industrial courses are more popular in schools located in towns or their neighbourhood. Schools that are managed by churches or philanthropic organizations tend to have better facilities for vocational subjects and subsidise the costs of teaching them, which tends to attract more students to these courses. Boys' schools are more likely to offer industrial courses, Business Studies, and Computer Studies while more girls' schools offer Home Science and Typewriting with Office Practice. Commerce and Computer Studies are also popular among girls. Finally, schools that do well in a given vocational subject in the Kenya Certificate of Secondary Education (KCSE) examination tend to show more interest and to set aside more resources for their teaching.

Student enrollments for given vocational courses are influenced by four main factors, the main one being the courses offered by the school to which a student has been admitted. Vocational subjects tend to be more popular with the academically weak students because they are perceived to be easier than other subjects. Related to this is the fact that students from economically disadvantaged backgrounds are more likely to enroll in vocational courses because economically well-off parents have more ambitious career designs for their children. Cultural factors also play a role in determining popularity of vocational courses. Pastoral communities, for example, view nonpastoral careers such as carpentry and metalwork as not fit for their children. Although unemployment of school leavers has been a problem for a while, the situation worsened in the 1990's and may very well be the single most important determinant of whether students enroll in vocational courses or not.

Assessment Methods and Learning Outcomes

Mastery of vocational skills is assessed at the school level, through continuous assessments, the collaborative project between schools, and the national examinations administered by KNEC. School-level assessments have no bearing on a candidate's final grade on completing secondary school partly because their validity and reliability are difficult to establish and because those examined and their examiners are not operating in comparable circumstances. Collaborative assessments between schools and KNEC involve assessing a student's practical subjects. This assessment accounts for 10% of the final student examination score. Several weaknesses, the most prominent of which relate to validity and reliability of these assessments, have opened them to much criticism from teachers, students, and parents. Criticism has also been levelled on the final KCSE examination which accounts for 90% of a student's final high school grade and which is therefore the main determinant of post-secondary school placement. Its critics point to the fact that the examination defeats the very purpose of vocationalisation by emphasising examination of factual as opposed to practical knowledge. This examination also does not address disparities in school facilities or gear the contents of what is examined to the environments in which students are based. The KCSE examination has further failed to encourage improved communication skills, as the emphasis of examiners has tended to be on memorised facts and not how they are presented.

Students who do well in this examination target university education and other post-secondary training opportunities. Schools and students thus place much emphasis on good performance in vocational subjects for good grades more than for their potential in promoting employment, unless one happens to be a top student in business and Computer Studies and in a top school. For the best students in vocational education, however, the university and a variety of other training opportunities are within reach. In fact, good performance in specific vocational courses has a direct bearing on the degree courses a student may enroll in. Finally, although they are not necessarily the principal objective for registering in these courses, students value them for the skills they pick up which they hope to apply in their daily lives.

Main Problems Encountered in Implementation

Because of the hasty nature in which the new curriculum was introduced, its implementation has not been easy. First, its design was too ambitious in assuming that education was capable of resolving the youth unemployment problem without addressing the underlying causes of this problem. As a result of inadequate planning, most schools found that they could not introduce the new

vocational courses in the curriculum as they lacked basic resources including teachers qualified to teach these subjects. At the same time, most schools could not construct and equip the needed workshops as in most parts of Kenya this responsibility was left to parents in the spirit of cost-sharing. An additional handicap is that the books to be used for teaching the new curriculum content were unavailable; and where KIE prepared some books, many of these books were characterized by numerous errors.

The biggest obstacle to the successful implementation of the new curriculum was its limited acceptance by most education stakeholders outside of government not only because they were not consulted on its introduction but also because it turned out to be an expensive system to implement for parents already burdened with other educational responsibilities with the onset of cost-sharing. In addition, the vocational curriculum has been criticised for overlaps in coverage between subjects, poor sequencing of teaching topics within individual subjects, and the limited time allocated for some subjects. Time constraints, lack of or inadequate infrastructure, facilities, and books have resulted in a situation where the teaching of theoretical knowledge has dominated over practical content. Also problematic is the failure of the curriculum to impart new ideas focusing instead on the old and obsolete knowledge most teachers know best, as they have virtually no opportunities to update their knowledge. Moreover, school inspectors rarely visit vocational education teachers. A combination of all these factors means that graduates of vocational courses are not necessarily advantaged over their academic education counterparts with regard to entry into a fiercely competitive labour market and post-secondary training institutions.

Recommendations

A number of measures could enhance the quality and relevance of this and future vocational education curriculum reform. First, with regard to setting objectives for any educational reform, it is important to have realistic expectations regarding what education can and cannot do. Second, planning for implementing a new curriculum has to be widely consultative and granted adequate time for putting in place relevant human and physical resources. Implementation is likely to succeed if done in phases as the needed resources become available. For the curriculum, it would help if its objectives are realistic and achievable and if its content is based on the immediate and everyday needs of learners. Also important is regular upgrading of teachers' skills as well as of the books used for teaching. In-servicing of teachers and regular advice by school inspectors should contribute to enhancing their ability to introduce new knowledge and to improvise in the absence of adequate learning/teaching facilities.

For financing, the removal of industrial courses from the syllabus will contribute to reducing the cost of teaching this curriculum. For those subjects that will still be offered, it may be important to reduce their coverage to what is feasible. It may also be necessary to limit the teaching of some vocational courses to a few well-equipped schools. Where possible, the private sector and local communities need to do more with regard to supporting what remains of vocational education depending on their ability and areas of interest. At the school level, there are opportunities for cost saving through a more cost-efficient use of available time and physical and human resources within and across schools.

A case can be made for retaining industrial education and the computer course in those schools that have the relevant physical and human resources and where performance in these subjects in the KCSE examination is exemplary. After all, there are students who value these subjects for a variety of reasons including their potential in enhancing employment and higher education opportunities. Moreover, developments in science and technology call for an increased output of middle-level technicians. Likewise, computers are increasingly becoming an element of everyday life as well as promoting participation in the global village. In any case, there is value in any type of education that may justify its retention especially if there are interested consumers of the product. More important, the resources invested in these courses should not be wasted.

Increased acceptance of vocational subjects by most students and their parents, however, is likely to result if what is taught is seen to have immediate and long-term benefits. This can be accomplished through regular reviews of the curriculum that involve the main stakeholders including employers, and through regular meetings with parents during school open days, exhibitions of products of vocational courses, and related measures. Parents are also likely to be persuaded if they do not have to meet the bulk of the costs associated with establishing and retaining these subjects. Gender stereotyping in course preferences by boys and girls is likely to be broken if it can be demonstrated that available career opportunities are open to both genders and if, in the case of girls, efforts are made to reveal examples of women who have succeeded in careers traditionally viewed as men's domains. Parents, teachers, and students also have to do their part in encouraging and not discouraging girls to enroll in vocational courses.

Relegating all vocational courses to the optional category with regard to national examinations has not motivated many students to be interested in them. One way of generating interest in these subjects is by making it mandatory for schools to offer a certain minimum of vocational subjects. Also likely to be of help is the strengthening of partnerships between schools, parents, and communities aimed at getting them to place more value on the teaching of

these subjects. Interest in these and other subjects is, however, likely to be heightened in the context of a vibrant national economy that is seen to generate valuable employment and training opportunities for vocational and other school graduates.

Finally, the national examination system needs to be remodelled to be more supportive of the goals of vocationalisation. To the extent possible, more practical knowledge needs to be examined. Second, more emphasis has to be placed on the testing of general knowledge and analytical skills. Finally, it is necessary to consider other criteria, apart from excellence in academics, for determining whether graduates of vocational subjects join higher educational or vocational training institutions.

2 The Introduction and Rationale for Vocationalisation of Secondary Education

Background

This report is on Kenya's experience with vocationalisation of some aspects of the secondary school curriculum since the introduction of the current system of education in 1986. This system of education, better known as the 8-4-4 system, comprises 8 years of primary education, 4 of secondary, and a minimum of 4 years of university education. The current system replaced the British type 7-4-2-3 education structure, which was organised around 7 years of primary education, 4 of junior secondary, 2 of senior secondary, and a minimum of 3 years of university education. Vocationalisation in the context of this report refers to the teaching of applied subjects or vocational courses that aim at improving learners' capacity for employment in the formal and informal sectors of Kenya's economy and, for a limited number of graduates, for further education in areas of their interest. Some of the applied subjects such as Agriculture, Business Studies (Accounting, Commerce, and Economics), Home Science, and industrial education were introduced into the curriculum prior to 1986. Industrial education courses were, however, offered in only 35 selected public schools assisted by SIDA. Also introduced prior to 1986 were Art and Design and Aviation Technology, which are taught in a very limited number of schools. Subjects introduced following the introduction of the 8-4-4 system in 1986 include an additional business studies course (Typewriting with Office Practice), Computer Studies, and industrial education in more schools than the 35 public secondary schools referred to above. In the industrial education curriculum are six courses: Building Construction, Drawing and Design, Electricity, Metalwork, Power Mechanics, and Typewriting with Office Practice. The focus

of this report is the vocational subjects of Agriculture, Business Studies, Computer Studies, and industrial education. Beginning in 2003, all the industrial courses, as well as Typewriting with Office Practice and Computer Studies, will no longer be part of the official secondary school curriculum following a recent Ministry of Education, Science and Technology (MoEST) directive. Nevertheless, these subjects are discussed in this report as they are still being taught in schools.

Four main approaches were utilised for collecting the data used to inform this report. The first involved a review of available official and nonofficial documentation, research and evaluation studies, and workshop reports. Curriculum review materials produced by KIE, the organisation responsible for curriculum development in Kenya, formed a valuable source of data. The second method involved an analysis of the secondary education syllabi and national examination results for vocational subjects released by KNEC for the years 2000 and 2001. Third, unstructured interviews were conducted among teachers of vocational subjects in 10 secondary schools and among MoEST officials responsible for ensuring that the curriculum of vocational subjects corresponds to national education objectives. The schools visited were mostly the top performers in vocational subjects in the KCSE examination although one poor achiever was also visited. They represented both rural and urban settings. These schools were Strathmore School, Moi Forces Academy, Starehe Boys' Centre and Precious Blood Riruta (Nairobi), Kagwe Girls' Secondary School (Kiambu), Lugulu Girls, Friends High School Kamusinga and Friends School Bukembe (Bungoma), Kambandi High School (Meru), and Nyandarua High School (Nyandarua). It was not possible to interview teachers of the top school in typing and office practice (Pangani Girls Secondary School in Nairobi) because the head teacher of this school does not allow such 'distractions' to interfere with the school's teaching programme. Although the national system of education may sometimes be contradictory regarding the objectives of vocationalisation, good performances in national examinations on any subject could be taken to be an indication of interest in the subject. This is because schools that perform well in the subject have shown greater commitment to them on the part of both teachers and students than would be the case for poorly performing schools.

Thirty-eight teachers of vocational subjects were interviewed in groups in their respective schools to maximise on limited time and on their shared experiences. They were asked for their views on a number of issues. Regarding students, they were asked to comment on their backgrounds and motivation for enrolling in vocational subjects. On the quality and relevance of vocational education, questions were related to the facilities available for teaching the subjects offered at the school, the number of students enrolled in vocational

courses, and their preparation for teaching these subjects. On the management and planning for teaching of vocational subjects, they were requested to comment on the kind of support they receive from MoEST, factors external to the school that may limit or promote appreciation of vocational subjects, and the time they have for teaching these subjects. Other questions related to their perceptions on internal and external assessments, student and parental perceptions of vocational subjects, and the relevance of the courses taught for labour market placement. From head teachers, data was collected on the numbers and qualifications of teachers of vocational subjects and their distribution by gender, academic qualifications, and experience in teaching vocational subjects.

The report is organised around eight main sections. In the following section, the genesis of Kenya's current system of vocational education and its broad aims and objectives are described. The third section highlights the nature of planning undertaken for the implementation of the curriculum including the more notable implementation experiences. Section four is an analysis of the specific objectives of vocational education curriculum, the content of the syllabi, and the inputs availed for its implementation. The fifth section discusses the costs and financing of vocational subjects. Section six describes the main achievements of vocationalisation from the point of view of numbers of students and teachers. The seventh section is on the characteristics of schools offering vocational subjects and the students who enroll for these courses. The final section is a summary of the whole report focusing on the main obstacles to successful implementation, lessons learned, and the way forward.

Origins of the Current System of Vocational Education

The Government of Kenya's commitment to the vocationalisation of the secondary school curriculum dates back to the recommendations of the 1976 *National Committee on Educational Objectives and Policies* (NCEOP) and the sessional paper that clarified them (Kenya, 1978). Among other recommendations, this Committee called for a restructuring of the education system in order for it to more effectively meet basic needs and promote income earning opportunities for school leavers and a change in the attitudes of pupils in favour of agriculture, crafts, and productive manual labour and pre-vocational skills that would stimulate self-confidence and creativity related to self-employment. Curiously, the Committee made a case for influencing society's system of rewards in favour of rural occupations and self-employment but without indicating clear strategies for making this possible. The recommendations of the NCEOP later formed the basis for the restructuring of Kenya's education system from the British 7-4-2-3 system to the American 8-4-4 system following *The Report of the Presidential Working Party on the Second University in*

Kenya (Kenya, 1984). Although this Committee's brief mainly addressed the establishment of a second university in Kenya, its recommendations on the restructuring of the national education system turned out to be by far the more famous because they affected most Kenyans.

Shortly after, the KIE published the relevant curriculum and a policy document on the new system (Kenya, 1984). Both the syllabus and the policy brief stress the need to engender in school leavers, at both the primary and secondary school levels, a predisposition to manual work and some kind of missionary dedication to working in rural areas and the informal sector of the urban centres of the country. Education would accordingly equip students with appropriate skills and attitudes for life and employment in these settings by emphasising the teaching of vocational and technical skills. Completely uninformed by previous experiences and debates on the limited role of education in determining occupational success (see, for example, Foster, 1965, among others), the naive assumption that education creates employment was accepted without any questioning.

Although in a less forceful manner, a more recent commission report, *Totally Integrated Quality Education and Training (TIQUET): Report of the Commission of Inquiry into the Education System* (Kenya, 1999), whose recommendations have not received presidential approval three years after they were released to the public due to their controversial nature, underlines the recommendations of its two predecessors. Unlike the two previous commissions, however, this report charges education with the additional responsibility of teaching '... a core of generic skills that would aid the graduate to better communicate, work in teams with less supervision, use information technology to access new ways of doing things, promote entrepreneurship education that has become invaluable to those in paid employment or in self-employment... and the ability to be creative, innovative as well as an intrinsic initiative for problem-solving...' (Kenya, 1999:146–147) Nevertheless, this particular commission was less ambitious with regard to how many vocational subjects could be taught, arguing instead for the reduction of subjects and in particular for the scrapping of the industrial courses from the secondary curriculum. Thus, the appointment of a Chairman from the President's home area to this Commission, which was meant to stem mounting criticism of the system and guard against radical changes, did just that.

The Broad and Specific Objectives of Vocationalisation

In brief, the policy documents cited above point to six ambitious broad aims for vocationalisation, namely:

- Provision of increased training opportunities for the rising numbers of school-leavers with a view to preparing them for self-reliance and self-employment through the promotion of practical skills and attitudes;
- Promotion of education and training that responds to Kenya's overall economic development and in specific sectors such as agriculture, industry, and commerce;
- Development of vocational entrepreneurial skills as the basis for further individual development;
- Improvement of the production of skilled artisans, technicians, and technologists for both the formal and informal sectors;
- Exposure of students to scientific and technological trends, skills, and ideas and promotion of lifelong skills that enable learners to better adjust to their work and domestic worlds through the inculcation of competencies that promote creativity, communication, cooperation, innovativeness, and problem-solving abilities; and
- Preparation of students for further training in post-secondary middle-level training institutions as well as the university.

The above broad objectives were operationalised through the nonacademic subjects that were introduced in 1986 with the implementation of the 8-4-4 system of education as well as the additional ones that have been introduced afterward to reflect changing times such as Computer Studies. Thus, more generally, the 8-4-4 secondary education curriculum is organised with a view to promoting the acquisition of knowledge and the development of skills and attitudes in the key areas of communication, mathematics, science, humanities, applied education, and physical education. To a limited extent, appropriate communication skills, which are imparted through the teaching of English, Kiswahili, and some foreign languages, could be considered vocational in that they enhance survival skills. However, it is the applied education subjects-Agriculture, Business and Computer Studies, Industrial Education, and Home Science-that are seen as the centrepiece of the vocational aspects of the secondary school curriculum (Kenya, 1992).

3 Planning for Implementation and Planning Experiences

Planning for Implementation

Planning for the new system of education and its vocational component was influenced by three main factors, namely the education commissions prior

to *The Presidential Working Party on the Second University*; the influence of North America's education system through the commission's chairperson who was Canadian; and the personality of Kenya's head of state whose authority was then virtually unquestionable. *The Report of the Presidential Working Party on the Second University in Kenya* did not give any direction regarding the outlook of the system it was recommending. However, there was an implication to the effect that introduction of the system at the primary and secondary school levels would support the structure of university education, which the Committee recommended, and should comprise four years as opposed to the three years of the existing system. In view of this, the A' level segment of secondary education, which comprised two years, was to be abolished and the two 'A' level years were to be shared between the primary and university cycles as these cycles' duration were lengthened from seven to eight years and three to four years, respectively. In this connection, the Committee's report explains that:

... The Working Party has already recommended the restructuring of the education system following on the dropping of the "A" level segment. It has recommended the lengthening of university education to at least four years. Under the present system, education from primary to university is of at least 16 years duration, and the working party considers this to be reasonable and should be retained. The party appreciated the NCEOP reasoning that primary school leavers should acquire some basic education in addition to numeracy and literacy skills. In order to achieve this, it is considered necessary that the primary school segment should be longer than it is at present. The working party therefore recommends that in order to streamline the education system of the country as a whole the present primary education system be extended from (7) to (8) years. (Kenya, 1981:10)

The curriculum content of the new system was also to be supportive of the role of the second university, which was named Moi University in honour of Kenya's head of state who had commissioned the formation of the Committee. This was to be made possible through the introduction of a vocational curriculum in both primary and secondary education. Among the courses introduced at this new higher education institution were Wood Technology and Information Technology, both of which were to be an important aspect of the 8-4-4 system of education. It was not lost to cynics that this committee's deliberations were highly influenced by its chairman, Professor C.B. Mackay, a Canadian whose country followed the structure of education it recommended for Kenya. His influence was further buttressed by the fact that the terms of reference for the committee he chaired related to working out a mechanism for establishing a university in the Rift Valley province of Kenya, the President's home region. This may explain the speed with which the recommendations of this particular commission received official government approval. Thus, although the hurried nature with which the new system was being implemented was the subject of much controversy and debate, most of this criticism was ignored within official

circles. At some point, parents, teachers, and others who voiced their disapproval of the new system were reminded that the implementation of the system was a presidential decree that had to be followed to the letter.

Implementation Experiences

Following the preparation of the 8-4-4-policy document and the curriculum of the new system, the next step in the implementation of the curriculum was a dissemination of its content. A KIE research report on the secondary school curriculum, which was made public only after the government accepted the criticisms of the 8-4-4 system, is quite candid about the political motive for reform and the political way in which the reform was launched. Notes the report:

. . . It was evident and accepted, through the discussions with the Ministry of Education headquarters' personnel, that the decision to launch the 8-4-4 system at the time it took place (1985) and with the impact it did was political. It was accepted that the idea had emerged from the Mackay Report of 1981. However, the decision to launch it came with a bang. This explains why the then Minister of Education, the Permanent Secretary, the Director of Education and essential others took it upon themselves to travel round the country to legitimize the system by explaining the policy on the new curriculum. The team visited all the eight provinces meeting community leaders and head teachers, carefully explaining the policy and giving information on the general implication of the system. According to some members of that team, there was no retreat to another system but points for clarification could be raised during the meetings. At one point when the public had started giving their views openly, the public debate was closed. Members of the public were therefore left to synthesize any answers for any questions they had. Another interesting dimension is that at the material time, the political system was receiving negative publicity from a significant section of the public. (KIE, 1985:55-56)

The KIE report goes on to state that muzzling the views of the consumer of the new education system was a false start, contrary to the expectation that much of the costs of implementing the vocational aspect of the curriculum was to be a responsibility of parents. It thus came as no surprise that when *The Commission of Inquiry into the Education System of Kenya* (Republic of Kenya, 1999) was appointed to review the system in 1998, the overwhelming majority of Kenyans argued for its abolition for reasons related to its cost, overburdening of learners, and lack of competitiveness in the world education arena, among other reasons. Also disappointing with regard to the implementation of the new curriculum is the fact that it was not piloted, which would have given curriculum developers and implementers the required experience on its most appropriate coverage. Due to lack of its piloting, many mistakes were exposed after thousands of students had gone through the curriculum. Moreover, post-secondary education institutions were not well prepared for the graduates of the

new system, with most not making any adjustments to their curriculum. As a result, mass failures of the first crop of 8-4-4 secondary school graduates were experienced at tertiary education institutions, particularly at public universities.

Inclusion of subjects that were largely practical and vocational in nature in the new curriculum called for different types of human and physical resources. One of the more urgent needs of the new system therefore was in-service training of the existing cadre of teachers to enable them cope with new challenges. Thus in 1986, the government quickly launched a crash in-service training programme for primary school teachers that comprised a training programme of a selected number of subject specialists on the content, methodology, and expected outputs of the new system during a week's workshop. This team of subject specialists was then deployed to their provincial headquarters to train teachers of their respective provinces, again for a week. The teachers benefiting from this training then in-serviced their colleagues at their respective schools. An obvious shortcoming of this scheme was the brief training duration and lack of adequate preparation of the training seminars. Second, because the existing cadre of teachers was inadequate to keep up with the increased load of subjects, the government also embarked on a teacher recruitment drive. As there were no unemployed trained teachers then, the new recruits were mostly professionally untrained. It was estimated that by the time the new system was being introduced, almost half of the teachers recruited to support the system were professionally untrained (KIE, 1995). Thus in addition to the inadequate in-service period, new entrants into the teaching profession did not have the relevant teaching skills, a particularly serious problem in the context of a newly introduced product. A second level of resource mobilisation related to the deployment of additional school inspectors. Both the established and the newly appointed inspectors, however, acknowledged the difficulties of examining the newly introduced subjects on which they had received no training.

The inclusion of the new practical and vocational subjects further called for the provision of relevant infrastructure, namely workshops, laboratories, and books. The government clearly indicated that only the arid and semi-arid areas would receive state support in this regard. Other areas of Kenya had to provide for their own schools in accordance with the cost-sharing policy. This course of action was an unfortunate one, as parents who did not support the introduction of the system simply did not bother to contribute the necessary provisions for schools that their children attended. Also because of the way the system was introduced and the financial difficulties faced by many parents, most schools were unable to put up the required workshops and science laboratories while the few that could put up such structures failed to equip them. The government did, however, intervene with regard to the provision of books by commissioning the Kenya Literature Bureau (KLB) through the KIE to publish

students' books and teachers' guides at affordable prices. Meanwhile, teachers were asked to continue using existing books from the previous system but were to use only those aspects of content that related to the new curriculum. In addition to parents, therefore, teachers were also put under much pressure as their performance was going to be judged by how well their students did in the national selection examinations irrespective of the facilities that they had at their disposal to attain the required standards.

4 Syllabi Content and Input Requirements

Syllabi Content

KIE was mandated to develop curricula for the newly introduced subjects and to make modifications on the existing ones. In addition to promoting self-reliance, the teaching of all the vocational subjects is meant to prepare learners for further education and training. Most of these subjects are taught through a combination of theory and practice and as such, practicals are an essential element of their teaching.

Agriculture

The teaching of agriculture is expected to promote the acquisition of skills for self-reliance in farming. It is viewed as particularly critical for the development of Kenya as agriculture is the main economic activity in most parts of the country. The overall objective of the course is the development of basic agricultural skills relevant to Kenya and the learner's home environment. The subject is meant to have a large practical component to enable learners to acquire useful agricultural practice skills. Among other goals, its teaching aims at reinforcing interest in and awareness of opportunities existing in agriculture by demonstrating that farming is a dignified and profitable occupation. A second aim is to expand the students' knowledge on basic principles and practices in agriculture. The third aim is to develop students' understanding of the value of agriculture to the family and community with a view to promoting self-reliance, resourcefulness, problem-solving abilities, and an occupation outlook in agriculture. Fourth, students who take this course are expected to be active participants in rural development activities while in school. The content of the agriculture syllabus includes crop and livestock production, farm machinery, farm structures, and agricultural economics. Students are also introduced to the practice and role of agriculture in Kenya's economy. Key areas of coverage include soils and soil fertility, water conservation supply and irrigation,

land reclamation, farm layout, principles of crop production, crop parts and diseases, crop production practices, crop types, principles of livestock production, farm power tools, equipment and machinery, farm records, land tenure and land reform, production economics, farm accounts, agricultural marketing, and agricultural organizations.

Business Education

The business education curriculum comprises four courses: Accounting, Commerce, Economics, and Typewriting with Office Practice. These courses have some common objectives. The first is the promotion of learners' general business literacy, basic knowledge, and skills related to self-reliance and employment and their understanding and appreciation of the importance of business activities in society. The second objective is the development of basic accounting skills and desirable attitudes and habits for efficient business operation. The third objective is the promotion of understanding of the role of government in relation to business activities. These common objectives also have some common teaching topics: satisfaction of human wants; economic resources and supply; trade and chain of distribution; forms of business organizations; government involvement in business activities and consumer protection; location of business enterprises; business office; communication; keeping business records; business transactions; ledger and types of ledgers; the cash-book; preparation of final accounts; source documents and books of original entry; types of errors and their correction; end-of-year adjustments; bank reconciliation; evaluation of stock; accounting for incomplete records; partnership and company accounts; nonprofit organizations; and elements of costing and budgeting. Business courses also introduce students to basic concepts of entrepreneurship through practical sessions and organised interactions with the business community.

The three courses also have their specific objectives and coverage in addition to the common ones as follows:

- (a) *Accounting*. The teaching of this course aims at inculcating in learners skills that would help them improve their understanding and appreciation of measurements of business results; operations of economic entities; the importance of neatness and attendance to everyday work; and the value of accuracy in business calculations. In addition to the common core topics of the business education curriculum, students who enroll in Accounting are introduced to business record keeping, bank reconciliation, evaluation of stock, partnership and company accounts, nonprofit organizations, and the elements of costing and budgeting.

- (b) *Commerce*. Commerce aims at improving learners' knowledge, understanding, and awareness of the business environment and their acquisition of business knowledge for general use and for preparing them for self- and formal employment. A second objective is to develop an understanding and appreciation of the role of commerce in improving the standards of living in society and for effective participation in the development of Kenya. Outside the core topics, the commerce syllabus covers transport, warehousing, sales promotion, money and banking, insurance, business finance, international trade, business calculations and financial statements, large-scale organisations, and distribution of commodities.
- (c) *Economics*. The specific aims of teaching economics are to improve learners' understanding of general principles of economics and its role and that of the learner in Kenya's development; regional and international trade; and use of economic data. In this course, students are introduced to the theory of the firm, product market structures, the factory market, national income, population and development, money, banking and public finance, international trade, and economic development and development planning.
- (d) *Typewriting with Office Practice*. This course's specific objectives include promotion of communication and manipulative skills needed for efficiency in an office, appreciation of the purpose and importance of good working habits and procedures in the office, and use of typewriters and other word processing equipment. More practically, students are introduced to typing and word processing equipment, typewriting techniques for various functions, publishing and reproduction of documents, office materials and stationery, sources of information, and filing.

Computer Studies

The Computer Studies course was launched in 1996. Its broad aim is to promote appreciation of computers and the acquisition of skills for using computers which have become an integral element of current and future developments in science and technology (Kenya, 1996). The course has three main aims. The first is the promotion of learners' appreciation of computers and their components including developing basic skills in their safe use and care. The second is improvement of learners' understanding of fundamental concepts of computing and the use of computers in different areas of application including application packages and basic programming. The third objective is enhancement of students' appreciation of the impact of computer technology on society. The topics taught in this course are the computer and its components, use of

computers, basic computer concepts, word processing, programming, fundamentals of spreadsheets, application areas, databases, networks, data communications, and impact of computer technology on society.

Home Science

The Home Science course is the oldest of the vocational subjects. Its main objectives are the promotion of self-reliance and the improvement of the quality of life of learners, their families, and immediate community. The subject is meant to enable learners to acquire and practice principles of hygiene with respect to self, food, and the environment and to develop knowledge and skills in maternal health and child care; skills for selection, use, and care of fabrics for various uses; appreciation of the nutritive value of various foods and the importance of a balanced diet; creative ability in the selection, preparation, and use of a wide variety of foods; basic knowledge and skills in the use, storage, and preservation of foods; and appreciation of foods from different communities, as well as to attain artistic values and appreciation of good designs in clothing, interior decoration, and those related to eating habits. Learners are also expected to develop the ability to understand and adapt to the environmental and social and economic changes taking place around them. Third, those going through the course are expected to acquire some awareness of the sources of consumer information with a view to using this information intelligently in developing their ability to improvise resources when necessary. Fourth, students are expected to acquire skills related to time management, energy and finance in the home, ability to apply principles involved in the selection and care of household equipment and furniture, and relevant knowledge and skills in home science to make items for the home and income generation.

Home Science is taught in five units. Unit one on home management focuses on personal health; homes and their care; environmental hygiene; safety at home; laundering, care, and storage of clothes; methods of providing shelter; lighting and ventilation; fuel use at homes; choice, use, and care of household utensils; and time and energy management. Unit two covers food and nutrition with the main teaching topics including food hygiene, kitchen equipment and tools, food nutrients and related disorders, cooking methods, flour mixtures and raising agents, meal planning and management, use of leftover foods, and food preservation. Unit three centres on clothing and textile, specifically textile fibres, sewing equipment and tools, stitches, body measurements, various types of designs, commercial patterns, clothing construction, repair and maintenance of clothes, and choice of clothes for different occasions. Unit four is on pre- and post-natal care and covers pregnancy and related topics, weaning the baby, and childhood ailments. Unit five is on consumer education and focuses on

consumer awareness, problems of the consumer, consumer buying, budgeting, advertising, consumer protection, and facilities available to the consumer.

Industrial Education

Before the introduction of the 8-4-4 system of education, the teaching of industrial education was limited to 35 selected public secondary schools. The industrial education curriculum is organised around six subjects: Building Construction, Drawing and Design, Electricity, Metalwork, Power Mechanics, and Woodwork. These courses have some joint objectives. The first is development of learners' insights on practical skills and their place in the society. The second is the identification, development, and application of individual talents in practical subjects. The third is the promotion of the learner's ability to interpret and express practical ideas more effectively and to select and use tools to make valuable items using locally available material in solving problems related to the design and construction of projects. The fourth objective is to promote the acquisition of skills and attitudes that will enable learners to select, use, and care for manufactured products in an informed way. As with the business studies curriculum, there are some areas of overlap, particularly in Woodwork and Metalwork where the common topics include safety, building materials, measuring and marking out, separation, and planning. Information related to occupations and further training is covered in all seven courses, which also have their specific objectives and content as follows:

- (a) *Building Construction*. This course strives to develop in students the ability to select and use tools safely; select and use building materials more effectively; be aware of the requirements of building services and finishes; interpret working drawings; and construct functional structures. The course content comprises shelter selection and preparation of sites; foundation types, including laying of foundations and building foundation walls; designing, excavating, and levelling trench bottoms; backfilling openings in walls, roofing, fixings, services, finishes, and external looks; and related drawings.
- (b) *Drawing and Design*. This course is intended to enhance the ability of the learner to: express ideas through the use of freehand sketching and technical drawing; read and interpret working drawings; distinguish between good and bad design with a view to identifying solutions to design problems and to appreciating the constraints involved in designing; and to make simple models using available materials. The main topics covered in this course are principles of design, general communication, use and care of instruments, types of drawings and their applications,

- drawing conventions, symbols and lettering, scale measurements and dimensioning, plane and solid geometry, and orthographic projections.
- (c) *Electricity*. The objectives of this course are to improve learners' ability to acquire skills in the safe use and care of tools and electrical components, materials, and equipment; develop safety awareness related to electrical systems; troubleshoot and repair faults in electrical circuits; and research on and develop individual projects. The topics taught therefore are fundamentals of electricity, safety and workshop behaviour, magnetism and electromagnetism, measuring instruments, electrical machines, domestic installation, semi-conductors, troubleshooting, and circuit analysis and project fabrication.
- (d) *Metalwork*. The objectives of the course are to engender in the learner the ability to develop skills in the safe use and care of materials used in metalworking processes; identify various common materials used in metalworking processes; interpret drawings related to metalwork projects; recognise various tools and equipment used in metalwork; perform accurately any given metalwork activity using correct tools and equipment; and make functional articles to suit relevant design requirements by applying correct metalwork skills and techniques. The metalwork syllabus thus concentrates on the teaching of metal cutting and preparation, sheet metalwork, riveting, forge work, brazing, oxy-acetylene welding, finishing, and related drawings.
- (e) *Power Mechanics*. This course aims at imparting to learners skills that should enable them to develop an insight into and understanding of operations, maintenance, and servicing of power-producing machines and transmitting systems; develop individual talents and use them in desirable skills in the field of power mechanics; read mechanical drawings and interpret information available in service manuals; select correctly, use safely, and care for common repair tools and equipment; identify and solve common problems related to construction and operation of machines and their power transmitting components in a sequential manner; select quality spare parts and replace defective parts; and show desirable attitudes in handling manufactured products. The course content includes topics on related technical drawings; hand tools and their use in fastening devices, riveting, soldering, and oxy-acetylene welding; engine and other energy converters and the disassembly and reassembly of engines; engine bearings, lubricants, gaskets, and engine seals; engine systems and engine troubleshooting; power transmission systems, brake systems, wheels, and suspension systems; chassis and body construction; automobile electrical systems; and physical concepts and law.

- (f) *Woodwork*. This course aims at developing in the learner skills related to proper use and care of basic woodworking tools and equipment; identification of and use of local wood and manufactured wood products; their ability to acquire skills related to constructing functional items; developing awareness of the safety aspects related to personnel, tools, materials, and equipment used in woodworking; demonstrating ability to read and interpret working drawings; appreciate the basic aspects of good design with regard to wood products; appreciate and apply related knowledge to solve problems with woodwork; and understand the importance and demonstrate methods of planting and conserving trees. Outside of the common topics listed above, the other topics covered in this course are cutting holes, shaping, furniture assembly, and finishing and related drawings and designs.

Drawbacks of the Curriculum

The curriculum described above has been faulted for four main reasons (KIE, 1995, 1999). First, some of its objectives are virtually unachievable in the face of available resources. A second problem relates to many overlaps across subjects. For example, the agriculture syllabus repeats many topics covered in biology, chemistry, geography, and business education. Likewise, all the business education courses duplicate up to half of the curriculum content of the other courses in this cluster. There are also some repetitions among the industrial courses; the whole Drawing and Design course is repeated in the other industrial courses. Overlaps are also observable across the three levels of education: primary, secondary, and university. The question of overlap in course content is significant given that most students enrolled for these subjects often take other subjects offering the same coverage. This leads to the third problem identified by teachers on the sequencing of the syllabus content: in some cases, there is little logical progression from one subject to another. Sometimes, difficult material is taught before students are introduced to simpler and more basic content. In other cases, material already taught in primary school is also offered at the secondary level and for some subjects such as Home Science, Commerce, and Economics, some content has been viewed as better suited to university education.

In addition, the vocational curriculum has been criticised for being obsolete and not responsive enough to the needs of local, national, and regional markets. This is tied to its failure to keep pace with changing times and the tendency to promote knowledge that is unfamiliar to learners. Some of this knowledge is

also obsolete, as most schools do not have equipment that is needed to teach newly emerging knowledge in some of the vocational areas. Nor are teachers adequately prepared to convey such developments. Thus, the above objectives and content have proved difficult to implement for their being unrealistic and almost unachievable by most schools as more is being targeted than can be achieved given the available resources at the school level.

In view of the above and as a result of complaints by parents and educationists (Kenya, 1999), MoEST has recommended a revision of the primary and secondary education curriculum. In a June 14, 2002, press release, Education Minister Henry Kosgey (Kenya, 2002) noted that evaluations of the 8-4-4 system in 1990, 1995, and 1999 '... have shown that the curriculum was too broad and there was need to review and rationalize it. It was not therefore feasible to fully realize the expected objectives. In 1991 the curriculum was revised and an attempt made to reduce and reorganize the content in the various subject areas. The number of examinable subjects per student in secondary schools was reduced from 10 to 8. Despite these measures the school curriculum continued to be overloaded in subject content with overlaps across subjects and levels. It was also demanding in terms of books required to implement the curriculum and the households found it difficult to meet the cost of learning materials for their children. The reports also indicated that the curriculum at both primary and secondary schools was not meeting the needs of the learners fully and needed to respond to the needs of changing society. Following the foregoing a national survey was carried out in 1999 which has resulted in the reduction of subjects in primary schools from 13 to 9 and in secondary schools from 35 to 14. . . ' The revised secondary education curriculum will include mathematics, English, Kiswahili, biology, chemistry, physics, geography, history and government, religious education (Islamic, Christian, Hindu), and physical education. Thus all the industrial subjects and Computer Studies will not be offered under this new curriculum beginning in 2003 and secondary schools with industrial education equipment have been asked to turn them over to technical training institutes. Although not so widespread, complaints have been raised on the wisdom of doing away with vocational education altogether in the face of the educated unemployment problem as well as on the cost-efficiency of the move given that Kenya Technical Teachers College (KTTC), Kenya Science Teachers College (KSTC), and Moi University will continue to train teachers for these subjects and that already many teachers are employed to teach them in secondary schools (Kavagi, 2002). There are those who argue that what is needed is to redesign a vocational education curriculum that is affordable and more in tune with changing times. In this connection, the withdrawal of Computer Studies has been particularly contentious.

Table 6.1 Timetable allocation for vocational subjects (2002)

Subjects	Weekly lessons (theory)		Weekly lessons (practical)		Approximate # of lessons per 4 Years (theory & practical)	Total time in hours (4 years)
	Forms 1–2	Forms 3–4	Forms 1–2	Forms 3–4		
Agriculture	3	5	Same periods	Same periods	598	379
Business studies	3	4	Same periods	Same periods	462	308
Computer studies	3	5	Same periods	Same periods	598	598
Industrial education	2	2	2	2	528	352
Home science	3	5	Same periods	Same periods	598	399
9 subjects	45	45	Same periods	Same periods	1,485	990

Source: Ministry of Education, Science and Technology (2002).

5 Teaching Time and Methods of Delivery

Teaching Time

The time allocation for the teaching of vocational subjects is shown in Table 6.1. The table gives an indication of the number of periods per week each of the vocational courses is supposed to be taught for as well as the estimated total number of hours it would be taught for after four years of secondary education. It is also apparent that each vocational subject is allocated between 7% and 11% of the total time available (45 periods) for all 14 subjects offered at the secondary level. It is not possible to estimate the actual amount of time taken up by all vocational subjects in each school as none offers all of them and given that students can select only one for specialisation in forms 3 and 4. It is also clear that Home Science, Agriculture, and Computer Studies courses are allocated the most time of the vocational subjects. During the four years of secondary education, a student enrolled for these subjects is taught for up to 598 forty-minute periods and almost 400 hours. Each of the industrial courses is allocated up to 528 forty-minute periods and just over 350 hours. Business studies courses have the lowest time allocation at 462 periods and 308 total teaching hours in four years. For the industrial subjects, a clear distinction is

made between time allocation for the theory and practical periods with two of each per week. This notwithstanding, much of the teaching for these subjects tends to be theoretical in the absence of adequate equipment and workshops. For example, a KIE formative evaluation report (KIE, 1995) shows that although 3,131 workshops were needed for complete coverage of all the schools offering vocational subjects, only 1,788 (57%) were in place in 1991. According to the MoEST inspector for technical subjects (no recent data are available), the situation has not changed significantly from that of the early 1990's. With regard to Home Science and Computer Studies, some schools allocate an extra period each week. For Home Science, this is because the syllabus is too wide, while for Computer Studies it is more because of the keen interest many students have in the subject.

A major complaint by the teachers interviewed is that the time allocated for both the theory and practical teaching is hardly enough for effective teaching of most vocational subjects. The problem is most acute for Agriculture and Home Science. According to teachers of the two subjects, the syllabus of the two courses is too broad. The situation is exacerbated by the perpetual shortage of relevant facilities and equipment for effectively teaching the many practical components of the syllabus supposed to be undertaken through-out the duration of teaching the two courses. In fact, in the case of Agriculture, teachers noted that the requirement of handling so many practical sessions could hardly be met because most schools lack farm tools and plots (especially those located in urban areas) on which to use them. Instead, the majority of schools have only small-sized demonstration plots (the average is about one plot of 10 square meters), which are mainly used for the examinable practical projects by final-year students.

Methods of Delivery

In the absence of adequate time to cover the syllabus, the pressure to excel in examinations has forced most teachers to use more of their free time at nights and weekends for the teaching of the practical component of vocational subjects. Although this is the case for most subjects, the problem is particularly serious for subjects that have a practical component, in particular Home Science and Agriculture. This is the evidence provided by a KIE research report (KIE, 1999) and corroborated by all the Home Science and Agriculture teachers interviewed in seven of the schools offering these subjects among those that were visited. In other cases both teachers and students give up some of their vacation time to teach these and other subjects. Other strategies used by teachers of these and other subjects include early morning lessons, giving too many assignments

to students, rushing over topics, drilling students and concentrating on what is likely to be included in the KCSE, teaching practical work theoretically, and using group, team, and block teaching. According to students, parents, and teachers, the major drawbacks of extra-timetable teaching are that students tend to experience exhaustion and stress, are denied time to socialise with peers and parents and for entertainment, are exposed to insecurity, and are more likely to engage in irresponsible behaviour. Extra tuition is also unpopular with parents as it increases the cost of education (KIE, 1999).

Some of the teachers interviewed suggested that industrial subjects should be allocated at least six lessons (instead of four) each week. Two of these lessons would be for the theory part of the syllabi while four would be for the practical lessons. In the case of Home Science, teachers did also explain that the assumption that students would have adequate time to practice the subject at home hardly holds as most girls' schools that offer this subject are boarding institutions. Of the vocational subjects, business education courses were said to be the least demanding from the point of view of mounting them and the time they require for teaching. The only exception here is Typewriting with Office Practice, which requires students to practice typing during their free time; however, time constraints are not nearly as serious as they are for Agriculture and Home Science.

A number of teachers have sought innovative ways to make the teaching of some vocational subjects more attractive to their students in the absence of adequate teaching/learning resources. For example, at Kagwe Girls in Kiambu, one of the top-performing schools in Commerce in the 2001 KCSE examination, the Commerce teacher uses a number of strategies including arranging visits to commercial enterprises such as banks, post offices, and local trading centres and markets; demystifying the mathematical aspect of the subject by simplifying relevant mathematical calculations and using familiar life experiences as examples; and administering regular continuous assessment tests. In Accounting, Starehe Boys Centre has introduced a post-secondary diploma-level training for interested students in accounting while some of the industrial subjects' teachers make an effort to use locally available materials and organise tours to agricultural and other trade exhibitions. For most subjects, some teachers invite guest lecturers to cover specific topics in which they possess relevant experience. In Home Science, some teachers organise visits to food processing factories, hotels, and relevant university departments, among other initiatives. Finally, some teachers of all vocational subjects in schools located in or near Nairobi organise a system whereby their students spend time with professional persons for a whole day(s) as a way of being mentored.

6 Input Requirements

Teachers

The introduction of the 8-4-4 system of education resulted in a situation whereby teacher-training institutions could not match the demand for vocational subject teachers, particularly those for industrial subjects as more schools introduced these subjects in 1986. Thus, the number of schools offering industrial courses for the secondary school leaving examination rose from 44 in 1987 (the last year the old secondary school curriculum was examined) to 1,024 in 1989 (the first year 8-4-4 graduates did the KCSE examination). For individual subjects, the respective increases were 4 to 289 for Building Construction; 4 to 142 for Drawing and Design; 5 to 187 for Electricity; 11 to 167 for Metalwork; 5 to 116 for Power Mechanics; and 12 to 250 for Woodwork. As a result, many of the schools that opted to offer industrial courses had to do with untrained technical teachers who had been trained in the technical institutions and national polytechnics. Unlike KTTC, KSTC, and other diploma college graduates, these untrained teachers had not received any training on pedagogy, nor could they be utilised for the teaching of related science subjects. Official MoEST statistics show that as of 2001, more than 90% of the teachers in Kenya's secondary schools were trained (Kenya, 2001). Data from the Teachers' Service Commission (TSC), however, illustrates that most of the teachers available for the vocational subjects have either diploma- or certificate-level qualifications as Table 6.2 demonstrates. Part of the problem is that no industrial education teachers have been trained at KSTC and KTTC since the mid-1980's while the TSC has not recruited industrial education (IE) teachers since 1997.

The data available is for five subjects: Accounting, Agriculture, Computer Studies, Home Science, Metalwork, and Woodwork. Out of 2,9161 teachers of these subjects, fewer than half or 1,339 (41%) have university-level qualification; 1,225 or 37%, diploma-level qualification; and a further 712 (22%), certificate qualification or below. Woodwork has the most teachers with certificate- or secondary-level qualifications (37%), followed by Agriculture (29%) and Metalwork (18%). It is not surprising that the industrial subjects have the fewest university-educated teachers. Except for Wood Technology, which is offered at Moi University, the others are not taught in the public universities, while training at KSTC has stopped for all vocational subjects except Woodwork. That up to 29% of the Agriculture teachers have certificate qualifications or below is also not surprising given that Agriculture teachers are mainly trained at diploma level at only one public university, Egerton University, and because of this the subject has the highest demand for teachers of all the vocational subjects. There are more schools offering Agriculture (3,122) in Kenya than

Table 6.2 Qualifications of teachers of selected subjects (2002)

Subject	Teacher qualifications					
	D Degree	Diploma	Certificate/ other	Total	Total qualified	% Qualified
Accounting	207(54)	137(36)	37(10)	381	344	90%
Agriculture	614(35)	637(36)	522(29)	1,773	1,251	71%
Computer Studies	6(67)	3(33)	0(0)	9	9	100%
Home science	498(90)	357(52)	97(10)	952	855	90%
Metalwork	1(16)	17(77)	4(18)	22	18	82%
Woodwork	13(9)	74(53)	52(37)	139	87	63%
Total	1,339	1225	712	3276	2564	78%

Source: Teachers' Service Commission (TSC).

Notes: (1) Data on other subjects is unavailable as of now; (2) Figures in parentheses are percentages.

any other subject. It is also clear from this table that even though Computer Studies has the highest percentage of qualified teachers, they are very few indeed. This is because persons qualified to teach this course are likely to find employment opportunities outside of the teaching profession. Teacher shortage is not a serious problem for vocational subjects except in Agriculture, Commerce, and Computer Studies where there were 588, 442, and 121 vacancies respectively as of July 2001. In the same year, there were 20 vacancies in Home Science. Industrial subjects are relatively better off as only Woodwork has a substantial number of vacancies (18) while there are 7 in Electricity and 1 each for Metalwork, Building Construction, and Power Mechanics. This is the case because there are more teachers trained in these subjects than are in demand by schools. Only a negligible number of Kenya's secondary schools teach these subjects. As is evident from Table 6.3, the subjects most hit by teacher shortage are English, Mathematics, Kiswahili, and the sciences.

Workshops, Equipment, and Consumables

Except for accounting, commerce, and economics courses, all the other subjects require workshops, which are well equipped with appropriate practical learning materials.

Table 6.3 Secondary schools summary of vacancies (2002)

Subject	Vacancies	Subject	Vacancies
English	908 (14.5)	Metalwork	1 (0)
Mathematics	756 (12.0)	Building construction	1 (0)
Kiswahili	790 (12.6)	Power mechanics	1 (0)
Biology	469 (7.5)	Electricity	7 (0.1)
Physics	631 (10.1)	Drawing and design	8 (0.1)
Chemistry	511 (8.2)	Aviation technology	0
History	289 (4.6)	Computer studies	121 (1.9)
Christian religious education	130 (2.1)	French	51 (0.8)
Islamic religious education	28 (0.5)	German	5 (0.1)
Physical education	2 (0)	Arabic	18 (0.3)
Social education & ethics	0	Music	29 (0.4)
Geography	263 (4.2)	Accounting	75 (1.2)
Home science	59 (0.9)	Commerce	588 (9.4)
Art & design	20 (0.3)	Economics	27 (0.4)
Agriculture	442 (7.1)	Typing with office practice	12 (0.2)
Woodwork	18 (0.3)		
Total number of vacancies 6,258 (100)			

Computer Studies

The needs for this course are listed as physical facilities which include a computer laboratory/classroom; at least one computer for every two students and one printer to every four computers; printing stationery; blank diskettes and storage for diskettes; and software appropriate for the curriculum. All computers should be IBM compatible. These requirements are unattainable by a majority of Kenyan schools as a result of which only privileged private, established provincial, and national schools might be in a position to offer this course to their students. Thus, the less endowed schools that opt to offer this subject largely depend on donations of usually obsolete models of computers, which are housed in poorly built computer laboratories or in a small section of a normal classroom. The relatively high cost of the equipment needed and lack of qualified teachers, maintenance technicians, and electricity account for the fact that only 2% of the schools that register candidates for the KCSE offered this course in 2001. Those schools that can afford the equipment required for this

subject, however, especially the high-cost private schools located in Nairobi, have done quite well in the subject. In fact, because the ability to afford the required equipment and teaching resources is critical for good performance in the subject, it is hardly any surprise that for the 2001 KCSE Computer Studies examinations, 7 out of the 10 top schools happen to be situated in Nairobi and its close environs. These schools are Strathmore College, Starehe Boys' Centre, Dagoretti High School, Pangani Girls, Loreto Convent Limuru, Alliance Girls' High School, and Mary Hill School. The outsiders were St. Joseph Ramogi, Precious Blood Kilungu, and Friends School Kamusinga. Box 6.1 below

Box 6.1 The Attractiveness of Computer Studies at Strathmore College

Strathmore College is a private boys-only day school located in Nairobi. It was the overall top performing school in the KCSE examination in 2001. It has led in Computer Studies in the KCSE examination for the past two years. Like most top Kenyan schools, Strathmore limits the vocational subjects offered to the barest minimum. Out of a possible 15 vocational subjects, the school teaches only Computer and Business Studies. In fact, the head teacher indicated that even those two subjects are popular among students because they improve their overall KCSE grade, not so much due to their vocational appeal. In fact the Commerce teacher was surprised by our allusion to Commerce as a vocational subject. Nevertheless, the Computer and Business Studies teachers explained that there are other reasons why this subject is particularly popular with their students. One of them is the perceived occupational success of Strathmore students who have excelled in information technology (IT)-related careers both during and after their stint at the school. For example, out of the current class of 20 students, 7 of them have part-time jobs with city computer firms. In fact, almost all the students enrolled for the course find employment immediately after they graduate from the school as they await entry into the university. Some students even opt not to pursue further education, preferring instead to settle for trainee positions in the information and computing technology sector. Many of those who join the university also have opportunities for attachments with computer firms where they are employed on graduation. The Strathmore students enrolled for the computer course are motivated by a host of other factors. Most of them have a very good background in the sciences and mathematics, have a computer to themselves at school, and come from homes where they have access to computers and where computers and the IT revolution are familiar discussion points. In addition, students enrolled for the course have access to the computer laboratory as long as they wish and have a teacher who is an MIT graduate to guide them through their computer work for both school-related assignments and their own personal projects.

summarizes some of the factors that enhance the popularity of Computer Studies at schools such as Strathmore College based on interview with teachers at this school.

Industrial Subjects

The requirements for these subjects are a workshop, workshop machines, and hand tools. The demands vary from course to course, with the most expensive to equip being workshops for Power Mechanics, Metalwork, and Electricity. In the case of Power Mechanics, for example, some of the recommended machines that are unaffordable by most schools are single and multicylinder engines, compressors, and drills, among others. Even for Woodwork, most schools offering it lack standard equipment such as planers and circular saws. Other demanding courses, more because of the number of items that need to be purchased by schools that offer them and not so much because of costly individual items, are Woodwork, Electricity, and Drawing and Design. Woodwork was offered by 5% of all schools in 2001 while only 2% offered Electricity in the same year. The least common vocational courses are Metalwork and Power Mechanics due to the high cost of starting and maintaining them. As with Computer Studies, all industrial subjects require the availability of electricity. In 2001, for example, only 312, 368, and 497 candidates entered for the KCSE examination in Power Mechanics, Metalwork, and Electricity, respectively. Not unexpectedly, Kabarak High School, a national secondary school patronised by Kenya's head of state, led in terms of both number of candidates entered and performance in the KCSE examination in this subject (Figure 6.1).

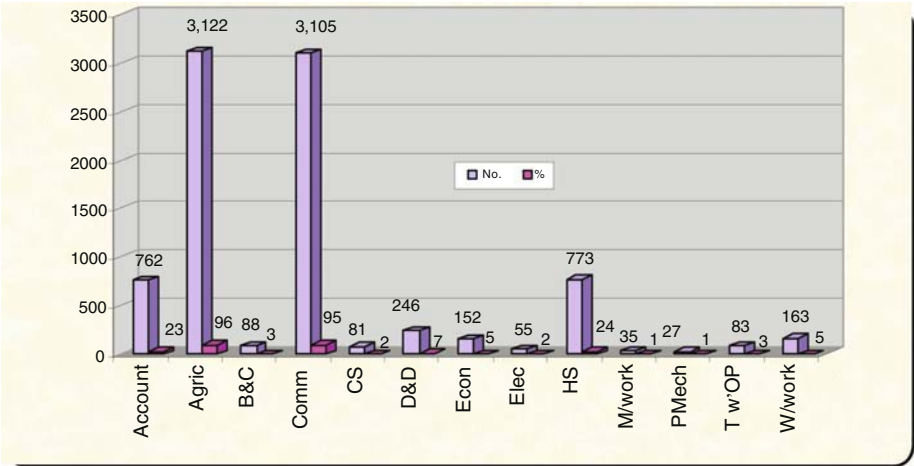
The low enrollment in these subjects has been the trend during the past 11 years or since the introduction of the vocational subjects in the formal school curriculum as demonstrated in Table 6.6. Other schools offering and excelling in these subjects are the former industrial schools such as Nyandarua, which enrolled 17 candidates for the KCSE examination in 2001 when it was the top-performing school. All the former industrial schools are adequately equipped to teach industrial courses. Box 6.2 illustrates the privileged position of Nyandarua and other such schools. Some schools offering the industrial subjects may have the basic equipment but no workshops for practical lessons. As a result, teachers have to organise a system of sharing the available workshops between a number of subjects while others who lack both workshops and basic equipment resort to teaching the subject theoretically. As of 1991 when data on the workshop situation in secondary schools was available, almost 47% of the schools offering the practical vocational subjects had no workshops.

Box 6.2 The Privileged Position of Nyandarua High School's Metalwork Students

Nyandarua High School is a mixed provincial boarding school situated in Nyandarua district, Central Province. The school topped other schools countrywide in the Metalwork portion of the 2001 KCSE examination. Metalwork as a technical subject is not new in the school. Long before the inception of the 8-4-4 system, the subject was being taught. The school has been able to build confidence in the learners fashioned on this tradition, bearing in mind that it is the only school in Nyandarua district that offers Metalwork and most of the boys are serious about making use of a chance they perceive as golden. According to the majority of students, they opt for Metalwork due to their inclination to the subject, having been introduced to its rudimentary skills while in primary school through Art and Craft in which they performed well at the Kenya Certificate of Primary Education (KCPE) and hope to do even better. Unfortunately, Art and Craft as well as Home Science and Agriculture are currently not examinable at the KCPE level. According to students, good performance in the subject has been driven by their career aspirations and relevance of the subject to their lives. Many aspire to be engineers, noting that the country needs technically skilled manpower. As a springboard to the attainment of their goals, learners opt for Metalwork. The presence of a state-of-the-art workshop up to the standards of most Kenyan schools has greatly boosted learners' morale. On their part, the teachers attribute their success to the spirit of cooperation espoused by the administration. It has remained awake to the needs of the subject by providing training materials despite the fact that these materials are very expensive with yearly expenditure estimated at Kenya Shillings 150,000 (US\$ 1,900). Teachers always endeavour to cover the syllabus in good time especially for the theory part while emphasising accuracy, which is vital in project work and which students take seriously. Apart from the industriousness of teachers and learners, in the words of one student, 'the subject breaks the monotony of listening to the teachers in class because the subject entails project work which is interesting and fulfilling'

Agriculture

The main requirements for teaching the Agriculture course are land for farming and raising livestock, farm machinery, hand tools, and seeds and plants. This is the most popular subject offered in Kenyan schools as evidenced by the fact that 96% of all schools registering candidates for the KCSE examination offered it in 2001. Commerce is a close second as 95% of the schools offered it



Source: Kenya National Examinations Council (KNEC) (2002)

* The total number of secondary schools is 3,272.

Key:

Account = Accounting

Agric = Agriculture

Comm = Commerce

CS = Computer Studies

D&D = Drawing and Design

Econ = Economics

Elec = Electricity

HS = Home Science

M/work = Metalwork

PMech = Power Mechanics

T w'OP = Typewriting with Office Practice

W/work = Woodwork

Figure 6.1 Number of schools* offering vocational subjects (2002)

in the same year. Apart from the fact that it is easily identifiable with most of Kenya’s rural population, the popularity of Agriculture has a lot to do with the fact that the amount of land required for teaching the practical aspect of the subject could be a few square metres and because no demands are placed on schools to purchase expensive machines such as tractors and ploughs. The subject is, however, not particularly popular in urban centres. In fact, where urban schools register students for it, their performance in the KCSE examination is on average poorer than that of rural schools. Thus, none of the top-performing schools in this subject at the KCSE examination happened to be located in large towns such as Nairobi or Mombasa (KNEC, 2001).

Home Science

For Home Science, the main requirements are a workshop, cooking equipment, sewing machines, worktops and other tables, a refrigerator(s), a sofa set(s), iron boxes and ironing boards, and related equipment. A Home Science laboratory is almost half as expensive as a computer laboratory but much

less expensive than the industrial subjects' facilities. As with these other subjects, a reliable supply of electricity is essential. This, in addition to the cost of the equipment and inadequate supply of teachers, contributes to the fact that although this subject was introduced long before the beginning of the 8-4-4 system of education, it is offered by only 24% of the total number of schools that registered students for the KCSE examination in 2001.

Typewriting with Office Practice

This course is also relatively demanding as any interested school has to have a typewriting workshop, at least one typewriter for every two students, computers for those schools that can afford them, and appropriate stationery. Where schools use electric typewriters, a reliable supply of electricity is a must. As a result, this subject is offered by only 3% of all the schools that registered students for the KCSE examination in 2001. The course is therefore the least popular in the business education cluster as it is the only one demanding expensive infrastructure. Economics is also relatively unpopular as only 5% of schools offer it. The subject is viewed as a hard option. In fact, performance of students in this subject is one of the poorest among the optional KCSE subjects. On average, performance is poorest in the sciences and other compulsory subjects, namely Mathematics and English, partly because of the large numbers that enroll for these compulsory subjects, poor preparation in primary education, and lack of adequate qualified teachers in most schools. Table 6.11 conveys information on examination performance by subject. For both the 2000 and 2001 results, performance in all vocational subjects except the business studies courses of Economics and Commerce is on average better than that of all other subjects with the exception of foreign languages (Arabic, French, and German), Social Education and Ethics, and History and Government. Except for Home Science, boys perform better than girls in all vocational subjects. Economics and Commerce appear to be the harder options among the vocational subjects but even for these subjects performance is generally higher than that of the compulsory subjects and the sciences.

Textbooks

In addition to limited infrastructure for most of these subjects, there is the problem of inadequacy and inappropriateness of the textbooks available for use by students and teachers. For some subjects such as Computer Studies, there are no recommended official textbooks, so the more creative teachers have to identify possible textbooks and other teaching/learning materials. While this may not be a serious problem for teachers in major urban centres, and especially

Box 6.3 The Difference that Lack of Infrastructure Makes: The Experience of Friends School, Bukembe

Friends Secondary School, Bukembe, is a mixed day and boarding school located in Bungoma district, Western Province. The school offers Woodwork as a vocational subject but has the reputation of performing dismally in this subject over the years. The main reason is the lack of basic tools, equipment, and learning/teaching materials such as textbooks. Tools that are available are poorly maintained and in bad condition. Faulty consumable materials such as poor quality and defective timber and screws used for practicals contribute to poor performance. Also lacking is a full-fledged Woodwork workshop. This has affected overall performance in the subject because students do not have access and adequate exposure to requisite learning experiences for the attainment of the stated instructional objectives. The adoption of poor and unprofessional pedagogical approaches that place more emphasis on theoretical knowledge has resulted in generally incomplete coverage of the Woodwork syllabus. Teaching has been selectively conducted, with emphasis on areas likely to be covered in the examination. Through this approach, teachers have short-changed their students in terms of covering the syllabus. During the practicals, teachers explained that lack of patience and keenness during the cutting of joints, preparation of surfaces, and finishing application has resulted in poor workmanship, which in turn causes poor grades in practical examinations. Selection of students who scored low marks in the KCPE has further lowered their chances of performing well in the subject. Their generally low aptitude level has had a negative influence on their performance. Partly as a result of this, a majority of students have negative attitudes toward the subject; few recognise its relevance. Woodwork is viewed as a subject for academically challenged students and many students therefore do not imagine how one can study all the way [**... imagine why one would study hard to get to high school just to study Woodwork'?**] to high school to study Woodwork. This negative mentality toward the subject has affected performance and applicability of skills gained at school for earning a living. Since Bukembe is located in an area where it draws its students, one would expect to witness small business ventures around the school's catchment zones. However, a visit to the carpentry workshops in nearby market centres revealed that learning of woodwork skills at the school has not had any impact in the area.

Nairobi, it is a key challenge for teachers in remote rural locations. Where textbooks are available, they are often in short supply. This is less of a problem, however, in the high-cost and national catchment schools or in the provincial

and district schools that are managed by religious organisations, particularly the Catholic Church. In these schools the recommended textbook:student ratio of 1:2 is more than achieved. In the less endowed schools, this ratio can be as high as 1:6. However, even for courses for which textbooks are available, there is a serious problem with their quality. Most teachers complained about the numerous mistakes regarding the content and typing errors in the KIE-recommended textbooks, yet these books are used not only by teachers and students but also by examiners. Some teachers also told us that these KIE-published books often confuse students who confront teachers with facts they claim are true because they appear in a book recommended for their use by the KIE. There is also a serious problem with regard to the availability of reference books, which are, however, a luxury for most secondary schools. In addition, some of the textbooks available for industrial subjects are foreign published and thus not the most appropriate for the Kenyan environment. Box 6.3 below demonstrates how the lack of facilities could hamper the performance and popularity of vocational subjects.

The location of Bukembe secondary school in the neighbourhood of a number of market centres where there are various types of workshops may not necessarily be an advantage for vocational subject graduates of these schools for two main reasons. For one, the workshops are small family enterprises, which cannot afford to hire trained artisans. Proprietors would rather train their own relatives on the job. Second, students themselves generally look down upon these local workshops, preferring instead to look outside their respective home locations.

7 STS and Financing of Vocational Education

Costs of Teaching Vocational Subjects

Depending on the subject, the cost of teaching most vocational subjects is on average higher than that of teaching all science subjects which are comparable to them from the point of view of the basic teaching/learning resource needs. The main examination costs of teaching vocational subjects relate to workshops and workshop equipment; teachers; textbooks; small class sizes; and examination of practical subjects.

Workshops and Workshop Equipment

All the vocational subjects with the exception of the business studies courses need workshop facilities for teaching the practical aspects of the curriculum. In

Table 6.4 Estimated costs of a science laboratory and workshops (US\$)

Subject	Cost of building workshops	Cost of equipment (usable for 5–10 years)	Consumables (yearly)	Estimated student places (based on KCSE entries)	Estimated per-student cost (5-year period)
Computer studies (private, high cost, Nairobi)	20,000	25,000	2,000	17	553
Home science (public, low cost, Bungoma)	40,000	25,000	500	22	600
Industrial (woodwork) (public, Nairobi)	25,000	10,000	1,000	19	379
Science laboratory (chemistry) (public, Meru)	30,000	10,000	1,000	90	91
Standard classroom (Kiambu)	5,000	1,500	200	40	35

Source: MoEST and school-level data (5 schools) (2002).

Notes: (1) 1 US\$ = KES 78 as of June 2002; (2) The estimates for the computer facility are for a top-of-the range private school. The average cost in a public school would be about 1/2 of the cost of this high-cost private Nairobi school; (3) Construction and equipment costs are on average 10% higher in the rural than urban areas; (4) a Woodwork workshop is much cheaper to set up and maintain than those of other industrial subjects.

almost all cases, the cost of setting these workshops up and equipping them is higher than that of similar facilities for the sciences. As Table 6.4 shows, the cost of a Computer Studies laboratory and a Home Science room is much higher than that of a Science (Chemistry, Biology, Physics) laboratory. Home Science and computer laboratories are also almost twice as expensive as science laboratories to equip. However, the annual costs for running a Home Science room are far lower than that of other subjects. Although some industrial subjects such as Power Mechanics and Metalwork can be quite expensive to equip schools for, these subjects are a rarity in most Kenyan schools and thus their comparison with the more common subjects such as Home Science may not be justified.

The same is true of Computer Studies. The maintenance cost of the vocational subjects' equipment is also higher than that of science equipment. In the case of Home Science and Computer Studies, cookers, refrigerators, and other electric power equipment and computers often break down partly because many students are being exposed to their use for the first time and because of electric power fluctuations. Moreover, these items of equipment call for more security and thus the additional costs of metal grills and salaries for security personnel. On the contrary, science equipment is less amenable to theft and experiences longer life spans. Also clear from Table 6.4 is the fact that subjects that require no workshops but normal classrooms are much less expensive to teach than those that do.

The Cost of Teachers

Science teachers are more expensive to employ than their counterparts in vocational subjects. In a bid to encourage science graduates to join the teaching profession, the government has introduced a monetary incentive amounting up to 30% of the graduate teachers' basic salary for science teachers and teachers of compulsory KCSE subjects such as English, Mathematics, and Kiswahili. Included in this category are teachers of Agriculture, Typewriting with Office Practice, and Accounting. These privileged teachers enter the graduate teacher-salary scale three salary points above the minimum. Science teachers also have more salary raises and chances of promotion than their counterparts teaching vocational subjects. However, depending on the school in which they are teaching Computer Studies, teachers in private schools earn higher salaries than most science teachers. Some public schools also introduce some incentives for their computer and business education teachers through PTA contributions. Second, vocational subject teachers may on average be more expensive to train than science teachers. This is because a good number of them first enroll for a three-year diploma course in a technical institute or diploma-level college followed by a two-year diploma course in education to enable them to gain relevant pedagogical skills. Most science teachers, on the other hand, hold either a three- or four-year university degree while many others hold a three-year teaching diploma. A third factor that may make teachers of some vocational subjects more expensive to retain is the fact that on average they teach fewer classes than their science counterparts. In fact, because vocational subjects are optional for the KCSE examination, some lessons meant for these courses are allocated to other subjects for which there is more demand by students. In some schools, therefore, some vocational courses teachers end up having paid free time. However, in the better-managed schools, head teachers allocate them other responsibilities outside of teaching such as management of clubs,

school maintenance, and student catering. In other cases, some of the vocational education teachers are trained to teach other subjects.

Cost of Books

For most secondary school subjects, the cost of the textbook cost is equivalent to about US\$ 3–4. Of the vocational subjects, only books for Agriculture, Commerce, and Economics and to some extent those for Accounting fall within this category. The cost of most vocational textbooks is raised by two main factors. First, books for virtually all these subjects with the exception of those for business studies and Home Science are imported. As a result, some books for industrial subjects, Computer Studies, and Typewriting with Office Practice may cost as much as US\$ 10 apiece. This is particularly the case for reference materials. Second, because of the small number of students enrolled in the vocational subjects, local book publishers show little interest in publishing vocational subject texts. Those who do, retail them more expensively than texts of the more popular subjects. Third, because of the variety of the subject matter and relatively unestablished tradition with vocational subjects as well as an absence of commonly agreed-upon textbooks, there tend to be more reference books recommended for the vocational subjects than is the case for comparable science subjects, which further raises the cost of teaching these subjects. Nevertheless, the small numbers of students registered for these subjects means that they have more access to the available textbooks once they have been bought. In even the less privileged schools, student:textbook ratios are usually lower (2:1) for vocational subjects compared to an average of 6:1 for other subjects, particularly the compulsory core ones (English, Mathematics, Kiswahili).

Class Sizes

On average, class sizes of vocational subjects are smaller than those of science courses. For example, while the mainstream sciences enroll an average of at least 30 students for the KCSE examination, except for Commerce and to some extent Accounting, all the other vocational subjects enroll fewer than 20 students and in some cases even fewer than five candidates. (See Table 6.5.) This is because whereas students are required to enroll for at least one science subject for the KCSE examination, all vocational subjects are optional. Second, the building of workshops and procurement of equipment has greatly contributed to curtailing the number of schools that could offer the applied vocational subjects. Whereas most established secondary schools had science laboratories built by either the government or donor organizations in the pre-cost-sharing days, some established and almost all schools built after the introduction of

cost-sharing find it hard to build and equip vocational subject workshops because this burden has been shifted to parents. The small numbers involved have made the government want to remove the industrial subjects from the curriculum. The question is whether such small numbers of students merit the high investments in infrastructure and human resources. This question is now at the centre of MoEST discussions related to removing vocational subjects, especially the industrial courses, from the curriculum.

Cost of Examining Vocational Subjects

Wasanga and Ingolo (2001) further point to the cost of examining practical projects that is not the case for other subjects. First, practicing teachers assigned to assess several schools may stay away from their students for long time periods, yet they are being paid to teach. In practice, such teachers end up drawing two payments over the same time period. Second are the costs related to printing and distributing relevant assessment documentation, transportation, and paying for the assessors' professional fees when projects have to be assessed. It was not possible to get any estimates of the cost of examining vocational subjects from KNEC. Some MoEST officials and teachers have expressed their doubts as to whether these expenses are justified by the very low proportion of the marks awarded for practical projects.

Financing of Vocational Education

The financing of vocational courses is a shared burden between the government and parents. The government pays for the salaries of teachers that are now accounting for upward of 90% of the total recurrent expenditure on secondary education. Parents on their part meet the costs for buildings, equipment, books, and consumables. In some cases, parents donate computers for the Computer Studies course and machinery and tools for some of the industrial courses. In addition to direct contributions by parents, schools have introduced a variety of levies in addition to the school fees. However, the rate of collection of both school fees and these levies is quite problematic for most schools, many of which receive less than 75% of the expected collections from students (Karani et al., 1985). The situation has not been helped very much by the political declaration that no child should be sent home for lack of school fees as well as the placing of official limits on the amount of fees school heads can collect from parents. This situation does not augur well for the teaching of vocational subjects in two main ways. First, since a school's ability to raise funds determines the quality of the teaching/learning facilities available to it, most schools, especially those in remote rural areas, are bound to offer vocational education of

Table 6.5 Students entered for the various subjects in the KCSE examination

School	English	Kiswahili	Math	Biology	Physics	Chemistry	History & Government	Geography	Christian religious education	Social education and ethics	French	German	Home science
Kambandi	17 (12.3)	17 (12.3)	17 (12.3)	15 (10.9)	7 (5.1)	16 (11.6)	13 (9.4)	13 (9.4)	3 (2.2)	4 (2.9)	—	—	—
St. Mark's Mokorogoinwa	2 1(13.4)	21 (13.4)	21 (13.4)	21 (13.4)	2 1.3	19 (12.1)	5 (5.2)	7 (4.4)	7 (4.4)	9 (5.7)	—	—	—
Menyenya SDA	152 (12.6)	152 (12.6)	152 (12.6)	152 (12.6)	91 (7.5)	117 (9.7)	42 (3.5)	85 (7.0)	27 (2.2)	10 (0.8)	—	—	25 (2.1)
Mutuma high	38 (12.5)	38 (12.5)	38 (12.5)	26 (8.6)	36 (11.8)	14 (4.6)	24 (7.9)	15 (4.9)	37 (12.2)	—	—	—	—
Strathmore school	80 (13.6)	80 (13.6)	80 (13.6)	54 (9.2)	80 (13.6)	77 (13.1)	—	80 (13.6)	—	—	—	—	—
Precious Blood Riruta	88 (13.8)	88 (13.8)	88 (13.8)	83 (13.8)	51 (8.0)	88 (13.8)	36 (5.7)	40 (6.3)	88 (13.8)	—	—	11 (1.7)	18 (2.8)
Leitim	172 (12.5)	172 (12.5)	172 (12.5)	169 (12.3)	57 (4.1)	172 (12.5)	72 (5.2)	172 (12.5)	12 (0.9)	36 (2.6)	—	—	—
Sawagongo	117 (11.3)	117 (11.3)	117 (11.3)	91 (8.8)	62 (6.0)	117 (11.3)	108 (10.4)	69 (6.7)	24 (2.3)	14 (1.4)	—	—	—
Moi High school-Kabarak	162 (12.5)	162 (12.5)	162 (12.5)	160 (12.4)	138 10.7	162 (12.5)	94 (7.3)	90 (6.9)	50 (3.9)	—	8 (0.6)	10 (0.8)	7 (0.5)
Nyandarua high	156 (13.6)	156 (13.6)	156 (13.6)	125 (10.9)	95 (8.8)	156 (13.6)	48 (4.8)	89 (7.8)	—	19 (1.7)	—	—	16 (1.4)
Kirima high	91 (12.5)	91 (12.5)	91 (12.5)	62 (8.5)	55 (7.6)	91 (12.5)	39 (5.4)	91 (12.5)	26 (3.6)	—	—	—	—

Source: Kenya National Examinations Council data on the top-performing schools in vocational subjects in 2001.

questionable quality, if at all. As already indicated, such an education does not equip graduates of vocational education to compete effectively with their counterparts who have trained in the better endowed private institutions. Second, the goal of education for survival and self-reliance is unlikely to be realised as the skills learned by most graduates of public secondary schools are ill matched with the expectations of a fast changing and very flexible job market.

In this connection, four teachers of Woodwork and Drawing and Design, from Moi Forces Academy and Bukembe High School, explained that students are taught the most basic concepts of the syllabuses in industrial education subjects but often without any real opportunity to practice them. It is estimated that as many as 50% of these schools lack basic equipment. At Strathmore, Starehe, and Kagwe Girls', Computer Studies teachers indicated that although

for the top-performing schools in vocational subjects (2001)

Art & D	Agriculture	Woodwork	Metalwork	Building & construction	Power mechanics	Electricity	Drawing & design	Computer studies	Music	Accounting	Commerce	Economics	Typing with office practice	Total
—	1 (0.7)	—	—	—	—	—	—	—	—	—	15(10.9)	—	—	138
—	14 (8.9)	—	—	—	—	—	—	—	—	1(0.6)	8(5.1)	1(0.6)	—	157
—	66 (5.5)	—	—	8(0.7)	3(0.2)	—	—	1(0.1)	—	11(0.9)	112(9.3)	—	—	—
—	37 (12.2)	—	—	—	—	—	—	—	—	—	1(0.1)	—	—	304
—	3 (0.5)	—	—	—	—	—	10(1.7)	17(4.3)	—	—	30(7.7)	—	—	588
—	112 (8.1)	—	—	—	—	—	1(0.1)	—	6(1.0)	—	33(5.60)	—	3(0.5)	636
—	17 (1.6)	—	—	—	—	—	8(0.8)	—	—	—	67(4.9)	8(0.6)	—	1,036
—	13 (1.0)	—	—	—	9(0.7)	12(0.9)	—	—	8(0.6)	—	47(3.6)	—	—	1,294
—	47 (4.1)	12 (1.0)	17(1.5)	—	—	—	—	—	—	75(6.5)	70(6.1)	11(1.0)	—	1,148
—	34 (4.7)	2 (0.3)	—	—	—	—	—	—	3(0.6)	—	52(7.1)	—	—	728

there is a market for students gifted in programming, most of the others are poorly equipped for the job market because the focus of the curriculum is more on programming and in particular on ‘dead’ computer languages such as Cobol, Pascal, and Fortran. Much emphasis is also placed on DOS with little concern for what is more easily applicable in everyday life such as Internet applications. Teaching of Internet use is unaffordable for most schools offering Computer Studies due to the high costs associated with Internet connection. It was further explained that for most industrial subjects as well as business studies, the KIE personnel that prepare the syllabus are the ‘old guard’ who have had few opportunities to acquaint themselves with new developments in these subjects. The situation is made even more serious by the limited professional interaction between these curriculum designers and employers as representation of employers in the KIE subject panels is limited to only one representative from the

Federation of Kenya Employers (FKE) who rarely attends relevant curriculum development sessions. These views are supported by recent KIE research (KIE, 1999). According to this report (the study team interviewed 1,362 students from 54 schools), the subjects most popular with students are English, Mathematics, Kiswahili, Biology, Geography, Physics, Chemistry, History and Government, and Religious Education, in that order. These subjects were rated very highly in meeting the needs of students. The same report adds that the secondary education objective of vocational subjects, namely to 'enable the learner to choose with confidence and cope with vocational education after school' (KIE, 1999:28), was rated as unachievable by the majority of the teachers, head teachers, lecturers of teacher training institutions, and the education officers interviewed. The reasons for this are '... general lack of facilities, equipment and material for practical work in schools. ... practical skill subjects in the secondary cycle do not provide a strong base for vocational education because of curriculum overload ... inadequate career guidance in schools ... curriculum is too broad to allow students to be well organized in subjects of their choice. ... the teaching emphasizes more on theory than practical work ... the students do not acquire adequate skills for the world of work, the subject cluster policy denies students freedom to choose subjects they are interested in ... learners have negative attitudes towards manual work ... teachers are not adequately trained and in-serviced to handle practical skills subjects ... school leavers lack capital for self-employment. ...' (KIE, 1999:34). The sample from which these responses were gathered included 54 head teachers, 547 teachers, and 39 education officers from 21 districts selected from all eight Kenyan provinces.

Also highlighted by this KIE report are responses from teachers regarding whether or not the secondary school curriculum meets the needs of school leavers. Teachers cited the following as the needs most important for the curriculum to meet: self-reliance and economic empowerment, moral uprightness/self-discipline, socialisation, self-appreciation, intellectual growth, and vocational skills in that order. However, the need that most teachers indicated is not being met is that of self-reliance/economic empowerment (53.4%), followed by the imparting of vocational skills (27.8%) (KIE, 1999:78). The report, however, notes that practical industrial subjects along with Computer Studies, Mathematics, and Natural Sciences were seen to be crucial for Kenya's industrial and technological development and relevant for student needs. Thus, the challenge is how to best address the identified problems in order to promote this goal.

Parents also pay for some specific vocational courses. This is especially the case with Computer Studies. The fees charged range from Kenya Shillings 2,500 (US\$ 32) per term in high-cost private schools such as Strathmore College (and some public schools) and Precious Blood Riruta, to no fees at highly subsidised institutions such as Starehe Boys' Centre. Although such fees are justified as

a way for managing the running costs of the computer course, they tend to discourage most students from disadvantaged backgrounds from enrolling for this course.

8 Quantifiable Achievements

Trends in Enrollment in Vocational Subjects

Due to an unreliable system of collecting, analysing, and storing education data, it is not possible to provide accurate data on the enrollment of students in vocational subjects for all grades. In any case, as vocational subjects are optional, MoEST does not keep records of those enrolled for courses they have not decided would be their final selections. In view of this, we found records of students who register for the KCSE examination to be the best available data to use in estimating numbers of students enrolled in these subjects in the final year of secondary education. Table 6.6 gives a breakdown of students who registered for vocational subjects in the KCSE examination between 1990 and 2000. Data in the table shows that since 1990, more than 2 million students have taken one vocational subject or another. The most popular subjects over the years have been Agriculture and Commerce and, to a limited extent, Home Science. During this period, Agriculture and Commerce have accounted for nearly half of all the students registered for vocational subjects in the KCSE examination. Home Science and Accounting have also fared better than most other subjects. The popularity of Agriculture and Home Science may have to do with the fact that these are some of the oldest subjects in the secondary curriculum; most students have practical experience with the main concepts being taught in them given their mostly rural peasant background and can therefore easily apply what they learn; they are easy to set up as schools can easily find staffing for them and because of relatively lower running costs; and these are subjects for which the pass rates in the KCSE are above average. This last fact has been given as the reason relatively weak students choose these subjects for the KCSE examination. Commerce and Accounting may appeal to students for the possibility of opening up opportunities for further professional training in areas that are among some of the most rewarding.

It is also evident from Table 6.6 that, overall, the popularity of most vocational subjects, except Agriculture, Commerce, and Accounting, shows a constant trend. The number of students enrolled for the KCSE examination in vocational subjects rose from 201,444 in 1990, the second-year vocational courses were examined since the introduction of the curriculum in 1985, to 240,242 in 2000. However, a drop was experienced in the industrial courses

Table 6.6 Students entered for the KCSE vocational subjects examination (1990–2000)

Subject	Number entered											
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total
Accounting	7,487	6,917	7,192	6,661	6,970	7,361	8,170	9,068	9,307	10,069	11,167	90,369
Agriculture	99,950	101,155	101,598	94,622	91,697	87,476	96,343	94,249	99,095	100,368	104,661	1,071,214
Building construction	670	658	710	822	731	831	831	844	851	877	999	8,824
Commerce	75,800	79,498	88,946	69,659	72,338	71,828	81,034	83,806	96,266	97,052	104,626	920,853
Computer studies	—	—	—	—	—	—	—	—	25	114	611	750
Drawing & design	2,287	2,286	1,965	2,012	2,011	1,888	1,977	2,124	2,141	2,304	2,124	23,119
Electricity	631	447	503	486	509	501	591	562	641	635	612	6,618
Home science	11,391	10,228	9,545	10,332	10,749	10,542	10,952	11,180	11,551	11,643	11,777	119,890
Metalwork	654	595	646	640	676	643	672	606	544	507	479	6,662
Power mechanics	276	261	265	265	242	289	333	319	390	373	383	3,396
Typewriting with office practice	—	—	—	1,459	1,308	1,339	1,497	1,465	1,462	1,243	1,305	11,098
Woodwork	2,298	2,105	2,133	2,353	2,211	1,905	1,840	1,741	1,648	1,555	1,500	21,289
Total	201,444	204,150	213,503	189,311	189,442	184,603	204,240	205,964	223,921	226,740	240,244	2,284,062

Source: Kenya National Examinations Council (2002).

where the number enrolled for the KCSE examination in these subjects dropped from 6,816 in 1990 to 6,097. Because of the insignificant numbers involved, however, one cannot read too much into these data. The analysis is also somewhat complicated by the fact that, for reasons that are not easy to explain, there was a drop in enrollments in most subjects between 1993 and 1995. The reason for lessened interest, especially among the industrial subjects and Typewriting with Office Practice, may have a lot to do with the increased costs associated with establishing and maintaining them. Of the industrial subjects, Building Construction appears the most popular with students, perhaps because construction is taking place in every part of Kenya, the difference being more of the degree of its prevalence. Although the number of students enrolling for Computer Studies since its launch in the secondary education curriculum have been modest, the number of schools offering this course has risen from 2 in 1998 to 81 in 2001. The number of students registered for this course has accordingly risen from 25 in 1998 to 1,113 in 2001, which represents an increase of more than 400%. As is the case in most parts of the world, the computer revolution is being associated with some relatively high growth in career opportunities in Kenya. In addition, knowledge of computers and their languages creates a lot of other interests in young people, and for many their use tends to become addictive.

A comparison of the enrollments in vocational subjects as a proportion of enrollments for all other subjects (see Table 6.7) confirms the arguments made above. In 2001, 51%, 49%, 6%, and 5% of the vocational subjects candidates who registered for the KCSE examination were respectively entered for Agriculture, Commerce, Home Science, and Accounting with very limited interest in the industrial subjects. From Table 6.7, it is evident that girls who enroll for vocational subjects are more likely to be in Agriculture, Commerce, Home Science, and Typewriting with Office Practice. Their representation in Computer Studies is also on par with that of boys. Boys, however, dominate in the industrial subjects. That the representation of girls in Computer Studies is on par with boys may on the surface point to equity of access. However, many girls may opt for Computer Studies in preparation for secretarial jobs for which computer literacy is a compulsory requirement these days. It is a case of the subject serving to perpetuate the channelling of girls into careers presumed to be more 'feminine'.

Regional Trends in the Teaching of Vocational Subjects

Data on gender and regional trends for 2001 is shown in Table 6.8. As is clear from the table, gender parity with regard to enrollment in vocational subjects has been achieved in Eastern and Central provinces and is almost being attained in

Table 6.7 Distribution of candidates by gender as a percentage of the 2001 KCSE candidates

Subject	Candidates		% of candidates	
	Female	Male	Female	Male
Accounting	3,404 (3.87)	6,704 (6.47)	1.77	3.48
Agriculture	44,309 (49.86)	53,181 (51.30)	23.011	27.62
Building construction	46 (0.052)	821 (0.79)	0.002	0.43
Commerce	43,441 (48.88)	50,553 (48.75)	22.56	26.27
Computer studies	543 (0.61)	570 (0.55)	0.28	0.30
Drawing & design	93 (0.11)	1,74 (1.71)	0.050	0.92
Economics	302 (0.34)	875 (0.84)	0.16	0.45
Electricity	16 (0.02)	481 (0.46)	0.008	0.25
Home science	10,365 (11.66)	526 (0.51)	5.380	0.27
Metalwork	3 (0.003)	365 (0.35)	0.001	0.19
Power mechanics	9 (0.01)	313 (0.30)	0.005	0.16
Typewriting with office practice	970 (1.09)	42 (0.04)	0.50	0.02
Woodwork	24 (0.03)	1,277 (1.23)	0.015	0.66
Total candidature	88,868	103,670	192,538	

Source: Kenya National Examinations Council (2002).

Note: Figures in brackets represent percentages of entry out of the respective gender totals.

Table 6.8 Distribution of candidates by province and gender (2001)

Province	Candidates		% of total vocational		
	Female	Male	Total	Female	Male
Coast	5,148 (43.5)	6,679 (56.5)	11,827	4.6	5.1
Central	26,513 (51.2)	25,270 (48.8)	51,789	23.6	19.3
Eastern	22,520 (50.0)	22,550 (50.0)	45,070	20.1	17.3
Nairobi	3,287 (38.2)	5,323 (61.8)	8,610	2.9	4.1
Rift valley	24,205 (43.8)	31,102 (56.2)	55,307	21.6	23.8
Western	12,151 (46.4)	14,030 (53.6)	26,181	10.8	10.7
Nyanza	17,334 (42.1)	23,887 (57.9)	41,221	15.4	18.3
North/eastern	598 (48.7)	871 (59.3)	1,469	0.5	0.7
Private candidates	470 (33.1)	951 (66.9)	1,421	0.4	0.7
Total vocational	112,226	130,669	241,781	100	100

Source: Kenya National Examinations Council (2002).

Note: Figures in brackets are percentages.

North Eastern and Western provinces. Rather surprisingly, apart from private candidates, girls' representation in vocational subjects is poorest in Nairobi, followed by Nyanza, Coast, and Rift Valley Provinces. While the situation of Central and Eastern provinces is not totally unexpected given the historical advantages these two provinces, along with Nyanza and Western, enjoyed with regard to the growth of formal education, the case of Nairobi may be explained by the fact that most of the schools located here do not offer many of the vocational subjects that are more attractive to girls, in particular Home Science and Agriculture. In Nairobi, one finds more courses that, on the grounds of historical and other factors, may tend to appeal more to boys, especially the industrial subjects and Commerce.

With regard to regional trends, the most revealing finding is that Rift Valley has the largest number of candidates enrolled in vocational subjects. The strong showing of Central, Eastern, and Nyanza provinces is not that difficult to discern as these regions have historically led in other areas of education provision. In the same vein, Coast, North Eastern, and Rift Valley have always lagged behind these provinces. Rift Valley may be leading in this regard due to the political way in which vocational subjects were introduced in the school curriculum as indicated earlier in this paper and because it is also the largest province in Kenya with more schools than in any other region. Going along with the new curriculum as a show of solidarity with their own, in the face of much opposition from elsewhere in the country, Rift Valley schools were also favoured with regard to the allocation of education and other resources. Thus, schools in this province tend to benefit from more subsidisation by the state under the excuse of redressing historical imbalances than are schools in the more economically endowed parts of Kenya. In fact, many of the model schools, particularly in the area of industrial education, are located in this region. Kabarak High School, which is located in the Rift Valley town of Nakuru, is one of these schools and has been the leader in the area of Power Mechanics and Electricity as well as being among the top in the other vocational subjects since the introduction of these subjects in the school curriculum. In the 2001 KCSE examination, Kabarak High School held the top position in Power Mechanics and Electricity. In the previous year the school was first in the Metalwork examination, third best in Power Mechanics, and fourth best in Electricity.

Teachers

The TSC is responsible for providing all public secondary schools with teachers for all subjects in the school syllabus. The number of teachers distributed to schools is, however, dependent on the output of the teacher training institutions. The KTTC is the main training institution for teachers of industrial

subjects. The College runs upgrading courses for graduates of technical institutes focusing mainly on pedagogical approaches. Other diploma-level colleges, in particular KSTC, Kagumo, and Kisii teachers colleges, support KTTC. Teachers for other key vocational subjects of Agriculture, Business Education, Computer Studies, and Home Science are trained at the six public universities of Kenya, namely Kenyatta, Egerton, Moi, University of Nairobi, and Maseno University. Agriculture teachers are trained only at Egerton University through the diploma programme. Home Science teachers are trained at Kenyatta, Egerton, Moi, and Maseno. KSTC and Moi University are the only higher education institutions training diploma-level industrial education teachers. However, due to limited demand for this training, KSTC is only offering training in Woodwork. KSTC trained teachers can normally teach an industrial subject and either Mathematics or Physics. Moi University graduates are also equipped to teach an additional subject outside the industrial ones.

It is not possible to give an accurate picture on the number of teachers available for the vocational subjects for three main reasons. First, data on teachers that is available at MoEST does not disaggregate teacher data by the subjects they teach. Second, graduate teachers are recruited on their ability to teach more than one subject. Thus, teacher trainees at the public universities are expected to enroll for two teaching subjects in addition to the education course. Third, there are cases where graduate teachers are teaching subjects for which they have not been trained due to a shortage of teachers in these particular subjects. Nevertheless, one can make some estimates based on numbers of technical/diploma-level teachers, most of whom are trained to teach industrial subjects. It is, however, more difficult to do the same estimates for other vocational education courses since teachers of these subjects teach other subjects. Between 1990 and 1995, the number of technical/diploma teachers grew from approximately 7,000 to 10,000. By 2000, the number of this category of teachers had increased to almost 18,000. The majority of these teachers are male; they comprised between 60% and 70% of the total number of this category of teachers between 1990 and 2000.

Although MoEST records (Kenya, 2001) indicate that more than 97% of the secondary school teachers are professionally qualified, there are a substantial number of unqualified teachers in the vocational subject areas as evidenced by the data presented in Table 6.2. Most of the teachers falling in this category have either a technical certificate from a technical institute or only 'A' level qualification in the subjects, which they are teaching with no professional training as teachers. The situation of some inadequately trained vocational subject teachers is not helped much by the fact that most of them, as is indeed true for other subject teachers, have limited opportunities for in-service training and other skills-upgrading programmes such as training workshops. While MoEST

organises seminars for in-servicing teachers through the Provincial Directors of Education, such seminars are rare. In the urban areas, these seminars may be held on average twice a year. Rural teachers are lucky if they attend one such seminar in three years. The problem is aggravated by the absence of regular advice by school inspectors. Again, while schools close to urban centres may experience visits by subject inspectors on a quarterly basis, most teachers of vocational subjects who teach in rural schools do not benefit from these advisory visits. Yet, teacher training could compensate for some of the inadequacies resulting from the severe shortage of teaching materials experienced by most schools.

9 Characteristics of Schools and Students

Schools

Given that the 8-4-4 curriculum was compulsory in all public schools, most secondary schools offer at least one vocational subject. However, the fact that these subjects are optional for examination purposes has played a big role in differentiating schools on the basis of the vocational subjects they offer to their students. There are six main distinguishing characteristics with regard to which schools offer which subjects. First, there are the top academic schools in the country. These schools, and particularly the private high-cost ones, limit their vocational curriculum to the bare minimum (refer to Table 6.9). They tend to offer subjects that are likely to give them the least problems when it comes to the needed facilities, teachers, and time such as business education courses and, in a few cases, Drawing and Design. Some schools in this category also offer Agriculture, and Home Science is retained despite its relatively high demands because most of the established schools have had the basic infrastructure to teach these subjects since the days of adequate government funding to schools. Other schools include Computer Studies in the curriculum because of its potential in opening up opportunities for their students in further training and employment. This attraction also applies to business studies courses, particularly Accounting and Commerce. In other schools, students have limited opportunities to enroll in more than one vocational subject. This is, for example, the case at Precious Blood Riruta, and some other church-sponsored schools, where the school's administration has included religious education in the list of compulsory subjects.

From Table 6.9 it is clear that of the top-performing schools in the KCSE in 2001, none offered more than one industrial subject. Metalwork was not offered in any of these schools while Building Construction and Woodwork were offered

Table 6.9 Vocational subjects offered by the top ten schools in the KCSE (2001)

Top schools in order of merit	Accounting	Agriculture	Building & construction	Commerce	Computer studies	Drawing & design	Economics	Electricity	Home science	Metalwork	Power mechanics	Typewriting with office practice	Woodwork
Strathmore	—	—	—	X	X	X	—	—	—	—	—	—	—
Starehe boys	X	X	—	X	X	—	—	X	—	—	—	—	—
Precious blood Riruta	—	X	—	X	—	—	—	—	X	—	—	X	—
Alliance high	X	X	X	X	X	X	X	X	—	—	X	X	—
Bahati girls	X	X	—	X	X	—	X	—	X	—	—	—	—
Kianda school	—	—	—	X	X	—	—	—	X	—	—	—	—
Mangu high	X	X	—	X	—	—	—	X	—	—	X	—	—
Loreto high Limuru	—	X	—	X	X	—	X	—	X	—	—	—	—
Sacho high	X	X	—	X	—	X	—	X	X	—	—	—	X
Alliance girls	X	X	—	X	X	—	—	—	—	—	—	X	—

Source: Kenya National Examinations Council (KNEC) 2002.

in one school. Electricity and Drawing and Design are more common, as two and three schools offer them, respectively. The fact that most vocational subjects, especially the industrial ones, are not so popular among the top Kenyan public secondary schools contrasts rather sharply with the situation of the early and mid-1980's (Lauglo, 1985). There are two possible explanations for the change. First, unlike the current situation where schools were expected to finance the establishment of these courses, the industrial education schools had adequate financing from SIDA. Second, although job opportunities for school leavers were already limited by the 1980's, the situation was then much more favourable than it is now.

A second distinction can be made between urban and rural schools. Agriculture and Home Science, and to some extent Building Construction, are more popular in the rural than urban areas for reasons to do mainly with the familiarity and practicability of these subjects for rural settings. Likewise, the industrial courses, business studies, and Computer Studies tend to be more

popular in schools located in large urban areas such as Nairobi, Mombasa, Nakuru, Kisumu, and Nyeri where there may be more, or perceived to be more, opportunities for learners who study these courses. But relevant infrastructure, more significantly electricity, is also more likely to be available in urban settings. For Computer Studies, availability of reliable telephone communication is an added incentive to schools that would like to use available computer infrastructure for Internet communication. However, hardly any schools encourage use of this facility because of the high telephone bills that go with it. Kenya has yet to liberalise the telecommunication sector enough to make Internet services affordable to most Kenyans.

Third, the sponsorship of schools also does influence what is taught there. Church-sponsored schools and schools supported by international and local philanthropies such as Catholic schools and Starehe Boys' Center for disadvantaged academically talented students tend to be more resourced and better managed than most government- and community-supported schools. Starehe benefits from the goodwill and devotion by international and local philanthropic organizations and individuals. Not having to rely entirely on fees, contributions, and the support of parents, such schools find it is relatively easy to meet the costs related to teaching vocational subjects without requiring students to pay any extra fees if they register for them. For example, students of Starehe and Kagwe Girls, the former being supported by philanthropists and the latter by the Catholic Church, do not pay the fees charged in other schools for Computer Studies. These two schools also have all the necessary equipment for the subjects they teach. Likewise, teachers in these schools and other similar ones indicated that one of their biggest advantages over most other schools is that they never lack learning/teaching materials.

A fourth area of distinction is based on gender. Girls' schools are more likely to offer Home Science and Typewriting with Office Practice. More boys' schools offer industrial subjects and business studies. However, computer and some business courses, in particular commerce, are popular in both boys' and girls' schools (Table 6.7). A fifth area of distinction is the level of establishment for given courses at a school. Much of this has to do with the availability of qualified teachers for the subjects being offered in a given school as well as the record of the school in the KCSE examination. A school that traditionally performs very well in a given subject is likely to continue offering the subject not only because it improves its overall performance in national examinations but also because such a subject becomes more attractive to students. Related to the ability of teachers is the presence of a head teacher who has a keen interest in a given subject because of his or her background in it. For example, the exemplary performance of Lugulu Girls High School in Bungoma in Home Science has much to do with the school's head teacher who has been teaching and examining

	005	A	A-	A	A	—	—	—	—	—	—	—	A
	008	A	B+	A	A	—	—	—	—	—	—	—	—
	011	A	A	A	B+	—	—	—	—	—	—	—	A
	016	A	A-	A	A-	—	—	—	—	—	—	—	—
	019	A	A-	A	C+	—	—	—	—	—	—	—	A
	039	A	A-	A-	A	—	—	—	—	—	—	—	—
Moi high, Kabarak: (5 students: mean grade = A)	001	A	A-	A	A	—	—	—	—	A	—	—	—
	002	A	A-	A	A	—	—	—	—	A	—	—	—
	004	A	A-	A	A	—	—	—	—	—	—	—	—
	009	A	A-	A-	A	—	—	—	—	—	—	—	—
	015	A	A-	A	A	—	—	—	—	A	—	—	—
Leitim: (3 students: mean grade = A-)	002	A-	B	B+	A	—	—	—	—	—	—	A-	—
	003	A-	B+	B+	—	—	—	—	—	—	—	—	—
	004	A-	B+	B	A	—	—	—	—	—	—	—	—
Menyenya S.D.A: (1 student: Mean grade A)	004	A	B+	A	B	—	—	—	—	—	—	—	—

Source: Kenya National Examinations Council (KNEC) 2002.

this subject nationally for over 20 years. It is also the case that graduate teachers with experience have a better record than diploma-level holders. Most of the teachers of vocational subjects in schools that were among the top 10 performers in the KCSE examination in 2000 and 2001 are university graduates with over 10 years' teaching experience. Sixth, schools that excel in vocational subjects in the KCSE examination, which also results in the popularity of these subjects among students, are characterised by good administrative systems. In most of these schools, head teachers are known to be good managers and disciplinarians. They also ensure that their schools have all the equipment and consumables needed by teachers. As a result, they are able to win the cooperation of teachers and students in being more devoted to academic work. Also, in these kinds of schools, collaboration between schools, parents'/teachers' associations, and local communities is strongest.

Students

Five main factors influence which types of students enroll for vocational subjects. One is the school one joins. Most students opting for a vocational subject have no choice but to select from the range of subjects offered in their respective schools. In addition to consideration of the interests of students, many Kenyan schools stream students into specific subject areas on the basis of their aptitude for these subjects. For example, at Strathmore School, a student interested in Computer Studies is also expected to be of above-average aptitude in physics and mathematics. Likewise, most schools allow only those students who have outstanding grounding in mathematics to enroll for business and Computer Studies. In other schools, students are interviewed and tested before the vocational subjects are allocated, especially in cases where the number of those interested in a subject surpass the number of available places.

Within the more competitive schools, rarely do the best students opt for many of the vocational subjects, the exception being business and computer courses. This is not withstanding the fact that some of these schools are the leaders in vocational subjects in the KCSE examination. This conclusion was reached following interviews with 15 Agriculture, Industrial Education, and Home Science teachers from Moi Forces Academy, Friends School Kamusinga, Lugulu Girls, Friends School Bukembe, Nyandarua High School, Kagwe Girls, Kambandi High School, and Precious Blood Riruta. In addition to these interviews, we analysed KCSE results for top-performing schools in 2001 in some vocational subjects, namely, Agriculture (Kambandi), Home Science (Precious Blood, Riruta), Building Construction (Menyenya SDA), Power Mechanics and Electricity (Kabarak High School), and Woodwork (Karima Boys). This analysis demonstrates that hardly do any top students in these schools opt for the subjects in question, as is shown by Table 6.10. For example, the two top

students at Pangani and Menyenya SDA who scored an overall grade of 'A' and the top students at Kambandi whose average score was a B did not enroll for any vocational subject. Of the nine top students at Nyandarua High School who scored a mean grade of A-, only one of them registered for a vocational subject (Home Science). Similarly, of the seven top students at Karima High School, only one enrolled for a vocational subject (Agriculture). One of the three top students at Leitim enrolled for a vocational subject (Agriculture). At Precious Blood, three of the nine top students (mean grade of A) registered for Home Science while three of the top students at Kabarak (mean grade of A) registered for Electricity. Significantly, only at Kabarak and Precious Blood did some top students enroll for subjects in which their schools had the best results nationally.

The view that weaker students may tend to opt for industrial subjects is strengthened by the fact that pass rates in vocational subjects are on average higher than in other subjects (see Table 6.11). Yet, surprisingly these subjects are most disadvantaged with regard to relevant teaching facilities. The teachers interviewed noted that this view is not helped much by the fact that these subjects are not compulsory for the KCSE examination. They added that many parents discourage their children from enrolling for some subjects as demonstrated shortly. This finding, on which too much emphasis need not be placed in view of the small sample of teachers interviewed, again contrasts with that of Lauglo (1985) who found that '... the status of industrial education is quite high in the great majority of schools in terms of (a) teachers' ratings of industrial education's popularity, (b) students' and parents' attitudes to industrial education, and (c) the academic performance of those students who take industrial education as an examination subject. Other practical subjects which are taught in some industrial education schools (business subjects and agriculture) also seem to hold their own in terms of attracting their share of academically able students. Thus, these practical options are not at all repositories for students who are academic rejects ...' (ii-iii). Perhaps, in addition to the possibility of the unreliability of our small sample, this situation may have to do with the fact that as optional subjects, the best students select them only as a last resort. In most Kenyan schools, the top students enroll for the KCSE examination in those subjects that they perceive would best prepare them for the most rewarding career in such fields as engineering, medicine, commerce, computer science, and other less common professional careers.

In retrospect, Lauglo (1985) had every reason to wonder why failure rates in IE subjects were higher than for other subjects in the mid-80's, yet unlike the current situation, the very best students in top schools enrolled for them. Have examiners become less rigorous when grading vocational subjects? According to the head of KNEC's research unit, Mr. P.M. Wasanga, the relatively high

Table 6.11 KCSE performance in all subjects by gender (2000 & 2001)

Subject	2000				2001			
	Girls		Boys		Girls		Boys	
	No. Sat	Mean %	No. Sat	Mean %	No. Sat	Mean %	No. Sat	Mean %
English	84,016	37.4	97,968	32.2	89,484	34.7	104,339	34.4
Kiswahili	84,009	48.9	97,963	47.9	89,486	44.7	104,339	43.3
Mathematics	84,013	13.4	97,967	18.7	89,481	15.8	104,334	21.2
Biology	49,757	30.2	59,718	33.6	85,499	29.5	91,525	34.5
Physics	11,276	29.5	28,516	32.7	16,225	22.2	38,425	26.8
Chemistry	50,442	27.7	64,883	31.8	84,534	29.4	96,862	23.4
Biological science	32,302	19.9	30,858	22.8	10	25.2	18	23.8
History & Government	38,909	37.0	49,100	43.9	34,989	47.9	46,961	53.1
Geography	53,915	33.8	67,998	38.9	48,116	31.7	61,354	37.3
Christian religious education	39,739	49.5	30,048	49.8	38,339	49.2	26,961	49.4
Islamic religious education	1,357	56.4	2,420	59.5	1,494	42.2	2,810	46.6
Hindu religious education	17	46.5	14	47.5	9	35.2	8	36.1
Social education & ethics	22,119	44.0	26,268	46.6	23,618	53.0	25,725	55.9
Home science	11,157	54.8	620	48.8	10,365	58.3	526	51.7
Art & design	528	53.0	869	53.6	418	53.6	775	54.9
Agriculture	47,618	48.6	56,727	52.0	44,309	45.5	53,181	48.7
Woodwork	38	42.0	1,458	48.5	24	51.3	1,277	50.6
Metalwork	16	45.8	464	53.5	3	56.0	365	59.1
Building construction	54	32.6	940	47.3	46	39.9	821	49.3
Power mechanics	7	53.3	377	67.9	9	36.8	313	54.4
Electricity	18	58.7	595	53.5	16	52.3	481	54.9
Drawing & design	110	36.1	2,015	48.9	93	25.5	1,774	42.2
Aviation tech.	1	46.0	31	66.7	—	—	43	60.9
Computer studies	318	54.2	293	61.8	543	54.4	570	57.6
French	1,326	37.8	662	40.8	1,141	43.3	716	43.9
German	280	60.3	100	56.0	241	56.9	93	60.3
Arabic	133	59.8	304	60.4	131	61.2	393	61.2
Music	1,540	50.5	1,007	50.5	1,236	50.0	818	49.5

Table 6.11 (Continued)

Subject	2000				2001			
	Girls		Boys		Girls		Boys	
	No. Sat	Mean %	No. Sat	Mean %	No. Sat	Mean %	No. Sat	Mean %
Accounting	3,657	48.4	7,510	49.2	3,404	49.2	6,704	50.9
Commerce	48,111	39.3	56,556	42.5	43,441	36.6	50,553	39.5
Economics	431	36.4	1,271	38.7	303	38.8	868	38.8
Typewriting with office practice	1,242	46.8	74	45.6	970	54.2	42	55.9

Source: Kenya National Examinations Council (KNEC) 2002.

performance in some vocational subjects may have to do with the predominantly factual nature of the material being tested. A second explanation may relate to the relatively smaller numbers of students registered for the industrial subjects which makes it possible for students to have more interaction with their teachers and to have more access to the limited available teaching/learning resources.

Third, the popularity of vocational subjects in some schools has a lot to do with the immediate post-secondary school opportunities available to students. For example, in addition to other factors, the popularity of Accounting and Computer Studies at Starehe has to do with the fact that the school offers diploma and certificate courses for interested students who have completed four years of secondary education. These post-secondary courses are very popular with students, as those who qualify to enter the public university system often have to wait for over a year before starting their studies at the university. In addition, the opportunity to enroll for these post-secondary diploma and certificate courses enhances students' career and employment opportunities.

The home backgrounds of students and parental influence also contribute to determining which vocational subjects students register for and stick to after they have selected them. Many of the teachers interviewed indicated that many students who are genuinely interested in vocational subjects end up dropping them because of pressure from their parents. Elite parents are especially hostile to their children enrolling for these subjects (with the exception of Computer Studies), which they associate with failure to succeed. Some of them have the colonial experience when those who enrolled for vocational subjects were mostly Africans being trained, as they were, for subordinate and menial tasks in the colonial economy. Other parents tell their children that some of the subjects being taught in school such as Home Science and Agriculture contain basic

knowledge, which one can learn outside school. Some parents even tell their daughters that they cook well enough without having gone through the Home Science course; others remind their sons who might be interested in Home Science that the subject is 'lady like' or that it is a 'science of the house'. In mixed schools, boys also tease their peers who enroll for Home Science while girls make fun of their contemporaries who study industrial courses. In this connection, cultural factors also come into play. Some Kenyan communities are still not comfortable with their boys pursuing careers traditionally pursued by girls such as home science and agriculture. Such communities also discourage girls from joining the industrial courses. In the case of pastoral Kenyan communities such as the Maasai, low status is associated with craft and vocational education (Kenya, 1999). Thus masons, mechanics, builders, and metalworkers are despised as outcasts, and these jobs are not seen as acceptable for their children. Notes the Report of Inquiry into the Education System of Kenya: '... Submissions to the Commission by some Kenya pastoral communities expressed the very low status accorded to craft and vocational education. Masons, mechanics, builders, and metal workers are despised and treated as pariahs. The communities said that these jobs were for other communities and not for their own children. It was also pointed out that educationists themselves need to be liberated from this mentality, because many of them design vocational education for other peoples' children instead of designing a universal system that 's suitable for all the children who opt to take that career line, including their own children. . . .' (Kenya, 1999:41).

But other parents are not attracted to vocational subjects because of their dead-end nature. According to the teachers we interviewed at Moi Forces Academy and Strathmore College, it is increasingly clear to the more informed Kenyan parents that the post-graduation success of their children has little to do with the acquisition of vocational skills in a context of a depressed economy where employment opportunities are shrinking every year. They also know that the historically prestigious professions such as medicine, engineering, and law call for academic education and that this is where their children are likely to find a promising future. Ngome (1993) reached the same conclusion with regard to the negative views of parents regarding the teaching of agriculture. This is another area of difference with the IE research of the mid-1980's (Lauglo, 1985). However, this finding need not be that surprising given that almost 20 years of experimentation with vocational education as a 'fall back on' route is no longer tenable with a much more depressed economy. There are virtually no jobs for most school leavers with or without vocational skills. Matters are not made any better by the burden these subjects have placed on parents and their schoolgoing children in terms of both the time required to cover the syllabus and the increased cost of education.

Thus, students from disadvantaged backgrounds are the majority in vocational courses. This is the case at Kambandi, Nyandarua, Precious Blood Riruta, Bukembe, Lugulu, and Kamusinga, all of which are either district or provincial schools. National schools (Starehe, Moi Forces) and private ones (Strathmore) have the best students; most of whom, because of the competitive nature of Kenya's education system, hail from economically advantaged backgrounds. Moreover, as indicated earlier, most top schools do not offer much by way of vocational subjects for interested students. Students in these schools do not benefit much from the advice of their parents regarding which subjects are the more rewarding in terms of career opportunities. Also having not performed so well academically due to a variety of factors, they tend to go for subjects thought to be more likely to pass in to increase their chances of passing the KCSE examination. Career guidance is also either lacking or inadequate in most schools, especially the less privileged ones (KIE, 1999). These facts, plus the limited opportunities available for further training, have tended to discourage many potential students from pursuing vocational subjects after secondary education. The popularity of vocational subjects among both students and parents is further lessened by the fact that students from the disadvantaged backgrounds may have limited access to start-up capital. Moreover, in most rural communities, the market for products of those skilled in vocational subjects is limited. The problem is intensified by the government policy of allowing the dumping of cheap imported products into the country.

According to teachers of the same schools, there are, however, students who enroll in these subjects because of genuine interest in them. Such students tend to be more confident than average students about what they are doing in life and therefore have the discipline and motivation to enroll in the courses of their interest. This is one of the factors that come out clearly in the illustration below in Box 6.4.

Box 6.4 shows on why Home Science is so popular at Lugulu Girls High School in Bungoma and other schools nationally. Interest in the subject is among the main reasons for this school's exemplary performance in Home Science in the KCSE examination. The positive status of home science at Lugulu Girls High School corresponds to the case at Precious Blood Riruta in Nairobi. According to their teachers, Home Science students of this school value the subject because it prepares them for all the aspects of life at home including improved practices in hygiene and nutrition. The subject is also valued because some of the items made during the practical sessions such as soft furnishings and cakes have some commercial value to the extent that students continue to make them during the vacation and after completing secondary school. The teachers revealed that a number of students are making a living out of this skill and a few have taken over related businesses from their retired parents. This

Box 6.4 Popularity of Home Science at Lugulu Girls High School

Lugulu Girls High School is located in Bungoma district in Western Kenya. It is a government boarding school that draws most of its students from Bungoma district. At Lugulu, apart from teaching students how to utilise locally available resources, the teaching of Home Science places great emphasis on self-reliance. The subject area is well staffed with competent and highly qualified, committed, and hardworking teachers. Teachers view some of the problems related to teaching the subject as challenges. Among other factors, the school's sterling performance in the subject at the KCSE examination is attributed to the harmony and good working relationship that exists and permeates the members of Lugulu community, namely the administration, teachers, and students. A focused and understanding administration ensures that all the required learning materials for the practicals are never in short supply. In addition, it has recognised and ensured that Home Science as a subject requires more time allocation. On the other hand, the school owes success in the subject to the studious, disciplined students with a willingness to learn and be corrected. Students admit that their teachers who encourage them to work hard often give them valuable pieces of advice. This has aroused great interest among students who derive a lot of pleasure from learning the subject. Students cherish the practical sessions, which they say promote opportunities for creativity and innovation, for example, in cookery when it comes to preparing unfamiliar dishes recipes. In addition, students view practicals as a welcome break from the monotony and boredom that characterise normal classroom sessions. Students are motivated to work hard, cognizant of the fact that the applicability of the skills acquired and knowledge gained is lifelong and has a direct bearing on their lives. For example, one could become self-reliant in business ventures by employing skills and knowledge gained in areas such as sewing, cookery, tailoring, and dressmaking. Aware that home science can open promising opportunities for the best students, many of them are keen and hardworking. Moreover, students have a positive attitude toward the subject and their teachers. They view it as a science and they take time to do serious reading and remedial work.

revelation is supported by a KIE report (1990), which summarizes findings from students interviewed in 1990 on the same score. Students indicated that they liked Home Science because the subject '... teaches on the day to day activities, ... is beneficial in life after school ... enables one to be creative and learn things that are done practically ... has many careers ... involves general knowledge.'

Likewise, the MoEST inspector of schools for Home Science added that Home Science students have a better chance of being admitted to a variety of post-secondary training opportunities, especially the hospitality courses at medical and hotel training schools and for the education degree course for those keen on specialising in home economics.

10 Assessment Methods and Learning Outcomes

Assessment Methods

There are three main levels of assessing mastery of vocational skills: the school; the collaborative project between the school and the KNEC; and the final national KCSE examination (KIE, 1995; Wasanga and Ingolo, 2001).

School-Level Evaluation

All schools offering vocational courses are expected to use a variety of assessment methods to gauge their students' mastery of vocational curriculum content. The most common ones are class tests, assignments, practicals, and end-of-term examinations. Some schools also organise provincial- and district-level assessment collaboratively with other schools, using the same measures. The intention is to measure their performance against that of other schools as well as to evaluate their respective levels of preparedness for the national examinations. For courses that are meant to teach practical and problem-solving skills, continuous assessments at the school level are critical. However, although teachers and MoEST officials all agree on this fact, school-level continuous assessment tests are yet to form part of the final school leaving examination grade. This is because the validity and reliability of these tests would be difficult to guarantee. The matter is made even more complicated by the fact that both the examiners and the examined would be operating at varying levels of competence and under different circumstances. An additional handicap is that given the fact that competition for post-secondary opportunities is national as opposed to regional, micro-level evaluations may be difficult to make acceptable across the board. Nevertheless, some schools such as Strathmore and Moi Forces Academy in Nairobi reported that they find continuous assessment tests very valuable in getting students to master manageable portions of knowledge content and that the system improves the management of available time. Another advantage is that students are less threatened by examinations in one or two topics than they are by end-of-term examinations, end-of-year examinations, and, even more

so, the KCSE examination which is administered at the end of four years. Moreover, the use of continuous assessment tests by teachers makes them more confident of their students' mastery of specific topics before evaluating them on more advanced ones.

Another evaluation technique used at the school level is the administration of competitions within the class, across different classes, in the whole school, and with other schools. The Nairobi interschool competition—the Nairobi Provincial Art, Home Science, Industrial and Creative Arts Competition (NAPAHICA)—is one such competitive arrangement of the Nairobi schools. Such competitions are some of the best available mechanisms for evaluating mastery of vocational skills, for they give students the freedom to innovate and show their individual creative skills related to what they have learned at school.

The Practical Subject Application

Students registered in vocational subjects for the KCSE examination are required to do a practical project individually or in groups. Teachers are required to guide their students in the identification and conduct of their practical project, which accounts for 10% of the final KCSE grade for specific vocational subjects. The KNEC contracts subject experts who set and moderate these projects. These subject experts develop broad projects for each vocational subject showing the abilities that need to be assessed and prepare marking guides that teachers are to use for assessing their students (Wasanga and Ingolo, 2001). The KNEC then provides a timetable and instructions on how the project should be conducted, the materials needed, and a marking scheme. There are two main levels of assessing these projects: the end-of-term practical assessment and the project coursework assessment. What makes this a collaborative venture between the schools and the KNEC is that the latter appoints, trains, and commissions external assessors who share the duties of assessing the two types of projects.

The effective assessment of the practical projects has been hampered by a number of factors (Wasanga and Ingolo, 2001). First, teachers complain about the fairness and reliability of the external assessors' method of using a sample of students' scores to arrive at the final project grades for all the other students. Teachers argue that, as they know their students best, their grades should be the final ones used by the KNEC, complaining that external assessors are often arbitrary on their assessments, which are based on one test. The KNEC has, however, pointed to issues of validity and reliability of the scores awarded by both the teachers and assessors as the reason for sticking with this system. But this KNEC-recommended system has also been found unreliable because of inflation of scores; awarding of fake marks; and failure

of the assessors in using the objective criteria recommended by the Council for the evaluations as well as the required frequency of school visits. Wasanga and Ingolo (2001:14), who are senior officers at the KNEC, describe how in the 2000 project examinations ‘... one head teacher forced one of his teachers to give fake marks to a candidate who did not even attempt the agriculture project at all... another head teacher employed a teacher to do the project for his daughter...’ In such cases, the Council cancels the results of the affected candidates and disciplines the concerned teachers. Reliability and validity of these tests are further undermined by the fact that what is measured may not be comparable across schools, as schools have different facilities and teachers of varying professional and academic qualifications. Finally, the often-inaccurate transcription and recording of relevant project information by teachers, external assessors, and council staff is further cause for questioning the objectivity of these practical tests. In addition to cases of missing practical marks, inaccuracies relate to the wrong coding of subjects, interchanging of marks, and omission of some candidates’ examination identification numbers, among other errors. These shortcomings notwithstanding, both teachers and KNEC staff appreciate the value of these project evaluations as perhaps the most effective way available at present and note that what is needed is to identify ways of innovatively coping with the challenges currently being posed by the way it is being administered.

The KCSE National Examination

The major component of the secondary school leaving examination (KCSE) is the final one administered by the KNEC for students at the end of their fourth year of secondary education. Among other things, this examination is meant to evaluate the extent to which students have internalised positive attitudes toward practical work, vocational training, and self-employment. Students taking the KCSE examination are therefore expected to have had a broad-based education. They are tested in a minimum of seven subjects. This examination has been blamed for being one of the biggest obstacles to the learning of vocational skills. First, of the seven subjects candidates are examined in, none of the vocational subjects are compulsory, all of them being electives. The compulsory subjects are English, Kiswahili, Mathematics; at least two social science subjects; and either one applied or cultural subject. The applied subjects from which students may choose one are Home Science, Art and Design, Agriculture, Woodwork, Building Construction, Power Mechanics, Electricity, Drawing and Design, Aviation Technology, Computer Studies, Accounting, Commerce, Economics, and Typewriting with Office Practice. Because most schools nationally are ill equipped for many of these subjects, the majority of the students who elect a subject from this group tend to go for one of the three most established ones

in most schools, which are Agriculture, Home Science, and Economics. Thus many of the applied subjects do not have to be chosen, meaning that there is no real mechanism for ensuring that most students enroll for vocational subjects. As a result, most parents are not keen to buy books for these specific subjects or to construct and equip workshops.

A second way in which the KCSE works against the spirit of a vocation-alised curriculum is that in the absence of adequate physical infrastructure and equipment, the focus is more on theory with little stress on practical aspects of the curriculum. In a sense, this situation has encouraged teachers to also focus more on the theory part of the syllabus. More serious, however, is the fact that much of the theoretical content of the KCSE examination rarely tests students' capacity for interpretation but instead tests their ability to memorise factual material. Although this weakness was also highlighted by the IE research of the 1980's (Lauglo, 1985), it seems like no serious efforts have been made to rectify the situation. This forces teachers of vocational subjects to make every attempt to cover the whole secondary school syllabus. Teachers complain that as a result, most questions are graded in quarter or half points because too many of them have to be asked in examinations of most vocational subjects to ensure that the whole syllabus is tested.

Third, as with other practical examinations, the KCSE examination does not take account of disparities in school facilities or environments. This point is particularly critical because one of the objectives of the practical curriculum is to orient students to their everyday experiences. Fourth, the very spirit in which national examinations are conducted and schools evaluated by government, parents, and the community defeats the goal of promoting creativity or problem-solving abilities in students. This is because teachers focus their attention on drilling their students to excel in examinations, as they are aware that society, parents, and even the government judge them on the basis of how many of their students excel in national examinations. The matter is not made any better by the KNEC system of ranking schools as well as their students on the basis of performance in the KCSE examination. At the more general level, KNEC has been blamed for showing little value for students' mastery of communication skills. Examiners of all subjects are known not to check on grammatical mistakes when they grade papers, their main concern being mastery of factual knowledge and not how it is relayed. Yet, improved communication is one of the goals of the 8-4-4 system of education.

Learning Outcomes

As indicated in the previous section, the teachers interviewed were categorical about what parents wanted their children to pursue, namely further education

in professional careers. It was also shown how much schools, especially the top ones, value teaching of some specific vocational subjects insofar as they improve overall performance of the school in the KCSE examination and that most students take these courses to improve their overall grade. This finding is in agreement with that of Närman and Lauglo (Närman, 1985, Lauglo and Närman, 1988) regarding the occupational expectations of students enrolled for IE courses. Students taking these courses aspired to higher education although they showed a preference for work of a technical or practical kind. More significant, however, is their finding that students with greater exposure to IE possess no advantage over others in finding employment and that even those who found jobs were not employed in IE-related areas. Needless to stress, the situation could only have gotten worse not only because the quality of vocational education may have declined but more important because jobs are even harder to find now.

This is, however, not the case with Computer Studies and even Accounting, particularly for students in the top Kenyan schools. At Strathmore and Starehe, teachers indicated that most Computer Studies graduates find employment even while at school. As for Accounting, the top students are able to register for professional examinations during and immediately after completing their secondary education. In the case of both Starehe and Strathmore, their top Accounting students can register for diploma courses even before their KCSE results are out. But as with the IE research of the 1980s, the current study's limited conversations with teachers and MoEST officials pointed to the fact that students who take vocational subjects find them of some value in their daily lives. For example, Home Science is credited with improved hygiene and nutritional status while some industrial courses such as Woodwork and Building Construction are valued for imparting skills related to homemaking and choice of good construction materials and furniture. According to a 1990 KIE report, students enrolled for Woodwork like it because it promotes the possibility of '... self reliance ... making their own furniture and as a hobby during leisure time ... skills in handling tools, materials and finishes correctly and safely ... to select good furniture and reject bad ones...' (KIE, 1990:256). This report does not give any students' impressions on the other industrial subjects.

Moreover, good performance in the vocational subjects improves a student's chances of enrolling for specific degree programmes. Business studies courses are considered for those likely to enroll for the commerce degree. The Computer Studies course is useful for those who like to study computer science. Home Science is a necessity for those who like to pursue a bachelor of education degree in home economics. Typewriting with Office Practice counts for selection to the bachelor of education course in secretarial studies. Electricity is considered for those keen on electrical engineering, and Metalwork and Power Mechanics

are useful for those interested in other branches of engineering. Drawing and Design are valuable for students keen on pursuing architecture-related degree programmes as are Building Construction and Woodwork. Finally, a high score in Agriculture places students who want a bachelor's degree in agriculture at an advantage. In addition to being useful for entry into these degree programmes, all these subjects add admissions points for specific subject clusters in which potential degree applicants have to obtain a minimum total score. The vocational subjects are also part of the overall grade point average which counts towards university admission, especially the public ones.

11 Main Problems Encountered in Implementation and Lessons Learned

The Original Purpose and Objectives of Vocationalisation

Although very well intentioned in its quest for broadening the horizons of learners, vocationalisation of the Kenyan secondary school curriculum was designed and introduced without an adequate analysis and appreciation of the problems it sought to address, chief among them being the youth unemployment crisis. By blaming education for this crisis, education was made a victim for a problem it is incapable of resolving. Besides, the conceptualisation of this curriculum placed limited emphasis on the role of education in imparting functional survival skills, instead emphasising excellence in academic subject matter. Thus even the computer syllabus, which was introduced in 1997, does not have this focus as one of its objectives. Vocationalisation of the curriculum was an ambitious project that was largely unattainable.

Given that the majority of Kenya's secondary school leavers are unlikely to secure any form of employment or further education, a more realistic and worthwhile vocational (functional) curriculum may be that which focuses on the imparting of skills that promote self-development and learners' sustainability at home and in their respective communities. This may call for generalised basic and short duration course(s) taken by all students throughout their four years of secondary education. Among other skills, the coverage of such a curriculum may include communication skills, basic knowledge of health, family life, nutrition, subsistence agriculture, entrepreneurial skills, environmental, social studies, civic and religious education, construction, repair and maintenance skills, and information technology. The main lesson from this experience is that educational reform focusing on vocationalisation needs to be informed by a professional understanding of the causes of unemployment and of the

experience of countries where vocationalisation has succeeded in achieving some of its set targets. A second lesson is that, after such a system has been put in place, regular reviews are needed to ensure that it is both feasible and responsive to changing times. Despite its widespread criticism, there is really nothing intrinsically wrong with the system; the problem is with its unplanned for and very ambitious objectives.

Planning for Implementation and Implementation Experiences

Planning for implementation of the vocationalisation curriculum left much to be desired. The process was characterized by lack of consultation with relevant stakeholder groups as a result of which it was intensely opposed even before it was launched. As a matter of fact, the changes that are taking place within the 8-4-4 system in general, and the vocational curriculum in particular, and which are mainly targeting removal of vocational subjects from the curriculum are a result of public disagreement. A KIE report (1995:64–68) points to how the media coverage in Kenya had been ‘... indicative of a very critical perception of the education system commonly referred to as 8-4-4... It appeared that the criticism was centered more on the structure since members of the public could not have had the chance to critically examine the curriculum itself. The only reference to the curriculum seemed to have been the alleged overloading which parents especially have alleged is seen through the work habits of pupils or after school... there was generally a negative attitude towards the curriculum, expressed by all respondents from primary teachers’ colleges, tertiary education institutions, Kenya National Examinations Council and the Kenya National Union of Teachers...’ The reasons for opposition included the wide scope of the syllabus, inadequate preparation before initiation, and lack of facilities and time to realise the syllabus objectives. In fact, a main reason for the reduction of the teaching subjects at the secondary level from 35 to 14 and the removal of the industrial subjects and Computer Studies emanates from the public’s submissions to the 1998 commission of inquiry into Kenya’s education system whose report now appears to have received official recognition. The same public, the report adds, would have been more understanding if it had been involved in relevant decision making. Second, the recommended changes were not preceded by appropriate reform in the wider socio-economic and political contexts. Also regrettable was the failure to involve external stakeholders, especially those in industry and business who are the main consumers of educational products. This section of society would have been particularly relevant with regard to the design of a curriculum that is responsive to changing market needs. A fourth weakness of the planning stage was the failure to take into account the human and physical resources required for successful

implementation of the new system well in advance. Planning for the implementation of this experiment was a clear case of management through crisis. Although efforts were made with regard to some crash training programmes, their adequacy and quality were questionable. Third, planning for this system was very much an afterthought as it was tied to the implementation of a much smaller project—that of the establishment of a second university.

There are five main lessons here. First, any educational reform of this magnitude is unlikely to succeed without a broad-based consultative process. In the short run, parents, teachers, and other immediate stakeholder groups may merely go along with a political decree, but their cooperation cannot be forced. In this connection, major curriculum designs need to involve more than the political establishment and top civil servants who are often limited in terms of exposure and experience. Consumers of education products, parents, and teachers should have the opportunity to input into a system that is sure to affect them in a variety of ways and that can benefit greatly from their support. More important is the involvement of professional researchers and education experts, especially those not in total agreement with the political establishment, as their divergent opinions may help in bringing about some balance regarding any proposed reforms. Second, among other measures, extra-education reform needs to be put in place with a view to targeting the conditions that are likely to improve demand for vocational skills. These may include protecting the local economy from being a dumping ground for cheap imported products and creating an enabling environment for business, both formal and informal. Third, popularity of vocational education is also likely to be enhanced by the establishment of mechanisms that make it possible for students to more easily move into middle-level colleges and the university, supported by some kind of national qualification framework. Fourth, such a project needs to be planned for on its own, not as an appendage to a less significant project, and with enough time to ensure that essential implementation inputs are in place. Finally, introduction of vocationalisation would have been more successful if it was phased in depending on the availability of key human and physical implementation resources.

Syllabi and Input Requirements

The main weaknesses of the vocational education syllabus relate to its ambitious objectives and content, overlaps in coverage across subjects, poor sequencing of topics, and the inclusion of material that is either too difficult or too simple—all of which have to do with poor planning before implementation and limited opportunities to pilot and evaluate the system. The stated objectives and content may also prove unattainable because the required resources

for their implementation are inadequate or absent altogether as is the case with most industrial subjects. There are additional problems related to unfamiliarity of the content of the syllabus given the rural and economically disadvantaged backgrounds of most of Kenya's secondary school populations. The curriculum has also been blamed for not relating science and vocational education more closely. As things stand now, science subjects and vocational subjects are grouped differently for purposes of selection of areas of specialisation by students. Finally, very few schools use external resources for teaching.

The need for a thorough review of the curriculum has been noted, although much of what needs to be done may have been accomplished with the removal of most vocational education subjects from the syllabus. The aim should be to design one that is feasible to implement in the face of available resources. Thus, schools should not be required to teach what they do not have the capability to teach; otherwise, concerted efforts need to be made to ensure that they have the required facilities to make it possible to implement the chosen curriculum. Second, the objectives and proposed coverage of any vocational course need to closely relate to the context in which it has to be implemented in order to be more attractive to learners. Third, regular in-service teacher training can go some way in improving their ability to teach the remaining vocational subjects and to impart newly emerging ideas and practices. Fourth, the number of courses and content within each of the subjects that continue to be on offer should be manageable. Fifth, given that resources are likely to be limited however few the subjects on offer, teachers should be encouraged to improvise teaching/learning materials and methods where possible. Thus to the extent possible, teachers need to use locally familiar examples with a view to making the best use of locally available teaching/learning materials. Also vital is the need to build closer links between the teaching of vocational subjects and that of science subjects because a firm grounding in science is likely to support learning of most vocational subjects. Finally, opportunities for using professionals and representatives of industry as guest speakers in schools and of exploiting the potential provided by trade and agricultural shows and student internship programmes can go a long way in enhancing the relevance and quality of education offered through vocational subjects.

Financing and Costs of Vocational Education

Overall, most vocational courses are more expensive to teach than the sciences and other academic subjects. Higher costs are due to the building and equipping of workshops and the cost of training and retraining some subject teachers, more expensive books, and smaller class sizes. The government meets the costs of teachers' salaries while parents pay for the construction

and equipping of workshops, procurement of teaching/learning materials, and the recurrent costs of teaching the various courses. There is thus little contribution by external stakeholders or from school-based income-generating projects. Second, available resources are not always put to the best use.

In view of the fact that vocational subjects are more expensive to teach than academic subjects, the decision by the government to transfer the teaching of vocational courses, especially those falling under industrial education, to the better equipped and more specialised technical institutions seems an appropriate one. Ordinary secondary schools are just not adequately prepared for this kind of training and most Kenyan parents have not been able to put any more resources in them, particularly given the uncertainties of the benefits that are likely to result from such investment. Other than transferring most courses to specialised institutions, an alternative may be to consolidate teaching of these subjects in selected and well-equipped district, provincial, and national secondary schools.

A second lesson relates to the need to lure the private sector to support the remaining vocational aspects of secondary educational programmes (Agriculture, Business Studies, Home Science). Private sector support could be in the form of scholarships, awards for the best students and teachers, internships and research programmes, and provision of teaching/learning materials. However, this can only be possible if the relevant organizations see a clear benefit with such support. To court such support, therefore, schools need to work out a strategy that demonstrates clear benefits to the sponsoring companies. Third, measures need to be taken to enhance the capacity of schools offering vocational subjects to make better use of the available resources including physical infrastructure and teachers. Teachers could be better utilised during the three months of vacations by having them grade end-of-term examinations and organising remedial classes for weaker students during these breaks for which they get paid.

Quantifiable Achievements

More than 2,000,000 students have done at least one vocational subject since the introduction of these subjects in the school curriculum. The majority of these students have been enrolled in Agriculture, Business Studies, and Home Science. The popularity of these courses has to do with a number of factors, chief among them being the ease of setting and maintaining them and the assumed market value of some of the business courses. Overall student performance in the national secondary selection examination is high for vocational subjects. The industrial courses are the least common, mainly because of the costs associated with setting and maintaining them. Although Computer Studies is also relatively expensive, its popularity has been growing, although not

significantly, mainly because of the economic opportunities associated with knowledge of computers. Overall, participation of boys and girls is almost equal. Boys are more into industrial education than girls. Girls are also not as well represented among the student body entered for the vocational subjects particularly in Nairobi mainly because more of the courses popular with boys are taught here. Of the eight Kenyan regions, Rift Valley has more students enrolled in vocational subjects, perhaps due to factors related to political patronage that may also influence the extent of government support of schools in this region and its large size. Although more than 90% of all Kenya's secondary school teachers have relevant academic and professional training, all industrial courses are characterized by the presence of teachers who have only technical certificates or just 'A' level secondary education. Moreover, most teachers of vocational subjects, as indeed is true of those of other subjects, have limited opportunities for on-the-job training or for professional advice by subject inspectors.

Despite that under the changed circumstances, it may be worthwhile to concentrate limited resources and effort on strengthening the more popular and easily manageable vocational subjects, namely Agriculture, Business Studies, and Home Science, the decision to move Computer Studies may be ill informed in this day and age and it is hoped that schools that are able to can still offer it as an option to interested students. Second, although issues of gender and regional imbalance may not be that prominent, especially with the removal of IE courses from the syllabus, there are concerns about the underrepresentation of boys in Home Science and of the unpopularity of this course compared to others such as Business Education and Agriculture. This gender barrier is more likely to be broken if measures are taken to show that even boys can excel in and need Home Science as much as girls do. However, teachers and parents have to do their bit to support their children and have students enroll and remain in vocational subjects irrespective of their gender and the courses they choose to study.

Schools and Students

Six main factors distinguish between schools that offer vocational subjects and those that do not. First, top national and private schools mostly opt for subjects that are easy to set up and maintain. IE courses are therefore quite uncommon in such schools. Second, some subjects, particularly Agriculture and Home Science, tend to be more common in rural schools while IE subjects are more commonly found in urban centres. Third, high-cost private schools, church-sponsored schools, and those benefiting from philanthropic organizations and individuals tend to be more resourced than government-maintained

ones. Fourth, girls' schools tend to be the ones offering Home Science and Typewriting with Office Practice while Industrial Education is more common in boys' schools. Also important is the level of establishment of given courses; where they are more established, schools tend to stick by them. Finally, as with other subjects, good school management contributes to the teaching and retention of vocational courses, as would be expected to be true of other courses.

With regard to students, five main factors determine which students enroll for vocational courses and for which ones. First, most students' choice is limited by what is taught in the schools that they attend. Within the schools, teachers develop sets of criteria for allocating students to the available courses. Second, in most schools vocational subjects are more common among average or below-average students and more unpopular with the top students. Some of these subjects are perceived as soft options as evidenced by the better performance in these subjects compared to the compulsory ones (English, maths, sciences) in national selection examinations. A third influential factor is a positive perception regarding availability of employment opportunities as with Business and Computer Studies. A fourth factor is the home backgrounds of the students and in particular the influence exerted by their parents. Some parents are particularly against their children enrolling in Home Science partly due to traditional cultural practices. Other parents disapprove of vocational subjects because they do not view them as the best preparation for a successful professional career. Finally, some students are attracted to vocational courses due to genuine interest in them and the economic benefits they see as likely to result from skills imparted through these courses. Such students are less likely to be influenced negatively against enrolling in their chosen vocational subjects.

Beginning in 2003, most Kenyan schools offer more or less the same vocational subjects with the removal of the Industrial Education subjects from the syllabus, a factor that will result in some level of equity among schools. What is more urgent therefore is to deal with the rural/urban and gender divides. If these differences are to be effectively addressed, MoEST needs to take a concerted effort to ensure that all schools have requisite human and physical resources for efficient implementation of the remaining vocational courses in all schools. The handicap of limitation of the necessary financial resources no longer applies as most of what is left for vocational subjects, except Home Science, requires more or less the same level of investments necessary as most academic subjects. Given the value of Home Science in the lives of both girls and boys, it is important for this subject to also be introduced in most boys' schools. In addition to encouraging students to enroll in this course, however, the learning process needs to be redesigned to highlight the value of the functional aspect of this and other vocational subjects for both boys and girls. Second, to enable interested students to have a choice of at least one vocational subject, MoEST

should take measures aimed at ensuring that some schools do not introduce their own compulsory subjects, as with the religious ones that force students to enroll for Christian or Islamic education as this only limits the options available to students among the vocational subjects. To support those students who are more interested in vocational subjects, it may be necessary to introduce incentives for the best performers. One such incentive would be to retain the current system whereby performance in these subjects is seen to be useful with regard to entry into post-secondary school courses. Third, given that good school management contributes to the popularity of vocational subjects, there is need for MoEST to mount relevant courses for the improvement of the management skills of head teachers and teachers of specific vocational subjects. Interest in vocational subjects is also likely to be promoted if the courses offered in secondary school are also taught throughout the primary cycle. Finally, given that the teaching of most vocational subjects is dependent on the level of parental support, schools should be encouraged to forge stronger partnerships with parents and local communities in order to gain their support in efforts related to the establishment and maintenance of vocational courses.

Assessment Methods and Learning Outcomes

Mastery of vocational skills is assessed at three levels, namely internal school assessment; the practical projects; and the final secondary school leaving national examinations, the KCSE. The KCSE examination accounts for 90% of the student's final grade, the remaining 10% being accounted for by the practical project. Although there is general agreement on the value of school-level continuous assessments, inability to guarantee their validity and reliability has meant that they cannot be used toward a student's final grade. Issues of validity and reliability are also of much concern with regard to the practical project. Although not of any certification value, some schools use other evaluation techniques such as competitions within classes and schools and among schools. The main objective of the final KCSE examination is to gauge the extent to which students have internalised positive attitudes toward practical work, vocational training, and self-employment. Students who perform well in this national examination target university education and other post-secondary training opportunities. Schools and students thus place much emphasis on good performance in vocational subjects for good grades. In any case, exemplary performance in these subjects does not necessarily place one at any advantage with regard to employment of any kind, unless one happens to be a top student in Business and Computer Studies and in a top school. For the best students, however, the university and a variety of other training opportunities are within reach. In fact, good performance in specific vocational courses has a direct bearing

on the degree courses a student may enroll in. Finally, although not necessarily the principal objective for registering in these courses, students value them for the skills they pick up which they hope to apply in their daily lives.

Having said this, it needs to be pointed out that the examination orientation of the curriculum and the examination system itself contradict some of the key objectives of vocationalisation especially as they relate to the promotion of problem-solving abilities and creativity in performing actual and out-of-school assignments. The current examination system also tends to test more of the theoretical aspects of learned skills partly as a response to a situation whereby schools have limited facilities to make teaching of practical aspects of the curriculum effective. The examination system has further been blamed for glorifying excellence in examinations through its system of ranking schools and students. This puts a lot of pressure on teachers, students, and parents to excel in what is tested and not what is functionally relevant.

In the absence of a more objective system for sorting out the beneficiaries of limited opportunities, the national examination system may be around for a while. However, it could be made more supportive of the goals of vocationalisation. One way this could be done is through attempts to test more practical knowledge than is presently the case. Second, there is a need to orient the examination system to testing more of general knowledge skills and analytical ability. Third, more weight needs to be given to continuous assessments and other school-level testing systems if a system for making them more objective can be worked out. Fourth, criteria for judging the worth of any school may need to include nonacademic considerations such as excellence in sports, drama, and community service in order to encourage schools to stress the value of nonacademic qualifications. Within schools, inter-school, inter-district, and national school competitions and exhibitions of vocational educational products can go some way in generating more interest in the retained vocational subjects. Finally, the system of career guidance needs to be strengthened in order to better prepare students for available out-of-school opportunities.

12 Some Concluding Remarks

The heavy criticism of the 8-4-4 system has culminated in the removal of most vocational subjects from the secondary school curriculum. This has come as a relief to parents who found it difficult to meet the demands of many vocational curriculum courses, particularly the industrial ones. Likewise, most head teachers will not find the exclusion of those courses a major loss as they were nonexistent in most schools, were popular with a small proportion of students, and were expensive to maintain where they had been introduced.

Although the removal of Computer Studies is regrettable given the growing role of computer technology in everyday life, only a few privileged schools can mount and retain the course. However, even for those schools that teach the Computer Studies course, its withdrawal may be justified because few schools in the country have access to electricity; only a few schools can afford computers; not many teachers are computer literate (even the few that are may not be competent in teaching the subject); and its teaching introduces and widens inequality between rural and urban schools/regions.

Nevertheless, the wholesale withdrawal of industrial education courses, Typewriting with Office Practice, and Computer Studies from even those schools that are well equipped to teach them is a somewhat unfortunate development. Those schools that have what it takes to offer the subjects should probably have the option of teaching them. To ensure equity of access to such schools, MoEST may designate at least one school in each district and province and a few national schools to offer these subjects. This may be one way of promoting cost-efficiency in their teaching if students who have an interest in them could be encouraged to join such schools. Cost-efficiency could also be promoted by de-emphasising sophisticated and expensive-to-maintain equipment in preference for simpler ones such as hand tools. Likewise, the computer course could focus on the teaching of more practical skills such as word processing, simple analytical skills, and the use of computers in local and international communication.

Along the same lines of teaching simple functional skills and aware that vocational education is not the panacea to unemployment, the curriculum needs to be reviewed with a view of introducing other types of functional survival skills in the form of short courses or one general knowledge course resembling the general paper of the former 'A' level system. Among the skills that could be taught under this course may be communication, simple analytical skills, home- and health-related knowledge, basic business and agricultural skills, knowledge of environmental awareness, civic education, democratic values, and basic repair and maintenance. Teaching this set of knowledge, as well as basic computer skills, could be made compulsory in all schools. Its examination could focus more on measuring ability to apply relevant skills rather than on their memorization.

The retention of Computer Studies and industrial education courses in at least some schools is justifiable on five fronts. First, these courses complement the teaching of other courses, especially the sciences. Second, they have the potential to enhance internalisation of valuable technological skills that are handy for a country targeting full industrialisation by 2020. Third, students who are genuinely interested in these subjects need the opportunity to exploit their full potential in these areas. Fourth, and as noted above, the computer revolution is

having an impact on all aspects of everyday life and individuals and communities risk serious marginalisation if they choose not to improve their understanding and exploitation of this technology. Finally, the heavy investment by government and parents in Computer Studies and industrial education courses should not be allowed to go to waste.

The introduction and implementation of most of the vocational subjects in Kenyan schools implies the need for widespread consultation before the mounting of any new courses, such as what is being suggested in this paper. Perhaps even more important is the need to appreciate that even such basic functional skills as are being proposed here are more likely to be usable in the context of a favourable economic and political climate, particularly one that promotes employment opportunities at the domestic and other levels.

13 References

- Cummings, C.E. (1998). Curriculum costs: vocational subjects. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education: an International perspective*. Oxford: Pergamon Press.
- Cummings, C., Davies, M., Lillis, K. and Nyagah. B. (1985). *Practical subjects in Kenyan academic secondary schools: background paper*. Stockholm: Swedish International Development Agency. SIDA Education Division Documents No. 22.
- Foster, P. (1965). The vocational school fallacy on development planning. In C.A. Anderson and M.J. Bowman (Eds.), *Education and Economic Development*. Chicago: Aldine.
- Karani, F. A. et al. (1995). *Cost and financing of quality education in Kenya, study 2: access, quality and equity in secondary education*. Study commissioned by the World Bank for the Ministry of Education. Nairobi: Mimeo.
- Kavagi, L. (2002, August 12). Directive on technical subjects ill-advised. In *Daily Nation*. Nairobi: Nation Printers.
- Kenya (1984). *8.4.4 System of Education*. Nairobi: Ministry of Education, Science and Technology.
- Kenya (1992). *Secondary education syllabus*. Nairobi: Ministry of Education.
- Kenya (1996). *Secondary education computer studies syllabus*. Nairobi: Kenya Institute of Education.
- Kenya (1999). *Tiquet: totally integrated quality education and training for unity, equity and development: report of the Commission of Inquiry into the Education System of Kenya*. Nairobi: Ministry of Education.
- Kenya (2001). *Economic survey*. Nairobi: Ministry of Education.
- Kenya (2002, June 14). *Press release: the revised primary and secondary curriculum*. Nairobi: Ministry of Education, Science and Technology.
- Kenya Government (1978). *Sessional paper on educational objectives*. Nairobi: Government Printer.
- Kenya Government (1981). *Second University on Kenya: report of the Presidential Working Party*. Nairobi: Government Printer.
- Kenya Government (1988a). *Report of the Presidential Working Party on education and manpower training for the next decade and beyond*. Nairobi: Government Printer.

- Kenya Government (1988b). *Sessional paper no. 6 of 1988 on education and manpower training for the next decade and beyond*. Nairobi: Government Printer.
- Kenya Institute of Education (1990). *Formative evaluation of the secondary education curriculum phase II*. Nairobi: Kenya Institute of Education.
- Kenya Institute of Education (1992). *Secondary education syllabus*. Volume three. Nairobi: Kenya Institute of Education.
- Kenya Institute of Education (1995). *Evaluation of the secondary school curriculum*. Nairobi: Kenya Institute of Education. Research Report series No. 53.
- Kenya Institute of Education (1999). *Needs assessment survey: report on the secondary education curriculum*. Nairobi: Kenya Institute of Education. Research Series No. 64.
- Kenya National Examinations Council (1998). *1996 Examination Report*. Nairobi: Kenya National Examinations Council.
- Kenya National Examinations Council (2001). *Results of performance in vocational subjects in Kenya Certificate of Secondary Education*. Nairobi: Kenya National Examinations Council.
- Kenya National Examinations Council (2002a). *KCSE: Kenya Certificate of Secondary Education. Regulations and Syllabuses (2002–2003)*. Nairobi: Kenya National Examinations Council.
- Kenya National Examinations Council (2002b). *KCSE: Kenya Certificate of Secondary Education-Regulations and Prescribed Texts*. Nairobi: Kenya National Examinations Council.
- Kenya National Examinations Council (2002c). *Results of Performance in Vocational Subjects in the 2001 KCSE*. Nairobi: Kenya National Examinations Council.
- Kerre, B.W. (1998). A position paper. In UNEVOC (Ed.), *Under the sun or in the shade? Jua Kali in African countries*. Paris: UNEVOC.
- King, K., and Martin, C. (2002). The vocational school fallacy revisited: education, aspirations and work in Ghana 1959–2000. *International Journal of Educational Development*, 22, 5–26.
- Lauglo, J. (1985). *Practical subjects in Kenyan academic secondary schools: general report*. SIDA Education Division Documents, No 20. Stockholm: Swedish International Development Authority.
- Lauglo, J. and Närman, A. (1987). Diversified secondary education in Kenya: the status of practical subjects and their uses after school. *International Journal of Educational Development*, 7(2).
- Ministry of Education and Human Resource Development and UNICEF Kenya Country Office. (1999). *Comprehensive education sector analysis*. Nairobi: UNICEF.
- Mwiria, K., and Menjo, F. (1997). *Improving the quality of secondary education through a networking of schools: proposal on the establishment of a Kenya school net*. Report prepared for IDRC. Nairobi: Mimeo.
- Närman, A. (1985). *Practical subjects in Kenyan academic secondary schools: Tracer study*. SIDA Education Division Documents No. 20. Stockholm: Swedish International Cooperation Agency.
- Ngome, C. K. (1993). *Factors that influence the provision of agricultural education in Kenya*. Unpublished MA thesis. Nairobi: Kenyatta University.
- Okaka, P. O. (1998). Technical and Vocational Education and Training Policy in Kenya. In UNEVOC (Ed.), *Under the sun or in the shade? Jua Kali in African countries*. Paris: UNEVOC.
- Wasanga, P.M., and Ingolo, G.G. (2001). School based assessment (SBA) experience at the Kenya Certificate of Secondary Education (KCSE) level. A paper presented at the 19th Annual Conference of the *Association for Educational Assessment in Africa (AEAA)*, Nairobi, Kenya (September 24–28).

Part III: Labour Market Impact

Technical and Vocational Education and Training in Mozambique: Better than Its Reputation, *Jørgen Billetoft and AUSTRAL Consultoria e Projectos*

Economic Returns to Vocational Courses in U.S. High Schools, *John H. Bishop*

Jørgen Billetoft and AUSTRAL Consultoria e Projectos

7

Technical and Vocational Education and Training in Mozambique: Better than Its Reputation

1	Introduction	309
2	Basic Structure of Vocational Education and Training	311
3	Short-term Training	315
4	Main Findings of the Cost Effectiveness Study	315
5	Conclusion	326
6	References	327

1 Introduction

The paper presents the main findings of a recent study of the cost-effectiveness, internal efficiency and cost structure of technical and vocational education (TVE) in Mozambique. The objective of the study was to examine the current TVE system vis-à-vis the labour market ‘in view of the costs incurred in providing the training and with a view to contribute needed knowledge that facilitates improvement of the present system for provision of skills training’. To the surprise of most onlookers, the study found fairly high labour market absorption of graduates, even though a significant proportion of the graduates were found to have continued the studies at a higher level. Only a small percentage of traced graduates reported that they were unemployed. This situation, which seems to be positively different from that of most sub-Saharan countries, is primarily attributable to two factors: a) the recent growth of the Mozambican economy, and b) the narrowness of the education pyramid allowing only a small fraction of an age group to enter secondary school.

The study was conducted by Austral Consultoria e Projectos Lda, Maputo, in close consultation with Ministry of Education (MINED) and Ministry of Labour (MINTRAB). The World Bank through a credit to MINED provided funding for the study, and arranged for additional funding for technical assistance to the

study through a grant from the Norwegian Education Trust Fund. The authors respectively assisted the survey team with design and quality assurance, and headed the survey team.

The current structure of TVE in Mozambique originates in the socialist economic planning practice which dominated until the late 1980's. In the aftermath of the Portuguese dominance, policy-makers committed to a planned economy anticipated fast and growing modernisation of agriculture, industry and services. Thus, rather than personal development or socio-political goals, economic goals were the determining concern for structure of TVE in Mozambique. The aim was to develop a cadre of youth who would have the skills needed for the transformation of the economy.

Unlike many other African countries, Mozambique has opted for a conventional dual secondary education system comprising purely academic secondary education running parallel to the TVE schools, oriented towards acquisition of competencies and knowledge required for particular industries or professions—though some types of TVE also confer credentials on level with purely general courses. Mozambique has never subscribed to the notion of only a 'light dosage' of vocational subjects in the curriculum of general secondary education as a means to prepare for self-employment. However, both for basic and intermediate level, the time allocated for practical subjects is quite limited although the picture varies from institution to institution. Rather, the curriculum structure was originally designed in the context of a centrally planned economy with a view to producing qualified workers and technicians for formal employment in large state-owned companies.

Hence, the structure of the current education system in Mozambique dates from the early 1980's. Following independence in 1975, the Frelimo government made strong efforts to develop education. However, the civil war had devastating effects on the education sector. Since it ended in 1992, the government has been strongly committed to increasing access and participation in education. Against a backdrop of reconstruction and growth, lack of qualified labour is considered a serious constraint on development.

Between independence and the peace accord in 1992, the economy was in decline mainly due to the exodus of qualified Portuguese, nationalisation of most companies and the devastating effect of the civil war. The government began liberalizing the economy in the late 1980's but it was not until after the 1994 election that economic growth really took off. Mozambique is today the fastest growing economy in sub-Saharan Africa.

The state is the main provider of TVE. The sub-sector is managed by the Ministry of Education through the Directorate of Technical Education (DINET). DINET controls a network of approximately 35 institutions. In addition to this, other ministries and public enterprises provide technical education through specialised schools and training centres. The Ministry of Health is

the largest owner of specialised institutions, but many public utility companies such as the telecommunication, railways and water companies all have their own training system.

The Ministry of Labour is responsible for short-term, mainly non-formal, skills development training, and runs six vocational training centres (VTCs).

The misbalance between capacity of public TVE schools and the demand for employment-oriented competencies has led to mushrooming of private and semi-private schools, for profit as well as not-for-profit institutions. As elsewhere, ICT and management courses are particularly popular, but also the demand for high-quality technical courses seems to be growing due to the better quality of teaching and the superior facilities. Not all private courses are government recognised.

There is no central mechanism for coordinating the overall training provision and the policy of the involved actors. DINET is in charge of TVE institutions belonging to the Ministry of Education, but has limited influence on other institutions.

2 Basic Structure of Vocational Education and Training

Vocational Secondary Education

Technical and vocational education comprises three levels: elementary, basic and intermediate. Successful graduates obtain a general education certificate one level higher than the entrance level and a professional trade certificate. In the late 1990's a process of curriculum reform was initiated at the intermediate level with a view to introducing new courses, for instance management and computing, and reducing the number of subjects.

The *elementary level* recruits Grade 5 completers. The course, which last 3 years at the Arts and Craft Schools, aims at elementary skills with predominance of practical aspects. To the graduates it confers equivalence to the two years of upper primary education in the mainstream system of general education. Graduates thus qualify for secondary education at basic level. Due to the practical subjects the Arts and Craft course lasts one year longer than the corresponding upper level general primary education.

The *basic level* recruits Grade 7 completers and is of 3 years official duration (day course) or 4 years (evening courses). The graduation level is equivalent to the first cycle of the ESG-General Secondary Education. Leavers from basic level technical schools qualify for second circle of secondary education, corresponding to technical education at intermediate level.

The *intermediate level* recruits Grade 10 completers (first cycle of ESG). The duration of the day course is 3½ years (4 years for agriculture) and 4 years for the evening course. The last term of the course is centred on professional practice and is usually spent in industrial attachment.

For basic as well as intermediate level, the curricula put strong emphasis on general academic subjects, particularly in the first year, similar to those of general secondary education. The proportion of academic and technical subjects taught in MINED institutions varies with institutional level but not greatly so. At basic level, where 75% of the TVE students are found, academic subjects make up two-third of the curriculum, 25% is devoted to technical subjects and approx. 10% is used for practical training. The practical training component is in reality probably smaller because much of the equipment and machinery that is required is not in working order. Academic subjects are particularly prevalent in the first two years of the courses. The low pass rate for 1st year students is often explained by the students' poor performance in the academic subjects. Another critical factor may be the many subjects taught at the TVE institutions; some courses have as many as 25 subjects of which many are criticised for being of little relevance for understanding of the trade. The pass rate is higher for 2nd and 3rd year students, and more attention is in these upper grades given to trade theory and practical subjects.

The duration of the basic and intermediate levels is ½–1 year longer than that of general secondary education to compensate for the time allocated to practical subjects in the curricula.

It is estimated that the MINED's TVE institutions combined, provide education opportunities for only 1% of the youth between the age of 15 and 20. Public general secondary education, i.e. provided by MINED, is available for approx. 5–6% of this age group. This makes the Mozambican education pyramid one of the narrowest in sub-Saharan Africa.

Basic level schools dominate among the TVE institutions under the management of MINED, accounting for more than three-quarters of the places. The intermediate level accounts for approx. 15%, and Arts and Craft Schools at elementary level for the rest¹. The Government has recently initiated a reform of the elementary level and started construction of several new such schools.

Basic Level

The training aims at acquisition of theoretical as well as practical professional abilities and knowledge related to the trade. The level corresponds to

¹ There have been just two elementary level TVE schools under the management of the Ministry of Education till recently, but several NGOs offer training at that level.

a qualified professional status, i.e. ability to conduct technical and professional duties requiring both practical and theoretical knowledge of the trade. Courses are offered in the areas of agricultural, commercial, industrial trades with numerous sub-specialisations. The courses comprise 2,700 to 4,500 teaching hours.

MINED operates 23 TVE schools at basic level of which 8 are industrial & commercial schools, 1 all commercial school, and 8 agricultural schools (2002). There are three schools in Maputo run by other ministries providing courses at basic level. In addition some few semi-government institutions operate training centres at basic level.

Intermediate Level

Graduates are supposed to be professionally qualified technicians and to possess a high enough skill and understanding of the trade to enable them to undertake supervisory functions.

Graduates from intermediate level qualify for continued studies at tertiary level, *nível superior*.

Of the 8 intermediate level TVE institutes managed by MINED one is all industrial, one all commercial, two commercial & industrial institutes, two agricultural, one institute of geology & mines, and one teacher training & agro-industry.

Limitations of Technical/Vocational Education in Mozambique

Several reports from the 1990's found that the current TVE system suffers from the low efficiency and effectiveness characterising most sub-Saharan TVET systems. The weak points typically mentioned are:

- Lack of strategic orientation of the TVE system;
- Lack of flexibility, coherence and co-ordination among the different actors in the training process. Centralised management practice is preventing adaptation to local circumstances. The management of the individual TVE institution has no freedom to decide on which courses to provide, to initiate special courses in response to local needs or to hire and fire teachers;
- Lack of relevance as demonstrated by a mismatch between training objectives and Mozambique's social and economic needs. Outdated curricula² are an indication of this;

² Some few curricula have been updated recently, but the majority still dates from the 1980's.

- Self-employment as a possible career path is essentially ignored in the curricula;
- Lack of relevance and effectiveness as shown in high failure and drop-out rates and in mismatch between graduate quality and training objectives defined in the curricula. Crowded classes contribute to the high failure and drop-out rates;
- Shortage of management capacity and qualified teachers at the individual schools and institutes. The majority of teachers lack practical knowledge and professional experience. Pedagogical knowledge and skills are also very limited;
- Resource constraints resulting in poor motivation of teaching staff (and potential risk of petty corruption), shortage of instruction materials and equipment, and run-down classrooms and workshops. There is considerable variation between schools, depending mainly upon the prior use of donor funds to upgrade provisions and provide training of staff.

Although many TVE institutions are not able to provide the intended practical training due to inadequate workshop facilities, equipment, materials and trained instructors, the picture is varied. Institutions which have been sponsored by a foreign organisation are often quite well equipped and seldom lack materials. In recent years, as a result of the government's effort to upgrade the quality of technical education, there are also some TVE institutions without foreign support which have been rehabilitated. However, the institutional constraints mentioned above are essentially valid and continue to hamper the performance of the government TVE system. No data are available to compare the qualifications of graduates from upgraded schools with those from schools that have not been sponsored.

Reform of TVE

As part of the global reform of education in Mozambique MINED has embarked on a reform of TVE. In December 2001 the Cabinet approved a new TVE strategy for Mozambique (*Estratégia do Ensino Técnico-Profissional em Moçambique 2002–2011*). The main thrust of the strategy is improvement of the quality of the technical education, adjustment of curricula to the realities of the economy, forging of stronger links with the productive sectors, and introduction of more flexible courses based on a modularisation concept. However, some of the structural constraints such as the need for increased management autonomy of the individual TVE schools are not yet on the agenda of issues to be dealt with.

3 Short-term Training

Training Centres under Ministry of Labour

MINTRAB is responsible for 6 Vocational Training Centres, *Centros de Formação Profissional*. The Centres cater for two target groups: a) Young, first-time jobseekers, b) Workers who wish to upgrade their skills or are changing job due to unemployment. The entry requirement is Grade 4 to 6, depending on the course. Courses typically last 4 months (500 hours). 75% of the lessons are practical exercises in workshops, while 25% are technology (trade theory) lessons. The curricula do not include academic subjects. The courses do not lead to any academic qualification.

Private Training Centres

No exact figures are available on the short-term training conducted by private companies. In 1999 it was estimated (CBE 1999) that 50 companies all over Mozambique have some sort of training centre and even more practice in-plant training of their staff. Today this number is probably significantly higher. A number of NGOs such as religious organizations have created training centres for young unemployed people. Many (rural) development projects have a strong training component as well.

There is no uniform standard for the training and therefore no official registration of the training provided by companies and NGOs.

4 Main Findings of the Cost Effectiveness Study

Detailed planning of the study began in January 2002 and the first draft report was submitted to MINED and MINTRAB in September the same year. The revised final version was submitted to the Government of Mozambique in May 2003 (Study of the Costs and External Effectiveness of Technical and Vocational Education, MINED, 2003).

Methodology

A three-track approach was adopted for the cost-effectiveness study: (i) a tracer study of graduates from technical and vocational training institutions, (ii) an analysis of the recurrent unit cost of training in different types of institutions, (iii) an assessment of the internal efficiency of individual institutions.

Table 7.1 Composition of tracer sample

	Graduates (1998)	Final sample
MINED:		
Elementary	22	15 (68%) of which 33% are women
Basic	1,764	292 (17%) of which 24% are women
Intermediate	502	174 (35%) of which 14% are women
Drop-outs	N/A	35
Private:		
ADPP (Basic)	51	22 (43%)
IEG (Intermediate)	35	25 (71%)
MINTRAB:		
	Gross sample (2000)	Traced
Short-term	174	97 of which 25% are women

Graduates for the *external effectiveness study* were chosen from three types of institutions: a) MINED institutions (1 institution at elementary level, 7 at basic level and 3 at intermediate level, representing all three lines of specialization i.e. agriculture, commerce and industry); b) MINTRAB centres (3 Vocational Training Centers (VTC), all of them “industrial”); and c) private providers (1 at basic level (ADPP³) and 1 at intermediate level in commerce (IEG⁴). For MINED and the private institutions, graduates who had passed their exams in 1998 were chosen as the basis for tracing, i.e. three years after the graduation. For MINTRAB, those who have attended courses in year 2000 were traced. All together 661 graduates/course attenders and 35 dropouts were interviewed. In addition to this a number of employers and teachers/professors were interviewed about the quality of education and the conditions of the training institutions. Sample characteristics are given in Table 7.1.

By virtue of extensive efforts the field team managed to trace as much as 90% of the originally set target for MINED graduates. This is a remarkably high rate for this kind of survey. For the remaining portion of the target sample, non-traceables were substituted by other graduates who had attended the same kind of course and from the same year and institution. In this way a total of 38 graduates were added to the original sample of 475. Considerable attention

³ ADPP (People-People) is a Danish-based leftist populist NGO which is very active in the education sector all over Mozambique. It maintains good collaboration with the government.

⁴ IEG is a renowned private for profit management training institute. Many of the students are taking the degree courses (evening classes) while working full-time.

was given to checking the reliability of the responses in order to secure the credibility of the findings and clarify any inconsistency.

For basic and intermediate schools the gender composition matches that of the national system. For the elementary level the sample has a slight overrepresentation of women. In relation to the MINED institutions, graduates from intermediary level TVE institutions account for a larger share of the sample than they do within the population of graduates from MINED technical education institutions. This may lead to a more positive assessment of the overall external effectiveness of TVE as intermediate level graduates tend to perform better than those from level basic. However, if data are analysed by level, this has no implications for the validity of the findings.

For the *unit cost estimates* five different categories of schools were selected for in-depth analysis, four public and one private. It proved rather difficult to obtain the required information, in part because the expenses are covered through different channels and therefore recorded by different authorities, and in part because not all school income seems to be accounted for. The unit costs analysis did not take into account the costs of operating the ministry itself.

As regards *internal efficiency*, the analysis was done on the basis of official national statistics compiled by MINED. Especially the issue of dropouts caused considerable analytical difficulties. Official statistics merely register students who drop out *during* the course of the year. Students who do not re-enroll after having failed the exam are not reflected in the figures. Therefore, the statistics very severely underestimate the extent of the phenomenon. In order to compensate for this situation, existing MINED statistics were recalculated and reassessed⁵.

Main Findings of the External Efficiency Study

Roughly speaking one-third of the total sample have continued their studies, one-third have found a full-time salaried job-‘permanent’ or temporary-and one-third have some kind of part-time job, were self-employed or reported to be overtly unemployed, as indicated by the table below. However, there is significant variation among levels of education and trades (Table 7.2).

The main findings as indicated in the table are:

- As expected more basic-level graduates reported that they were still studying. This is expected as an intermediate-level certificate is the goal of most students. Few have the resources and qualifications required to pursue

⁵ For the use of the tracer study, drop-outs were defined as those who have dropped out during the course of the year and not resumed the studies at the same training institution within three years of the drop out. Hence, the tracer study does not provide information on those who renounced the studies after having failed the (annual) exam.

Table 7.2 Current main activity

	Ministry of Education-MINED				Private		Min. of Lab. MINTRAB	TOTAL
	Elemen.	Basic	Intermed.	Dropout	IEG	ADPP	VTC	
Student	5	148	19	6	—	10	20	208
	33%	52%	11%	24%	—	45%	23%	33%
Full-time employed	3	69	146	1	19	7	31	276
	20%	24%	83%	4%	83%	32%	35%	44%
Part-time employed	2	30	7	—	1	—	1	41
	13%	11%	4%	—	4%	—	1%	7%
Self- employed	3	13	2	7	1	1	20	47
	20%	5%	1%	28%	4%	5%	23%	7%
Unemployed	2	20	1	10	2	4	13	52
	13%	7%	1%	40%	9%	18%	15%	8%
Others	—	2	—	1	—	—	3	6
	—	1%	—	4%	—	—	3%	1%
TOTAL	15	282	175	25	23	22	88	630
	99%	100%	100%	100%	100%	100%	100%	100%

tertiary education. Also a considerable percentage of the VTC course participants reported to be studying.

- In fact, half of the respondents continue with studies, even if they are working at the same time. The level of education is critical for the career of graduates, both in terms of remuneration and job responsibility.
- Intermediate level graduates tend to have a higher share of persons in permanent positions than the basic level. Graduates from agricultural schools have experienced more difficulties in finding employment than those from commercial and industrial schools. The reasons for that are probably the slow recovery of the agricultural sector and the fact that the agricultural schools tend to be located in faraway areas with limited employment opportunities.
- Surprisingly few graduates are self-employed, even among those who have attended VTC courses (less than one-quarter). More drop-outs than graduates reported to be self-employed (in the informal sector), but also for this group self-employment is limited.
- Direct unemployment is low for all categories. As predictable, drop-outs have a higher rate of unemployment than other categories.
- Essentially participants from MINTRAB's short VTC courses and leavers from MINED's elementary level show the same post-course pattern, the

main difference being a relatively higher proportion of students among graduates from elementary level and more persons in salaried employment among those trained in VTC courses. However, due to the smallness of the sample from Arts and Craft Schools, firm generalisations cannot be made.

The findings of the study also revealed a number of other interesting facets:

- Women reported a relatively higher unemployment rate than men (four times as high among graduates and twice as high among drop-outs). Along the same line, slightly fewer interviewed women than men are having full-time employment.
- As regards trade specialisation, graduates from schools teaching agriculture are not as inclined as graduates from schools specialised in commerce and industry to pursue further studies. Perhaps young people bent on continuing their studies are more interested in commerce and industry than in agriculture. The chance of continuing also depends on access to institutions of a higher level, and not all provinces have agricultural schools at intermediary level. Graduates from agricultural schools also reported a much higher share of temporary employment than any other groups, reflecting the employment structure of the agricultural sector with a predominance of fixed-term appointment, a phenomenon which is widespread among donor organizations and NGOs as well.
- Finally, in the central part of the country (zona Centro), relatively more of the respondents who were traced, reported being 'student' than in other parts of the country; while those with permanent employment dominate among the respondents in the southern part (zona Sul)— suggesting that graduates looking for employment aim at the Maputo region.

Employment as Main Activity after Three Years

For those who reported employment as their main activities, the main findings were:

Time lapse before first job: The level of education plays an essential part in the search for employment. Approximately 45% of the graduates from MINED institutions managed to secure a job within the first 6 months after graduation. This was only the case for 33% of those who have participated in short-term training at a Vocational Training Center. Intermediate level graduates were those who most easily found jobs, probably reflecting the smallness of this group compared to the demand. ADPP graduates reported time spent on searching for a job similar to those of

Table 7.3 Current job by professional field

Current Job	Professional field				
	Agricultural	Commercial		Industrial	
	MINED	MINED	VTCs	MINED	VTCs
State company	10 20%	26 21%	5 33%	37 20%	5 18%
Private company	6 12%	54 44%	8 53%	112 60%	17 61%
Public administration	24 47%	31 25%	1 7%	27 14%	1 4%
NGO	7 14%	3 3%	— —%	3 2%	— —
Informal business	1 2%	1 1%	— —%	2 1%	1 4%
Others	3 6%	7 6%	1 7%	7 4%	4 14%
TOTAL	51 99%	122 100%	15 100%	188 100%	28 100%

the VTCs. As many as 50% of the VTC course participants looking for salaried employment were still unemployed 1½ years after the course.

Category of employer: The private sector generally absorbs the majority of graduates from the TVE schools. No more than 23% of the MINED graduates with jobs reported to be engaged in public administration. Twenty percent are working for parastatals and 48% for private companies. Hence, public technical schools are not in any way catering only for the needs of the public sector. Graduates from basic level schools have by far the highest share of public employees (41%), the reason apparently being that a considerable number of them become school teachers, especially in the northern part of Mozambique where other employment opportunities are limited. This applies especially to graduates from basic level agricultural schools.

Job mobility is reported to be low. As many as 70% of the MINED graduates (traced after 3 years) stated that they are still in their first job after graduation. Nevertheless, 47% of the MINED graduates indicated they were looking for another job. The corresponding figure for VTCs is 61%, indicating a higher level of job dissatisfaction for that group. The

principal reason given for looking for another job was dissatisfaction with the current salary. However, general job satisfaction was reported to be high.

Respondents were also inquired about the match between their present job and the type of TVE they had received. Sixty-two percent of those who have been to TVE schools rated the correspondence as good. For those who have been to the private IEG the figure was even 77%. This suggests that the students actually do take advantage of their line of specialisation when looking for a job, and that for the great majority their TVE specialization is relevant for the work they find.

Remuneration: Roughly half of those who have graduated from technical school stated that they have a monthly salary between 1m and 2.5m MZM per month (early 2002 figures)⁶. Approximately one quarter reported monthly salaries between 2.5m and 5m MZM, and one-quarter above 5m MZM. Salaries tend to be lowest in agriculture and highest in commerce. Not surprisingly, VTC course participant reported considerably lower wages. For comparison, the minimum wage by that time was 650,000 MZM/month; a primary school teacher would be paid approximately 1m MZM, and an experienced worker between 1m and 1.5m MZM per month. Thus, the salaries of technical school graduates compare well with the general level of income in the country. There seem to be two reasons for that: Firstly, with the narrow education pyramid prevailing in the country, TVE graduates belong to the relatively small group of those with more than 7 years of education; secondly, most respondents are employed in the private sector which tends to pay better than the public one.

Self-employment: As can be seen from the Table 7.2, very few graduates, especially from MINED schools, have actually opted for (or been forced to venture into) self-employment. The fact that so few have started their own business shows that the labour market at present can secure salaried employment for most graduates. But it also indicates that if preparation for self-employment is a principal objective of the short-term courses provided by the VTCs, it is an objective that VTCs fail to reach.

Assessment of education: A selection of private and public employers ($N = 63$) and the graduates themselves were asked to assess the quality of the vocational education which the graduates had received. The majority of students found the training they have received adequate for their current job. Almost 80% of the intermediate level graduates stated that they use their technical knowledge in their current employment,

⁶ By March 2002 USD\$ 100 was equal to approx. MZM 2,400,000.

as compared to just 40% for basic level students. This finding is quite logical because especially basic level institutions offer limited practical experience. Among the graduates the main view was that the curricula had too much theory and should give more attention to practical skills. Also lack of exposure to modern technology such as Information and Communications Technology (ICT) was seen as a major shortcoming. In general the students rated the facilities of the MINED institutions low, complaining about outdated equipment and lack of teaching materials of all sorts.

Employers in general are more critical about the qualifications of the graduates. Lack of knowledge of foreign languages and lacking supervisory skills were mentioned as other weaknesses. Also complaints were raised concerning the graduates ability to express themselves in written Portuguese, indicating that the quality of the teaching in academic subjects leaves something to be desired. As a result of this most graduates need further training and supervision. Many employers called for an update of the curriculum to reflect contemporary knowledge.

Continued Studies as Main Activity

Whereas one-third of the respondents reported 'student' as their principal activity, a significantly greater proportion indicated that they are continuing to study, either full- or part-time. For instance, almost one-quarter of those with a full-time job stated at the same time that they are continuing their studies usually at evening courses. In total approximately 50% of all respondents stated that they were attending some sort of further education, showing the extremely strong interest of young people in striving to achieve a higher level of education.

Many of those who are continuing their studies are doing so in an area related to their previous studies. This is particularly the case for graduates of commercial schools. The figure is somewhat lower for industrial schools and much lower for graduates of agricultural schools (approx. 50%). The latter is explained by the fact that there are not many technical schools at intermediate level specialised in agriculture. Instead, those students seem to opt for general secondary education schools. Hence, continuation of studies in the same field seems to depend on availability of institutions of higher learning for that specialty in the geographical area. Agricultural school graduates instead opt for higher level general secondary education.

Among those who have attended the short-term courses of the VTCs, the link between subject specialisation and continued studies is vague. The relatively

few who opt for more education tend to aim at general secondary education. It has been suggested that the VTC courses in some instances in fact serve as waiting room for youngsters waiting to get access to the next level of formal education.

Professors of tertiary education institutions were requested to evaluate the competences of technical school students. Relatively few professors were able to provide the requested information. Firstly, because students from TVE institutions in most cases constitute a clear minority of the tertiary students and, secondly, the professors are often unaware of the school background of their students. However, those able to make an assessment stated that technical secondary school graduates tend to perform poorer in academic subjects, which dominates the first years of the tertiary education, while they tend to be superior in technical subjects related to their specialty, which dominate the last years of the higher education. Hence, TVE students are better prepared to deal with the courses in their specialisation area, but perform poorly in other areas.

Approximately three-quarter of the respondents have experienced internship as part of their education. Although few students have found their current job with the enterprise where they have had their internship, the internship was highly appreciated as a means to acquire practical skills and to get the sense of the 'real world of work'. The ongoing privatisation of state-owned enterprises has rendered it more difficult for the TVE institutions to arrange internships for their students.

Drop-outs

According to persons associated with the education system rather few students actually drop out entirely. When facing difficulties, whether academic or personal, they are rather likely to deregister temporarily until the problems have been resolved. The 'genuine' dropouts are those who for some personal reason have to relinquish the studies entirely, and those who fail the exam repeatedly (all students get three chances). Available statistics do not make possible a distinction between 'genuine' dropouts and those who temporarily interrupt a course. The issue is further scrutinised in the section on internal efficiency.

Among the 35 dropouts identified, the following reasons for abandoning the studies were reported: financial difficulties (27%), failed exam (21%), pregnancy (18%), bad health (15%) and other reasons (21%). As the table indicates, the activity pattern of drop-outs is somewhat different from that of graduates. Especially, the rate of unemployment and self-employment is significantly higher for this group. In fact 50% of the drop-outs said that the fact they dropped out has hindered them from finding a place in the labour market.

Conclusions on External Efficiency

The study indicates that the overall external effectiveness of TVE in Mozambique is higher than stated by earlier reports. Labour market absorption is fairly high and overt unemployment almost non-existent. Even if informal sector self-employment is perceived as hidden unemployment, very few are neither working nor studying. The narrowness of the education pyramid in Mozambique allowing merely few (less than 5% of a cohort) to pursue senior secondary education significantly contributes to this. However, both employers and graduates suggest that the content of most courses need to be updated to better reflect modern technology and modes of organisation. The study also revealed an overwhelming lack of interest in self-employment. At the same time, though, remarkably many of the graduates were working in the private sector rather than being government employees.

Arts and Craft Schools and the VTC require essentially the same qualifications of their entrants, namely Grade 5. It is therefore interesting to notice that the three year courses provided by the Arts and Craft Schools are not leading to higher labour market absorption or self-employment than the short courses offered by the VTCs.

Internal Efficiency

A number of indicators were used to assess the internal efficiency of TVE in Mozambique: The rates of drop-out, pass and failure, completion of education and repetition. Besides, the mean time for completion of the courses was calculated for the sample.

Drop-out rate: As mentioned, official education statistics only provide figures on those who abandon the studies during the course of the academic year, but do not account for those who discontinue the studies *between* two academic years, for instance because they failed the exam. Therefore, a major effort was made to compute the real extent of drop-out, understood as a combination of those who gave up during the year(s) and those who did not show up after the term-break. It turned out that in some instances, there is actually a positive influx of students during the year (computed as the difference between enrolled at the beginning of the year, and those who pass or fail the exam at the end). Also, occasionally, in a given year more students commence a class in the second or third grade of a course, than those who pass in the previous year the annual exam in the grade supposedly preparing for these higher grades. These findings show that a significant number of students enter the technical secondary schools from other institutions both during the academic year and between

grades. Some are those who failed previously without wanting to repeat the entire year, others probably derive from other schools where they have been less successful.

However, computed over a longer period, there is a net flow of drop-outs with a high percentage of students leaving without certificate. Drop-out rates in the magnitude of 40–45% are not in any way unusual, calculated as the number of drop-outs relative to the original enrolment of a course in the year the course commenced. Evening school classes have the highest rates, in some instances exceeding 50%. The dropout rate diminishes with grade, the first grade having the highest rates. Women have in general higher drop-out rates than men.

Pass rate: For all courses (trades) at all levels (basic, intermediate) the annual pass rate is distinctly low; rates of 45–50% are common with a slight increasing tendency for higher grades. The statistics suggest that 70 to 80% of those who fail repeat the class.

It is important to keep in mind that a high internal efficiency (pass rate) does not necessarily imply a higher quality of the teaching. Indeed, it may rather suggest weaker management structures resulting in less control and assessment of student qualification based on personal relations. Interestingly, more remote schools tend to have a higher pass rate.

*Completion rates*⁷ vary considerably across courses. For *intermediate level institutes* a completion rate in the region of 60% for day classes is not unusual, whereas it is somewhat lower for evening classes, around 35% corresponding to dropout rates of 65%. For *basic level* completion rates for day classes are typically around 45% and somewhat lower for evening classes (approximately 35%). Finally, students of schools at elementary level enjoy completion rates of about 75% but they are few in numbers.

The *Austral* Team estimated the mean completion time for the graduates of the tracer sample. While day class students typically use an extra 1–1½ year for completion of the course, evening class student on the average needed an additional 1½–2 years in order to finalize their course. Hence, it is estimated that less than 25% of the students at basic level complete their vocational education within the ideal time, while the percentage for the intermediate level is a little higher (in the magnitude of 30%).

For reason of comparison, pass, completion and drop-out rates of general secondary education students were computed as well on the basis of official MINED statistics. General secondary education enjoys somewhat higher pass rates (60–70%)⁸, increasing from lower to higher grades. Especially drop-out

⁷ Completion rate is computed as the number of graduates in a given year compared with net enrollment at the beginning of the course.

⁸ Calculation by Austral Team on the basis of official MINED statistical information.

rates are lower than those recorded for TVE institutions. Consequently, the completion rate is markedly higher. This confirms the assumption that many young people opt for TVE because they did get access to general secondary education in the first place, and that they continue to seek enrollment at a secondary school also after they have started at the TVE institution.

In conclusion, the internal efficiency of the technical and vocational education system is very modest. The fact that the pass rate is particularly low at the end of the first year points to the predominance of general academic subjects in the curricula as a major cause for low efficiency. Lack of student motivation may also contribute to the low efficiency, e.g. if students are waiting to be enrolled at a general secondary school. Finally, large class-sizes and limited pedagogical competences of the teachers contribute to the problems.

Cost-structure of Technical and Vocational Education

Unit costs were calculated for five training institutions, four under MINED and one private (IEG). The cost of producing a MINED graduate in 1998 varied between MZM 9,000,000 (USD\$ 740) and MZM 20,000,000 (USD\$ 1,650), with the unit cost for most graduates being closer to the latter. The unit cost of IEG was in 1998 MZM 49,600,000, which is $2\frac{1}{2}$ times the unit costs of Instituto Comercial de Maputo, the MINED institution that is most similar to IEG. These figures do not include overhead costs of operating the technical education system at central government and provincial level. Neither is depreciation (replacement value of physical installations and equipment) taken into consideration, as it proved impossible to estimate these figures in the given circumstances.

As a rough indication, teacher salaries consume 70–75% of the budget, while operational costs and boarding facilities account for the rest.

5 Conclusion

The current cost-effectiveness study of TVE in Mozambique is the first study based on extensive empirical material. Adrian Ziderman (1993, 1997). earlier conducted a modified tracer study which was based on a reunion of previous students who were requested to report on their present situation. Ziderman's findings were less promising than those of the present study, probably reflecting the more depressed economic situation at that time. While many of the systemic weaknesses identified previously are generally confirmed, the striking difference between the present study and the previous assessments is the relative

'high' labour market absorption of the graduates. Further, the fact that rather many employers find the competencies of the graduates acceptable, although many pointed to a clear room for improvement, somewhat contradicts the claims which often have been made about a complete mismatch between the contents of TVE and the needs of the labour market.

The findings suggest that under the prevailing situation of fast economic growth the demand for skilled labour is high enough to absorb a considerable part of graduates from TVE institutions keen to pursue a career as wage employee despite their obvious limitations in terms of practical and theoretical knowledge. However, the pattern is not even all over the country. The current growth is generally centred in the greater Maputo area, with less employment opportunities reported for other parts of Mozambique. Hence, one-third of the sample reported to be underemployed or searching for a better paid job.

The study also demonstrates that for many, a degree from a TVE school is not their final education and training ambition. Rather, it is a means to pursue further education at a higher level. Allegedly, many students do not choose TVE because they are interested in a professional career as a skilled craftsman or technician, but because access to TVE schools is easier than it is to general secondary education. This calls for a reassessment of the current system which automatically qualifies a TVE graduate to the next level of education.

Finally, and maybe most importantly, the study discovered an extremely low internal efficiency indicating sub-optimal utilisation of existing scarce resources. Obsolete centralistic planning routines, weak management capacity, outdated curricula, and lack of adequate equipment and materials are some of the critical aspects calling for further attention in this connection. Investment in reforms that alleviate these problems would have a major impact on the number of students who can gainfully pass through the TVE system.

6 References

- Ministry of Education (MINED) (1995). *Education sector strategic plan (ESSP)*. Maputo: Ministry of Education.
- MINED (June 1999). *Investment strategy for technical and professional education in Mozambique. Draft Report*. Maputo: Ministry of Education.
- MINED (December 2001). *Estratégia do ensino técnico profissional em Moçambique 2002–2011*. Maputo: Ministry of Education.
- Revisiting technical and vocational education in sub-Saharan Africa: An update on trends, innovations and challenge. A report for the World Bank*. Paris: International Institute for Educational Planning, UNESCO.

- MINED (Austral Consultoria e Projectos, Lda) (November 2003). Study of the costs and external effectiveness of technical and vocational education in Mozambique. Final Report.
- Ziderman, A. (1993). *Using the "Old Boy Network". Early results from a tracer study of technical education in Mozambique*. Aarhus, Denmark: Denconsult, 142–160.
- Ziderman, A. (1997). Locating graduates through reunion parties: secondary technical education in Mozambique. *Comparative Education Review*, 41(2), 71–90.

John H. Bishop and Ferran Mañé

8

Economic Returns to Vocational Courses in U.S. High Schools

1	Introduction	329
2	Labour Market Payoffs to Career-Tech Education	340
3	Summary and Policy Implications	350
4	References	354
5	Appendix 1. Variables used in the NELS-88 Regressions	356

1 Introduction

High school career-technical education (CTE) in the United States is a massive enterprise. Last year high school students spent more than 1.5 billion hours in vocational courses of one kind or another. Of the twenty-six courses taken by the typical high school graduate, 4.2 (16%) are career-tech courses (NCES, 2003a). Courses in general labour market preparation (principles of technology, industrial arts, typing, keyboarding, etc.) and family and consumer sciences are offered in almost every lower and upper secondary school. High school graduates in the year 2000 took 1.2 full-year introductory CTE courses during upper secondary school and probably almost as many during middle school (NCES, 2003a).

Occupation-specific education is also available to most high school students. Nineteen out of twenty high school students attend comprehensive high schools. About 60% of public comprehensive high schools offer specific labour market preparation in at least one program area inside the school. Students who attend schools that do not offer occupation-specific education at the school or who want to pursue a field of study that is not offered at their local high school are typically able to spend part of the school day at an area or regional vocational-technical centre. These regional centres account for 6.2% of upper secondary schools. In many large urban school districts students are also able to choose to attend full day vocational high schools or career academies (schools of choice built around occupational themes). About 4.6% of the nation's high schools are of this type

offering concentrated occupational studies and related academic coursework all in one building (Silverberg et al., 2003). The schools that specialise in CTE offer a greater range of occupational programmes and their programmes are generally of higher quality.

Participation in CTE courses is quite widespread. Nearly every graduate takes at least one CTE course and 90.7% take at least one occupation specific course. Forty-four percent take three or more occupation specific courses and 25% take a sequence of three or more courses in a specific occupational field (referred to as an occupational concentration) (Levesque, 2003). Occupational concentrators allocate about one-third of their time in high school to vocational courses. The total number of occupational vocational credits earned has been remarkably stable: 3.00 for 1982 graduates and 3.03 for year 2000 graduates (Digest of Education Statistics, 2003: 163). Averaging across all graduates, introductory vocational courses accounted for 4.5% of courses taken during the four years of high school by graduates in the year 2000. Occupation-specific vocational courses account for 11.6% of courses taken. The twenty-five per cent of graduates who are occupational concentrators allocate about one-third of their time in high school to vocational courses.

The Challenges Presented by the Drive to Raise Academic Standards

The last two decades have been challenging for high school career-technical education. The payoff to college rose dramatically during the 1980's causing a 30% increase from 1982 to 1998 in the share of students who enter college right after graduating from high school (NCES, 2001a). Occupation specific course taking is normally concentrated in the last few years of a student's time in school. As college attendance becomes more common, one might expect growing numbers of high school students to postpone occupation specific course taking until college.

The other major shock came from the National Commission on Excellence in Education's call for schools to turn back 'the rising tide of educational mediocrity' threatening American competitiveness and living standards (NCEE, 1982). Their report, *A Nation at Risk*, recommended that **all** teachers expect more of their students and that **all** high school students take a New Basics curriculum of at least four credits in language/arts, three credits in mathematics, science and social studies, and a half credit course in computers. Responding to the report, many states increased academic course graduation requirements and introduced a minimum competency test requirement for receiving the high

school diploma.¹ Career technical education could no longer be an alternative to strong academic skills. CTE students were now being required to develop their occupational skills on a strong academic foundation.

High school CTE responded to employers' growing knowledge and skill demands by changing the types of CTE courses offered. Enrollments in traditional fields such as automechanics and materials production declined, while health-care courses tripled and computer related occupational courses sextupled from .16 credits in 1982 to .97 credits in 1998. Computer related courses now account for fully one-third of all occupational vocational courses (Levesque, 2003:48, 121). In addition, occupational concentrators have increased the number of academic courses they take by 27% and the share of concentrators completing the New Basics curriculum rose from about 8% in 1982, to 18.5% in 1990 to 46% in 1998. The proportion of high school graduates who complete both college prep and vocational concentrations in high school rose from 0.5% in 1982 to 7% in 1998. The greater emphasis on academics has produced results. The proportion of occupational concentrators going to college rose from 41.5% in 1982 to 54.7% in 1992. Reading scores of CTE concentrators increased by nearly a grade level equivalent on the National Assessment of Educational Progress between 1994 and 1998 (Silverberg et al., 2003:261).

The increase in academic course taking was accomplished largely by increasing the total number of courses taken and secondarily by reducing the number of introductory vocational courses that students take in high school. The number of introductory career-technical education (CTE) courses taken by the typical high school graduates fell from 1.62 in 1982 to 1.3 in 1990 but has remained stable during the 1990's. Much of this decline in introductory CTE courses resulted from a 50% reduction in typing and keyboarding courses in high school (Levesque, 2003:118). Once a staple of the high school curriculum, typing and keyboarding are now largely learned in earlier grades.² Courses in specific occupation skills fell for a time in the early 1990's but by the year 2000 they had returned to the level prevailing in 1982 (Levesque, 2003).

While vocational course taking has been stable or declined slightly in high school, it has risen dramatically at the postsecondary level. Occupational certificates and occupationally oriented AA and BA degrees rose 33% more rapidly than young adult population. When the tiny decline at the secondary level is

¹ Declines in vocational course taking occurred in states that raised academic course graduation requirements during the 1990's (Levesque et al., 2001). States that require graduates to pass minimum competency tests in core academic subjects to graduate from high school also tend to have reduced levels of CTE course taking (Bishop and Mañe, 2001).

² Data from 1948/49, 1960/61, 1972/73 and 1981/82 indicate that 20 to 23% of high school students took a typing course during that school year (Goldin, 1999:59).

subtracted from the increases at the post secondary level, young people are clearly now receiving considerably more school-based occupation specific education than they did ten or twenty years ago. This is exactly what one would expect to happen in a period of rapidly rising skill demands.

The past, however, may not be prolog for the future. Academic standards will continue to rise. Declines in tax revenue are forcing many schools to scale back CTE offerings, limiting student choice to just a few low cost programmes. A few states are consolidating low incidence CTE programmes at community colleges and requiring high school students who want to pursue these fields to spend substantial time commuting to a distant community college. Some of the reports calling for better schools express doubt about the economic benefits of the vocational education provided by secondary schools (Committee on Economic Development, 1986). This suggests a need to reexamine the economic returns to career-technical education in high school in a post industrial society like the United States. This paper will assess the empirical evidence for the two major benefits claimed for occupation-specific education in high school:

Giving students the option of choosing career-technical courses in high school will help retain some students in high school, raise the high school graduation rate and induce some to continue their occupational preparation in college. Students who start preparing for an occupation in high school are more successful in the labor market both in the short and long run. They are more likely to find a job, more likely to enter the occupation of their choice and they end up earning more.

We examine the effects of the CTE option on high school attendance and completion in Section 1. The labour market payoffs to high school CTE are examined in Section 2. Rates of return are calculated in the final section where we also try to provide a balanced assessment of the arguments pro and con for the continuing to provide high school students with the option of taking occupationally specific courses.

Are High School Completion Rates Higher When Students Can Take Career-Technical Education Courses?

CTE advocates argue that allowing students to start preparation for their chosen career in upper secondary school increases the share of young people who choose to stay in school when they are no longer required to attend. People have diverse interests, diverse talents and diverse learning styles. The labour market is similarly diverse in the skills and talents that are sought. A 'one size fits all' upper secondary education is bound to fail many students. Students should not be forced to take CTE courses, but neither should they be forced

to take only academic courses. The following quote from the Report of the Advisory Committee for the National Assessment of Vocational Education makes the case:

Career and technical education empowers students by providing a range of learning opportunities that serve different learning styles. CTE relies on a powerful mode of teaching and learning that cognitive scientists call “contextual” or “situated” learning, both in classrooms and in workplaces. For many students, applying academic and technical skills to real-world activities, using computers and other tools, and being able to see how their learning is related to the world of work make CTE classes more interesting and motivating, and more educationally powerful than standard academic classes. A career focus often gives students a sense of direction and motivates them to achieve and to stay in school. Practically inclined students can be hooked on academic learning through CTE study. This is especially important for young people who learn best by doing, a group that includes disproportionate numbers of disadvantaged and special education students. Just having the option of being able to concentrate in CTE in high school results in more young people staying in school because more individually relevant choices are available to them. (Advisory Committee for the National Assessment of Vocational Education, 2003: 2.)

A number of studies have attempted to measure the effect of CTE by comparing the drop-out rates of vocational students and other students. But this approach mischaracterises the claims made above. CTE advocates are not saying that randomly assigning a student to take a CTE course will lower their propensity to drop out. Indeed they would predict that forcing a student to take a particular course would increase the risk of their dropping out. They are saying that students differ in their preferences and goals and that creating more options will induce a larger share of them to stay in school.

Some students do not like academic courses or have been unsuccessful in them and are at high risk of dropping out. While predictable to some degree by grades and test scores in 8th grade, this ‘I dislike academics’ (IDA) characteristic is an unobservable. When the option of taking CTE courses is presented to all students, the ‘I dislike academics’ (IDA) students will all take one or more CTE courses and will be significantly over-represented among CTE course takers. Let us assume that taking a CTE course has no effect on the very high graduation rates of non-IDA students but a substantial positive effect on IDA students. Assume further that the graduation rates of IDA students remain low because they are still being required to take some academic courses. Now let’s hire a statistician to compare the subsequent drop out rates of students who do and do not take CTE courses controlling for all available background characteristics. Taking a CTE course is still a marker for being an IDA student and regression coefficient on the CTE variable will be biased in the negative direction. As in Willis and Rosen seminal paper on estimates of the return to

college attendance, there is no way to completely control for the unobservable trait that makes CTE students more prone to drop out.³

A better way to assess the effect of the CTE option on high school completion rates is to study the history of education systems. In country after country, introducing CTE options at the secondary level helped spur expansions of secondary school attendance. A positive feedback cycle is begun. The CTE option induces students to stay in school longer. The flow of occupationally trained graduates into the labour force generates employer support for further expansion of secondary education.

At the beginning of the twentieth century in the United States, Latin was a required subject, vocational classes were unknown and only 6% of the age cohort got a diploma. By 1927/8 vocational courses were three times more popular than Latin and 27% of the age cohort was graduating from high school. Many historians explain this growth of vocational education as a response to public pressure to open upper-secondary education to children from immigrant and working class families. Elite opinion believed that the traditional classical curriculum was inappropriate for these youth, so a less rigorous vocational option was created for them. Introducing a tracking system in which the ‘top’ track retained a classical focus and “high” standards accommodated the teachers of academic subjects. Absent the vocational option, the story goes, very few immigrant and working class children would have made it into and through high school. Vocational education, therefore, helped high schools grow; but did so by denying the masses access to the more ‘uplifting’ (in some educational historians view) classical curriculum.

Recent work by two economic historians, Claudia Goldin and Lawrence Katz, proposes a different explanation. Rapid economic development at the beginning of the 20th century in the United States generated a need for workers who could handle clerical and skilled craft jobs. Private entrepreneurs had started schools to teach bookkeeping and typing skills. The payoff to this training was extremely high. In 1915 adult males in Iowa who had attended proprietary business schools teaching typing, shorthand, bookkeeping, real estate and other commercial subjects for a year or so earned 34% more than other adult males with the same amount of regular schooling. Unmarried females who had attended a business school earned 47% more (Goldin and Katz,

³ The negative bias in standard econometric models of CTE effects is even stronger when planning to drop out causes students to take vocational courses. Some students probably make tentative decisions about whether to drop out a year or so prior to reaching the compulsory school leaving age. Students who plan to drop out will want to quickly take some vocational courses so they have some skills when they start looking for work. Students who plan to stay in school to get the diploma will postpone CTE courses until junior and senior year. The result, of course, is a positive association between dropping out and taking CTE courses early.

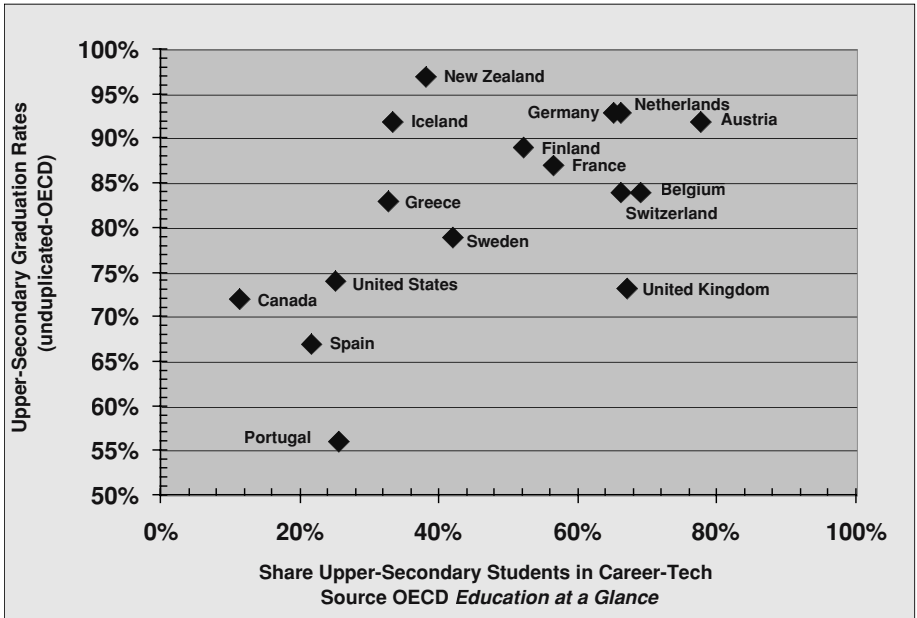


Figure 8.1 Availability of career-tech in secondary school and upper-secondary graduation rates

2000:37–39, 43). Public schools saw an opportunity to attract more students and to gain political support in the business community by adding typing, stenography and bookkeeping to the public school curriculum. However, the process got started, diversifying and modernizing the public high school curriculum expanded employer demand for graduates and prevented private returns to secondary education from falling precipitously as the supply of secondary school graduates grew. If high schools had remained purely academic, graduates would have soon had difficulty getting good jobs and secondary enrollment would have grown much more slowly. These positive feedback mechanisms should produce a positive correlation between the size of high school vocational programmes and national rates of school attendance. Figure 8.1 presents OECD data on graduation rates from upper-secondary school in Europe, Australia and North America and how they correlate with the vocational share of upper-secondary enrollments (OECD, 2000:147). Some countries accommodate many of their secondary school students in apprenticeship programmes where students spend most of the week being trained at a work place.

Figure 8.2 presents comparable data on school enrollment rates of 15 to 19 year olds (OECD, 2002:221). Figure 8.3 and Figure 8.4 present data on the

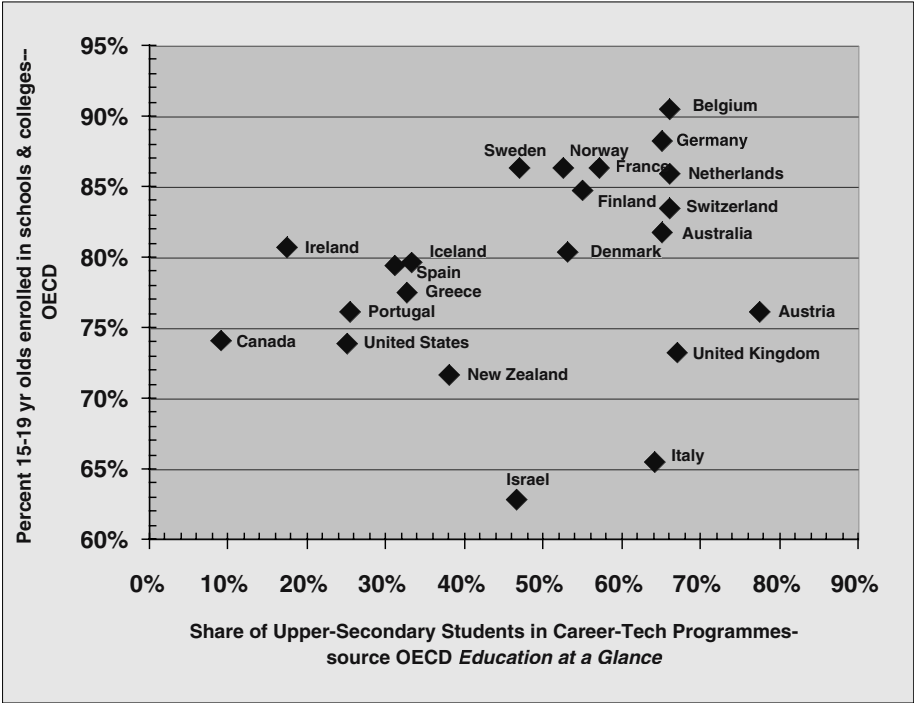


Figure 8.2 Availability of career-tech in secondary school and enrollment of 15–19 yr olds in schools & colleges

relationship between career-tech programmes and reading and mathematics achievement of 15 year olds in the PISA assessments in 2000 and 2001.

Just about all of Western European members of the Organization of Economic Cooperation and Development (OECD) have higher upper secondary school graduates and higher proportions of 15 to 19 year olds in school than the US and Canada. One of the possible reasons for higher school attendance rates in Northern Europe than in Canada, the United States, Spain and Portugal may be the low share of students in career-tech programs in these four countries. There appears to be a positive association between the share of students in Career-Tech programmes and graduation rates.

Examining Figure 8.3 and Figure 8.4, we see no apparent association between academic achievement at age 15 and the share of upper-secondary students in career-tech programs. This suggests that giving a career focus to a majority of a nation’s upper-secondary schools does not inevitably result in lower levels of academic achievement at age 15. In the final year of secondary school, however, academic achievement will probably be lower in systems that

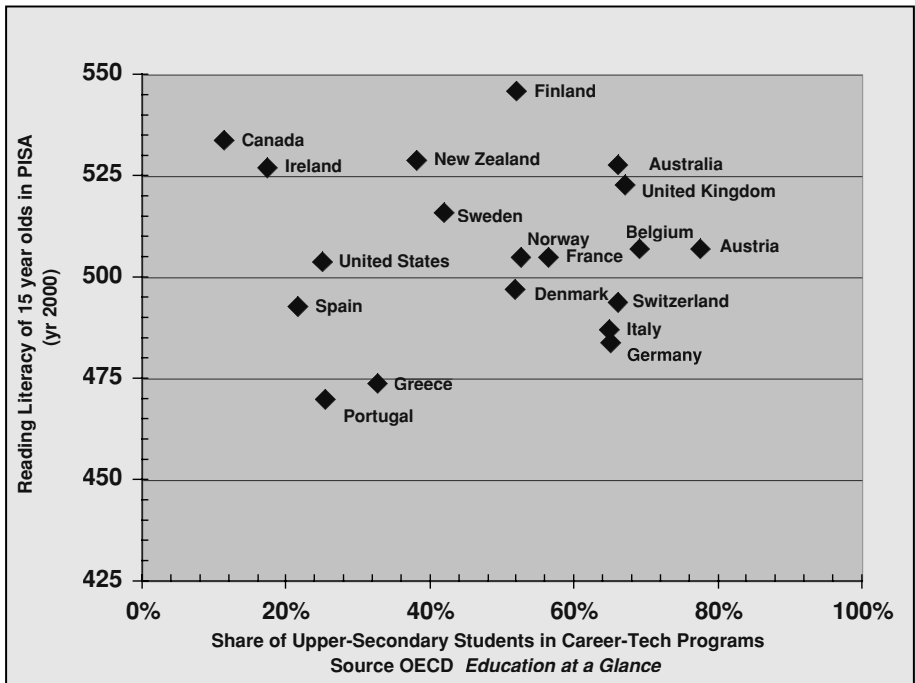


Figure 8.3 Relationship of availability of career-tech in secondary school to reading literacy of 15 yr olds in PISA

have most upper secondary students in programmes that heavily emphasise occupational preparation and work experience.

While these graphs are consistent with the causal hypotheses advanced on page 447, other factors such as family background, productivity levels, graduation exams and unemployment rates also influence school enrollment, completion rates and test scores. These factors need to be statistically controlled before conclusions can be drawn. Regressions predicting high school graduation rates, school enrollment rates and PISA test scores that control for these other factors are presented in Table 8.1.

Not surprisingly, the most important determinant of all of these outcomes is the productivity level of the country—per capita GDP. The adult unemployment rate has statistically significant positive relationships with both the expected number of years of full-time equivalent school attendance and the school enrollment rate of 15 to 19 year olds. Every one percentage point increase in a country's adult unemployment rate is associated with a 1.27 point increase in the proportion of 15 to 19 year olds who are attending school. Curriculum-based external exit exams had no significant association with school enrollment rates

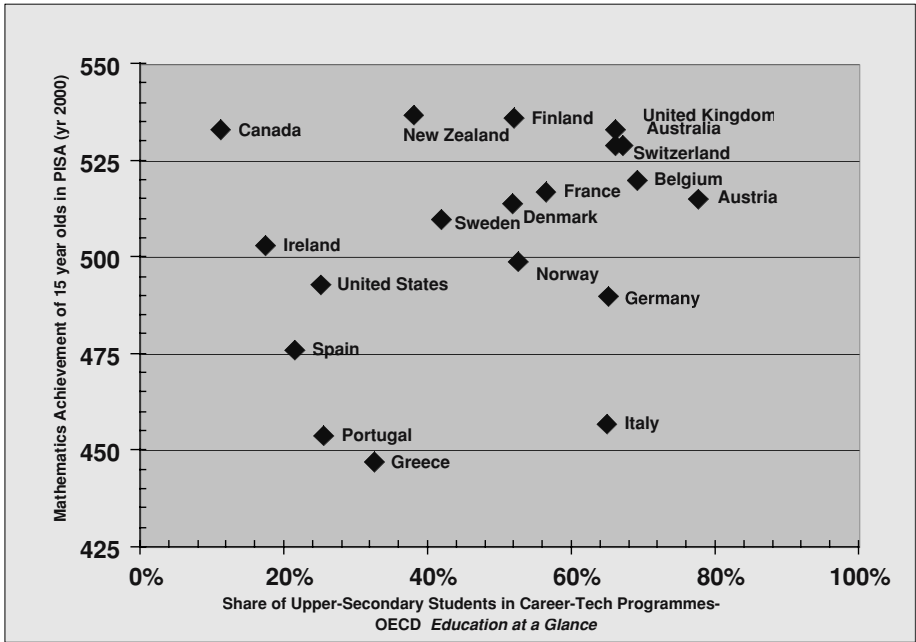


Figure 8.4 Relationship of availability of career-tech in secondary school to mathematics achievement of 15 yr olds in PISA

but did have large positive relationships with the PISA test scores of students who spoke the test language at home.⁴

The share of upper-secondary students in Career-Tech programmes has a statistically significant (at the 10% level on a two-tail test) positive effect on rates of graduation from upper secondary school and the proportion of 15–19 year olds in school or college. The relationship appears to be rather strong. A 10 percentage point increase in the share of upper secondary students in vocational and prevocational programmes is associated with a 2.6 percentage point increase in the high school graduation rate and a 1.9 percentage point increase in the proportion of 15–19 year olds in school. The career-tech share had no effect on academic achievement at age 15, school attendance rates of 20–29 year olds or on the expected number of years (full-time equivalent)

⁴ Students whose language at home is different from the language of instruction score between 35 and 110 points lower on the PISA reading assessment than students who speak the language of instruction at home. Since the proportion of students who are taught in a different language from the one spoken at home varies a great deal (reaching a high of 18% in Luxembourg), limiting the analysis to students who speak the language of instruction at home eliminates an important confounding source of variation in academic achievement across nations.

Table 8.1 Effects of upper-secondary vocational share on enrollment rates, completion rates and literacy

	Upper-secondary graduation rate (percent)	School/college enrollment of 15–19 yr olds (percent)	School-college enrollment of 20–29 yr. olds (percent)	Expected full-time equivalent years of schooling	Reading literacy of 15 yr olds taking PISA test in home language	Mathematical literacy of 15 yr olds taking PISA test in home language
Percent upper-secondary students in vocational or pre-vocational programmes	.26* (.13)	.19* (.10)	.013 (.073)	.012 (.010)	–.04 (.26)	.43 (.35)
Adult unemployment Rate	1.13 (.74)	1.27** (.56)	.61 (.40)	.123** (.057)	—	—
Log GDP per capita	27.3*** (6.3)	21.6*** (5.0)	10.4*** (3.5)	3.36*** (.49)	75.4*** (9.5)	90.7*** (13.3)
Curriculum-based external exit exam	10.1 (6.2)	–3.6 (4.8)	1.8 (3.4)	.25 (.49)	33.6*** (11.2)	34.8** (14.8)
Adjusted <i>R</i> square	.549	.460	.176	.652	.756	.729
Mean of dependent variable	78.0	77.2	21.2	16.05	489	483
Standard deviation of dependent variable	20.1	14.3	7.6	1.95	35.7	49.7
Number of nations	21	27	27	26	30	30

Source: OECD, Education at a Glance, Asian members of OECD not included in sample. The following 19 countries were included in all six regressions: Austria, Belgium, Canada, Czech Republic, Finland, France, Germany, Greece, Iceland, Ireland, Mexico, Netherlands, New Zealand, Portugal, Spain, Switzerland, Sweden, and the United States. The model predicting the upper-secondary school graduation rate also included Hungary, Luxembourg and Turkey. The model predicting the share of 15–19 and 20–29 year olds in school also included: Australia, Denmark, Italy, Norway, Poland, Turkey and United Kingdom. The model predicting full-time equivalent years of schooling was the same set of countries with the exception of Luxembourg. The models predicting PISA scores for students who were taking the PISA test in the same language their parents usually spoke at home included six additional countries—Argentina, Brazil, Peru, Chile, Russia and Luxembourg—but dropped Hungary and Turkey. Data on unemployment rates in OECD countries in the United Nations' *Human Development Report 2001*. Nearly a third of the people who work in the Duchy of Luxembourg commute from France, Belgium and Germany so the GDP per capita figure for Luxembourg overstates the wealth and productivity of Luxembourg residents. We, therefore, felt that Belgium's GDP per capita more accurately reflected the productivity and standard of living of Luxembourg and used that figure for Luxembourg.

spent in school between age 5 and 60. These results are consistent with the hypothesis that offering students a robust career-tech option increases upper-secondary enrollment and completion rates without lowering test scores at age 15 or college attendance rates after the age of 20.

2 Labour Market Payoffs to Career-Tech Education

Literature Review: The Payoff During the 1970's

There have been a number of studies of the impact of high school vocational education on labour market success in the United States. The earliest studies used student reports of their participation in the vocational track to define participation in CTE (Grasso and Shea, 1981; Gustman and Steinmeier, 1981; Woods and Haney, 1981). When, however, these student reports of track were cross checked against transcripts, it was found that some of the self-identified vocational students had only a few vocational courses on their transcript and many 'general track' students had taken 3 or 4 vocational courses (Campbell, Orth and Seitz, 1981). Since it is the number and types of courses taken which are influenced by school policy, studies of the impact of vocational education need to employ objective measures of participation and not self-assessments of track, which apparently measure the student's state of mind as much as they measure the courses actually taken.

The solution to this problem has been to use transcripts or reports of actual courses taken to measure participation in vocational education. Meyer's (1981) analysis of longitudinal data on 1972 high school graduates used school reports of the number of courses taken in vocational and non-vocational fields to define a continuous variable: the share of courses that were vocational. He found that females who devoted one-third of their high school course work to clerical training earned 16% more during the seven years following graduation than those who took no vocational courses. Those who specialised in home economics or other non-clerical vocational courses did not obtain higher earnings. Males who specialised in trade and industry earned 2.8% more than those in the general curriculum. Males in commercial or technical programmes did not earn significantly more than those who pursued a general curriculum.

Rumberger and Daymont (1982) used transcripts to define variables for the share of course work during the 10th, 11th and 12th grades that was vocational and the share that was neither academic nor vocational. Analysing 1979/80 data on 1161 recent high school graduates in the National Longitudinal Survey (NLS79) who were not attending college full time, they found that males who devoted one-third of their time to vocational studies instead of pursuing a

predominantly academic curriculum spent about 12% more hours employed, but experienced slightly greater unemployment and received a 3% lower wage. Females who similarly devoted one-third of their time to vocational studies at the expense of academic course work were paid the same wage but spent about 8% more time employed and 1.6% less time unemployed.

The Payoff During the 1980's

Studies of vocational education using more recent data sets get more positive results. Kang and Bishop's (1986) study of 2485 men and women who graduated from high school in 1980 and did not attend college full-time used student reports (transcripts were not available) of courses taken in three different vocational areas—business and sales, trade and technical, and other—and five academic subjects—English, math, science, social science and foreign languages—as measures of curriculum. Males who took 4 courses (about 22% of their time during the final three years of high school) in trade and technical or other vocational subjects by cutting back on academic courses were paid a 7 to 8% higher wage, worked 10 to 12% more, and earned 21 to 35% more during 1981, the first calendar year following graduation. Males who took commercial courses did not have higher earnings or wage rates. Females who substituted 4 courses in office or distributive education for 4 academic courses were paid an 8% higher wage, worked 18% more, and earned 40% more during 1981.

Joseph Altonji's (1988) study of the NLS Class of 72 follow-up surveys for 1973 through 1986 found modest positive effects of vocational course work on hourly wage rates. Holding years of further education constant, four trade and technical courses substituted for a mix of academic courses (English, foreign language, social studies, science and mathematics) raised wage rates by 5 to 10.3% depending on specification. Substituting four commercial courses for a mix of academic courses had no effect on wages in OLS models but raised wage rates by 3% in instrumental variable models intended to correct for selection bias.

Studies by Paul Campbell and colleagues of young people graduating in the late 1970's and early 1980's also obtained positive findings. Controlling for test scores and past and present enrollment in higher education, their analysis of 1983 and 1985 National Longitudinal Survey data on 6953 young men and women between the ages of 19 and 28 found that graduates of vocational programmes had 16.5% higher earnings than those who had specialised in academic courses (comparison is made with academic rather than general track students because most general track students take one or two vocational courses) A parallel analysis of High School and Beyond data on 6098 students who graduated in 1982 (which also controlled for test scores and college attendance)

found that the vocational graduates were 14.9% more likely to be in the labour force in 1983/84, were one percentage point less likely to be unemployed, and were paid about 9% more per month than the academic graduates. The overall earnings effect was 27%. The differential between vocational and general curriculum graduates (who generally took 1 to 2 vocational courses) was generally about half the size of the differential between vocational and academic graduates (Campbell et al., 1986, 1987).

Gray and Huang (1992) found that high school vocational education had positive effects on yearly earnings and that these effects were not related to further attendance at technical or community college after high school. Gray et al. (1993), using data from the NLS-72 and defining the high school courses taken by students with the counsellor-coded data, found positive long-term effects (fourteen years after graduation) of high school vocational education on earnings as high as the returns of college degree, both for males and females.

Ferran Mañé's (2000) study is the most comprehensive study to date of the labour market impacts of career-technical education on students who do not go to college full time. Employing almost identical variable definitions and specifications, he compared the short and medium term effects of CTE courses for 1972 graduates, 1980 graduates and 1992 graduates. He concluded that both short and medium term returns to CTE were a great deal higher for 1980 graduates than 1972 graduates. Short-term returns to CTE remained high for 1992 graduates.

Why Did the Payoff Increase?

The payoff increased because skill needs of business were growing and shifting very rapidly during the 1980s and 90's. Career-technical education also became more responsive and more effective. During the 1970's, competency based instruction tied to competency profiles certifying the skills learned became common practice, career education courses preceding the selection of an occupational specialty were introduced, job search skills were added to the curriculum of most vocational programmes, home economics was reoriented from a focus on home making to a focus on preparation for work, and the content of many individual programmes was upgraded and updated. Change continued in the 1980's and 1990's. CTE students were required to take more demanding academic programmes. Courses in computer skills and programming were introduced and have grown so much that they now account for one-third of occupational (occupation specific) CTE courses. Data has now become available on the medium term payoffs to CTE for the class of 1992. We now turn to an analysis of these data.

Impacts of Career-Technical Education Obtained at the Beginning of the 1990's

Our study uses micro-data from the National Educational Longitudinal Study (NELS-88), a longitudinal data set that followed a nationally representative sample of 8th graders in 1988 every two years through 1994 and then once more in 2000. We studied the subset of NELS:88 high school graduates who were in public schools in 10th grade and earned between 15 and 32 Carnegie units during high school.

We aggregate high school courses into five subtotals. The first category: 'Computer courses' included courses in keyboarding taught in high school, word processing, computer applications and programming. This variable had a mean of .57 credits and a standard deviation of .67. The second subtotal, all other advanced occupational vocational courses, included courses in agriculture, appliance repair, automechanics, business, construction, health occupations, metal working, etc. High school graduates in our data accumulated an average of 1.32 Carnegie units of advanced non-computer occupational courses. The standard deviation of this variable (1.7) was large relative to the mean indicating that some students took more than four courses while others took none. 'Beginning vocational courses' included all home economics courses (including those referred to as vocational or occupational) and the introductory course in general business, agriculture, distributive education and health occupations). Students completed an average of .46 Carnegie units of these beginning vocational courses during high school. When students take these courses in middle school they do not show up in the high school transcript data.⁵ The fourth subtotal, academic courses—English, foreign languages, mathematics, science and social studies—has a mean of 15.36 Carnegie units. The final subtotal, Personal Interest Courses—art, music, health, physical education, driver education—has a mean of 4.35 or roughly 20% of the total number of courses taken by graduates.⁶

⁵ The 'Beginning Vocational Courses' variable is the sum of F2RVGN.C and F2RVHO.C on the public use NELS:88 data CD. The 'NAEP' coding scheme employed by NORC does not count Typewriting 1 and traditional industrial arts courses as high school courses, so they do not appear as Carnegie units in any of our five categories of courses. This is the reason why the mean number of 'Beginning vocational courses' reported in the previous sentence is substantially smaller than estimates of "General Labor Market Preparation" and 'Family and Consumer Sciences' courses reported at the beginning of the paper and in the Digest of Education Statistics and other NCES publications (NCES, 1995, Appendix H.)

⁶ The three largest groups of courses included in our 'Personal Interest' category are visual and performing arts, health and physical education. The category also includes courses in interpersonal skills, leisure and recreation activities, citizenship/civic activities, military sciences

Models were estimated predicting five indicators of early labour market outcomes: earnings in calendar year 1993, the total number of months worked during the 21 month period from July 1992 to March 1994, the total number of months unemployed, the hourly wage rate and a one-zero dummy variable indicating that the job held in winter 1994 is a low skill job (that probably offers few promotion opportunities). The four indicators of medium term labour market success were: annual earnings of the job occupied during the first quarter of the year 2000, the hours worked per week in that job, the number of months worked during 1999 and the hourly wage rate of that job. The wage rate and 'Bad Job' variables are not defined for respondents who did not report a job sometime during 1993–94 or 2000. The other variables treated those who reported no work during the reference period as a zero (the variable was missing if the individual reported work but did not report earnings or hours worked). Thus, models predicting annual earnings assess the effect of coursework on both time employed and wage rates.

Since attending college reduces the time available for work, we included an extensive set of controls for current and past college attendance: the number of semesters of full-time college attendance during the period from fall 1992 to Spring 1994, number of semesters of part-time college attendance during that same period, the number of semesters attending a two year institution full-time and the number of semesters of part-time attendance at a two year institution. We also included controls for 'Attending college full time in the first quarter of 2000', 'Attending college part time in the first quarter of 2000,' 'Ever dropped out of high school,' 'Obtained a GED,' 'graduated early' and, for late graduates, 'the length of the delay in graduation.' In the models predicting medium term outcomes, we included dummy variables for some college, for 'ever attended a 4 year college', for earning a vocational certificate, for an associate degree, a bachelors degree, a masters degrees and graduate or professional degrees. Family structure in 2000 was controlled by four indicator variables: married male, married female, male with children and female with children.

and technologies, library sciences, theology and life skills taken from the detailed course codes available in the restricted data set. Our 'Personal Interest' set of courses is larger than the 'Personal Use' category that appears in NCES tables because NCES counts the visual and performing arts as academic courses. We decided to exclude art and music from the academic category because we did not expect them to have any effect on gains on NELS:88's academic tests or on post high school wages. We, therefore, placed art and music with other nonacademic courses that we similarly expected to have no effect on wages or academic test score gains between 8th and 12th grade. Both NCES and NORC coding schemes count psychology and ethnic studies as social studies so they are included in our academic category (NCES, 1995, Appendix H.)

We also control for as many characteristics of the community and the student as possible in order to increase efficiency and reduce omitted variable bias. Our estimations include controls for grade point average in 8th grade, an average of 8th grade test scores in English, mathematics, science and social studies and other characteristics of the student in 8th grade. These included whether the student took remedial courses in 8th grade or earlier, whether she has taken advanced courses, has a computer at home, TV and homework hours, reading for pleasure, an indicator for being handicapped, socio-economic status of the student's family, logarithm of the number of books in the home, parent involvement index, family size, marital and parental status in 8th grade, locus of control index, self esteem index and hours working for pay during 8th grade (and it's square), an index for smoking in 8th grade, dummies for race, ethnicity and religion and rural, suburban and urban residence and ten indicators describing the character and quality of the high school. From the principal's questionnaire we took the following indicators of quality of the student's secondary school: average teacher salary, the pupil-teacher ratio, percent free lunch, percent students that were white, school is a vocational high school, percentage of the school's full-time faculty who are vocational educators and average enrollment per high school grade (and it's square). Two other measures of the quality of the school attended in 10th grade—the average socio-economic status and 8th grade test scores of students at the school—were calculated by averaging student responses for each high school in the NELS:88 data base. More detail on how variables are defined is available in Appendix 1. Variables used in the NELS-88 Regressions.

We used the restricted data set that identifies the state in which the student's high school was located. This allows us to merge information on state policies and characteristics into the data set. Control variables were included for: unemployment rate, mean weekly wage in retailing and manufacturing, state graduation requirements policies and dummies for 4 Census regions.⁷ Results are reported in Table 8.2. The first column of the table gives the means and standard deviations of the dependent variables. The effects of vocational course taking are captured by three variables: the number of computer courses (column 2), the number of non-computer occupation specific CTE courses taken (column 3) and introductory vocational courses (column 4). The estimated effects

⁷ States without statewide minimum course graduation requirements were assigned a value of 13—the lowest minimum total Carnegie unit requirement for the states with a requirement. Data is available on the academic course graduation requirements set by states but not the academic requirements of individual high schools, so local graduation requirements are not included in the model. We include separate measures of academic and total course requirements because they correlate only .22 with each other and are likely to have different effects on course taking patterns and post high school outcomes.

Table 8.2 The effect of high school courses on employment outcomes. Regression coefficients

	Mean (SD) (1)	Computer courses (2)	Other advanced CTE courses (3)	Intro- ductory CTE courses (4)	Academic courses (5)	Personal interest courses (6)	1 Computer + 2 CTE advanced (7)	3 CTE Advanced –Academic. –Personal Interest (8)	3 CTE Advanced + 1 Computer –2*Personal Interest (9)	R ² # Obs. (10)
<i>Short run</i>										
1993 Annual earnings	\$5427 (5394)	– 14 (86)	248*** (47)	101 (87)	–52* (31)	– 42 (34)	482*** [.000]	838*** [.000]	813*** [.000]	.2689 6,267
Total months worked in 92–94	14.15 (7.45)	–.107 (.125)	.129** (.057)	.089 (.096)	–.092** (.043)	– .023 (.044)	.151 [.399]	.501*** [.001]	.325+ [.114]	.1396 7,339
Total months unemployed 92–94	1.47 (4.09)	.007 (.064)	–.041 (.035)	–.012 (.053)	–.019 (.022)	.019 (.024)	–.075 [.447]	–.123+ [.190]	–.154+ [.198]	.0389 7,339
Log hrly wage rate in 93–94	1.292 (.557)	– .0045 (.0090)	.0217*** (.0045)	.0150 (.0076)	– .0052 (.0032)	.0015 (.0034)	.039*** [.004]	.069*** [.000]	.058*** [.000]	.1002 7279
Logit for bad occupation	.294 (.456)	–.041 (.059)	–.114*** (.027)	–.044 (.040)	.002 (.022)	.025 (.022)	–.269*** [.002]	–.369*** [.000]	–.433*** [.000]	.0686 2959
<i>Year 2000</i>										
Earnings in 2000	\$26,535 (\$18,953)	828** (358)	362** (160)	–15 (246)	–130 (100)	–289*** (108)	1552*** [.002]	1501*** [0.01]	2484*** [.000]	.2619 6,036
Months worked—1999	10.49 (3.29)	080 (.053)	.123*** (.025)	.000 (.054)	.006 (.021)	.013 (.023)	.326*** [.000]	.352*** [.000]	.425*** [.000]	.1261 6,041
Hours per week in 2000	36.75 (15.33)	.227 (.225)	.386*** (.106)	.280 (.202)	.096 (.077)	–.119 (.087)	.999*** [.003]	1.18*** [.001]	1.65*** [.000]	.3345 6324
Log hourly wage rate—2000	2.543 (.436)	.0135* (.0073)	.0061+ (.0039)	–.0034 (.0064)	–.0031 (.0028)	–.0046 (.0031)	.026** [.030]	.026** [.013]	.0415*** [.004]	.1959 5584

Source: Analysis of NELS:88. Sample is public school students with 16 to 32 Carnegie units of course credit who were also interviewed in 1994 or 2000. Models reported in this table contain controls for when the respondents got their high school diploma, whether the respondent was in college full time (or part-time) during spring 1994 or 2000, the number of months spent attending college full-time and months spent attending part-time. Models also contain a full set of student background variables measured in the 8th grade including grades and test scores. Numbers in parenthesis below the coefficient are Huber-White standard errors that correct for clustering by school. The numbers in brackets in the columns 7–9 are the p values for hypothesis tests of whether the total effect of adding three CTE courses is significantly different from zero. Column 7 tests the effect of a package of one computer course and 2 other advanced CTE courses. Column 8 and 9 test the effect of adding three advanced CTE courses by reducing two academic and/or personal interest courses. Models were not weighted.

+ Statistically significant at 10% level on a tail test; * Statistically significant at 5% level on a tail test; ** Statistically significant at 5% level on a 2 tail test; *** Statistically significant at 1% level on a 2 tail test.

of academic courses are reported in column 5. The effects of personal interest courses—physical education, health, fine arts, music, theatre, driver education, etc.—are reported in column 6. Below the coefficients we report Huber-White robust standard errors that account for the clustering of students within schools and deals with the problem of the correlation of errors generated by the cluster-based sampling frame. *R* square of the model and the number of observations with non-missing data are reported in column 10.

Effects of CTE Courses

Advanced non-computer CTE courses had significant positive effects on earnings in 1993 and 2000, months worked in 1992–94 and in 1999, wage rates in 1994, job quality in 1994 and hours worked per week in 2000. Each additional non-computer CTE course was associated with 1993 earnings being \$248 (4.6%) higher and year 2000 earnings being \$362 (1.4%) higher. Computer courses had no effects on labour market outcomes immediately after graduation but large significant positive effects on earnings and wage rates in 2000. Eight years after graduating from high school, students who took one computer course earned \$828 (3.1%) more annually and were paid 1.4% more per hour than students who took none. The incremental cost of delivering one CTE course in 1990/91 was only \$1200 or \$1500, so benefits of this magnitude imply very high rates of return. The large positive labour market effects of advanced CTE courses contrast with the negative (sometimes significantly negative) effects of academic and personal interest courses on labour market outcomes. Even though controls for college attendance were included, graduates who took extra academic courses in high school worked significantly less after high school and earned less in 1993. Art, music and personal interest courses had no effects on labour market outcomes in 1993 but were significantly associated with lower earnings in 2000. Introductory vocational courses had no significant effects on employment, unemployment, wage rates and earnings in either 1993–94 or 2000.⁸

Many students combine computer courses with other CTE courses. Effects of combining one computer course with two advanced non-computer occupation-specific CTE courses and no reduction in academic or personal interest courses are given in column 7. The numbers in brackets underneath

⁸ Other student characteristics that were associated with significantly lower monthly earnings or lower wage rates were: current attendance at college, female, African American, Asian, handicapped, rural location, Northeastern location, many siblings, and attending a school with a high incidence of free lunch. Monthly earnings were higher for students who had worked for pay in 8th grade, who had an internal locus of control and high self esteem and for students with parents who set tighter limits on behaviour in 8th grade.

these estimates of the effects of a CTE course package are the p values for a hypothesis test that the estimate of the effect of the package is not significantly different from zero. Students who took this package of CTE courses were 5.6 percentage points more likely to have a good job in 1994. They earned \$482 (8.9%) more in calendar year 1993 and \$1552 (5.8%) more in the year 2000. Wage rates were also significantly higher in both years.

Students who do a CTE concentration take a larger total number of high school courses on average than other students. But they also typically take fewer academic and personal interest courses. What is the combined effect of increasing CTE courses and reducing non-CTE courses? Column 8 presents the estimated effects of taking three advanced non-computer CTE courses and taking one fewer academic course and one fewer personal interest course. Our regressions indicate that these graduates spent more time in employment after high school and were 7.7 percentage points more likely to have a good job when they worked. They earned \$838 (15.5%) more in 1993 and \$1501 (5.7%) more in 2000. They were paid 6.9% more per hour in 1994 and 3.6% more per hour in 2000.

Column 9 presents the estimated effects of taking 4 CTE courses—three advanced non-computer CTE courses and one computer course—and giving up two personal interest courses while holding academic courses constant. These graduates spent more time in employment after high school and were 9.0 percentage points more likely to have a good job when they did work. They earned \$813 (15%) more in 1993 and \$2484 (9.4%) more in 2000. They were paid 5.8% more per hour in 1994 and 4.2 percent more per hour in 2000.

Are the Benefits of CTE Smaller for Students Who Go to College?

Since the majority of CTE course takers go to college after high school, an evaluation of the economic payoffs to high school CTE needs to include its effects on college students and on those who complete postsecondary certificates and degrees. This is the reason why we did not drop full-time students and college degree holders from our analysis as so many other studies have done. We included both groups in the analysis and controlled for their school attendance and the degrees they completed. Because full-time students necessarily spend less time working, it seems inevitable that the earnings impacts of CTE courses will be smaller for students than for non-students. Going to school full-time also limits one's ability to get jobs in the field studied in high school, so we would also expect wage rate effects to be smaller for students. We tested these hypotheses in Bishop and Mañé (2003b) and found that indeed high school CTE courses had significantly smaller effects on 1993 earnings and wage rates of college students than of non-students. As a result, the average

short-run effects of high school CTE for students and non-students we report in Table 8.2 understate the effect of CTE on those who do not go to college. The one computer and two non-computer course CTE programme featured in column 7 raised the earnings of non-college bound students by \$861 not by \$482 which is an average for students and non-students.

What about high school CTE's medium term effects on those who complete college degrees and certificates? Is the time in high school CTE courses wasted if the individual subsequently gets a voc-tech certificate, an associate's degree or a bachelor's degree? Do employers care only about the most recent credential and ignore high school coursework? Or does the CTE taken in high school help students make better choices about college major and assist them in quickly achieving high levels of skill? Our analysis of wage rates and earnings in 2000 tried to answer these questions. We tested the hypothesis that wage rate and earnings effects of high school CTE are smaller for students who have earned postsecondary degrees. We found no support for this hypothesis. Indeed point estimates for the model predicting earnings imply that CTE courses had somewhat larger effects on earnings and wage rates when the individual later got licenses, certificates or degrees.

The model also included tests of two other hypotheses: (a) returns to college are greater for students with high 8th grade GPAs and (b) high school academic courses have a more positive effect on earnings and wage rates of college graduates than of students who do not go to college. Point estimates were positive as hypothesised but the magnitudes of the effect were never large enough to become statistically significant.

3 Summary and Policy Implications

We conclude that offering students the option of starting preparation for their chosen occupation during upper secondary school tends to increase school attendance of 15 to 19 year olds and improve labour market outcomes of high school graduates. Nations that have a large share of their upper secondary students in career-technical education have higher attendance rates and higher upper secondary completion rates. Test scores at age 15 and college attendance rates for young adults in their twenties are not reduced by a heavy emphasis on CTE in upper secondary education.

Our analysis of longitudinal data on U.S. students in high school between 1988 and 1992 indicates that those who trained for specific occupations were more successful in the labour market. They spent more time in employment (both immediately after high school and eight years later), got better jobs and earned significantly more than students who did not take advanced CTE courses.

In Table 8.3 we present calculations of the earnings benefits of CTE cumulated over a student's entire working career and then compare them to the incremental costs of providing the CTE instruction. Graduates take an average of three advanced occupation specific CTE courses while in high school so we present results for two different scenarios in which the students take a package of three CTE courses. In the first row of Table 8.3 we present our calculations of costs and benefits (in year 2000 dollars) of taking one computer course and two non-computer CTE courses without reducing the number of academic and personal interest courses (the scenario described in column 7 of Table 8.2). Instructional costs for this package are \$5120.⁹ The second row presents results for a scenario in which three extra CTE courses are offset by a reduction of two non-CTE courses. This costs approximately \$2845 ($\$5120 - 2 * \1138) in 2000 dollars. The third row presents a scenario where four additional CTE courses are partially offset by reducing personal interest courses by two. This costs \$4567 per student ($4 * \$1797 - 2 * \1138).

Column 6 of the table gives the present discounted value (using a 4% interest rate) of this stream of benefits discounted back to 1991.¹⁰ Column 7 presents the Benefit-Cost ratio obtained by dividing column 6 by column 3. Column 8 contains the internal rate-of-return for the CTE investment: the interest rate that makes the present discounted value of benefits for 1992 through 2025 equal to the incremental cost of the package of CTE courses in 1990–91 (column 3).

Benefit-cost ratios and internal rates of return are remarkably high. Benefit cost ratios exceed 6.0 and real internal rates of return all exceed 18%. These very high internal rates of return are not a consequence of our assumption that the earnings payoffs measured for the year 2000 will continue for another 25 years. If we assume, instead, that they last for only five more years to 2005, the internal rates of return for the three CTE packages described in Table 8.3 are respectively 16%, 33% and 27%. If we make the completely unrealistic assumption that the benefits disappear in 2001, the internal rates of return become 10%, 29.6% and 23%. However calculated, these rates of return are

⁹ In 1990/91 when these students were in school, school expenditure per pupil was \$5421. Graduates in 1992 took 24 courses on average, so we divided by six to get an estimate of per student costs of mounting a typical one-year long course. Due to smaller class size, instructional costs per student are about 50% higher in advanced CTE classes, so our estimate of per student instructional cost for one full-year CTE course was \$1355 in 1990/91 dollars and \$1797 in year 2000 dollars. Therefore, instruction cost of three CTE courses is \$5120.

¹⁰ Earnings benefits were calculated for each year by first translating the impact estimate for 1993 in row 1 of table 2 into year 2000 dollars and then by interpolating between the 1993 and 2000 figures. The 1992 earnings gain was assumed to be one-fourth of the 1993 estimate. Earnings benefits of CTE for years after 2000 were assumed equal to the 2000 figure in real terms and to last until 2025.

Table 8.3 Benefits and costs of high school career technical education (Costs and benefits in year 2000 dollars)

High school career-tech education—1990–92	Extra hours occup. training (1)	Extra hours acad. instr. (2)	Programme costs per student (3)	Increased annual earnings 1 st & 2 nd year after completing (4)	Increased earnings 8 years after graduation (5)	Present discounted value (4% real discount rate) (6)	Benefit/cost ratio (4% real discount rate) (7)	Internal rate of return (8)
2 Advanced CTE plus 1 Computer course	450	0	\$5120	\$ 570 8.9%	\$ 1552 5.8%	\$ 24,004	6.64	18.7%
3 Advanced CTE minus 1 Academic course & 1 Personal interest course	450	–150	\$2845	\$ 992 15.4%	\$ 1501 5.7%	\$ 24,738	8.70	33.5%
3 Advanced CTE plus 1 Computer course— 2 Personal interest courses	600	0	\$4567	\$ 962 15.0%	\$ 2484 9.4%	\$ 38,854	8.44	28.7%

substantially higher than those calculated for government training programmes targeting high school dropouts.¹¹ Rates of return are at their maximum when costs are kept low by substituting CTE courses for academic and personal interest courses.

The earnings increments for postsecondary CTE programmes are larger than the increments generated by three high school CTE courses (as simulated in Tables 8.2 and 8.3). But so are the costs. The 26 year olds in our sample with an Associates degree earned \$5360 more than high school graduates; a premium that is three times the earnings benefit generated by three high school CTE courses. An Associates degree, however, requires two years of full-time college attendance with associated reductions in earning power and instructional costs roughly equal to those for 12 high school courses. As a result, benefit-cost ratios and internal rates of return for high school CTE are likely to be higher than for most postsecondary CTE programmes. This does not make postsecondary CTE a less attractive option than high school CTE. Students need not choose between them. They can do both and indeed they do not lose the benefits of their high school CTE when they do so. That, indeed, is what Tech-Prep programmes are designed to foster. Students are encouraged to start an occupational specialisation in high school and continue it in college. Many students in high school CTE programmes are following this advice. They are significantly over represented in postsecondary CTE programmes (Silverberg et al., 2003).

The second group that clearly needs to take CTE courses in high school are the students who do not plan to enter college immediately after graduating from high school or are uncertain about what they will do. The immediate benefits of CTE instruction in high school are much larger for these students than for those who go to college full-time. They should be strongly advised to take CTE courses in the fields they are considering for a career while they are still in high school. This will help them pay for college if they choose to go and give them the skills to find a better job if they do not. The programmes should be structured so as not to foreclose the student's changing their mind about college.

Once skills become standardised, schools have natural advantages as competitors in the occupational training market: (a) they offer students flexibility

¹¹ These positive results contrast markedly with the negative findings regarding classroom occupational skills training programmes targeted on *disadvantaged* youth such as the Job Training Partnership Act (JTPA), the Comprehensive Employment and Training Act (CETA) and the Supported Work Demonstration. For example, youth under 22 years of age who applied for and were offered JTPA classroom occupational skills training earned **\$501 less** during the 30 months following assignment than a randomly assigned control group (Bloom et al., 1994). Only the Job Corps, a considerably more costly training programme, appears to have positive impacts that even approach those of high school career-technical education.

in scheduling and the choice of courses, (b) hourly costs of training are lower because teaching staff are specialised and economies result from spreading the cost of developing courses over many students, (c) school certification of skills makes them more portable, and (d) schools and students have access to public subsidies not available when training takes place at firms. Another advantage of school based occupational training is that they allow individuals to select the occupation for which they will prepare. When firms provide occupational training, competition to enter an occupation occurs before training rather than after.

When trainers with the necessary expertise are scarce, schools are a way to get the most out of a limited supply of expert trainers. Frequent teaching of a course should enable improvements to be made. Many enterprises are too small to mount training by themselves and so must rely on training programmes organised by schools and trade associations. Owners and managers cannot be expected to be well informed about the technological developments and organisational innovations that may make their company more effective. School-based occupational training can be a means of spreading the latest knowledge and techniques to millions of workplaces.

When schools become major training providers, barriers to entry into skilled occupations fall, the supply of skilled workers grows, the costs of employing people with the skill fall, and expanded use of the technology is facilitated.

4 References

- Altonji, J. (1994). The effects of high school curriculum on education and labor market outcomes. *The Journal of Human Resources*, XXX(3), 409–438.
- American Institutes for Research in the Behavioral Sciences (1982). *Development and evaluation of vocational competency measures*. Palo Alto, CA: American Institutes for Research.
- Barnow, B.S. (1985). *Government training as a means of reducing unemployment*. ICF Incorporated, USA.
- Bishop, J.H. (1989). Occupational training in high school: how can it be improved? *Economics of Education Review*, 8(1), 1–16.
- Bishop, J.H. (1995). *Expertise and excellence*. Working paper 95-13. Ithaca, NY: Cornell University, Centre for Advanced Human Resources Research Studies.
- Bishop, J.H. and Mañe, F. (2001). *Impacts of tougher graduation requirements on course selection and learning in high school and post high school experiences of vocational students*. Discussion paper. Ithaca, NY: Cornell University, Center for Advanced Human Resources.
- Bishop, J.H. and Mañe, F. (2004). The impacts of career-technical education on high school labor market success. *Economics of Education Review*, (4), 381–402.
- Bloom, H.S., Orr, L.L., Stephen H. Bell, Cave, H., Doolittle, H. and Lin, W. (1994). *The national JTPA study overview: Impacts, benefits, and costs of Title IIA*. Bethesda MD: Abt Associates.
- Campbell, P.B., Basinger, K.S., Dauner, M.B. and Parks, M.A. (1986). *Outcomes of vocational education for women, minorities, the handicapped, and the poor*. Columbus, OH: The National Center for Research in Vocational Education, The Ohio State University.

- Campbell, P.B., Elliot, J., Hotchkiss, L., Laughlin, S. and Seusy, E. (1987a). *Antecedents of training-related placement*. Columbus, OH: The National Center for Research in Vocational Education, The Ohio State University.
- Campbell, P.B., Elliot, J., Laughlin, S. and Seusy, E. (1987b). *The dynamics of vocational education effects on labor market outcomes*. Columbus, OH: The National Center for Research in Vocational Education, The Ohio State University.
- Campbell, P.B., Orth, M.N. and Seitz, P. (1981). *Patterns of participation in secondary vocational education*. Columbus, OH: The National Center for Research in Vocational Education, The Ohio State University.
- Goldin, C. (1999). *A brief history of education in the United States*. Historical Paper 119, Cambridge, MA: National Bureau of Economic Research.
- Goldin, C. and Katz, L.F. (2000). Education and income in the early 20th century: evidence from the prairies. *Journal of Economic History*, 60(3), 782–818.
- Grasso, J.T. and Shea, J.R. (1979). *Vocational education and training: impact on youth*. Berkeley, CA: The Carnegie Council on Policy Studies in Higher Education.
- Gray, K. and Neng-Tang, H. (1992). An analysis of the long term effects of educational attainment on yearly earnings. *Journal of Industrial Teacher Education*, 29(3), 9–20.
- Gray, K., Neng-Tang, H. and Li, J. (1993). The gender gap in yearly earnings: is it lack of education or occupational segregation? *Journal of Industrial Teacher Education*, 18(3), 1–14.
- Gustman, A.L. and Steinmeier, T.L. (1981). *The relation between vocational training in high school and economic outcomes*. Paper prepared for the Division of Technical Systems in the Office of Technical and Analytic Systems, Office of the Assistant Secretary for Planning and Budget, U.S. Department of Education. Hanover, NH: Dartmouth College.
- Kang, S. (1984). Time profile of youths' labor market outcomes: an analysis of high school and beyond data. In L. Hotchkiss and S. Kang (Eds.), *High school preparation for employment*. (95-135). Columbus, OH: The National Center for Research in Vocational Education, The Ohio State University.
- Kang, S. and Bishop, J. (1986). The effect of curriculum on labor market success immediately after high school. *Journal of Industrial Teacher Education*.
- Kang, S. and Bishop, J. (1989). Vocational and academic education in high school: complements or substitutes. *Economics of Education Review*, 8(2), 133–148.
- Levesque, Karen. *Trends in high school vocational-technical coursetaking: 1982–1998*. NCES 2003-025. Washington, DC: U.S. Department of Education, National Center of Education Statistics.
- Maller, C., Kerachsky, S. and Thornton, C. (1982). *Evaluation of the economic impact of the job corps program*. Third Follow-up Report. Princeton, NJ: Mathematical Policy Research Inc.
- Mañé, F. (1999). Trends in the payoff to academic and occupation-specific skills: the short and medium-run returns to academic and vocational high school courses for non-college bound students. *Economics of Education Review*, 18, 417–437.
- Mertens, D.M., McElwain, D., Garcia, C. and Whitmore, M. (1980). *The effects of participating in vocational education: summary of studies reported since 1968*. Columbus, OH: The National Center for Research in Vocational Education, The Ohio State University.
- Mertens, D.M., Seitz, P. and Cox, S. (1982). *Vocational education and the high school dropout*. Columbus, OH: The National Center for Research in Vocational Education, The Ohio State University.
- Meyer, R. (1981). *Vocational education: how should it be measured?* Cambridge, MA: Urban Institute, Harvard University.

- Meyer, R. (1982). Job training in the schools. In R. Taylor, H. Rosen and F. Pratzner (Eds.), *Job training for youth*. Columbus, OH: The National Center for Research in Vocational Education, The Ohio State University.
- Meyer, R. (1988). The effects of high school academic reforms on course enrollments and academic skills growth: evaluation and new directions for reform. Presented at *Research Conference of the Association for Public Policy Analysis and Management*, Oct. 29, 1988.
- National Center for Education Statistics (1995). *Second follow-up: transcript component: data file users manual, Appendix H*. Washington, DC: Department of Education.
- National Center for Education Statistics (2003a). *The condition of education: 2002*. Washington, DC: Department of Education.
- National Center for Education Statistics (2003b). *Digest of education statistics: 2002*. Washington, DC: U.S. Department of Education.
- National Commission on Excellence in Education (1983). *A nation at risk: the imperative for educational reform. A report to the nation and the Secretary of Education*. Washington, DC: Government Printing Office.
- OECD (2000). *Education at a glance: OECD indicators 2000*. Paris: OECD.
- OECD (2002). *Education at a glance: OECD indicators 2002*. Paris: OECD.
- Rasinski, K.A. (1994). *The effect of high school vocational education on academic achievement gain and high school persistence: evidence from NELS:88*. Chicago: National Opinion Research Corporation.
- Silverberg, M., Warner, E., Fong, M. and Goodwin, D. (2003). *National assessment of vocational education: final report to congress*. Washington, DC: U.S. Department of Education. Office of the Under Secretary.
- Weber, J.M. (1986). *The role of vocational education in decreasing the dropout rate*. Columbus, OH: The National Center for Research in Vocational Education, The Ohio State University.
- Willis, R. and Sherwin, R. (1979). Education and self-selection. *Journal of Political Economy*, 87, 57–536.
- Woods, E. and Haney, W. (1981). *Does vocational education make a difference? A review of previous research and reanalysis of national longitudinal data sets*. Cambridge, MA: The Huron Institute.

5 Appendix 1. Variables Used in the NELS-88 Regressions

Dependent Variables

Labour Market Outcomes Immediately after High School

Earns93: earnings in calendar year 1993 (Individuals who did not work in 1993 are included as zeros. Variable is missing if employment is reported but data on earnings is missing.).

Empltot: total number of months worked in the 21 month period from July 1992 to February 1994.

Unempltot: total number of months unemployed in the 21 month period from July 1992 to February 1994.

Logwages: hourly wage rate in the last job held.

BadJob: A zero-one dummy variable for job is as a labourer, food service or retail sales worker.

Labor Market Outcomes Eight Years after Graduation from High School

Inyes000: earnings in current/most recent job in 2000 (individuals who did not work in 2000 are included as zeros). *Months99*: total number of months worked in the calendar year 1999 (individuals who did not work in 1999 are included as zeros).

Hour00b: total number of hours per week in current/most recent job in 2000 (individuals who did not work in 2000 are included as zeros).

Lnwag00b: hourly wage rate in current/most recent job in 2000 (individuals who did not work in 2000 are excluded).

Independent Variables

High School Courses (Information Comes from Transcript Data Files)

computer: total number of Carnegie units taken in computer courses (included keyboarding) during high school.

newvoca: total number of Carnegie units taken in non-computer occupation specific courses during high school.

homeintr: total number of Carnegie units taken in beginning vocational courses (included all home economics courses) during high school.

Academic: total number of Carnegie units taken in English, foreign languages, mathematics, science and social studies courses during high school.

othercor: total number of Carnegie units taken in personal interest courses during high school.

Control Variables Used in Regression Analysis

1. High school completion and college attendance variables

Used for Predicting Short-run Outcomes

Nodiplo: high school graduation status. Dummy variable indicating whether the student is in one of these situations (takes value = 1): enrolled in high

school in 1994, working to get a equivalent high school diploma or not graduated and not working to obtain it.

Ged: high school graduation status. Dummy variable indicating whether (takes value = 1) or not (takes value = 0) the student has received a GED or a certificate of attendance.

F2evdost: dummy variable indicating whether (takes value = 1) or not (takes value = 0) the student ever dropped out over the whole period (1988–92).

Graderly: dummy variable indicating whether (takes value = 1) or not (takes value = 0) the student graduated early from high school.

Whengrad: length of the delay in graduating from high school (in years).

Fulsem: sum of the percentages (ranging from 0 to 1) of months attending as a full-time student any postsecondary education institution in all semesters from fall 1992 to spring 1994. In every single semester 1 means that the student attended a college the whole period and 0 the opposite. Therefore, the maximum value is 4 and the minimum is 0.

Parsem: sum of the percentages (ranging from 0 to 1) of months attending as a part-time student any postsecondary education institution in all semesters from fall 1992 to spring 1994. In every single semester 1 means that the student attended a college the whole period and 0 the opposite. Therefore, the maximum value is 4 and the minimum is 0.

Tottwful: sum of four dummy variables indicating whether the student was enrolled as a full-time student in a two-years postsecondary degree over the period fall 1992–spring 1994.

Tottwpar: sum of four dummy variables indicating whether the student was enrolled as a part-time student in a two-years postsecondary degree over the period fall 1992–spring 1994.

Variables Used in Models Predicting Outcomes in 1999 and 2000

Full2000: dummy variable indicating whether (takes value = 1) or not (takes value = 0) the respondent is, at the time of the interview, a full time student (not working).

Part2000: dummy variable indicating whether (takes value = 1) or not (takes value = 0) the respondent is, at the time of the interview, a part time student (working for pay).

Nodi2000: dummy variable indicating whether (takes value = 1) or not (takes value = 0) the respondent does not have a high school diploma or equivalent at the time of the interview.

Ged2000: dummy variable indicating whether (takes value = 1) or not (takes value = 0) the respondent has a GED certificate at the time of the interview.

Cert2000: dummy variable indicating whether (takes value = 1) or not (takes value = 0) the respondent has a Certificate of Attendance at the time of the interview.

Soco2000: dummy variable indicating whether (takes value = 1) or not (takes value = 0) the respondent has some post-secondary school experience but never obtained a degree.

Ev4y2000: dummy variable indicating whether (takes value = 1) or not (takes value = 0) respondents with some post-secondary school experience, ever attended a 4-year institution after high school.

Lice2000: dummy variable indicating whether (takes value = 1) or not (takes value = 0) respondent's highest PSE degree obtained is a certificate or license.

Asoc2000: dummy variable indicating whether (takes value = 1) or not (takes value = 0) respondent's highest PSE degree obtained is an associate's degree.

Bach2000: dummy variable indicating whether (takes value = 1) or not (takes value = 0) respondent's highest PSE degree obtained is a bachelor's degree.

Mast2000: dummy variable indicating whether (takes value = 1) or not (takes value = 0) respondent's highest PSE degree obtained is a master's degree.

Phd2000: dummy variable indicating whether (takes value = 1) or not (takes value = 0) respondent's highest PSE degree obtained is a PH.D. or a professional degree.

2. Grades and test scores

Grades1: average of the self-reported grades in English, mathematics, science and social studies in 8th grade. Five points scale where mostly A is 4 and mostly below D is 0.5.

Remedial: mean of two dummies measuring whether the student is attending at least once a week remedial English or remedial mathematics in 8th grade. Missing values were replaced by the mean of the variable.

Dumyreme: dummy variable with value = 1 when remedial was missing.

Advanced: mean of four dummies measuring whether the student is attending at least once a week advanced, enriched or accelerated courses in English, mathematics, sciences or social studies in 8th grade. Missing values were replaced by the mean of the variable.

Dumyadva: dummy variable with value = 1 when advanced was missing.

MeanTeta: mean of mathematics, reading, science and social studies test scores in 8th grade. The IRT Theta 'T' score was used because it has a normal distribution. Theta has a mean of 50 and a standard deviation

of 10 where the standardisation was carried out on the weighted panel sample.

3. Geographic region during high school

Urban1: dummy variable for school located in a urban community. Information from first follow-up (tenth graders).

Rural1: dummy variable for school located in a rural community (default is suburban). Information from first follow-up (tenth graders).

West1: dummy variable for school located in the west region. Information from first follow-up (tenth graders).

South1: dummy variable for school located in the south region. Information from first follow-up (tenth graders).

Central1: dummy variable for school located in the west region (default is Northeast). Information from first follow-up (tenth graders).

4. Personal characteristics

Male: dummy variable for being male.

Black: dummy variable for being black, non Hispanic.

Asian: dummy variable for being Asian.

Hispanic: dummy variable for Hispanic.

NatAmer: dummy variable for being Native American (default is white, non hispanic).

Mishand: dummy variable measuring in 1988 current or past participation in a programme for the orthopedically handicapped or learning disabled. Information comes from the parents and teachers questionnaires. Note that the eligibility criteria and participation patterns used in NELS:88 tended to eliminate most severely handicapped students from the sample.

dumyhand: dummy variable with value = 1 when mishandi was missing.

langmino: dummy variable with value = 1 when mishandi was missing.

5. Family background (all variables measured in 8th grade)

Ses88: composite created by NELS measuring the family socioeconomic status. They used father and mother's education level and occupation and family income.

famsize: composite created by NELS estimating family size from both the parent and student questionnaires.

parinvol: variable measuring parents involvement in student school activities. It was created using two questions: how often students discuss with parents what is done in class and how often parents check on the student's homework. It runs from low values (checking often) to high values (not checking at all).

divor: household composition reported by the student. In this case the student lives with either the biological father or mother and, respectively, a female or male guardian.

Singfem: household composition reported by the student. In this case the student only lives with the biological mother.

Singmale: household composition reported by the student. In this case the student only lives with the biological father.

Other: household composition reported by the student. In this case the student lives with a relative or non-relative other than his/her father or mother (default is living with student's father and mother).

Misbooks: number of books at home. Missing values were replaced by the mean of the variable.

Dummybook: dummy variable with value = 1 when misbooks was missing.

Miscomp: dummy variable with value = 1 when respondent's family have a computer at home. Missing values were replaced by the mean of the variable.

Household Religious Background (Information Comes from Parents Questionnaire)

Misbaptist: dummy variable for having a Baptist religious background.

Misprote: dummy variable for parents being in any of other [non Baptist] Protestant denominations (e.g. Methodist, Lutheran, etc).

Miscatho: dummy variable for having a Catholic religious background.

Miscrist: dummy variable for having an eastern orthodox or other Christian religious background.

Misjewis: dummy variable for having a Jewish religious background.

Misothe: dummy variable for having a Moslem, Buddhist, Hindu or other religious background.

misrelig: dummy variable which takes value = 1 when the answer is missing.

6. School background (all variables measured in 1990 and provided by the principal)

Sallowte: salary paid to a first year full-time teacher.

Pupteara: pupil-teacher ratio in the school.

Intevoca: percentage of full time vocational education teachers among the total number of full time teachers in the school.

Whitsch: percentage of white (non of Hispanic origin) students among tenth graders.

Lunfree: percentage of students over the total students body that receives free or reduced-price school lunch program.

Gr10enro: tenth grade enrollment in hundreds.

Sq10enro: square of the tenth grade enrollment deviated from the mean.

Newtest: clustering students by 1990 high school, mean of the average (four items) test score obtained in 1988.

Newses: clustering students by 1990 high school, mean of the family socio-economic status in 1988.

7. Value scores and attitude toward work in 8th grade

Locus: psychological scale created by NELS measuring respondent's sense of locus of control.

Self: psychological scale created by NELS measuring respondent's self esteem.

Mistv: number of hours per day watching television. Missing values were replaced by the mean of the variable.

Dumytv: dummy variable with value = 1 when *mistv* was missing.

Misread: number of hours per week the student read for fun. Missing values were replaced by the mean of the variable.

Dumyread: dummy variable with value = 1 when *misread* was missing.

Missmoke: variable indicating student's smoking behaviour, where 0 means not smoking at all, 1 means smoking between one to five cigarettes per day and 2 means more than half a pack per day. Missing values were replaced by the mean of the variable.

Dumysmok: dummy variable with value = 1 when *missmoke* was missing.

Mishomew: total number of hours spent on homework each week in all subjects. Missing values were replaced by the mean of the variable.

8. Work experience in 8th grade

Workhour: number of hours working for pay per week in student's present or more recent job.

Worksq: square of the number of hours working per week deviated from the mean.

9. Variables describing state policies and local/regional labour markets

mcestate: a dummy variable for states where students must pass a minimum competency exam to receive a regular high school diploma. The states that required students to pass a minimum competency exam to graduate in 1992 were Alabama, Florida, Georgia, Hawaii, Louisiana, Maryland, Mississippi, Nevada, New Mexico, New Jersey, New York, North Carolina, South Carolina, Tennessee, and Texas. Thirty-six percent of our sample lived in states that mandate the MCE and set the graduation standard on the exam.

Nounit, statunit, acadunit: Three variables characterise course graduation requirements: a one-zero dummy variable identifying states without state-set minimum course graduation requirements, the minimum number of Carnegie units required to get a diploma, the number of core academic courses (English, math, science and social studies) required to get a diploma. States without statewide minimum course graduation requirements were assigned a value of 13—the lowest minimum total Carnegie unit requirement for the states with a requirement.

U93unemp, meanunem: unemployment rate in the local labor market—available in restricted data.

Logret93: Log of the state's weekly wage in retailing—available in restricted data.

Logman93: Log of the weekly wage in manufacturing—available in restricted data.

CONSOLIDATED BIBLIOGRAPHY

- Achola, P.P.W. and Kaluba, H.L. (1989). School production units in Zambia: an evaluation of a decade of a presidential experiment. *Comparative Education*, 25(2), 165–178.
- African Regional Consultation (1998). *Final report: African regional consultation in preparation for the second international congress on TVE*. Nairobi: Retrieved January 15, 2004 from <http://www.unevoc.unesco.org/events/ev9811n1.htm>
- Akyeampong, F. and Lewin (2000). *Cost and financing of teacher education in Ghana. Multi site teacher education research project*. Discussion paper 20. Sussex: University of Sussex. Centre for International Education.
- Akyeampong, K. and Stephens, D. (2002). Exploring the backgrounds and shaping of beginning student teachers in Ghana: towards greater contextualisation of teacher education. *International Journal of Educational Development*, 22, 261–274.
- Altonji, J. (1994). The effects of high school curriculum on education and labor market outcomes. *The Journal of Human Resources*, XXX(3), 409–438.
- Amenuke, S. J., Sackey, J. and Watson, M. (1994). *Technical and vocational education in Ghana*. Document to Review Committee of Ministry of Education, Ghana
- American Institutes for Research in the Behavioral Sciences (1982). *Development and evaluation of vocational competency measures*. Palo Alto, Calif.: American Institutes for Research.
- Ampiah J. G. (2002). *Attitude of junior secondary school boys and girls towards science*. Institute of Education, Cape Coast, Ghana: University of Cape Coast.
- Anderson, J. (1970). *The struggle for the school. The interaction of missionary, colonial government and nationalist enterprise in the development of formal education in Kenya*. London: Longman.
- Asian Development Bank (1988). *Education and development in Asia and the Pacific*. Manila: Asian Development Bank
- Asian Development Bank (1995). *Secondary education in the Asia-Pacific region: strategic issues and policy analysis*. Unpublished report prepared by the UNESCO Asia-Pacific Centre of Educational Innovation for Development (ACEID), Bangkok, and the Colombo Plan Staff College for Technician Education (CPSC), Manila, for the ADB. Authors: Rupert Maclean (team leader), PPGL Siriwardene, Richard Tisher and Phil McKenzie.
- Atchoarena, D. and Delluc, A. (2003). *Revisiting technical and vocational education in Sub-Saharan Africa*. Paris: International Institute for Educational Planning.
- Atchoarena, D. and Delluc, A.M. (2001). *Revisiting technical and vocational education in sub-Saharan Africa: an update on trends, innovations and challenges*. Paris: International Institute for Educational Planning.
- Atchoarena, D. and Tesfa, M.T. (1997). *Skill development and labour market study in Eritrea. Report of the Tracer and Enterprise Surveys*. Asmara: Ministry of Education (in collaboration with International Institute for Educational Planning, UNESCO).

- Austral Consultores (2003). *Study of cost and external efficiency of technical and vocational education in Mozambique*. Maputo: Ministry of Education, National Directorate of Technical Education. [document translated from the original: *Estudo de custo e eficácia externa do ensino técnico e profissional em Moçambique*].
- Ayot, H.O., Patel, M.M., Kiminyo, D.M., Orwa, W.O., Okech, J.G. and Godia, G. (1989). *A study report on technical and vocational education in Kenya*. Nairobi: The Ministry of Manpower Development and Employment.
- Bachus, K. (1988). The political context of the vocationalization of education in developing countries. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education: an international perspective*. (31–44). London: Pergamon Press.
- Baiden, F.A. (1996). Technical and vocational education in Ghana. In *The development of technical and vocational education in Africa: case studies from selected countries*. (81–122). Dakar, Senegal: UNESCO Regional Office.
- Barnow, B.S. (1985). *Government training as a means of reducing unemployment*. ICF Incorporated.
- Bennell, P. (2000). *Human resources development and globalisation: what should low income developing countries do?* London: Think Piece for the White Paper on Globalisation and Development.
- Bennell, P. and Nyakonda, D. (1991). *The vocational school fallacy revisited: the employment experiences of secondary technical school graduates in Zimbabwe*. Harare: Department of Economics, University of Zimbabwe.
- Bennell, P. and Nyakonda, D. (1992). The vocational school fallacy revisited: the post-training experiences of secondary technical school graduates in Zimbabwe. *Education with Production* 9(1), 53–68.
- Bishop, J.H. (1989). Occupational training in high school: how can it be improved? *Economics of Education Review*, 8(1), 1–16.
- Bishop, J.H. (1995). 'Expertise and excellence'. Working paper 95-13. Ithaca, New York: Cornell University, Centre for Advanced Human Resources Research Studies.
- Bishop, J.H. and Mañe, F. (2001). *Impacts of tougher graduation requirements on course selection and learning in high school and post high school experiences of vocational students*. Discussion paper. Ithaca, New York: Cornell University. Center for Advanced Human Resources.
- Bishop, J.H. and Mañe, F. (2004). The impacts of career-technical education on high school completion and labor market success eight years after high school. *Economics of Education Review*, 23(4), 381–402.
- Bloom, H.S., Orr, L.L., Stephen H. Bell, Cave, H., Doolittle, H. and Lin, W. (1994). *The national JTPA study overview: Impacts, benefits, and costs of Title IIA*. Bethesda, MD: Abt Associates.
- Botswana, Republic of (1977). *Education for Kagisano: report of the National Commission on Education*. Gaborone: Government Printer.
- Botswana, Republic of (1979). *Supplementary report of the National Commission on Education*. Gaborone: Government Printer.
- Botswana, Republic of (1988). *The mid-term review of NDP VI*. (Ministry of Finance and Development Planning). Gaborone: Government Printer.
- Botswana, Republic of (1992). *Vocational education and training development plan: a report to the Minister of Education*. Gaborone: Government Printer.
- Botswana, Republic of (1993). *Report of the National Commission on Education*. Gaborone: Government Printer.
- Botswana, Republic of (1994). *The revised national policy on education April 1994: Government Paper No. 2 of 1994*. Gaborone: Government Printer.

- Botswana, Republic of (1997). *National Development Plan 8, 1997–2003*. Gaborone: Government Printer.
- Campbell, P.B., Basinger, K.S., Dauner, M.B. and Parks, M.A. (1986). *Outcomes of vocational education for women, minorities, the handicapped, and the poor*. Columbus, Ohio: The National Center for Research in Vocational Education. The Ohio State University.
- Campbell, P.B., Elliot, J., Hotchkiss, L., Laughlin, S. and Seusy, E. (1987a). *Antecedents of training-related placement*. Columbus, Ohio: The National Center for Research in Vocational Education. The Ohio State University.
- Campbell, P.B., Elliot, J., Laughlin, S. and Seusy, E. (1987b). *The dynamics of vocational education effects on labor market outcomes*. Columbus, Ohio: The National Center for Research in Vocational Education. The Ohio State University.
- Campbell, P.B., Orth, M.N. and Seitz, P. (1981). *Patterns of participation in secondary vocational education*. Columbus, Ohio: The National Center for Research in Vocational Education. The Ohio State University.
- Canagarajah, S. and Coulombe, H. (1997). *Child labor and schooling in Ghana*. Education. Child labor, returns to schooling series. Washington: World Bank working papers.
- Carnevale, A.P., Gainer, L.J. and Meltzer, A.S. (1990). *Workplace basics: the essential skills employers want*. San Francisco: Jossey-Bass.
- Chin-Aleong M. (1993). Vocationalizing secondary education. In D. Atchoarena (Ed.), *Policy and planning for vocational education and training*. (141–157). Oxford: Pergamon Press. Report of a Sub-regional training workshop. Hastings, Christ church, Barbados, September 20-October 1, 1993.
- Chin-Aleong, M. (1988). 'Vocational secondary education in Trinidad and Tobago and related evaluation results.' In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education. An international perspective*. (293–334). Oxford: Pergamon Press in association with the Swedish International Development Association.
- Chin-Aleong, M. (1988). Vocational secondary education in Trinidad and Tobago and related evaluation results. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing Education: an International Perspective*. (293–325). London: Pergamon Press.
- Chinyamunzore, N.N. (1995). *Devolution and evolution of technical/vocational education curriculum in Zimbabwe*. IDATER95 Loughborough University of Technology.
- Chisman, D. (1987). *Practical secondary education: planning for cost-effectiveness in less developed countries*. London: Commonwealth Secretariat.
- Coombe, C. (1988). *Survey of vocationally oriented education in the Commonwealth*. London: Commonwealth Secretariat.
- Crossley, M. and Vulliamy, G. (1986). *The policy of SSCEP: context and development*. Waigani: University of Papua New Guinea, Educational Research Unit.
- Crossley, M. and Weeks, S. (1986). Curriculum as an international commodity: dilemmas of relevance change. In *Education as an International Commodity*, Australia and New Zealand Comparative and International Education Society Conference, Brisbane, Australia, 1986, 419–430. Also published in *Directions*. Suva, Fiji, University of the South Pacific, 1987.
- Cumming, C.E. (1988). Curriculum Costs: Vocational Subjects. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing Education: an International Perspective*. London: Pergamon Press.
- Cumming, C.E. (1985). The contribution of cost studies. In C. Cumming, M. Davies, K. Lillis, and B. Nyagah (Eds.), *Practical subjects in Kenyan academic secondary schools. Background papers*. (77–107). Stockholm: Swedish International Development Cooperation Agency (SIDA), Education Division Documents No. 22.

- Cumming, C.E. (1988). Curriculum costs: vocational subjects. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education. An international perspective*. (293–294). Oxford: Pergamon Press in association with the Swedish International Development Cooperation Agency.
- Cummings, C.E. (1998). Curriculum costs: vocational subjects. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education: an International perspective*. Oxford: Pergamon Press.
- Cummings, C., Davies, M., Lillis, K. and Nyagah. B. (1985). *Practical subjects in Kenyan academic secondary schools: background paper*. SIDA Education Division Documents No. 22. Stockholm: Swedish International Development Agency.
- Daughtrey, A.S., Ristau, R.A. and Baker, R.L. Jr. (1982) Basic business and economic education: learning and instruction. 3rd ed. Cincinnati, OH: South-Western Publishing Co.
- Davies, M. (1985a). How is “industrial education” taught? Does the way it is taught promote its objectives? In C. Cumming, M. Davies, K. Lillis, and B. Nyagah (Eds.), *Practical subjects in Kenyan academic secondary schools: background papers*. Stockholm: Swedish International Development Cooperation Agency. Education Division Documents No. 22.
- Davies, M. (1985b). A long term tracer study of industrial education students from Nyan-darua Secondary School. In C. Cumming, M. Davies, K. Lillis, and B. Nyagah (Eds.), *Practical subjects in Kenyan academic secondary schools: background papers*. Stockholm: Swedish International Development Cooperation Agency. Education Division Documents No. 22
- Draxler, A. and Wadi, H. (2002). *Technologies for education: potentials, parameters, and prospects*. Paris and Washington: UNESCO and The Academy for Educational Development.
- Economists Intelligence Unit (EIU) (1997). *Ghana Country Profile 1997–1998*.
- Eisemon, T.O. (1988). *Benefiting from basic education, school quality and functional literacy in Kenya*. Oxford: Pergamon Press.
- Farstad, H. (2002). *Integrated entrepreneurship education in Botswana, Uganda and Kenya*. Report of a study commissioned by the World Bank. Oslo: National Institute of Technology. (Revised draft. September 2002). Retrieved January 15, 2004, from <http://wbln0018.worldbank.org/HDNet/HDdocs.nsf/0/3e6ed3a030821e3085256b84005a7237?OpenDocument>
- Finch, C.R. and Crunkilton, J.R. (1999). *Curriculum development in vocational and technical education*. Toronto: Allyn and Bacon.
- Fisher, G. (1993). Against vocationalism: the case for a late selection, high participative South African school system. *Education with Production*, 10(1), 77–100.
- Foster P. (1965). *Education and social change in Ghana*. London: Routledge and Kegan Paul.
- Foster, P. (1965). The vocational school fallacy in development planning. In C.A. Anderson and M.J. Bowman (Eds.), *Education and Economic Development*. Chicago: Aldine.
- Foster, P. (1965). The vocational school fallacy in development planning. In C.A. Anderson and M.J. Bowman (Eds.), *Education and economic development*. Chicago: Aldine Publishing House.
- Foster, P. (2002). The vocational school fallacy revisited: education, aspiration and work in Ghana 1959–2000. *International Journal of Educational Development*, 22(1), 27–28.
- French, H.W. (1977). Vocational education and training in Botswana. In *Education for Kagisano: Report of the National Commission on Education. Volume 2: Annexes*, pp. 3–1 to 3–96. Gaborone: Government Printer.
- Goldin, C. (1999). *A brief history of education in the United States*. Historical Paper 119, Cambridge MA: National Bureau of Economic Research.
- Goldin, C. and Katz, L.F. (2000). Education and income in the early 20th century: evidence from the prairies. *Journal of Economic History*, 60(3), 782–818.
- Government of Ghana (1995). *Ghana vision 2020*. Accra: Government of Ghana.

- Grasso, J.T. and Shea, J.R. (1979). *Vocational education and training: impact on youth*. Berkeley, CA: The Carnegie Council on Policy Studies in Higher Education.
- Gray, K. and Neng-Tang, H. (1992). An analysis of the long term effects of educational attainment on yearly earnings. *Journal of Industrial Teacher Education*, 29(3), 9–20.
- Gray, K., Neng-Tang, H. and Li, J. (1993). The gender gap in yearly earnings: is it lack of education or occupational segregation? *Journal of Industrial Teacher Education*, 18(3), 1–14.
- Gray, K.C. and Herr, E.L. (1998). *Workforce education*. Toronto: Allyn and Bacon.
- Gustman, A.L. and Steinmeier, T.L. (1981). *The relation between vocational training in high school and economic outcomes*. Paper prepared for the Division of Technical Systems in the Office of Technical and Analytic Systems, Office of the Assistant Secretary for Planning and Budget, U.S. Department of Education. Hanover, NH: Dartmouth College.
- Hallak, J. (1990). *Investing in the Future*. Paris: UNESCO IIEP and Pergamon Press.
- Heyneman, S. (1985). Diversifying secondary school curricula in developing countries: an implementation history and some policy options. *International Journal of Educational Development*, 5(4), 283–288.
- Hinchliffe, K. (1990). Is vocational training effective? Considerations of some training routes in Botswana. In A. Datta and K. King (Eds.), *Botswana—education, culture and politics*. (139–157). Edinburgh: Centre for African Studies.
- Hinchliffe, K. et al. (1988). *The cost effectiveness of technical and vocational education and training in Botswana*. Gaborone: University of Botswana.
- Hoppers, W. (1988). After training what? Youth training and self-employment in Botswana and Zambia. In *Education, training and work: some Commonwealth responses to youth unemployment*. (181–245). London: Commonwealth Secretariat.
- Hoppers, W. (1996). *Searching for relevance: the development of work orientation in basic education*. Paris: International Institute for Educational Planning. Fundamentals of Educational Planning No. 52.
- Institute of Education, University of Cape Coast in Ampiah, J.G. (2002). *Attitude of junior secondary school boys and girls towards science*. Institute of Education, University of Cape Coast.
- Japan International Cooperation Agency (JICA) and Ministry of Education, Ghana (2001). *The study for development of a master plan to strengthen technical education in the Republic of Ghana*. Accra: Pacific Consultants International.
- Jennings, Z.D. (1987). *Work experience programmes in Commonwealth secondary schools*. London: Commonwealth Secretariat.
- Johanson, R.K. and Adams, A.V. (2003). *Skills development in Sub-Saharan Africa*. Washington D.C. World Bank: Human Development series, sub-Saharan Africa Region.
- Jones, P.W. (1992). *World Bank financing of education: lending, learning and development*. London: Routledge.
- Journal of Educational Change (2001). Special Issue on ‘*Educational Change in Asia*’. Guest editor: Rupert Maclean. Volume 2, Number. 3. Dordrecht: Kluwer Academic Publishers.
- Jowitt, A. (2002). Reconceptualising labour markets in the South Pacific. *Journal of South Pacific Law*, 6(2), 1–15. Retrieved March 15, 2004 from <http://law.vanuatu.usp.ac.fj/jspl>
- Kaluba, L.H. (1986). *A Tracer study of grade 12 graduates from David Kaunda and Hillcrest Secondary Technical Schools*. Lusaka: University of Zambia: Educational Reform Implementation Project.
- Kang, S. (1984). Time profile of youths’ labor market outcomes: an analysis of high school and beyond data. In L. Hotchkiss and S. Kang (Eds.), *High school preparation for employment*.

- (95–135). Columbus, Ohio: The National Center for Research in Vocational Education. The Ohio State University.
- Kang, S. and Bishop, J. (1986). The effect of curriculum on labor market success immediately after high school. *Journal of Industrial Teacher Education*.
- Kang, S. and Bishop, J. (1989). Vocational and academic education in high school: complements or substitutes. *Economics of Education Review*, 8(2), 133–148.
- Kann, U. et al. (1988). *Education and employment in Botswana*. Gaborone: University of Botswana.
- Karani, F.A. et al. (1995). *Cost and financing of quality education in Kenya, study 2: access, quality and equity in secondary education*. Study commissioned by the World Bank for the Ministry of Education. Nairobi: Mimeo.
- Kavagi, L. (2002, August 12). Directive on technical subjects ill-advised. *Daily Nation*. Nairobi: Nation Printers.
- Kenya (1984). *8.4.4 System of Education*. Nairobi: Ministry of Education, Science and Technology.
- Kenya (1992). *Secondary education syllabus*. Nairobi: Ministry of Education.
- Kenya (1996). *Secondary education computer studies syllabus*. Nairobi: Kenya Institute of Education.
- Kenya (1999). *Tiquet: totally integrated quality education and training for unity, equity and development: report of the Commission of Inquiry into the Education System of Kenya*. Nairobi: Ministry of Education.
- Kenya (2001). *Economic survey*. Nairobi: Ministry of Education.
- Kenya (2002, June 14). *Press release: the revised primary and secondary curriculum*. Nairobi: Ministry of Education, Science and Technology.
- Kenya Government (1981). *Second University on Kenya: report of the Presidential Working Party*. Nairobi: Government Printer.
- Kenya Government (1988a). *Report of the Presidential Working Party on education and manpower training for the next decade and beyond*. Nairobi: Government Printer.
- Kenya Government (1988b). *Sessional paper no. 6 of 1988 on education and manpower training for the next decade and beyond*. Nairobi: Government Printer.
- Kenya Government. (1978). *Sessional paper on educational objectives*. Nairobi: Government Printer.
- Kenya Institute of Education (1990). *Formative evaluation of the secondary education curriculum phase II*. Nairobi: Kenya Institute of Education.
- Kenya Institute of Education (1992). *Secondary education syllabus*. Volume three. Nairobi: Kenya Institute of Education.
- Kenya Institute of Education (1995). *Evaluation of the secondary school curriculum*. Research Report series No. 53. Nairobi: Kenya Institute of Education.
- Kenya Institute of Education (1999). *Needs assessment survey: report on the secondary education curriculum*. Research Series No. 64. Nairobi: Kenya Institute of Education.
- Kenya National Examinations Council (1998). *1996 Examination Report*. Nairobi: Kenya National Examinations Council.
- Kenya National Examinations Council (2001). *Results of performance in vocational subjects in Kenya Certificate of Secondary Education*. Nairobi: Kenya National Examinations Council.
- Kenya National Examinations Council (2002a). *KCSE: Kenya Certificate of Secondary Education. Regulations and Syllabuses (2002–2003)*. Nairobi: Kenya National Examinations Council.

- Kenya National Examinations Council (2002b). *KCSE: Kenya Certificate of Secondary Education-Regulations and Prescribed Texts*. Nairobi: Kenya National Examinations Council.
- Kenya National Examinations Council (2002c). *Results of Performance in Vocational Subjects in the 2001 KCSE*. Nairobi: Kenya National Examinations Council.
- Kerre, B.W. (1995). *Technical and vocational education in Africa: a synthesis of case studies*. Dakar: UNESCO-UNEVOC International Project on TVE, UNESCO Regional Office at Dakar.
- Kerre, B.W. (1990). Technology education and world development: challenges and opportunities for Education in Africa. *The Journal of Technology Studies*, 16(1), 40–46.
- Kerre, B.W. (1998). A position paper. In UNEVOC (Ed.), *Under the sun or in the shade? Jua Kali in African countries*. Paris: UNEVOC.
- Kerre, B.W. and Kwende, T.G. (1995). *Towards a Managerial View of Technical and Vocational Education in Africa*. Dakar: UNEVOC-UNESCO International Project on TVE. UNESCO Regional Office at Dakar.
- Kibler, R.J., Barker, L.L. and Miles, D.T. (1970). *Behavioral objectives and instruction*. Boston: Allyn and Bacon, Inc.
- King, K. (1988a). *In-service training in Zimbabwe: an analysis of the relations amongst education and training, industry and the state*. Edinburgh: Centre for African Studies, Edinburgh University.
- King, K. (1988b). Evaluating the context of diversified secondary education in Tanzania. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education: an international perspective*. (279–292). London: Pergamon Press.
- King, K. and McGrath, S. (Eds.) (1999). *Enterprise in Africa: between poverty and growth*. London: Intermediate Technology Publications.
- King, K. and Martin. C. (2002). The vocational school fallacy revisited: education, aspiration and work in Ghana 1959–2000. *International Journal of Educational Development*, 22(1), 5–26.
- King, K. and Martin. C. (2002). The vocational school fallacy revisited: education, aspirations and work in Ghana 1959–2000. *International Journal of Educational Development*, 22, 5–26.
- Lane, J.I. and Peresson, J.P. (2000). *Skills development in Madagascar: background and potential approaches*. Washington: The Urban Institute. Unpublished paper prepared for the World Bank.
- Lauglo, J. (1985). *Practical subjects in Kenyan academic secondary schools. General report*. Stockholm: Swedish International Development Cooperation Agency. Education Division Documents, No. 20.
- Lauglo, J. (1985b). *Technical secondary schools in Kenya: an assessment*. Education Division Documents No. 26. Stockholm: Swedish International Development Authority.
- Lauglo, J. (1989). Technical secondary students in Kenya: Origins, achievement and destinations. *Prospects*, 19(3), 409–426.
- Lauglo, J. (1991). *Vocational training in Tanzania and the role of Swedish support*. Stockholm: Swedish International Development Cooperation Agency, Education Division Documents No. 48.
- Lauglo, J. (1992). Vocational training and the bankers' faith in the private sector. *Comparative Education Review*, 36(2), 227–236.
- Lauglo, J. (1993). *Vocational training: analysis of policy and modes*. Paris: International Institute for Educational Planning.

- Lauglo, J. and Lillis, K. (Eds.) (1988). *Vocationalizing education: an international perspective*. London: Pergamon Press.
- Lauglo, J. and Närman, A. (1987). Diversified secondary education in Kenya: the status of practical subjects and their uses after school. *International Journal of Educational Development*, 7(2).
- Lauglo, J. and Närman, A. (1988). Diversified secondary education in Kenya. The status of practical subjects and their uses after school. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education: an international perspective*. London: Pergamon Press.
- Levesque, Karen. *Trends in high school vocational-technical coursetaking: 1982–1998*. NCES 2003–025. Washington, DC: U.S. Department of Education, National Center of Education Statistics.
- Lewin, K. and Caillods, F. (2001). *Financing secondary education in developing countries: Strategies for Sustainable Growth*. Paris: UNESCO. International Institute for Educational Planning.
- Lillis, K. (1985). Constraints on the implementation of diversified curricula: a review of experience in developing countries. In C. Cumming, M. Davies, K. Lillis, and B. Nyagah (Eds.), *Practical subjects in Kenyan academic secondary schools: background papers*. Education Division Documents No. 22. Stockholm: Swedish International Development Authority.
- Maclean, R. and Caillods, F. (2002). *Overview of UNESCO activities regarding the renewal and diversification of secondary education*. Unpublished internal discussion paper. UNESCO, Paris.
- Maller, C., Kerachsky, S. and Thornton, C. (1982). *Evaluation of the economic impact of the job corps program*. Third Follow-up Report. Princeton, New Jersey: Mathematical Policy Research Inc.
- Mañe, F. (1999). Trends in the payoff to academic and occupation-specific skills: the short and medium-run returns to academic and vocational high school courses for non-college bound students. *Economics of Education Review*, 18, 417–437.
- Manning, S. (1998). Dually oriented qualifications: a knowledge base related to the LEONARDO projects. Retrieved January 15, 2004, from <http://www.b.shuttle.de/wifo/duoqual/qual.htm>
- Mansell, J. (1991). *Vocational education and training in Botswana: a report to the Permanent Secretary, Ministry of Education*. Gaborone: Government Printer.
- Mautle, G. and Weeks, S.G. (1993). Implications of educational structures: a position paper prepared for the National Commission on Education. *Mosenodi: Journal of the Botswana Educational Research Association*, 1(1), 3–6.
- McKenzie, C. (1997). Missionaries and the literature of missionary education: myths and misapprehensions. In J. Lynch, C. Modgil and S. Modgil (Eds.), *Education and Development: Tradition and Innovation*. London: Cassell
- McLean, G.N. and Kamau, D.G. (1999). Human resource development and vocational and technical education at Kenyatta University, Kenya. Paper presented at the *European Conference on Educational Research*, Lahti, Finland. Retrieved March 15, 2004, from <http://www.leeds.ac.uk/educol/documents/00001203.htm>
- McWilliam, HOA and Kwamena-Poh, M. (1975). *The development of education in Ghana*. Hong Kong: Longman Group Ltd.
- Mertens, D.M., McElwain, D., Garcia, C. and Whitmore, M. (1980). *The effects of participating in vocational education: summary of studies reported since 1968*. Columbus, Ohio: The National Center for Research in Vocational Education. The Ohio State University.

- Mertens, D.M., Seitz, P. and Cox, S. (1982). *Vocational education and the high school dropout*. Columbus, Ohio: The National Center for Research in Vocational Education. The Ohio State University.
- Meyer, R. (1981). *Vocational education: how should it be measured?* Cambridge, MA: Urban Institute, Harvard University.
- Meyer, R. (1982). Job training in the schools. In R. Taylor, H. Rosen and F. Pratzner (Eds.), *Job training for youth*. Columbus, Ohio: The National Center for Research in Vocational Education. The Ohio State University.
- Meyer, R. (1982). Job training in the schools. In R. Taylor, H. Rosen, and F. Pratzner (Eds.), *Job training for youth*. Columbus: The National Center for Research in Vocational Training, Ohio State University.
- Meyer, R. (1988). The effects of high school academic reforms on course enrollments and academic skills growth: evaluation and new directions for reform. Presented at *Research Conference of the Association for Public Policy Analysis and Management*, Oct. 29, 1988.
- Miller, M.D. (1985). *Principles and philosophy for vocational education*. Columbus, OH: The National Centre for Research in Vocational Education.
- (MINED) (2001). *Revisiting technical and vocational education in sub-Saharan Africa: An update on trends, innovations and challenge. A report for the World Bank*. Paris: International Institute for Educational Planning, UNESCO.
- MINED (Austral Consultoria e Projectos, Lda) (November 2003). Study of the costs and external effectiveness of technical and vocational education in Mozambique. Final Report. Maputo: Ministry of Education Mozambique.
- MINED (December 2001). *Estratégia do ensino técnico profissional em Moçambique 2002–2011*. Maputo: Ministry of Education Mozambique.
- MINED (June 1999). *Investment strategy for technical and professional education in Mozambique. Draft Report*. Maputo: Ministry of Education Mozambique.
- Ministry of Education (1999). *Excellence in education for the new millennium: a comprehensive report on the implementation of the revised national policy on education*. Gaborone: Ministry of Education Botswana.
- Ministry of Education (1999a). Basic education sub-sector improvement program: implementation progress report 1996–1998. March. Accra: Ministry of Education Ghana.
- Ministry of Education (1999b). *2000 a decade of educational reforms: preparation for the challenges of a new millennium*. Background paper for the National Educational Forum Accra: Ministry of Education Ghana.
- Ministry of Education (2000). *Policies and strategic plan 2001–2003 for the education sector (pre-tertiary)*. Accra. Ministry of Education Ghana.
- Ministry of Education (MINED) (1995). Education sector strategic plan (ESSP). Maputo: Ministry of Education.
- Ministry of Education and Culture (1988). *Current issues needing clarification in the junior secondary school program*. Accra: Ministry of Education and Culture.
- Ministry of Education and Human Resource Development and UNICEF Kenya Country Office. (1999). *Comprehensive education sector analysis*. Nairobi: UNICEF.
- Mndebele, C.B.S. and Mkhonta, S. (2002). *Ensuring relevance and quality in the delivery of high school vocational education: the case of Swaziland*. Kwaluseni: University of Swaziland.
- Mokhtar, G.A., Zaky, A.A. and El-Faham, M.M. (2002). The need for better standards of education at the technician level in developing countries. Retrieved January 20, 2004, from <http://www.asee.org/international/INTERTECH2002/172.pdf>

- Mokoti, G.M. (2001). *Design and technology annual report*. Department of Secondary Education. Gaborone: Ministry of Education.
- Molewa, J. (1995). The plight of the junior secondary school leaver in Botswana: and appraisal of the recommendations of the National Commission on Education-1977 and 1993-and other relevant papers. In *Mosenodi: Journal of the Botswana Educational Research Association*, 3(1-2), 33-54.
- Molwane, O. (1995). Implications of the national policy on education: reflection on design and technology. In *Mosenodi: Journal of the Botswana Educational Research Association*, 3(1-2), 77-83.
- Mudariki, T. (1997). Pro-vocational education and training for secondary school students: a Botswana case study. In K. Watson, C. Modgil and S. Modgil (Eds.), *Educational Dilemmas: Debate and Diversity-Quality in Education*. Volume 4. (355-364). London: Cassell.
- Mudariki, T. and Weeks, S.G. (1995). *Vocationalisation of senior secondary education—a report for the Second National Commission on Education*. Gaborone, Botswana Educational Research Association. [published in Volume 2 of the NCE 1993 Report. in 1995, pages A12: 1-50].
- Mudariki, T. and Weeks. S.G. (1993) Resource restrictions and educational development: implications for vocationalization of secondary education—a Botswana case study. Unpublished paper. *Boleswa Conference*. Roma, Lesotho.
- Muya, W. (1993). Changes in the 8-4-4 system fail to realise objectives. Nairobi: Sunday Nation, pp. 16ff.
- Mwiria, K. and Menjo, F. (1997). *Improving the quality of secondary education through a networking of schools: proposal on the establishment of a Kenya school net*. Report prepared for IDRC. Nairobi: Mimeo.
- NACVET/MOE (2000). *Draft TVET policy framework for Ghana*. Accra: Ministry of Education.
- Närman, A. (1985). *Practical subjects in Kenyan academic secondary schools: Tracer study*. SIDA Education Division Documents No. 20. Stockholm: SIDA.
- Närman, A. (1988a). *Practical subjects in Kenyan academic secondary schools. Tracer Study II (Three-year Follow-up)*. Stockholm: Swedish International Development Cooperation Agency (SIDA), Education Division documents No. 39.
- Närman, A. (1988b). Technical secondary schools and the labour market. Some results from a tracer study in Kenya. *Comparative Education*, 24(1).
- National Center for Education Statistics (1995). *Second follow-up: transcript component: data file users manual, Appendix H*. Washington, D.C.: Department of Education.
- National Center for Education Statistics (2003a). *The condition of education: 2002*. Washington, D.C.: Department of Education.
- National Center for Education Statistics (2003b). *Digest of education statistics: 2002*. Washington, D.C.: U.S. Department of Education.
- National Commission on Excellence in Education (1983). *A nation at risk: the imperative for educational reform. A report to the nation and the Secretary of Education*. Washington, DC: Government Printing Office.
- National Institute for Educational Research (1995). *Reorienting secondary education in Asia and the Pacific*. Tokyo: National Institute for Educational Research.
- Ngome, C.K. (1993). *Factors that influence the provision of agricultural education in Kenya*. Unpublished MA thesis. Nairobi: Kenyatta University.
- Ngome, C. (1992). Vocationalisation of education in Kenya: factors that have influenced policies and practices in the colonial and post-colonial period. Nairobi: Kenyatta University, Department of Educational Foundations (Mimeographed).

- Nishimura, M. and Orodho, J.A. (1999). *Education and vocational and technical training and employment: designing projects that link education and vocational training and employment in Kenya*. Nairobi: Japan International Cooperation Agency (JICA.)
- Nti, J. (1997). *Ministry of Education Report of Consultancy on Organizational and Institutional Analysis*. Accra: Ministry of Education.
- OECD (2000). *Education at a glance: OECD indicators 2000*. Paris: OECD.
- OECD (2002). *Education at a glance: OECD indicators 2002*. Paris: OECD.
- Okaka, P.O. (1998). Technical and Vocational Education and Training Policy in Kenya. In UNEVOC (Ed.), *Under the sun or in the shade? Jua Kali in African countries*. Paris: UNEVOC.
- Oxenham, J. (1988). What do employers want from education? In J. Lauglo and K. Lillis (Eds.), *Vocationalizing Education. An International Perspective*. (69–80). Oxford: Pergamon Press in association with the Swedish International Development Cooperation Agency.
- Phelps, A. and Cole, N.S. (1988). Reconsidering vocational-technical education in high schools. In M.B. Griggs, R. Jones, and A. Slocum (Eds.), *Proceedings of the Ninth Annual Report. Evans Symposium, April 28–29*. (3–19). Department of Vocational and Technical Education, University of Illinois.
- Psacharopoulos, G. and Woodhall, M. (1985). *Education for development: an analysis of investment choices*. New York: Oxford University Press.
- Psacharopoulos, G. and Loxley, W. (1985). *Diversified secondary education and development: evidence from Colombia and Tanzania*. Baltimore: Johns Hopkins University Press.
- Psacharopoulos, G. and Loxley, W. (1985). *Diversified secondary education and development*. Baltimore: Johns Hopkins University Press.
- Pucel, D.J. (1990). The curriculum. In A.J. Paulter, Jr. (Ed.), *Vocational education in the 1990s: Major issues*. (157–172). Ann Arbor, Michigan: Prakken Publications, Inc.
- Rasinski, K.A. (1994). *The effect of high school vocational education on academic achievement gain and high school persistence: evidence from NELS:88*. Chicago: National Opinion Research Corporation.
- Salkin, J.S. (1992). *Finance and development implications of the Vocational Education and Training Development Plan*. Gaborone: Ministry of Finance and Development Planning, September.
- Saunders, M. (1988) The 'Technical and Vocational Education Initiative': enclaves in British schools. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education: an international perspective*. London: Pergamon Press.
- Shacklock, G., Hattam, R. and Smyth, J. (1998). Enterprise education and the construction of teachers' work: exploring the links. Sturt: Flinders University School of Education. Paper prepared for *The Australian Association for Research in Education Conference*, Adelaide.
- Sifuna, D.N. (2001). African education in the twenty-first century: the challenge for change. *Journal of International Cooperation in Education*, 14(1), 21–88.
- Sifuna, D.N. and J.O. Shindu (1988). *Education with production in Kenya: a state-of-the-art review*. The Hague: Centre for the Study of Education in Developing Countries.
- Silverberg, M., Warner, E., Fong, M. and Goodwin, D. (2003). *National assessment of vocational education: final report to congress*. Washington, DC: U.S. Department of Education. Office of the Under Secretary.
- Standards of education at the technician level in developing countries. Retrieved January 20, 2004, from <http://www.asee.org/international/INTERTECH2002/172.pdf>
- Strong M.E. (1990). Administrative leadership in vocational education. In A.J. Paulter, Jr. (Ed.), *Vocational education in the 1990s: Major issues*. (139–156). Ann Arbor, MI: Prakken Publications, Inc.

- Teacher Educational Division/Ghana Education Service (TED/GES) (2001). *Report on teacher training colleges that offer technical skills as a subject*. Accra, Ghana: Teacher Education Division.
- Tempest, P.J. (1992). Vocational training in Botswana. In S. Seissa and F. Youngman (Eds.), *Education for all in Botswana*. Gaborone: Macmillan Botswana.
- Thijs, A. (1999). *Supporting science curriculum reform in Botswana: the potential of peer coaching*. Den Haag: CIP-Gegevens Koninklijke Bibliotheek.
- Touré, S. (1965). Education and social progress. In L.G. Cowan, J. O'Connell and D. Scanlon (Eds.), *Education and Nation-Building in Africa*. New York: Praeger.
- UNESCO (1996). *Learning: the treasure within*. Report to UNESCO of the International Commission on Education for the Twenty-first Century. Chaired by Jacques Delors. UNESCO, Paris.
- UNESCO (1999). *Secondary education and youth at the crossroads. Asia-Pacific Centre of Educational Innovation for Development*. Bangkok: UNESCO.
- UNESCO (2000a). *World education report: the right to education*. Paris: UNESCO.
- UNESCO (2001). *International experts meeting on general secondary education in the twenty-first century: trends, challenges and priorities. Final Report*. Paris: UNESCO.
- UNESCO (2002). *EFA global monitoring report*. Paris: UNESCO.
- UNESCO International Bureau of Education (2000b). *Prospects: Quarterly Review of Comparative Education*, Number 115. Special Issue on 'Education in Asia'. Guest editors: Victor Ordonez and Rupert Maclean. IBE, Geneva.
- UNESCO Regional Office for Education in Africa (BREDA) (1995). *Education strategies for the 1990s: orientations and achievements*. Report on the state of education in Africa 1995. Paris: UNESCO.
- United Nations Educational, Scientific and Cultural Organization (UNESCO) (1979). *Developments in technical and vocational education: a comparative study*. Paris: UNESCO.
- United Nations Educational, Scientific and Cultural Organization (UNESCO) (1999). *Second international congress on technical and vocational education: final report*. Seoul, Republic of Korea, 26–30 April 1999.
- Urevbu, A.O. (1988). Vocationalizing the secondary school curriculum: the African experience. *International Review of Education*, 34(2).
- van Rensburg, P. (1974). *Report from Swaneng Hill*. Uppsala: Dag Hammarskjold Foundation.
- van Rensburg, P. (1992). Education with production. Paper presented at the *Vocational Education and Training Development Plan Conference*. Gaborone: Department of Technical Education, September.
- van Rensburg, P. (2001). *Making education work: the what, why and how of education with production*. Gaborone: Foundation for Education with Production; and Uppsala, Sweden: Dag Hammarskjold Foundation.
- Villafana, B. (1995). Program and instructional development in occupational home economics. In S. J. Olson and S. F. Weise (Eds.), *Perspectives of occupational home economics, Year Book 15, 1995*. (53–72). Alexandria, VA: American Association of Family and Consumer Sciences.
- Vulliamy, G. (1981). *Planning for SSCEP: a case study*. ERU Report 38. Waigani: University of Papua New Guinea.
- Wallace, I. (1997). Building better learning systems through the development of formal/non-formal linkages in agricultural and rural education. In J. Lynch, C. Modgil and S. Modgil (Eds.), *Education and development: tradition and innovation*. London: Cassell
- Wasanga, P.M. and Ingolo, G.G. (2001). School based assessment (SBA) experience at the Kenya Certificate of Secondary Education (KCSE) level. A paper presented at the 19th Annual

- Conference of the *Association for Educational Assessment in Africa (AEAA)*, Nairobi, Kenya (September 24–28).
- Watson, K. (1994). Technical and vocational education in developing countries: Western paradigms and comparative methodology. *Comparative Education*, 30(2), 85–98.
- Weber, J.M. (1986). *The role of vocational education in decreasing the dropout rate*. Columbus, Ohio: The National Center for Research in Vocational Education. The Ohio State University.
- Weeks, G. (1995). Executive summary of the Second National Commission on Education's Recommendations and those of the Revised National Policy on Education. Government paper No. 2. *Mosenodi: Journal of the Botswana Educational Research Association*, 3(1–2), 84–102.
- Weeks, S.G. (1970). Innovation in education: comprehensive high schools in the Western State, Nigeria.' In *Sociology Conference Papers, 1968–1969 Social Science Conference*, pp. 493–512. Kampala: Makerere Institute of Social Research.
- Weeks, S.G. (1976). *The 'Foster fallacy' in educational planning*. ERU Occasional Paper No. 6. Waigani: University of Papua New Guinea.
- Weeks, S.G. (1989). *Western Highlands Province: technical high schools. Report to the Provincial Government, Division of Educational Research*. Waigani: National Research Institute, August.
- Weeks, S.G. (1991a). *Review of Vocational Centre Training in New Ireland Province*. Report No. 66, Division of Educational Research. Waigani: National Research Institute.
- Weeks, S.G. (1991b). *Education working: curriculum extension in Papua New Guinea* [video]. Waigani: National Research Institute.
- Weeks, S.G. (1993). Reforming the reform: education in Botswana. *Africa Today*, 40(2), 49–60.
- Weeks, S.G. (1997). Anti-vocational education and training for secondary school students: a Botswana case study. In K. Watson, C. Modgil and S. Modgil (Eds.), *Educational dilemmas: debate and diversity-quality in education. Volume Four*. (365–376). London: Cassell.
- Weeks, S.G., Mudariki, T., Motshabi, K. and Malikongwa, D.M. (1997). *Survey of private vocational training institutions in Botswana*. February 1997. Gaborone: Government Printer.
- Willis, R. and Sherwin, R. (1979). Education and self-selection. *Journal of Political Economy*, 87, 57–536.
- Wilms, W.W. (1988). Captured by the American dream: vocational education in the United States. In J. Lauglo and K. Lillis (1988) (Eds.), *Vocationalizing education: an international perspective*. London: Pergamon Press.
- Wilson, D.N. (1974). Towards an anthropology of educational planning in developing nations. *Educational Planning*, 1(2), 18–28.
- Wilson, D.N. (1977). Evaluation as a component of the educational planning: a case study—the Accra Technical Training Centre. *Educational Planning*, 3(3), 20–33.
- Wilson, D.N. (1990). The deleterious consequences of premature rate-of-return studies on LDC education policies: an Indonesian case. *Canadian and International Education*, 19(1), 32–49.
- Wilson, D.N. (1991). Reform of technical-vocational education in Indonesia and Malaysia. *Comparative Education*, 27(2), 207–221.
- Wilson, D.N. (1992). *An international perspective on trainer competencies, standards and certification*. Toronto: Ontario Training Corporation.
- Wilson, D.N. (1996). *Reform of Vocational and Technical Education in Latin America*. Washington: Inter-American Dialogue PREAL (Program to Promote Educational Reform in Latin America and the Caribbean), Occasional Paper No. 2.
- Wilson, D.N. (1997a). *Reform of Technological Education*. Toronto: Ontario Ministry of Education and Training. Reform of Secondary School Curricula.

- Wilson, D.N. (1999). A new wrinkle in planning post-secondary education in Ontario: B.A. degree holders enrolling in colleges of applied arts and technology. *Educational Planning*, 12(2), 3–22.
- Wilson, D.N. (2000). Technical-vocational education and training. In Deo and Anne Poonwassie (Eds.), *Fundamentals of Adult Education*. Toronto: Thompson Educational Publishers.
- Wilson, D.N. (2001). Reform of TVET for the changing world of work. *Prospects*, XXXI(1), 21–37.
- Wilson, D.N. (2002). Botswana: a different path towards development. *Educational Planning*, 13(2), 23–33.
- Wilson, D.N. (2004, forthcoming). The Education and Training of Knowledge Workers. In J. Zadjia (Ed.), *International handbook on globalisation and education policy research*. Dordrecht: Kluwer Academic Publishers.
- Wilson, D.N., Brown, G.M., Otieno, A.V. and Ngugi, L. (1983). Final report: Kenya Technical Teachers' College evaluation. Toronto: David N. Wilson Consultants, Ltd.
- Wilson, D.N., Demetriou, V., El-Rashidi, R., Peresson, J.P., Gikas, G., Dib, E. and Jellinek, S. (1997b). *Project appraisal document on a proposed loan to the Lebanese Republic for a vocational and technical education (VTE) project*. Washington: The World Bank.
- Wilson, D.N., Desjardins, R.Q., Park, I., Noi, P.C., Ennim, E.K. and Bentil, J.C. (1976). *Final report on the evaluation project. the Accra Technical Training Centre*. Toronto: David N. Wilson Consultants, Ltd.
- Wilson, J.D. (Ed.) (2000). *Snapshots of primary and secondary education in Asia-Pacific*. Bangkok: UNESCO.
- Woods, E. and Haney, W. (1981). Does vocational education make a difference? A review of previous research and reanalysis of national longitudinal data sets. Cambridge, Mass.: The Huron Institute.
- World Bank (1991). *Vocational and technical education and training: A World Bank policy paper*. Washington: D.C.
- World Bank (1991). *Vocational and technical education and training, a World Bank policy paper*. Washington D.C.
- World Bank (1996). *Basic education sector improvement program, staff appraisal report, Republic of Ghana*. Population and Human Resources Division, West Central Africa Department, Africa Region. Washington, DC: World Bank.
- World Bank (1997). *Ghana education finance: its implications for sector effectiveness*. Human Development (3), Africa Region. Washington, D.C: World Bank.
- World Bank (1998). *Ghana education finance: its implications for sector effectiveness*. Draft, Human Development Report 3, Africa Region. Washington, DC: World Bank.
- World Bank (2002). *Eritrea education and training sector note. Report No. 24448-ERI*. Washington: Human Development I, Africa Region.
- Wright, C. (1988). Curriculum diversification re-examined. A case study of Sierra Leone. In J. Lauglo and K. Lillis (Eds.), *Vocationalizing education. An international perspective (115–136)*. Oxford: Pergamon Press in association with the Swedish International Development Cooperation Agency.
- Ziderman, A. (1993). *Using the "Old Boy Network". Early results from a tracer study of technical education in Mozambique*. Aarhus, Denmark: Denconsult, 71–90.
- Ziderman, A. (1997). Locating graduates through reunion parties: secondary technical education in Mozambique. *Comparative Education Review*, 41(2), 142–160.