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RESEARCH TOPIC

Traditional and Alternative Views of the Performance of Provincial School Systems in South Africa.

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Dedication

I would like to posthumously and specially dedicate this thesis to: my late aunt Vho-Thinavhuyo Phethamafhungo Negota, my late father Vho–Bernard Stephanus Masithi Nethengwe, my late grandmothers (Vho–Masindi Tshinyadzo Nethengwe, Vho-Mudzunga Mphaphuli Manyatshe and Vho-Mpfariseni Sikhitha Matodzi) and my late cousin Vho – Livhuwani Ethel Negota for their vision to instil in us as a family the quest to seek education and knowledge for sustenance and laying the groundwork to turn this vision into a mission half accomplished.

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Nethengwe Mmboniseni Enos

Certification

This is to certify that this Masters thesis entitled:

Traditional and Alternative Views of the Performance of Provincial School Systems in South Africa.

and submitted to the International Institute for Educational Planning (IIEP) in partial fulfilment of the requirements of the award of the International Masters Degree in Educational Planning and Management of the Institute is a work carried out by the candidate:

Mmboniseni Enos Nethengwe

under my guidance and supervision.

No part of this research work has, to my knowledge, been submitted to any other university or Institution for the award of any degree or diploma.

Signature of the advisor: ……..…..…….....

Name of the advisor: Kenneth N Ross

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Acronyms and Abbreviations

ABET	Adult Basic Education
ADEA	Association for the Development of Education in Africa
AIDS	Acquired Immune Deficiency Syndrome
AQEE	Access, Quality, Equity and Efficiency
CEM	Council of Education Ministers
CEPD	Centre for Education Policy Development Evaluation and Management
DoE	Department of Education
EC	Eastern Cape Province
ECD	Early Childhood Development
EFA	Education For All
EMIS	Education Management Information System
ESF	Equitable Share Formula
FS	Free State Province
GDE	Gauteng Department of Education
GDP	Gross Domestic Product
GP	Gauteng Province
HEDCOM	Heads of Education Departments Committee
HIV	Human Immunodeficiency Virus
HLM	Hierarchical Linear Modelling
HSRC	Human Sciences Research Council
IEA	International Association for the Evaluation of Educational Achievement
IIEP	International Institute for Educational Planning
INSET	In-service Education and Training
KZN	KwaZulu Natal Province
LOLT	Language of Teaching and Learning
MEC	Member of Executive Committee
MECs	Members of Executive Councils
MLA	Monitoring Learning Achievement
MP	Mpumalanga Province

Nat	National
NC	Northern Cape Province
NGOs	Non-Governmental Organisations
NP	Limpopo Province
NRC	National Research Coordinator
NRCs	National Research Coordinators
NW	North West Province
OBE	Outcomes Based Education
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PISA	Programme for International Student Assessment
RIEP	Research Institute for Education Planning
RNE	Royal Netherlands Embassy
RSA	Republic of South Africa
SACMEQ	Southern and Eastern African Consortium for Monitoring Educational Quality
SA	South Africa
SASA	South African Schools ACT
SD	Standard Deviation
SEL	Socioeconomic Level
SES	Socioeconomic Status
SGB	School Governing Body
SGBs	School Governing Bodies
SPSS	Statistical Package for Social Scientists
TIMSS	Trends in International Mathematics and Science Studies
UNESCO	United Nations Educational Scientific and Cultural Organisation
UNICEF	United Nations Children's Fund
UPE	Universal Primary Education
USAID	United States Agency for International Development
WC	Province

Abstract

This study has analysed the performance of pupils in reading in the provincial school systems of South Africa using a "Traditional View" and an "Alternative View" of school system performance. Two views of school system performance were used to identify the "best school system" and to determine the usefulness and meaningfulness of each view of school system performance as a tool for making cross-provincial comparisons of school system performance.

The data used in this study were derived from the SACMEQ II Project and stored within the SACMEQ Data Archives. These data were collected as part of SACMEQ's second large-scale educational policy research project conducted by the 14 Ministries that comprise the SACMEQ network of countries in Southern and Eastern Africa.

One of the premises in this attempt to identify a useful and meaningful view of school system performance in pupils' reading and writing skills was that the socioeconomic status (or background) of the pupil's family could determine his or her achievements.

The relationship between the socioeconomic statuses of pupils' home

backgrounds and their academic achievements was explored in the review of literature and in the overview of previous research undertaken on the evaluation of the quality of education in the provincial school systems of South Africa.

A socioeconomic status construct developed by Dolata (2005) was employed that was based on the educational level of parents; the quality of the family home; and family goods.

The general conclusion was that a more useful and meaningful view of school system performance was the "Alternative View" as it took into consideration the influence that the socioeconomic status of the pupil intakes could have on the academic achievement of pupils.

Chapter 1: The setting of the Study

Introduction

In South Africa the transition from the old system of education to the new system of education has proved to be a challenging experience. The first phase of transformation saw the demise of 19 racially and ethnically divided Departments of Education and their replacement with one Central Ministry of Education consisting of the national and nine Provincial Departments of Education. The National Department of education was charged with the responsibility of policy development while the Provincial Departments of Education were made responsible for implementing these policies at the school level *(Strategic Plan 2006-2010, 2006).*

For over a decade, the National Department of Education has given high priority to three main government concerns. First, the need to redress the inequalities of the past by providing a transformed inclusive education system. Second, the urgency to address the two issues of poverty and disease that have the potential to slow down the transformation process. Third, the longer-term objective of ensuring that the country has sufficient and appropriately skilled human resources to take it into the 21st Century.

Demographic Background

South Africa is a racially diverse country with a racial composition of blacks (75 percent), whites (13 percent), coloureds (9 percent), and Asians (3 percent).

The country is also multi-cultural and multi-lingual country. The Constitution (1996) guarantees equal status to 11 official languages. Of these languages, isiZulu is the mother tongue of 23.8 percent of South Africa's population, followed by isiXhosa at 17.6 percent, Afrikaans at 13.3 percent, Sepedi at 9.4 percent, and English and Setswana each at 8.2 percent. Having too many official languages has huge cost implications for the early Grades of schooling where children are taught in their mother tongue. This requires a big budget for the purchase of language specific textbooks and other learning support materials that are supplied free of charge to learners.

In recent years the annual economic growth rate has averaged 3.5 percent (September 1999 through to June 2005). Prior to 1994, economic growth averaged less than 1 percent a year. Gross domestic product (GDP) growth was running at an annualised 4.8 percent in the second quarter of 2005 (compared to 3.7 percent in 2004 and 2.8 percent in 2003). Consumer inflation averaged 6.8 percent in 2003 and 4.3 percent in 2004 - compared to 9.8 percent in 1994. Per capita GDP was US$3160 in 2004 while the debt service ratio was 6.4 percent of GDP (2004) and the official exchange rate was R7/US$ (2006 mid-year data). South Africa needs many more citizens with management skills, particularly in fields such as accounting, economics, science, and technology. These people are required in order to capitalize on the current robust economic growth, and to address problems associated with the nation's deep-seated inequalities.

The distribution of total employment by industry (in percent) indicated that the trade sector (24.6 percent) had the biggest share of total employment. This was followed by public administration (17.8 percent), while the electricity, gas and water sectors (0.81 percent) had the least share of total employment. The informal sector comprised 20 percent of the total employment in 2005. The unemployment rate has varied between 26 percent and 30 percent since 2001.

The Education System

(a) Access

Before 1994, only 9 percent of the children from 0 to 6 years had access to early childhood facilities. Over 75 percent of the children in these early childhood programmes were privately funded and thus excluded children from poor households. In 2000, a Nationwide Audit of early childhood education provision in South Africa revealed an increase in participation to 13 percent of all South African children aged 0 to 6 years. To improve the quality of the Early Childhood Development (ECD) programmes in the country, ECD materials relevant to the ECD curriculum have been developed and distributed and 4500 ECD practitioners have been trained nationwide (Department of Education, 2001).

The South African Schools 'Act (1996) makes schooling compulsory for children aged 7 to 15. This has resulted in the sustained participation of over 95 percent in schooling since the mid to late 1990s, and has also led to sustained increases in enrolment in all primary age

groups at education institutions observed in the years since 1999 according to data by Statistics South Africa on Universal Primary Education. The gross enrolment ratio in primary education as of 2003 was 104.6 percent whereas secondary participation has increased from levels of 70 percent in 1992 to a gross enrolment rate of approximately 86.7 percent in 2003 (Education Statistics in South Africa at a Glance, 2004). The primary net enrolment ratio was stable around 88.6 percent in 2003, and the net enrolment ratio for secondary education was 66 percent for the same period.

(b) Internal Efficiency

Repetition rates, dropout rates, and promotion rates reveal important quantitative and qualitative aspects of the schooling system. However, obtaining information about these flow rates is very difficult. The problem here is that the annual school survey, which covers all mainstream registered schools in South Africa, is not properly filled – especially as far as repeaters are concerned.

Grade repetition is under-reported, and consequently under-estimated, because there are incentives for school managers to under-report on repeaters. The first is that the promotion and progression policy stipulates that a learner may only repeat a phase once. The second is that allocations for school funding are tied to an index that includes enrolment as one of the variables, and enrolment has a substantial weight in this index.

Another problem is that school size in terms of enrolment determines the salary scale of the school managers. Besides deliberate under-reporting of flow through rates, the method of data collection seems to be not properly managed at the district level. This is evident in low return rates of completed questionnaires, inaccurate data that requires a lot of time to clean before processing, and the length of the questionnaire in terms of the number of questions included. As a result, the EMIS unit has reduced the number of questions in the Annual School Survey questionnaire for 2007.

(c) Quality

The education system in South Africa had 369 996 teachers in 2004 - with 20 950 in primary schools and 149 046 in secondary schools (Education Statistics in South Africa at a Glance, 2004). Of those in primary schools, 21.3 percent were unqualified, while only 10.9 percent of those in secondary schools were unqualified.

The pupil teacher ratio stood at 1: 34 in the same period. In 2004 there were still reported incidents of learning under trees in some severely under-resourced schools, especially in rural areas that were historically disadvantaged. In some schools, learners have to share textbooks, and furniture. The main quality problem is in the loss of teachers in the key subject areas of science and technology, who are leaving the teaching profession for attractive opportunities in other sectors.

There are also problems related to classroom space and equipment that is required for classroom teaching.

On the output side, the challenge is to improve pupil performance in historically disadvantaged schools – which are mostly found in historically poor provinces. In these provinces, there are also large income differentials between households. These differences translate into household possessions in the families of pupils that have been proved through research to have an influence on pupil achievements.

The average performance of South African students in cross-national studies of the quality of education such as the IEA TIMSS research study (TIMSS, 2003) has been below the other mostly developed countries taking part in the research. However, the comparison of school system performance in these studies has often not taken into account the well-researched finding that differences observed among school systems in average pupil achievement are usually related to the socioeconomic level of pupil intakes.

(d) External Efficiency

Education is failing to provide the necessary skills desperately needed to sustain the economic gains of the few last years. So serious is the problem that even the Deputy President sounded the same warning when she contended recently that if the skills shortage problem is not attended to as a matter of urgency, it could undo all the gains made in the past eleven years, hence her government's announcement a few days later that it is to cast a net abroad to attract skills that are desperately needed to sustain economic growth.

Opportunities for graduates securing employment after graduating depend on their career paths, and overall prospects are very good for employment especially in scarce skills of Engineering, Science, and Technology. There are however very few graduates in these key

areas, which leads to severe skills shortage in Actuarial Sciences, Manufacturing, Medical Technology, Construction, Environmental Sciences, Business Management, and Administration.

(e) Equity

Levels of inequality were systematically built into the South African economy and society by over three centuries of colonialism, culminating in four decades of apartheid social engineering (1948 to 1994). In many ways, education inequalities lie at the heart of South African inequalities, and the 1953 injunction by the Minister of Native Affairs (later Prime Minister) Verwoerd that the country's black majority be subjected to an education system that would be more separate, more centrally controlled, less costly, and of a lower quality than had previously been the case still stands out as an infamous milestone in the country's history (Crouch et al, 2005).

As a result, education reforms in South Africa have been geared towards the importance of equity with an emphasis on redress, equal opportunity, and equal access. Because of the historical context in which schools find themselves, the transformation of South Africa's education system has had to deal with gross inequalities in the provision of resources for teaching and learning.

Equality in teacher allocation has improved, quite dramatically – with notable improvements in intra-provincial equality of teacher allocation. Inequality in classroom allocation was higher than in teacher allocation in 1996, and the situation appears not to have improved, except, significantly, in the case of inter-provincial inequality.

Until 1994 public allocation to schooling emphasized rather than combated parental income inequality (since the rich got more public inputs than the poor). The distribution of basic results is, surprisingly, not much worse than the distribution of income and, in some measures, perhaps more equal. This suggests that the education system is playing a role in ensuring that the distribution of income of the coming generation will be more equal than that of this generation. All this begs the question of whether equitably redistributing resources will lead to redistribution of educational achievement.

(f) Cost and Financing

The South African Schools Act (SASA) (1996) makes provision for two types of schools: public and independent schools. Public schools are funded by the state, while independent schools mostly provide their own funding. The Department of Education continues to receive the largest share of the national budget, accounting to 18.1 percent of allocated expenditure in the 2006/7 financial year. This translates to 5.4 percent of GDP. About 90 percent of the education budget goes to personnel costs. This positive investment in education calls for close attention to improving attainment for learners and improving the performance of schools. The 1999 Education Sector Medium-Term Expenditure Framework Review Team recommended that the personnel costs be reduced to 80 percent in order to free some funds for non-personnel costs.

The national budget for education is divided among the nine Provinces on the basis of an Equitable Share Formula (ESF) which is a funding system that has been designed to ensure that the poorest provinces receive the largest portion of the national revenue allocated to education. The ESF includes provincial variables such as size of the school age population, number of learners enrolled in public schools, the distribution of capital needs in education and hospital facilities, the size of the rural population in each province, and the size of the population targeted for social security.

Allocations for recurrent costs to schools favour the poorer segments of the population on the basis of the conditions of physical facilities and crowding, and the relative poverty of the community served by schools. As such the most needy and largest schools receive priority in funding (Department of Education, 2003).

The governance of schools, which includes the management of recurrent expenditures, is the responsibility of School Governing Bodies (SGBs). Depending on the adequacy of a school's allocation from the State according to identified needs, SGBs may (in consultation with parents of the registered learners) propose ways and means to raise supplementary funds. One of these is for parents to pay school fees, provided that parents who are not able to pay may be exempted from such payments.

Businesses and NGOs are encouraged to adopt schools and other institutions of learning and in return get reasonable rebates in income tax. International agencies like the United States

Agency for International Development (USAID), the Royal Netherlands Embassy, and others offer considerable amounts of funding for selected projects and programmes.

(g) Management

The country's education system is administered through three levels of education administration: The National Department of Education, nine Provincial Departments of Education, and Education Districts. The Council of Education Ministers (CEM) comprised of the nine MECs or member of executive councils from each of the nine provinces has been established to form a link between the National Department of Education and the nine Provincial Education Departments. To cater for administrative issues, a Heads of Education Department Committee (HEDCOM) is in place. This is constituted by nine Heads of Education Departments from each Provincial Department of Education. District Managers oversee the administration of Education Districts. Circuit Managers manage the affairs of education circuits, while schools are under the management of school managers or school principals. School governing bodies provide governance at school level.

Conclusion

The transformation of the South African education system is a process unfolding in a very difficult environment and has come up against obstacles that require a lot of resources to address them. Unfortunately resources are very limited – and so not all problems can be addressed at the same time. As such prioritization is imperative.

School fees, although locally determined, are not affordable for some unemployed parents who in many instances have more that one child in school. In response, the Department of Education has made provision for fee exemptions and has determined a list of schools that will receive allocations of R692 per learner to fully cover student fees. The Department of Education has also embarked on a School Nutrition Programme that provides one balanced meal each day for students who would otherwise be attending school on an empty stomach. The Department of Education has also recently finished a feasibility study on the introduction of a National Student Transport Assistance Scheme to help learners who travel more that 5km to school.

Textbooks are already provided free of charge to schools. These may be borrowed by students who have to return them to the school at the end of the school year. Strategies to recover these textbooks have sometimes proved to be very illusive and have in most instances

led to conflict between parents and school governing bodies when sanctions are imposed on parents whose children fail to return textbooks.

As in many Sub-Saharan countries, the HIV – AIDS pandemic has had a great impact on the functioning of schools – especially in the areas of: (a) loss of teachers due to illness and deaths, and (b) problems presented by large numbers of orphans. A special Health in Education unit has been established with a view to effectively respond to and ameliorate the damage and despair that HIV and AIDS causes amongst affected families. The mortality of teachers is having a devastating effect on the availability of experienced and qualified teachers in the education system - especially for Mathematics, Science and Technology.

The Department of Education is trying to attract back into the teaching force those well-trained teachers who have moved into other sectors. As a long term strategy, the teacher recruitment programmes have been introduced that offer all - inclusive bursaries to those matriculants who to take teaching degrees at university in Mathematics, Science, Technology, and African languages. In addition, practicing teachers have been given incentives to remain in the profession through the provision of better pay progression schemes and promotions to senior teacher and master teacher levels.

Because of the country's divided past, the country's education system inherited many social and economic disparities, and therefore a great deal of effort will be required in terms of redressing them. The pace has been very slow, but there has been progress in the major areas such as the movement from a system of different education authorities for different sectors of society to a unified system of education.

Chapter 2: The Design of This Study

Introduction

The study analyses, interprets, and compares the relationships between the socioeconomic backgrounds of Grade 6 pupils and their level of reading achievement in the 9 provincial systems of education in South Africa. Therefore the type of study is analytical.

Data from the SACMEQ II Project derived from the SACMEQ Data Archives were used. This data archive was collected as part of SACMEQ's second large-scale educational policy research project conducted by the 15 Ministries that comprise SACMEQ. Therefore data used in this study are secondary data.

Access to the SACMEQ Data Archives was sought after which relevant data for South Africa was processed using familiar statistical analysis tools. Tables of provincial school systems reading achievement scores were generated after which analyses were conducted.

A range of analyses including descriptive statistics, correlation, and regression were undertaken using the Statistical Package for Social Scientists (SPSS) software. For example, regression analysis was used to explore the relationships between the socio-economic backgrounds of pupils and their reading achievement Grade. Regression analysis measures the amount of influence one variable (the predicator variable) has on another variable (the criterion variable).

The Research Topic

"Traditional" and "Alternative" views of the performance of provincial school systems in South Africa.

The Rationale for the Study

The average performance of South African students in cross-national studies of the quality of education such as the IEA's TIMSS research study (2003) has been below the other countries taking part in the research. The comparison of school system performance in these studies has often not taken into account the well- researched finding that differences observed

among school systems in average pupil achievement are usually related to the socioeconomic level of pupil intakes.

The "traditional approach" to judging school system performance has been based on cross-national comparisons of average pupil achievement scores that are displayed in "league tables". These "traditional" judgements can be misleading because they assume that observed differences are due only to differences in school systems without taking account of the socioeconomic backgrounds of the pupils when they enter school systems.

In fact such traditional judgements are limited in scope as they also fail to acknowledge that the quality of an education system needs also to be based on its capacity to deliver "equity" by (a) reducing the strength of the linkages between educational achievement and socioeconomic background, and (b) reducing the differences in educational achievement between the best and slower learners.
Research conducted by 15 Ministries of Education that comprise the Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) has moved away from the use of simplistic league tables towards a broader "alternative" view of school system performance.

SACMEQ researchers have expressed this alternative view as an operational definition of high performance that has included three benchmarks: "High performance school systems should demonstrate:

- ***high quality*** - illustrated by high values on an indicator of expected average student reading achievement in the hypothetical situation where the socioeconomic background of student intakes is equal to the average across all school systems;
- ***high social equity*** - illustrated by low values on an indicator of the impact of student socioeconomic background on reading achievement; and
- ***High distributional equity*** - illustrated by low values on an indicator of the spread in student reading achievement.

The Formulation of the Research Statement

Making judgements of the performance of provincial school systems in South Africa, by relying only on the "traditional" view of school system performance can be misleading. These misconceptions can be remedied by shifting to a broader "alternative" view that

defines quality in a manner that adjusts for pupil intakes, and that measures the extent of social and distributional equity associated with school system performance.

To make fairer and more meaningful comparisons of school system performance, analyses employing a combination of the "traditional" and "alternative" views of school system performance are proposed.

Scope and Objectives of the Study

(a) Scope of the study

The study covers a sample of pupils at the Grade 6 level in year 2000 (at the first week of the eighth month of the school year) who were attending registered mainstream primary schools. The sample comprised 3163 pupils in 169 schools in the 9 provinces of South Africa. The average age of the Grade 6 pupils who participated was 13 years and one month with 52.5 percent of the Grade 6 learners in the sample being female. Of the 169 schools, 41 percent were located in rural areas with 28 percent indicating that the school was located in a large town or city.

The study compares the average performance of Grade 6 learners in reading across the 9 provincial education school systems.

(b) Objectives of the study

The study endeavours to focus on the following objectives:

- An examination of the performance of provincial school systems in South Africa in pupil reading achievement using the "traditional" view and identify the "best school system".
- An examination of the performance of provincial school systems in South Africa in pupil reading achievement using the alternative view and identify the "best school system".
- A comparison between the traditional and alternative views of the performance of provincial school systems in South Africa in pupil reading achievement in identifying the "best school system".

- Drawing conclusions on the fairness and meaningfulness of the "traditional" and "alternative" views in making comparisons of performance of provincial school systems in South Africa in pupil reading achievement.

(c) Limitations of the Thesis

The thesis's main objective was to make comparisons of the performance of provincial school systems in South Africa in pupil reading achievement by employing two views of comparing school systems. Hence no attempt was made to make a deeper analysis of the test scores to determine the areas of the test items, where the pupils faired better or the worst. This is an important aspect especially for informed decision making in terms of putting in place interventions to improve achievement levels of pupils in reading.

Studies conducted in South Africa that were reviewed in chapter five were undertaken under different contexts using totally different measurement instruments to those used in the study on which data for this thesis is based for any comparisons to be made with the findings of this thesis. The purpose for inclusion of the findings for these studies was to emphasize the existence or lack of relationships between school resources, socioeconomic status, and pupil achievement. Therefore no comparable data exist to make trend analyses of the findings possible.

The Structure of the Thesis

The chapters of the thesis and the contents of the main chapters have been described below.
The first chapter gives some background to South Africa's Education System. It is in this chapter wherein the demographic composition of the country, the education system's background in terms of indicators of access, efficiency, quality, and equity is described. Issues of funding and financing of education as well as the administrative structure of the education system are also presented in this chapter.

In the second chapter, the research design is described wherein the research topic, the formulation of the research statement, rationale for the study, scope and objectives for the study, as well as methods for data collection and analyses hereof were presented.

The third chapter presents and describes the methods used to collect the data on which this thesis is based. The aim of this chapter was to describe the research procedures that were

applied for the execution of the SACMEQ II Project. The chapter is prepared in three parts that covered the main phases of the research, the sample design procedures, and the construction of the reading tests for pupils.

The fourth chapter reviewed a range of studies that had conceptual perspectives similar to this study. Where necessary, attempts were made to either (a) point out the gaps identified in similar or related research areas or (b) further expand and enrich what was already known about the concept.

In chapter five studies conducted in or about South Africa - especially where provincial comparisons of school system performance were made were presented. References were made to studies that were conducted nationally (Systemic Evaluation, Grade 3, 2001 and Grade 6, 2005) as well as international assessment studies in which South Africa participated (TIMSS,2003 and MLA,1999)

In the sixth chapter, specific literature on the link between socioeconomic status and pupil achievement was reviewed. In this chapter, arguments and counter arguments as to the existence or lack of relationships between school resources, socioeconomic backgrounds of the pupils' parents, the socioeconomic status of a country and learner achievement were presented.

In chapter seven, a description of the concept of Socioeconomic Gradient Lines was introduced and its use to judge the performance of school system performance was explained. The chapter summarised in part the contents of an article by Kenneth N.Ross (2007) (for which permission was granted) in which the construction of the socioeconomic gradient lines was described by modelling a hypothetical situation in which two school systems were A and B were emulated.

A description of the ranking of school systems performance in cross national tests, using the so-called "league" tables, was made in Chapter 7. In this chapter Cross-National comparisons of average pupil reading achievements in the SACMEQ II study were made to determine the best school system according to the "traditional" view. This method was then applied to determine the best provincial school system in South Africa.

In chapter nine the key findings of the study were presented. This chapter attempted to determine the best school system using an “alternative” view of school system performance - a remarkable deviation to the often misleading and unfair practice of using league tables to compare school systems performance used in Chapter 7.

In chapter ten a summary of all conclusions drawn throughout the thesis were presented and a few recommendations based on the findings of the study were made.

Chapter 3: The Source of Data for this Study

Introduction

The SACMEQ II project from which data for this thesis were sourced was the second of two projects undertaken by SACMEQ. The first project named the "SACMEQ I" was conducted between 1995 and 1998 and involved the participation of 7 Ministries of Education. South Africa did not participate in this project. The second project widely known as SACMEQ II project commenced in 1998 and 15 countries were involved including South Africa. Results of SACMEQ I were reported in a series of national policy reports (Kulpoo, 1998; Machingaidze et al, 1998; Milner et al, 2001; Nassor and Ali Mohammed, 1998; Nkamba and Kanyika, 1998; Nzomo et al, 2001; Voigts, 1998).

In this section, a description of the conduct of the SACMEQ II project has been presented in the form of extracts of articles authored by Kenneth N. Ross, Mioko Saito, Stephanie Dolata, Miyako Ikeda, Linda Zuze, Saul Murimba, T. Neville Postlethwaite, and Patrick Griffin.

The SACMEQ consortium aims to enable educational researchers and planners to locally develop important technical skills related to the design and implementation of large-scale data collections, and to be capable to apply a wide variety of computer-based techniques for the preparation, management, analysis, and reporting of educational planning data. SACMEQ's research programme has contributed immensely in the ability to prepare research reports that have contributed towards the conduct of informed debates concerned with: equity and redress in the allocation of human and material resources among regions and schools, and literacy and numeracy levels for important sub-groups (referred to as historically disadvantaged in South Africa's context) of pupils defined by gender, socioeconomic background, and geographic location.

The first two educational policy research projects undertaken by SACMEQ were designed to provide detailed information that could be used to guide planning decisions aimed at improving the quality of education in primary levels of schooling for school systems.

The SACMEQ II Project commenced in 1998 and has involved 15 Ministries of Education. Moving from the SACMEQ I Project (covering around 1100 schools and 20,000 pupils) to

the SACMEQ II Project (covering around 2500 schools and 45,000 pupils) resulted in a major increase in the scale and complexity of SACMEQ's research and training programmes.

This aimed to provide a detailed account of a selection of key technical procedures that were involved in the design and implementation of the SACMEQ II Project.

The Main Phases of the SACMEQ II Project

(a) "Pre-Planning" for the SACMEQ II Project

Before work commenced on the overall design and implementation of the research, a three-step pre-planning process described below was completed. The research projects were designed to address high-priority policy concerns of decision-makers in Ministries of Education through a process of engaging them in discussions about high-priority concerns associated with their education systems.

The SACMEQ National Research Coordinators (NRCs) achieved this by structuring these discussions around a process of asking the decision-makers to identify the main areas where the Ministry needed to review, refine, change, monitor, and/or develop policies that had relevance for the general conditions of schooling and the quality of education after which decision-makers' responses were analyzed in order to identify groups of **"General Policy Concerns"** that were subsequently used as a foundation for guiding the research design.
This resulted in research results emanating from these projects being widely used for policy, planning and post-graduate academic research purposes.

An analysis of outcome of this process revealed that SACMEQ countries were mainly concerned about policy issues linked with: (a) equity in the gender balance and home background profiles of Grade 6 pupils, and (b) the magnitude of the age range of Grade 6 pupils and its implications for teaching and learning. These and similar concerns were summarised in the form of a single question: "What are the personal characteristics (for example, age and gender) and home background characteristics (for example, books at home and parent education) of Grade 6 pupils that might have implications for monitoring equity, and/or that might impact upon teaching and learning?" This question represented the first General Policy Concern developed by the NRCs for the SACMEQ II Project.

The process ultimately generated a total of 20 General Policy Concerns that were prepared for the SACMEQ II Project. These have been grouped in Appendix E in this thesis under five "themes" concerned with: pupils' characteristics and learning environments, teachers' characteristics and viewpoints, school heads' characteristics and viewpoints, equity in the allocation of human and material resources, and the reading and mathematics achievement levels of pupils and their teachers.

Each of the 20 SACMEQ II General Policy Concerns were then linked to a set of **"Specific Research Questions"** that provided precise guidance concerning the information that was required in order to respond to the General Policy Concerns. That is, the Specific Research Questions were used to decide exactly what should be included in, or excluded from, the data collection instruments.

Three of the Specific Research Questions linked to the first General Policy Concern, for example, were: "What is the age distribution of pupils?" "What is the gender distribution of pupils" and "What is the level of parents' education?" Implications of these questions were that the pupil questionnaire should collect information about pupil age, gender, and the educational level of pupils' parents.

In the next exercise, **"Dummy Tables"** – which were blank (or empty) data tabulation templates that employed the variables and information layouts that would be used in the final SACMEQ II national policy reports were designed by using the SACMEQ II Specific Research Questions .

The main advantages of producing Dummy Tables were that this process forced the NRCs to (a) check that the data collection instruments covered all information needs, (b) ensure close linkages between the specific research questions and the questions on the data collection instruments, (c) reach agreement on the selection of variables and the types of data analyses to be applied, and (d) design and justify the data tabulation templates to be used in reporting the data analyses.

Appendix F of this thesis presents a an example of moving through the above three steps h – starting with the first General Policy Concern developed for the SACMEQ II Project, then moving to a set of Specific Research Questions, and finally arriving at a suitable Dummy

Table. The table shown in Appendix F only covers information related to the six Specific Research Questions that have been presented in bold type. A different table was developed for the other six Specific Research Questions.

The upper section of the Dummy Table in Appendix F was used to name the variables (for example Age, Gender, Books at Home, etc.) and also to provide guidance as to whether the variables were to be based on a single question in the data collection instruments (which was the case for the first three variables), or whether the variables were to be derived from two or more questions to form an "index" (which was the case for the second three variables). In this example, the information in the Dummy Table has been broken down by administrative regions(called Provinces in South Africa's context) - which was a popular approach because most SACMEQ school systems operated on the basis of some form of regional administration.

(b) "Trial Testing" of Instruments and Manuals

The trial testing of the data collection instruments as well as manuals took place during August-September 1999. This exercise involved more than 400 schools and 8000 pupils in the data collection. These data were entered into computers under the supervision of NRCs and then transmitted via the Internet to the IIEP where they were checked and merged into a single database. At the IIEP a number of validity checks were undertaken on the data. Errors and/or omissions discovered were corrected and/or clarified by email communication with the NRCs.

(c) Finalization of Instruments and Manuals for the Main Data Collection

To analyze the trial test data a meeting of SACMEQ II NRCs and their Deputies was convened at the IIEP in October 1999 at the same time as the biennial meeting of the SACMEQ Assembly of Ministers the NRCs took advantage of this coincidence by presenting a "Policy Forum" for the Ministers.

The main focus of the meeting was to analyze the trial test data that had been collected on reading and mathematics performance from pupils and their teachers –with the aim to select the best possible sets of test items for the main data collection by reducing the two forms of the trial tests for pupils and teachers to single forms.

The IIEP agreed to prepare final forms of the data collection instruments and to distribute these in "camera-ready" electronic and paper formats that would be suitable for immediate printing – a process which proved to be a massive task in view of the different notations used in different countries. This challenge was further compounded by an inevitable need to translate the SACMEQ II tests, questionnaires, and manuals into local languages.

(d) Main Data Collection

South Africa data was collected in September 2000 in all the 169 sample schools that were involved.

Two days of data collection were required for each sample school. On the first day pupils were given the pupil questionnaire and the pupil reading test, and on the second day they were given the mathematics test. The teachers (who completed a questionnaire) and school heads (who completed a questionnaire) were asked to respond on the first day. These arrangements made it possible for the data collectors to check all completed questionnaires during the evening of the first day and then, if necessary, obtain any missing or incomplete information on the second day. In South Africa teachers did not complete the tests.

Contained in the manual used by the data collectors were detailed procedures concerning the random selection of 20 sample pupils and up to 6 sample teachers within schools. This necessitated that data collectors be given intensive prior training in the strict application of these procedures otherwise the validity of the whole SACMEQ II data collection could have been seriously damaged if “outside influences” had been applied to selecting respondents. An additional measure that was applied in order to avoid the inclusion of unknown biases into the data collection was to absolutely forbid the replacement of absent pupils.

The data collectors were provided with a 40-point checklist in order to ensure that they completed all important tasks that were required before, during, and after their visits to schools - wherein each task was cross-referenced to specific pages of instructions in the data collectors’ manual.

(e) “Scoring” Literacy Levels

The SACMEQ II Project used a particularly innovative approach to presenting the literacy performance of pupils in a manner that provided descriptive accounts of increasing levels of competence by using Rasch scaling procedures. The procedures permitted, for each test, the

performance of pupils to be aligned along a single dimension that could be broken into groups or levels – each being named according to the skills required to successfully complete the items within each group.

Four main steps were used in The SACMEQ II Project involved the use of four main steps to define levels of competence. First, was the use of Rasch Item Response Theory to establish the difficulty value for each test item. The NRCs subjected each test item to an intensive "skills audit" (in order to identify the required problem-solving mechanisms for each item "through a Grade 6 pupil's eyes") in the second step. The step involved the clustering of items into eight groups or "levels" that had similar difficulties and that required similar skills. Finally, descriptive accounts of the competencies associated with each cluster of test items were written by using terminology that was familiar to ordinary classroom teachers.
The work undertaken to define the descriptive levels of competence was commenced at a meeting of NRCs and their Deputies in the Seychelles during June 2001 ,continued via the Internet and was eventually finalized at another follow-up meeting of the same participants that was held in Mauritius during December 2002. The major delay in finalizing this aspect of the work was due to the problem that the scaling of test scores using the Rasch technique required all countries to have completed their data cleaning.

Eventually, when all data were available, it was possible to transform the Rasch scores to an international mean and standard deviation of 500 and 100, respectively. These two figures were established by using a special sampling weight that treated the samples in each country as if they were the same size.

(f) Analysing the Data

Analyses of the data for the SACMEQ II Project were very clearly defined as they were focussed specifically on generating results that could be used to "fill in the blank entries" in the Dummy Tables described above. Two main tasks were undertaken in this area. First, the SPSS software system was used to construct new variables (often referred to as "indices") or to recode existing variables. An example, of this exercise is the construction of an index of "socioeconomic level" - which involved combining recoded variables that described the educational level of the pupils' parents, the materials used in the construction of pupils' homes, and the number of possessions in pupils' homes. This was followed by the use of the

IIEP's specialized data analysis software, IIEPJACK, to "fill" the Dummy Tables with appropriate statistics along with their correct measures of sampling error.

(g) Sample Design Procedures

Sample design procedures that were employed for the SACMEQ II Project are described in this section. First, a detailed description of the step-by-step procedures involved in the design of the samples, the selection of the samples, and the construction of sampling weights has been presented. Second, information on the "evaluation" of the SACMEQ II sampling procedures - in terms of the calculation of response rates, design effects, effective sample sizes, and standard errors of sampling has been presented.

Due to the fact that sample designs in the field of education are usually prepared amid a network of competing constraints, the designs need to adhere to established survey sampling theory and, at the same time, give due recognition to the financial, administrative, and socio-political settings in which they are to be applied. The "best" sample design for a particular project is one that provides levels of sampling accuracy that are acceptable in terms of the main aims of the project, while simultaneously limiting cost, logistic, and procedural demands to manageable levels. The major constraints that were established prior to the preparation of the sample designs for the SACMEQ II Project have been listed below.

Target Population: The target population definitions should focus on Grade 6 pupils attending registered mainstream government or non-government schools. Only government or public schools were targeted in South Africa. In addition, the defined target population should be constructed by excluding no more than 5 percent of pupils from the desired target population.

Bias Control: The sampling should conform to the accepted rules of scientific probability sampling. That is, the members of the defined target population should have a known and non-zero probability of selection into the sample so that any potential for bias in sample estimates due to variations from "epsem sampling" (equal probability of selection method) may be addressed through the use of appropriate sampling weights (Kish, 1965).

Sampling Errors: The sample estimates for the main criterion variables should conform to the sampling accuracy requirements set down by the International Association for the

Evaluation of Educational Achievement (Ross, 1991). That is, the standard error of sampling for the pupil tests should be of a magnitude that is equal to, or smaller than, what would be achieved by employing a simple random sample of 400 pupils (Ross, 1985).

Response Rates: Each SACMEQ country should aim to achieve an overall response rate for pupils of 80 percent. This figure was based on the wish to achieve or exceed a response rate of 90 percent for schools and a response rate of 90 percent for pupils within schools.

Administrative and Financial Costs: The number of schools selected in each country should recognize limitations in the administrative and financial resources available for data collection.

Other Constraints: The number of pupils selected to participate in the data collection in each selected school should be set at a level that will maximize validity of the within-school data collection for the pupil reading and mathematics tests.

(h) The Specification of the Target Population

The target population for both the SACMEQ I and SACMEQ II Projects was focused on the Grade 6 level. Three main reasons were reasons were advanced for the selection of this particular Grade.

First, Grade 6 identified a point near the end of primary schooling where school participation rates were reasonably high for most of the seven countries that participated in the SACMEQ I data collection during 1995-1997, and also reasonably high for most of the fourteen countries that participated in the SACMEQ II collection during 2000-2002. For this reason, Grade 6 represented a point that was suitable for making an assessment of the contribution of primary schooling towards the literacy and numeracy levels of a broad cross-section of society.

Desired Target Population

The desired target population definition for the SACMEQ II Project was exactly the same (except for the year) as was employed for the SACMEQ I Project. This consistency was maintained in order to be able to make valid cross-national and cross-time estimates of "change" in the conditions of schooling and the quality of education.

The desired target population definition for the SACMEQ II Project was as follows.

"All pupils at Grade 6 level in 2000 (at the first week of the eighth month of the school year) who were attending registered mainstream primary schools."

The desired target population definition for both SACMEQ Projects was based on a Grade-based description (and not an age-based description) of pupils. This decision was taken due t the fact that an age-based description (for example, a definition focussed on "12 year-old pupils") may have required the collection of data across many Grade levels due to the high incidence of "late starters" and Grade repetition..

(i) The Stratification Procedures

The stratification procedures adopted for the study employed explicit and implicit strata. The explicit stratification variable, "Region" (province in the case of South Africa), was applied by separating each sampling frame into separate regional lists of schools prior to undertaking the sampling. The implicit stratification variable was "School Size" – as measured by the number of Grade 6 pupils.

The main reason for choosing Region as the explicit stratification variable was that the SACMEQ Ministries of Education wanted to have education administration regions as "domains" for the study. That is, the Ministries wanted to have reasonably accurate sample estimates of population characteristics for each region.

Two other reasons for selecting Region as the main stratification variable were advanced. First, this was expected to provide an increment in sampling precision due to known between-region differences in the educational achievement of pupils – especially between predominantly urban and predominantly rural regions. Second, this approach provided a broad geographical coverage for the sample – which was necessary in order to spread the fieldwork across each country in a manner that prevented the occurrence of excessive administrative demands in particular regions.

The use of School Size as an implicit stratification variable within regions also offered increased sampling precision because it provided a way of sorting the schools from "mostly rural" (small schools) to "mostly urban" (large schools). It was known that this kind of sorting was linked to the main criterion variables for the study – with urban schools likely to have higher resource levels and better pupil achievement scores than rural schools.

(j) Sample Design Framework

To prepare SACMEQ II sample designs, a specialized software system (SAMDEM) was used. The software system enabled the high-speed generation of a range of sampling options which satisfied the statistical accuracy constraints set down for the project, and at the same time also addressed the logistical and financial realities of each country.

The lottery method of "probability proportional to size" PPS selection was implemented in the SACMEQ II Project with the assistance of the SAMDEM software (Sylla et al, 2003).

Probability proportional to size (PPS) approach commences with the sampling of schools within strata (provinces in the case of South Africa) followed by the selection of a simple random sample of a fixed number of learners within the schools. The approach provides control over the sample size and results in "equal probability of sampling method" (Epsom) sampling of learners within strata. The results of the sampling procedure employed in the SACMEQ II project are summarised in Table 3.1

Table 3.1: Planned and Achieved Samples for SACMEQ II in South Africa

South Africa	**SACMEQ II**			
	Schools		Pupils	
	Planned	Achieved	Planned	Achieved
	185	169	3700	3163

The Selection of Pupils within Schools

A critical component of the sample design for the SACMEQ II Project was concerned with the selection of pupils within selected schools. Because of the critical importance attached to this aspect, it was decided that these selections should be placed under the control of trained data collectors – after they were provided with materials that would ensure that a simple

random sample of pupils was selected in each selected school. The data collectors were informed that it was not acceptable to permit school principals or classroom teachers to have any influence over the sampling procedures within schools as these groups of people may have had a vested interest in selecting particular kinds of pupils, and this may have resulted in major distortions of sample estimates (Brickell, 1974).

In the two SACMEQ Projects the data collectors themselves used a "mechanical procedure" to select the sample of 20 pupils. This ensured that a true "random sample" of the pupils was selected in each school.

(k) Evaluation of the SACMEQ Sample Designs

Response Rates

In Table 3.1 the size of the planned and achieved samples have been presented for South Africa for the SACMEQ II Project. The value of the achieved sample size as a percentage of the planned sample size represents the "response rate".

Table 3.2 illustrates the response rate percentages for pupils and schools for South Africa in SACMEQ II Project. As a technical requirement all countries should seek to achieve overall response rates of 90 percent for schools and 80 percent for pupils for the SACMEQ research programme. According to Table 3.2, South Africa satisfied the required response rate for schools (91 percent) and pupils (85 percent).

Table 3.2: Response Rates, Design Effects, Effective Sample Sizes for SACMEQ II

	Response Rate (percent)		**Design Effect**		**Effective Sample Size**	
South Africa	Schools	Pupils	Reading	Math	Reading	Math
	91	85	17.1	13.6	185	230

Sampling Errors

In the calculation of sampling errors for the SACMEQ Projects consideration needed to be given to the fact that the samples were not simple random samples - but rather complex two-stage cluster samples that included weighting adjustments to compensate for variations in selection probabilities. The IIEP's specialized sampling software (IIEPJACK) was used to make these calculations.

In the SACMEQ I and SACMEQ II national policy reports the sampling errors were calculated for each summary statistic, and they were labeled "SE" in the completed Dummy Tables. For example, consider the statistics reported for South Africa overall and the Western Cape province

The pupil average reading score for South Africa overall was 492.4 and the standard error of sampling was 8.98. These figures indicated that one could be 95 percent confident that the population average for pupils in South Africa on the reading test was within the following limits: $492.4 \pm 2(8.98)$. That is, between 474.44 and 510.36. Similarly, the pupil average reading score for the western Cape province was 692.1 and the standard error of sampling was 17.90 These figures indicated that one could be 95 percent confident that the population value for pupils in South Africa's Western Cape province was within the following limits: $629.1 \pm 2(17.90)$. That is, between 593.2 and 664.8.

When data are collected using multi-stage sample designs from sources at different levels of aggregation (pupil, teacher, school) a great deal of care needs to be taken in interpreting the stability of sample estimates of population characteristics. For the SACMEQ Projects, the data analyses were undertaken at the between-pupils level. That is, data collected from teachers and school heads were disaggregated across the pupil data files before the data analyses were undertaken.

The interaction of sample design and level of data analysis required that extra caution be used in interpreting estimates obtained by using information from teachers or school heads. The sampling errors of estimates derived from these two "disaggregated sources" were far larger than figures generated by using standard statistical software packages.

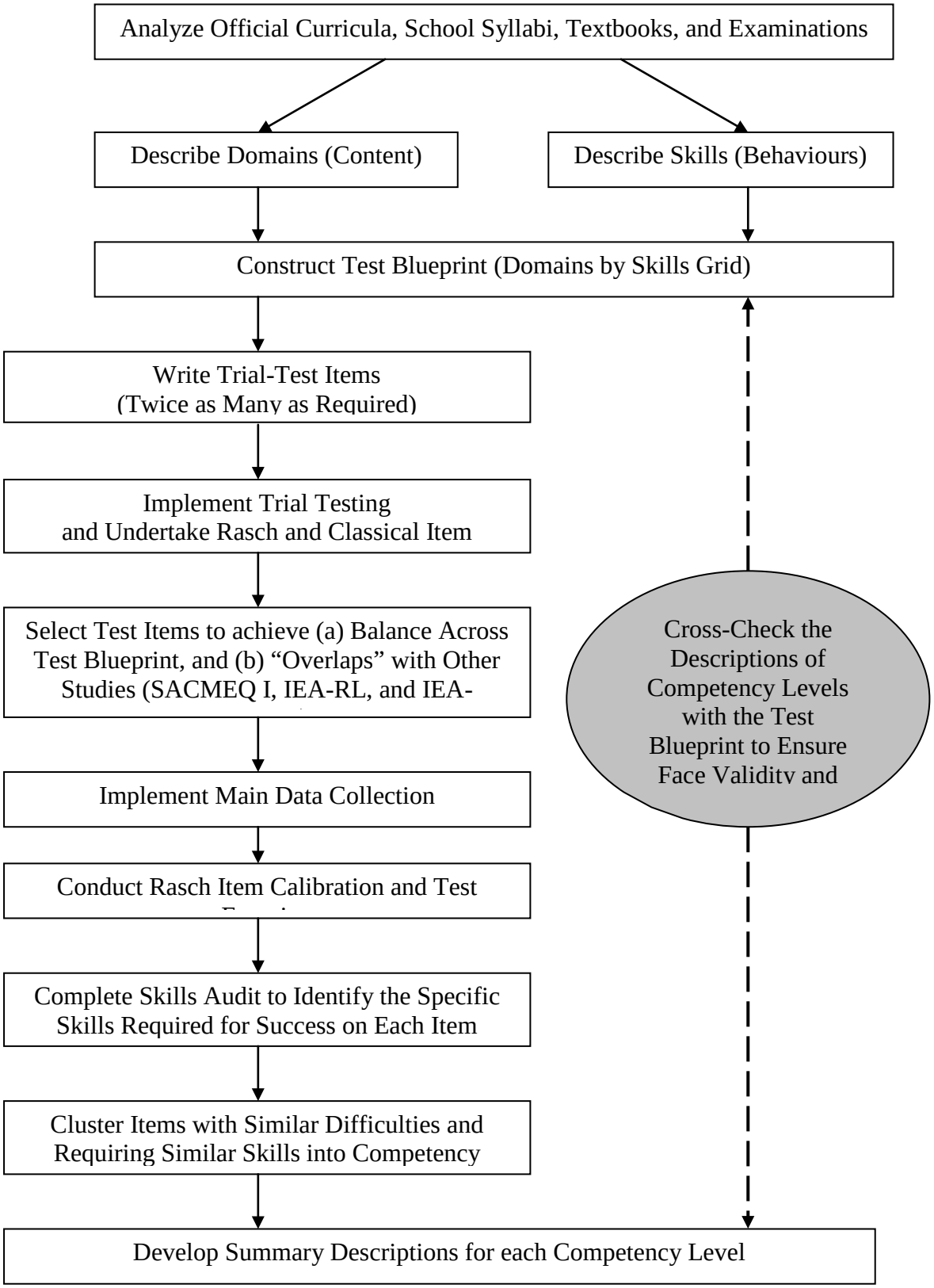
(l) The Construction of Tests for the SACMEQ II Project

In order to ensure that the structure of the pupil tests corresponded with the content (domains) and behaviours (skills) derived from detailed analyses of the curricula, syllabi, exams, and textbooks used in the SACMEQ countries extreme care was exercised in the construction of the both SACMEQ I and II projects.

The SACMEQ II tests for pupils included "overlapping" test items selected from five earlier studies: the Zimbabwe Indicators of the Quality of Education Study (Ross, 1991), the SACMEQ I and SACMEQ II Projects, the IEA's Third International Mathematics and Science Study (TIMSS) (Mullis et al, 2001), and the IEA's International Study of Reading Literacy (IRL) (Elley, 1992). These "overlaps", when combined with Rasch item analysis and test scoring techniques, made it possible to make valid comparisons among the following groups of respondents: pupils with teachers in the SACMEQ II Project, pupils in the SACMEQ I Project with pupils in the SACMEQ II Project, and pupils in both SACMEQ Projects with pupils in the IEA's TIMSS and IRL studies..

Figure 3.1 presents in diagrammatic form the key steps involved in constructing the SACMEQ II. This process was mainly aimed at ensuring high levels of face validity and construct validity by achieving correspondence between the test blueprint (prepared as a framework for test construction) and the descriptions of increasing levels of competence generated from a Rasch analysis of the item difficulty levels in combination with a skills audit of test items.

Figure 3.1: Main Steps Involved in Test Construction for the SACMEQ II Project



The Structure of the SACMEQ II Reading Tests

The Definition of "Reading Literacy"

The "reading literacy" was defined as "the ability to understand and use those written language forms required by society and/or valued by the individual" for the SACMEQ II project.

The definition was agreed to and was used by the 35 countries that participated in the International Reading Literacy Study that was conducted by the International Association for the Evaluation of Educational Achievement (Elley, 1992). The definition was also generally accepted by the SACMEQ National Research Coordinators (NRCs) for the SACMEQ I Project This is after the NRCs found this definition to be general enough to accommodate the diversity of traditions and languages represented in the SACMEQ countries, and yet still sufficiently specific to provide guidance for test construction.

The Three Reading Domains

In both SACMEQ Projects initial detailed curriculum analyses were undertaken across all countries in order to –define the reading skills that were considered by all countries to be the most important. A great deal of time was invested in this process because to enhance the validity of the tests by ensuring that they provided a balanced coverage of the main reading domains and the required reading skills. The NRCs decided to accept the three broad content domains for reading literacy (presented in Figure 3.2) that had been adopted for the International Reading Literacy Study, and also previously applied by the NRCs in the SACMEQ I Project.

Figure 3.2: The Three Domains for the SACMEQ II Reading Test

Narrative prose: Continuous texts in which the writer aims to tell a story – whether this be fact or fiction.

Expository prose: Continuous text in which the writer aims to describe, explain, or otherwise convey factual information or opinion to the reader.

Documents: Structured information organized by the writer in a manner that requires the reader to search, locate, and process selected facts, rather than to read every word of a continuous text.

Using a "Skills Audit" to Define Competence Levels

Systematically-generated test blueprints that described the proposed levels of competence in reading were used to prepare the SACMEQ reading tests. To make sure that there were sufficient high quality items remaining after the analysis of trial test data had been completed, twice as many test items were developed for the trial testing phase.

The data from the trial testing was subjected to Rasch and Classical item analyses in order to detect items that did not fit the relevant scales, or that were behaving differently across subgroups of respondents. The Rasch scaling procedure provided evidence that the items within the SACMEQ tests could be mapped into single underlying dimensions of reading performance that clearly defined scales along which test items were placed in gradually increasing levels of difficulty.

The results of the Rasch analyses provided a means of assessing whether the levels proposed in the test blue prints were congruent with a detailed examination of the actual test located at different difficulty levels along the dimensions that had been generated. The descriptions that were obtained after the NRCs had conducted the skills audits and identified the theme were called "derived levels of competence.

The skills audit analyses that National Research Coordinators conducted focused on whether they had actually been able to write items that were aligned along the five increasing skill levels proposed in the test blue prints. To address this question, the NRCs conducted a skills audit in which the set of 148 items composing the hypothetical reading test were each arranged in order of difficulty, after which thy examined item-by-item in order to describe the specific skills required to provide correct responses. The proposed levels and the skills required for correct responses are outlined in the paragraphs that follow.

Proposed Levels of Competence in Reading

Level 1: Pre Reading (Linked with Level 1 in the Test Blueprint)

(a) Skills: **Matches words and pictures involving concrete concepts and everyday objects. Follows short simple written instructions.**

(b) Example Test Items

- locate familiar words in a short (one line) text
- match words to pictures
- follow short and familiar instructions

Level 2: Emergent Reading (Linked with Level 2 in the Test Blueprint)

(a) Skills: **Matches words and pictures involving prepositions and abstract concepts; uses cuing systems (by sounding out, using simple sentence structure, and familiar words) to interpret phrases by reading on.**

(b) Example Test Items

- read familiar words and identify some new words
- use simple and familiar prepositions and verbs to interpret new words
- match words and very simple phrases

Level 3: Basic Reading (Linked with Level 3 in the Test Blueprint)

(a) Skills: **Interprets meaning (by matching words and phrases, completing a sentence, or matching adjacent words) in a short and simple text by reading on or reading back.**

(b) Example Test Items

- use context and simple sentence structure to match words and short phrases
- use phrases within sentences as units of meaning
- locate adjacent words and information in a sentence

Level 4: Reading for Meaning (Linked with Level 4 in the Test Blueprint)

(a) Skills: **Reads on or reads back in order to link and interpret information located in various parts of the text.**

(b) Example Test Items

- interpret sentence and paragraph level texts
- match phrases across sentences
- read forwards and backwards in order to locate information in longer texts

Level 5: Interpretive Reading (Linked with Level 5 in the Test Blueprint)

(a) Skills: **Reads on and reads back in order to combine and interpret information from various parts of the text in association with external information (based on recalled factual knowledge) that "completes" and contextualizes meaning.**

(b) Example Test Items

- Locate, interpret, and read forward to join two pieces of adjacent information
- use multiple pieces of information to interpret general purpose of a document
- paraphrase and interpret a single non-adjacent piece of information

Level 6: Inferential Reading (Linked with Level 5 in the Test Blueprint)

(a) Skills: **Reads on and reads back through longer texts (narrative, document or expository) in order to combine information from various parts of the text so as to infer the writer's purpose.**

(b) Example Test Items

- Interpret, and make inferences from, different types of texts by reading backwards and forwards to confirm links between widely separated information pieces
- extract information from a non-traditional (left to right) document
- make judgments about an author's intentions or purpose beyond the text content

Level 7: Analytical Reading (Linked with Level 5 in the Test Blueprint)

(a) Skills: Locate information in longer texts (narrative, document or expository) by reading on and reading back in order to combine information from various parts of the text so as to infer the writer's personal beliefs (value systems, prejudices, and/or biases).

(b) Example Test Items

- Combine several pieces of information from a range of locations in complex and lexically dense text or documents
- analyse detailed text or extended documents for an underlying message
- identify meaning from different styles of writing

Level 8: Critical Reading (A New Level Generated from the Skills Audit)

(a) Skills: Locate information in a longer texts (narrative, document or expository) by reading on and reading back in order to combine information from various parts of the text so as to infer and evaluate what the writer has assumed about both the topic and the characteristics of the reader – such as age, knowledge, and personal beliefs (value systems, prejudices, and/or biases).

(b) Example Test Items

- use text structure and organisation to identify an author's assumptions and purposes
- identify an author's motives, biases, beliefs in order to understand the main theme
- link text to establish multiple meanings including analogy and allegory

Conclusion

In the first section of this chapter a narrative of how the SACMEQ II Project commenced, was outlined - where an innovative "pre-planning" phase that underpinned the whole research design was described.

The second section of the chapter on sampling included an evaluation of the sampling procedures. The evaluation showed that South Africa did not satisfy some of the sampling accuracy requirements that had been set down for the SACMEQ II Project – by achieving equivalent sample sizes for the pupil tests that were in excess of 400 pupils. The accuracy of the sampling in South Africa fell far below the 400 target - achieving equivalent sample sizes

of only 230. These results indicated that care should be exercised in interpreting the reading achievement levels that were obtained from South Africa, and also that even more care should be taken when examining within-country provincial differences.

The third section of the chapter provided in more detail a description of how the SACMEQ II Project moved away from traditional approaches to the calculation of test scores (based on numbers of correct responses to test items) towards the use of Modern Item Response Theory to generate descriptions of "levels of increasing pupil competence" - which offered a mechanism for describing the performance of pupils in a manner that was more meaningful within a teaching and learning context.

Chapter 4: The Concept of "The Quality of Education"

Introduction

The main aim of this chapter is to review some of the previous literature that has been concerned with different interpretations of the concept of "quality of education". The review commences with an illustration of the evolution of this concept over time in terms of its meaning and its associated operational definitions. Much of this material has been based on the outcomes of conferences (Beeby, 1969; Ross and Mählck, 1990) that were organised by UNESCO's International Institute for Educational Planning.

An attempt is also made to locate the interpretation of the concept within current global programmes that seek to make education of good quality accessible to all a pursuit of the quality of education that will be constantly inferred in this study.

The Quality of Education: Three IIEP Conferences and their Operational Definitions of Quality.

The concept of the "quality of education", and in particular, the word "quality" can take different meanings depending on the situation in which it is used. It is important to note that the word "quality" can be used in either a descriptive sense or in a judgemental sense.

In a descriptive sense, the word "quality" generally implies the possession, or lack, of a particular characteristic. In this sense, the word becomes relatively straight forward in its application and interpretation. For example, when used in describing a person as "possessing certain qualities" without implying any kind of value judgement about the person (Ratsatsi, 2007).

What concerns educational planners as well as educational researchers are problems that often arise when the word "quality" is used to describe characteristics or attributes of an object in judgemental sense that suggests some embedded measure of "goodness". In this sense, the word "quality" conveys a difference in worth, in relation to what is common. Accordingly, it is perceived that if something has quality, that object is considered less accessible than a variant of the same object which comparably lacks quality. Thus, the notion of quality implies two or more versions of the same object, arranged in hierarchical order implying the relative presence of a valued characteristic (Kumar, 2004).

The main challenge associated with using the word “quality” in a judgemental sense is the inherent necessity to have a clear and agreed specification of the nature of the underlying measure that is being used.

The matter becomes further complicated in the use of the word “quality” when the word is used in association with the word “quantity”- which requires an additional task of having to make differentiations and then explanations about a commonly perceived dichotomy between “quantity” and “quality”. The implication of a dichotomy between the two words arises because they are often used with the word “or” placed or implied between them. For example, in the often used reference to a “qualitative assessment” of an object in order to signify that the assessment was not “quantitative” in the sense that it was subjective, judgemental, holistic, and not based on the measurement of identifiable and observable parts or behaviours (Ross and Mählck, 1990).

The International Institute for Educational Planning (IIEP) has organised a series of international conferences-spaced around a decade apart - that were concerned with the concept of “quality” when it is applied to the field of education. The first conference (Beeby, 1969) concerned itself with debates attempting to clarify the concept of the “quality of education” and to then explore the concept’s relationships with the field of educational planning.

The second conference scrutinized the uneven patterns of success that educational planners had experienced in seeking to improve the quality of education. Professor C.E Beeby, after acknowledging the impossibility of preparing an absolute definition of quality, proposed the adoption of what he referred to as a less controversial position and put forward the term “qualitative change” after an elaborate effort to distinguish it from “quantitative change”. By “qualitative change”, he meant a simple linear expansion of current practice of what already exists. For example, more buildings, more students, and teachers as well as fewer examinations of the present type and standards (Beeby, 1979, p17).

According to Beeby, “qualitative change” is two dimensional. One dimension is of “qualitative change in the classroom” – *what* is taught and *how* it is taught. The other dimension is “qualitative change in the flow of students” – *who* is taught and *where* he/she is taught (Beeby, 1979, p17).

Semantic and philosophical debates about the meaning of the phrase "quality of education" continued during the latter part of the 1980s. For example, an extensive review of terminology prepared by the OECD (1989), and the IIEP conducted a third conference (Ross and Mählck, 1990) that examined the major issues surrounding the collection and use of information by educational planners for the purpose of improving the quality of education through informed decision-making (Ross and Mählck, 1990).

An observation was made from these reviews and debates that, only a few analyses have pushed the definition of the "quality of education" to beyond Beeby's elegant and usable operationalization. At the IIEP's 1989 conference on Planning the Quality of Education, it was decided to reserve the notion of "quality" to describe the matters that came within the realm of what Beeby defined as "qualitative change in the classroom". Accordingly, the phrase "planning the quality of education" was interpreted as being concerned with educational planning that was likely to result in an improvement in the environment in which the student worked with the aids provided for that purpose by the school system and the impact that this environment was expected to have on the knowledge, skills, and values acquired by students" (Ross and Mählck, 1990, p6).

The Quality of Education: A Link between Resources, Process, and Pupil Performance

This section seeks to develop further the notion of "qualitative change in the classroom" alluded to in the previous section with particular reference to the resources and the teaching learning process. In this section the definition of "qualitative change" will be limited to - "a simple linear expansion of current practice and of what already exists (resources)".

In attempts to improve classroom practice, ministries of education have identified a number of measures that include searching for more experienced and better qualified teachers alongside the drive to reduce class sizes. Accordingly, they continue to seek information to design strategies in which the resources required to achieve that goal could be acquired and then put into action. As result, the tendency by educational planners around the world has often been one of pursuing strategies that facilitate the delivery of these inputs to education in the form of personnel, accommodation, and teaching and learning materials.

But the question remains as to whether there exists a strong or consistent relationship between school resources and student performance. In other words, is there some reason to be

confident that simply adding resources to schools will yield performance gains among students? Unfortunately studies of class size, teacher-pupil ratios, teacher qualifications, and of teacher experience give little if any support to the policies of expanding these resources. These findings have often been misinterpreted as implying that resources do not matter at all. For example the, "Coleman Report" (Coleman et al, 1966), which found that measured school resources explained a small portion of the variance in student achievement, has often been interpreted as implying that "schools don't make a difference".

It is worth pointing out the fact that studies of educational performance, that perform statistical analyses of determinants of student achievement use a variety of different measures of resources devoted to schools. Of these measures of resources, the three most commonly employed measures are: (a) the resources available within the classroom (teacher qualifications, teacher experience, and pupil-teacher ratios), (b) financial aggregates of resources (expenditure per student and teacher salaries), and (c) other resource measures – such as specific teacher characteristics, administrative inputs, and facilities (Hanushek,1998).

While resources alone may not be sufficient to guarantee a "qualitative change in the classroom", obviously adequate resources are necessary. Unfortunately, this paper could identify, nothing in the literature about the effects of resources on student achievement, that suggests that there is a level below which resources have clear and powerful effects on student achievement that would be a demonstration that some schools are below the threshold of "necessity" (Hanushek, 1998).

The Quality of Education: Judging the Performance of the Education System on the Basis of Students' Level of Achievement.

For many years the concept of the quality of education has been a topic of intense interest to the government and the public. Questions that often arise during the many discussions and debates on this concept are around the capability of the education system to deliver what it is supposed to provide to the nation. But how does one appraise the performance of an educational system or any of its sub-systems? Coombs (1969) asserts that simple logic suggests that the way to begin is by asking what the system is supposed to do - what its objectives and priorities are. Once answers to these questions are found, the next step is to establish some criteria of performance relevant to these objectives and priorities, and the third

step is to gather and analyse evidence in relation to these criteria which will reveal how well or poorly the system is actually doing in terms of its objectives.

However, there are diverging views with regard to the objectives that the education system is supposed to meet and upon which judgements on the performance of the education system are to be based. One of these views, and maybe the most frequent, is judging the performance of the education system on the basis of students' level of achievement. Another dimension is the relevance of the knowledge, skills, and attitudes that students acquire for life after school, which itself not only refers to work and employment, but also to the insertion of young people into the cultural, social, and political contexts of the society which surrounds them (Mählck and Grisay 1991). Often these outputs are evaluated in relation to the inputs. Compared to inputs, the outputs of an educational system are much harder to identify and measure in order to assess the efficiency of the education system.

It is even more difficult to assess the long-term benefits of education accruing to individuals and to all society over time in order to compare these aggregate benefits with the costs of achieving them. All difficulties notwithstanding, it is essential to find some workable means - even if far from perfect - for evaluating an education system's performance (Coombs, 1969). The most simple, and the most frequently used, means of judging the performance of an education system is the "level of student achievement".

From what has been discussed above, it appears that the general concept of the quality of education is complex and multi-dimensional. The quality of education is reflected in the fit between the expectations of society expressed in the general and specific objectives of education, and, the actual characteristics of the educational process and the changes observed at the student level (Mählck and Grisay, 1991). Therefore, evaluating the quality of the education system entails first and foremost:

a) the extent to which the products or results of the education provided (that is, the knowledge, skills and values acquired by students) meet the standards stipulated in the system's educational objectives, and
b) the extent to which the knowledge, skills, and values acquired are relevant to human and environmental conditions and needs (Mählck and Grisay, 1991).

It has been stated earlier that the most frequent issue on which public debates about the quality of education usually concentrate is that of the level of student achievement. Many parents who are aware of differences in the levels of student achievement existing between schools, even look closely at the past achievement of a school's students in terms of examination results when choosing schools for their children.

It is a pity that, much of these debates fail to recognise the obvious fact that education has expanded considerably in the past decade,- with learner profiles having changed accordingly as they are no longer being screened in the intermediate schooling level except in exceptional cases in the terminal grades of schooling, e.g. Matric in South Africa.

Besides, schools must now cope with a diversity of clients (student intakes) as schooling has changed from being a preserve of those who succeed in entry examinations - a trend that has caught many by surprise as "suddenly education was transformed from a scarce privilege, distributed parallel to economic development, to a human right". (Heyneman, 1980).

The inevitable change in the profile of student intakes has resulted in the need for schools to adapt to a greater diversity of learning needs – especially to the needs of students from poorer communities - which has unfortunately not been paralleled by the provision of the necessary resources. This is a serious mismatch considering that the notion of the quality of education cannot be limited to students' results alone as it should take into account their determinants. Based on the findings of a number of studies that students from poorer home environments tend to have lower achievement levels, the addition of these students to the school population means that there is likely to be a drop in the average achievement level of students in South Africa's schools. This outcome raises an important question as to how the performance of school systems be fairly evaluated and comparisons made in a manner that makes due account of the differences in the socioeconomic circumstances of student intakes.

Conducting an "experiment" in which several school systems, are given an intake consisting of a random selection of students from the total pool of students across all countries so that the average "wealth" of the home backgrounds of students was more or less the same for all student intakes has the potential to provide a solution to the question above. In this way, any differences in national average student achievement scores could be attributed to what each school system "added" to the learning of students.

It is unfortunate that in the "real" world conducting experiments of this kind is not possible. An alternative would be to use statistical procedures, based on regression analysis, that permit the calculation of the "expected" national average student achievement scores in the situation where the student intake for all school systems is exactly the same (Ross and Zuze, 2004).

The Quality of Education: The Ultimate Goal in the "Education for All" Imperative

The world's determination to continue working towards the goal of 'Education for All (EFA)' launched by the 1990 Jomtien World Conference on education and reaffirmed at **t**he Dakar World Education Forum in 2000 was a positive sign of the commitments of governments to provide quality education to children, the youth, and adults.

At a first glance, one could erroneously interpret the call for "EFA" to be concerned only with raising the participation rates of school-age children in basic education programs (Ratsatsi, 2007). For example, the United Nations Millennium Declaration's commitment to achieve Universal Primary Education (UPE) by 2015 was directly and simply set out without explicitly referring to quality. Goal 2, target 3 of the Millennium Development Goals urges countries to: "Ensure that by 2015 children everywhere, boys and girls alike will be able to complete a full course of primary schooling".

It is of course an undeniable fact that in many countries that are striving to guarantee all children the right to education, the focus on access to education often overshadows the issue of quality. But quality stands at the heart of EFA programmes as it determines how much and how well students learn, and the extent to which their education achieves a range of personal, social and developmental goals.

The element of quality of education is emphasized in two of the goals contained within the Dakar Declaration goals that to achieve EFA by 2015 would require all nations not only to expand participation in education but also to strive "to improve all aspects of the quality of education and ensure excellence so that recognized and measurable learning outcomes are achieved by all, especially in literacy, numeracy, and life skills, and to ensure that by 2015 all children, particularly girls, children in difficult circumstances and those belonging to ethnic minorities have access to complete free and compulsory primary education of good quality" (EFA Global Monitoring Report, 2005 p.28).

This is not an easy task to accomplish especially for some of the developing countries. Ross (2002) acknowledged this challenge when he said,

> "In order to work systematically towards achieving these goals, ministries of education will have to develop effective monitoring and evaluation systems that can be used to answer a very important question: Can nations, especially those with limited resources, improve the quality of education, and in particular schooling conditions and student learning outcomes, at the same time as they are expanding access to education through increased participation? (Ross, 2002, p.8)

Most developed countries have already established well-designed mechanisms for monitoring and evaluating the quality of education, for example, the initiatives implemented under the auspices of international organizations such as the International Association for the Evaluation of Educational Achievement (IEA) and the Organisation for Economic Cooperation and Development (OECD). Unfortunately, in many developing countries there are very few people with the advanced technical training that is needed in order to undertake large-scale scientific studies of the quality of education. It is of no use to address this problem in developing countries by having external experts step in to do the required work because such an approach would not be sustainable, and it may result in expensive data collections designed to meet external agency objectives rather than national policy and planning purposes.

An alternative is a need for long-term capacity building in developing countries which fosters an 'information culture' within ministries of education whereby policy decisions on the quality of education are informed decisions, and not merely inspired guesswork derived from crisis management models.

A move in this direction is exemplified by the undertaking in the 1990s where an extremely successful strategy for capacity building in the area of monitoring and evaluating educational quality was developed by the International Institute for Educational Planning (IIEP) through the establishment of a consortium of ministries of education that encouraged research specialists from many countries to undertake large scale scientific studies of the quality of their education systems by working in a co-operative manner that enabled them to share their

experiences and to learn from each other. The IIEP's role in this initiative has been to co-ordinate the delivery of intensive training programmes focused on the requirements of the research, and also to facilitate unlimited access to relevant technical knowledge so that the consortium can draw on new and emerging world-class research methodologies.

The IIEP's efforts in this area over the past decade have been focused on a capacity building partnership developed with the Southern Africa Consortium for Monitoring Educational Quality (SACMEQ). This Consortium of 15 ministries of education completed two major cross-national studies of the quality of education the first one in 1998 (SACMEC I), the second in 2000 (SACMEQ II) and now preparations for the third (SACMEQ III) are in an advanced stage where piloting in some of the ministries already done. Each of these studies has required a massive effort by large numbers of people in the SACMEQ countries – especially in terms of the logistics of collecting and processing vast amounts of data. For the SACMEQ II study alone, data were collected from 50,000 pupils and 5,000 teachers in 2,500 schools across 14 sub-Saharan countries.

The design of data collections for all three SACMEQ studies will ensure that the participating countries use exactly the same sampling and data collection procedures, and that they employ the world's most powerful measurement methodologies to construct and 'link' measures of student and teacher literacy and numeracy levels. This will permit valid comparisons to be made about the quality of education across countries at single points in time, and across time points for single countries. It is only by using data and methodologies of this kind that ministries of education will be able to respond scientifically to the question: can they only achieve either quality or quantity, or is it possible for them to achieve both? How can developing countries with limited resources both improve the quality of basic education and expand access in their efforts to attain the goals of the Dakar Forum (Ross, 2002).

It is clearly stated in the EFA Global Monitoring Report that the issues of the quality of education and of equity are two inseparable concepts that form part of the rights that all children are entitled to as fundamental principles enshrined in the Charter of the United Nations and the Convention on the Rights of the Child where is declared that:

> Where human rights legislation deals with education, its central concern is equity: the objective of increasing equality in learning outcomes, access and retention. This ambition reflects a belief that all children can develop basic cognitive skills,

> given the right learning environment. That many who go to school fail to develop these skills is due in part to a deficiency in education quality. Recent analyses confirm that poverty, rural residence and gender inequality persist as the strongest inverse correlates of school attendance and performance (UNESCO, 2003a) and that poor instruction is a significant source of this inequality. Quality and equity are inextricably linked. (UNESCO, 2004, p.31)

The main concern for all governments should be effective learning as opposed to the requirement for all governments, to merely create places for enrolments by learners to comply with different human rights conventions and covenants which are of no consequence. In addition to this basic requirement, governments are obliged to also ensure that there is gainful participation by all learners to achieve their potential through the provision of meaningful education that can benefit them through participation in the socioeconomic development of their own countries, not to forget their gainful participation in the global world.

Educational quality can therefore not be divorced from the concept of equity lest some children are left behind for ever. Having a few students perform at higher levels in terms of measurement of cognitive skills in standardised tests, while the majority of students are performing at the lowest level is not a sign of an equitable school system. Hence, the focus of Education for All should also integrate notions of social and distributional equity (Ratsatsi, 2007).

The Quality of Education: The Notion of Quality Embraced for this Study

Reviews of literature on the concept of the quality of education have shown that the issue has first and foremost revolved around the still unresolved issue of the definition of the concept of "quality of education" itself. Only when a compromise settlement has been reached on the operational definition to be used for a particular forum, does the focus shift to other avenues of the contest.

The contest is usually around which of the two, resources devoted to schools or the socioeconomic background, has a stronger effect on student academic achievement? That is whether the effects of the school or teacher quality on academic achievement are less than

those of family background or other characteristics of students that predate entry into school or the other way round.

This study recognises the fact that both the socioeconomic background and school resources do have an influence on students' academic achievement of varying degrees depending on the context in which education is taking place. Therefore when evaluations of the performance of education system are done, these effects have to be factored into the interpretation of the results especially the impact of socioeconomic background on academic achievement.

The SACMEQ approach to making assessments about the performance of school systems in cross-national surveys about the quality of education draws upon this perspective. To put this suggestion into practice, this study employed the following operational definitions of "quality" and "equity". First, "adjusted quality" was defined as the average reading achievement score of a school system after an adjustment for the home circumstances of their student intakes has been made. Second, equity was defined along two dimensions: (a) Social equity – which aims to reduce the impact of social class on student achievement, so that there are no major learning gaps between rich and poor students; and (b) distributional equity – which aims to reduce variances in student achievement – so that there are no major learning gaps between more able and less able students.

Conclusion

Many ministries of education have become increasingly inclined to view the evaluation of the performance of their education systems as a key element in strategies for improving the quality of education delivered in their schools. This trend, coupled with the enormous expenditures in terms of both human and material resources that are devoted to education, has amplified demands for enhanced scrutiny and accountability concerning the quality of education.

However these attempts to work towards improving the quality of their education systems through the process of informed decision-making have necessitated that education planners and decision-makers seek clarification on issues like what is meant by the concept of the "quality of education", whether the concept concerns only academic achievement, or should it also encompasses broader goals related, for example, to the affective domain, social and

life skills, and the capacity to adapt to a changing and uncertain world. Whether to expand access to education at the expense of quality or attempt to achieve both?

They have also to seek clarity on what factors affect the quality of education, which of these factors are amenable to policy intervention (such as textbook design, production, and distribution) and which important factors fall outside the reach of educational planners (such as the home circumstances of children).

They also have to locate the place of "equity" in interpreting the quality of an education system, and how can equity be assessed for students, schools, and regions

Lastly they have to identify mechanisms (examinations, testing programmes, regular inspections, etc.) can be used to inform authorities about educational quality, and what are their advantages and disadvantages and choose appropriate reporting formats of the results from such assessments.

This chapter has attempted to review literature related to the concept of quality along the lines alluded to above.

Chapter 5: The Link between the Socioeconomic Status of Pupils and Achievement: Evidence From Research.

Introduction

Most educational systems (formal and non-formal) require effective assessment systems for monitoring, and measuring learning outcomes, both cognitive and non-cognitive. This is achievable only through the mobilization and utilization of human resource capacities in the field of evaluation, monitoring and assessment. To monitor and assess what is taught, what is learnt, and the conditions of schooling requires appropriate methodologies, trained staff, and relevant quality indicators and instrumentation.

The Link between the Socioeconomic Status of Pupils and Achievement: Evidence From Research: South African Context

The Department of Education (DoE) of South Africa has embraced the need to conduct national assessments to monitor learner performance because assessments provide vital information that can lead to improved learning. The national assessment reports can provide information to all education stakeholders (teachers, principals, parents, education officials, NGOs, private sector, donors, academics and researchers) and thereby support evidence-based decision-making. Monitoring the performance of an education system also helps to hold schools, districts, and provinces accountable, and to "push" for or justify specific policies and practices.

Two of the National Assessment Studies listed in Table 5.1 have been reviewed in this chapter. Also included in this review of literature on the quality of education is the report on Mathematics and Science Achievement at South African Schools in the Trends in International Mathematics and Science Studies (TIMSS) 2003.

Table 5.1 National Assessment Studies in South Africa

Name of Study	Area of focus	Grade level	Year (s) conducted	Design
Grade 9 Longitudinal Study (HSRC)	Language, Maths and Science	9	1996	National sample
Monitoring Learning Achievement DoE/UNESCO/UNICEF	Numeracy, Literacy, Life Skills	4	1999	
Grade 3 Systemic Evaluation	Numeracy, Literacy, Life Skills	3	2001	
Learner Achievement Monitoring Program – Grade 9	Languages, Maths, Science	9	2002	
Grade 6 Systemic Evaluation	Languages, Maths, Science	6	2004	
Western Cape Provincial Assessments	Maths and Languages	6, 8,	2003, 4, 5	All schools, sample of learners

Source: Adapted from a Paper presented at the Gauteng Department of Education Assessment Conference Johannesburg, 6 May 2005

Monitoring Learning Achievement Project (MLA) 1999

The joint UNESCO-UNICEF Monitoring Learning Achievement (MLA) project started in the early 1990's as a result to the Jomtien World Conference on Education for All.
It was supposed to be an evolving project, from primary education (MLA I-Grade 4/5) in the 1990s to include junior secondary level (MLA II -Grade 8) at the beginning of this 21st century

South Africa has participated in the MLA project and the results are covered in the national research report by the Research Institute for Educational Planning (RIEP) and the University of Free State, commissioned by the Department of Education and supported by UNESCO and UNICEF.

(a) Design of the Study

The following instruments were developed for the purpose of data collection: Learner, Literacy, Numeracy and Life Skills Tests/Tasks as well as Learners, Educator and, Principal Questionnaires. The Literacy, Numeracy and Life Skills Tests/Tasks were developed in Harare in 1998 where a number of Southern African countries developed measuring instruments according to guidelines supplied by UNESCO. Piloting of the instruments was done in some schools in Southern African countries while researchers of the Human Sciences Research Council (HSRC) of South Africa helped with their evaluation. The final measuring instruments for each learning area were then compiled and contextualized for the South African environment. The questionnaires were the final products of previous tested questionnaires that were constructed in such a way that the participants could choose from a number of options, rather than to formulate his/her own answer.

(b) Sampling

The sampling procedure involved selecting a sample of 400 schools from all schools in the Republic of South Africa that had Grade 4. Excluded from this sample were schools that had less than 30 learners in Grade 4. The 400 schools to be selected were divided proportionally according to the number of schools in each province. Identified schools, (i.e. those that met the criteria of having Grade 4 with 30 or more learners) were alphabetically arranged by educational region, educational district and name of school. The appropriate number of schools for each province was determined by dividing the total number of identified schools in the province by the number of schools to be surveyed (400 schools).

A Grade 4 class in a school was randomly selected on condition that that the class was not selected according to the abilities of learners. Where there were more than 30 learners in a class, their names were arranged in alphabetical order and every second name was selected until 30 names had been selected. In cases where a class had less than 30 learners, additional learners from other Grade 4 learners in the school could be randomly selected.

(c) Results

Although the survey included tests on Literacy, Numeracy, and Life Skills, in this paper, only results on Literacy exercises are reported. The Literacy task consisted of thirty items whose focus ranged from: word recognition, understanding of detailed content, writing skills, spelling and grammar, retrieving information and providing information. The results of these tasks are illustrated in Table 5.2

Table 5.2: Cumulative results for the Literacy task per province, MLA

Province Cumulative Percentage	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Mpumalanga	Northern Cape	Limpopo	North West	Western cape	Total
75-100	9.7%	2.6%	30.0%	19.8%	1.5%	12.8%	4.9%	7.6%	28.9%	12.8%
50-75	32.6%	15.7%	32.7%	26.2%	8.3%	31.6%	23.7%	25.8%	36.6%	26.8%
25-50	48.3%	64.6%	32.5%	42.2%	58.7%	44.4%	53.8%	52.6%	28.1%	47.14%
0-25	9.1%	17.2%	1.8%	11.9%	31.5%	11.2%	17.6%	14.0%	6.4%	13.27%
MEAN	48.2%	40.2%	60.9%	51.4%	33.2%	52.7%	42.8%	45.2%	60.7%	48.10%

Source: Adapted from Monitoring Learning Achievement (MLA) Project Report (1999)

The majority of Grade 4 learners in the survey (47.1 percent) obtained scores for the literacy task ranging between 25 and 50 per cent (see Table 5.2), while very small proportion of learners demonstrated high levels of competency in this task, with only 12.8 percent of learners obtaining 75 percent or higher. An unacceptably high proportion (about 13 percent) of the learners achieved very low levels of performance (that is scoring less than 25 percent).

On average, learners obtained 48.2 percent in the literacy task - where performance levels vary substantially by province. On the one hand, Western Cape (28.9 percent) and Gauteng (30 percent) have the largest proportion of learners that obtained 75 percent or higher (see Table 5.2), resulting in high average performance scores (60.7 and 60.9 percent, respectively). Mpumalanga, on the other hand, had the poorest performance in the literacy task, with an average score of 33.2 percent. In this province nearly a third of the Grade 4 learners (31.5 percent) obtained scores that were below 25 percent, indicating that Mpumalanga Grade 4 learners have not adequately mastered competency in literacy.

Systemic Evaluation: Foundation Phase (Grade 3) Mainstream 2003

The *Assessment Policy for General Education and Training* (DoE, 2001) makes provision for 'Systemic Evaluations' to be conducted on a nationally representative sample of learners and learning sites to evaluate all aspects of the school system and learning programmes. As a platform from which from which these assessments could be conducted, the Department of Education has formulated a Systemic Evaluation Framework which seeks to answer the following key questions:

- What is the context in which learning and teaching is taking place?
- What is the level of achievement of the learners at key points of the education system (Grades 3, 6 and 9)
- What factors affect learner performance?
- How can the level of achievement be improved?

The first Systemic Evaluation study conducted at the Foundation Phase (Grade 3) laid an important and useful systemic baseline to reflect subsequent progress made by the education system in achieving the transformation goals in respect of access, redress, equity, and quality. In this section, a snapshot of the gains made and the challenges that remain in the quest to ensure that learners meet nationally set standards in reading, listening, writing, numeracy and life skills, is outlined. Although the study was focused on all these three learning areas in this paper and this section in particular, the emphasis will be on learner performance in reading, listening, and writing and the factors that affect their performance in these learning area.

(a) Design of the Study

The study was conducted under the auspices of the Quality Assurance Chief Directorate of the Department of Education - with the Human Sciences Research Council (HSRC), the

Research Institute for Education Planning (RIEP) and the Center for Education Policy Development, Evaluation and Management (CEPD), providing technical support. The design of instruments used in the study as well as the collection and scoring of data was tasked to the provincial departments. International sources assisted by making comments on the instruments and where necessary, the comments were incorporated into the instruments to improve the methodology.

(b) Sampling

A 5 percent national sample of all Grade 3 learners in the country was involved in the study. This sample included all regions and districts in each of the 9 provinces and was stratified to include learners from Urban, Rural and Farm schools. The number of schools to be involved in the study was randomly selected from an alphabetic list of schools having at least 30 learners each after 5 percent of the total number of Grade 3 learners was calculated from each of the districts/regions. From each selected school, a maximum of 40 learners were chosen. In the end, although 54 000 learners were envisaged to participate in the survey, about 51 000 learners actually participated. This comprised about 4.8 percent of what was planned. Table 5.3 represents a breakdown of the sample by province.

Table 5.3: Grade 3 Learners in the Sample and in the Survey

Province	Total Number of Grade 3 Learners	5% of Total	Learners Selected	Number of Learners Who Actually Participated	Percentage
Eastern Cape	213 915	10 696	10 738	9 456	4.4%
Free State	57 699	2 885	2 927	2 889	5.0%
Gauteng	126 321	6 316	6 425	6 220	4.9%
KwaZulu-Natal	245 038	12 252	12 282	11 115	4.5%
Mpumalanga	84 725	4 236	4 279	4 048	4.8%
Northern Cape	16 397	820	939	913	5.6%
Limpopo	164 577	8 229	8 387	8 062	4.9%
North West	88 979	4 449	4 554	4 524	5.1%
Western cape	81 601	4 080	4 104	4 080	5.0%
South Africa	1 079 252	53 963	54 635	51 307	4.8%

Source: Adapted from Systemic Evaluation 2003 -Foundation Phase Mainstream National Report

(c) Results

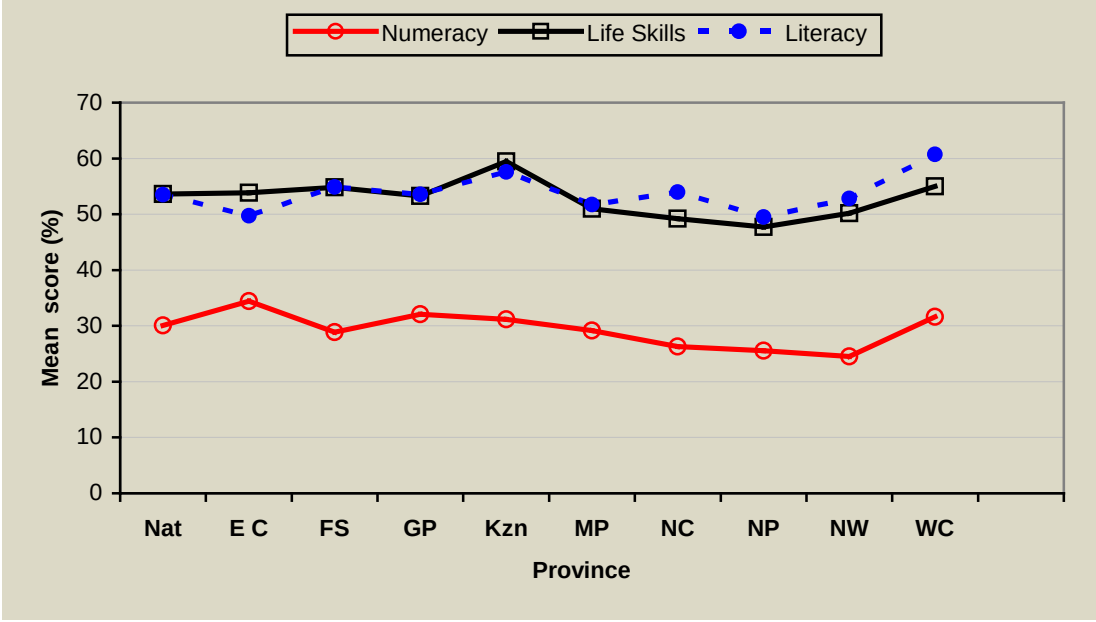
Indicators that displayed a significant influence on learner performance were identified by applying separate regression analyses on the various access, equity, and quality indicators. For this analysis, learner performance was represented by a total score that was obtained by averaging each learner's Life Skills, Listening Comprehension, Literacy and Numeracy scores.

The national average scores achieved by typical Grade 3 learners in the South African education system were as follows:

Life Skills - 54 percent, Literacy - 54 percent (with 68 percent in Listening Comprehension and 39 percent in Reading Comprehension and Writing), and Numeracy - 30 percent.

Figure 5.1 graphically illustrates these results. The results indicate that learners experience the greatest difficulty in Numeracy. While the performance of learners in Literacy is significantly higher, it must be noted that this is due primarily to the higher scores obtained in Listening Comprehension as opposed to the Reading and Writing aspects of Literacy.

Figure 5.1: Systemic Evaluation Grade 3 Results



Source: Adapted from Systemic Evaluation 2003 -Foundation Phase Mainstream National Report

The difference in mean scores across the provinces in these Learning Programmes was small indicating that the scores obtained by learners within the different provinces were similar.

Table 5.4: Regression Coefficients Showing the Strengths of Access, Equity, and Quality Indicators' Influence on Learner Scores

Type of Indicator	Indicator	Coefficient	R-Square
Access	Resources at home	.231	.202
	Ease of access to schools	.162	
	Number of years to complete a phase	.120	
	Utilisation of resource centre at school	.084	
	Early childhood development	.051	
	Pass rates	.032	
	Parents' qualification	.013	
	Educator: Learner Ratio	-.039	
	Repetition rate	-.053	
Equity	Discipline, safety and learning atmosphere	.187	.086
	Private contributions and utilization of funds	.146	
	Functioning of SGBs	.051	
	Assistance from the Department	-.119	
Quality	Facilities	.256	.223
	Satisfaction rates of stakeholders	.171	
	Learning and Teaching materials	.127	
	Teaching practices (learner responses)	.125	
	Attendance rates, contact time, time on task	.075	
	Assessment of learners and feedback procedures	.041	
	Teaching practices(educator responses)	.033	
	School management and leadership	.067	
	Repetition and dropout rates, age by Grade	-.058	
	INSET and SGB training	-.079	
	Record keeping	**-.085**	

Source: Adapted from Systemic Evaluation 2003 -Foundation Phase Mainstream National Report

This report examined the factors that affected the academic performance of learners through the lens of access, equity, and quality indicators. The results of a regression analysis as illustrated in Table 5.4 show that access indicators accounted for 20percent of the variation in learner scores. The resources at home indicator had the strongest positive influence on learner

scores (23percent), followed by ease of access to school. An important aspect of the findings is that Grade repetition did not improve learner scores, but did the opposite implying that repeating a Grade does not necessarily help learners to improve their performance.

In general, equity indicators accounted for approximately 9percent of the differences in learner performance. Of the equity indicators, discipline, safety and learning atmosphere had the largest positive influence on learner scores (19percent).

Quality indicators that had a significant influence on learner scores explained 22percent of the differences in learner performance. The facilities indicator had the strongest influence on learner scores. The indicators that had a negative influence on learner scores included repetition and dropout rates, INSET and SGB training, and record keeping.

The major findings are that there is a strong correlation between learner scores and the quality of the facilities available at schools. The same is true of learning and teaching materials - learners in schools that had greater learning and teaching materials obtained higher scores. There was also a correlation between learner scores and attendance rates, contact time, and time on task.

From the results reported in this section, it is not clear why critical indicators that are known to influence learner performance - for example, assessment of learners and homework - did not display an influence on learner scores. It is vital that specific reasons for these findings be determined in follow-up studies.

Systemic Evaluation: Intermediate phase (Grade 6) 2005

The main aim of this section was to report on the findings of the systemic evaluation study of the Intermediate Phase. This is a follow-up of the systemic evaluation study of the Foundation Phase that was carried out in 2003 which serves as the baseline for future Systemic Evaluation Studies. It is for this reason that the framework that was used for the Foundation Phase study was adapted with some modifications for the Intermediate Phase study. The study was carried out at the last Grade of the Intermediate Phase (Grade 6) in line with the Assessment Policy for General Education and Training requirement that “systemic evaluation be undertaken in three Grades of the education system: Grades, 3, 6, and 9”.

(a) Design of the Study

The initial design of systemic evaluations in South Africa was developed by the DoE with the technical and research knowledge support provided by a consortium that was managed by the Centre for Education Policy Development (CEPD) and included the Human Sciences Research Council (HSRC) and the Research Institute for Education Planning (RIEP) in a process that lead to the Grade 3 survey in 2001.

Key elements of the design included the development of assessment tasks based on the curriculum and to be administered on a representative sample of learners; the development of questionnaires on contextual factors that might impact on teaching and learning and the administration of these to all the role-players, including learners, parents, teachers, principals and district officials; and the analysis of data on learner achievement and the correlation of this data with contextual factors.

Part of the design included a set of educational indicators of inputs, processes and outputs of the education system. Ideally, the design and the instruments should remain the same in order to compare like with like as progress is tracked over time. However, a number of adjustments were found to be necessary – partly because the process is developmental and lessons learnt from one stage should inform the next, and also because the nature and complexity of the learning content is different in different Grades. It became clear after the Grade 3 study that the contextual questionnaires needed to be re-structured to make them more meaningful to the respondents and also to facilitate a clearer analysis of responses. The nature of the curriculum within which the Grade 6 assessments were embedded also necessitated a different assessment design from what had been done at the Grade 3 level. In fact, both studies provide important baseline information about the respective Grade levels studied. However, as far as was practicably possible, great care was taken to retain the original design. The whole process of redesign, instrument development, piloting and main implementation, coding and scoring, and report writing went through several phases, each of which was conducted by the DoE team or contracted to service providers and managed by the DoE.

(b) Sampling

The "desired target population" was defined as all South African schools with Grade 6, as at the tenth-day review of the Education Management Information System (EMIS) data in January 2004. The "excluded population" comprised independent schools, schools that cater

for learners with special educational needs, and mainstream public ordinary schools with fewer than 15 registered Grade 6 learners at the time of sampling. The total "excluded population" consisted of 4 079 schools with 25 169 Grade 6 learners among them.

This resulted in a "defined target population" of 14 190 schools with 1 082 466 Grade 6 learners among them. A stratified random sample of 1 000 schools (approximately 7percent of the "defined target population") was planned. These schools were allocated disproportionately to the nine provinces, using only province as the explicit stratification variable. The achieved sample sizes by province are reflected in Table 5.5.

Table 5.5: Number of Grade 6 Learners in South Africa and Distributions across the Provinces

Province	**Grade 6 learners in South Africa in 2004**		**Grade 6 learners' data collected**		Schools	
	Number	**Percentage**	**Number**	**Weighted percentage**	**Sampled**	Realised
Eastern Cape	219 256	19.8%	5 373	16.6%	181	180
Free State	68 498	6.2%	2 451	5.3%	72	72
Gauteng	140 122	12.7%	4 340	14.3%	112	112
KwaZulu-Natal	253 987	22.9%	5 643	21.7%	169	169
Limpopo	174 649	15.8%	4 952	15.%	138	137
Mpumalanga	74 610	6.7%	3 009	7.5%	90	90
North-West	61 574	5.6%	3 413	8.4%	101	101
Northern Cape	20 751	1.9%	1 678	2.1%	46	46
Western Cape	94 188	8.5%	3 156	8.%	91	91
South Africa	1 107 635	100.0%	34 015	100.0%	1000	998

Source: Adapted from Grade 6 Systemic Evaluation Report December 2005

School weights and learner weights were calculated so as to ensure that results obtained accurately reflected the population of all South African public schools. To keep the number of sampled schools constant, a possible substitute school was also drawn for each sampled school. The purpose was to ensure that if it was found during fieldwork that a sampled school could not be used for a valid reason, a possible replacement school of the same type and in the same area would be available for use instead. The final stage in the sampling process

occurred at school level. Data collectors sampled Grade 6 learners in each of the sampled schools. Where the number of Grade 6 learners present on the first day of data collection was greater than 42 learners, systematic sampling was used to draw a sample of 40 learners. If there were 42 or fewer learners, all of these learners were included in the survey. Sampled learners who did not attend school on the second day of data collection were not replaced. Data from 998 schools, with 34 015 learners among them, could eventually be used.

(c) Results

Indicators pertaining to the learning and teaching context within which Grade 6 learners function are described in terms of the "**AQEE** to improve learning" model. This model comprises several frameworks for each of the four policy goals of **A**ccess, **Q**uality, **E**quity, and **E**fficiency, which in turn are defined and implemented according to specific indicators.

The findings on many of the indicators under the policy goal of Access could be regarded as "problematic" in terms of the scale used in this study. Factors such as school fees, access for learners with special needs, access to information at school, school libraries, and access to textbooks and learning materials need to be addressed.

The quality policy goal factors such as learning and teaching resources were found to be inadequate in many instances, and appropriate steps should be taken to address this situation. Other factors that warrant considered attention relate to: safety at school, the language of learning and teaching, parental involvement, homework practices and educator qualifications.

For the policy goal of Efficiency, the main area of concern is the relatively high repetition rate of learners in the Intermediate Phase. The policy goal of Equity highlighted one area of concern that the majority of schools currently do not have the capacity to accommodate learners with special educational needs.

Learner achievement scores for each learning area were relatively low, with learners obtaining a national mean score of 38 percent in Language (LOLT), 27 percent in Mathematics and 41 percent in Natural Sciences. Across most provinces, similar performance trends were observed, with the highest scores recorded in Natural Sciences, followed by Language (LOLT) and Mathematics. In all three learning areas, the highest mean percentage scores

were recorded in the Western Cape, Gauteng and the Northern Cape. For each learning area, scores were also reported according to the four achievement levels so that the levels at which learners are functioning could be determined.

A significantly higher percentage of learners across all three learning areas are functioning at the "Not Achieved" level (63 percent in Language, 81 percent in Mathematics and 54 percent in Natural Sciences), with a relatively small percentage of learners – 28 percent in Language (LOLT), 12 percent in Mathematics and 31 percent in Natural Sciences – functioning at or above the required Grade 6 level (that is "Achieved" and "Outstanding" combined).

Overall, the study indicates that the majority of Grade 6 learners have not achieved the expected assessment standards, a result that has serious implications for the ability of Grade 7 teachers to cope with a diverse learner population in terms of knowledge and skills' levels; this also has corresponding policy implications for teacher recruitment and teacher education and development.

A number of factors were found to be consistently associated with learner achievement across the three learning areas assessed. In all instances, socioeconomic status (SES) was found to be an important predictor of learner achievement, with learners who reported to be in the lower SES categories obtaining significantly lower scores than those in the higher SES categories did. In addition, greater access to information and resources at school was found to have a high correlation with performance.

Trends in International Mathematics and Science Study (TIMSS 2003)

The Trends in International Mathematics and Science Study (TIMMS) is a project of the International Association for the Evaluation of Educational of Educational Achievement (IEA) – an organisation that conducts cross-national studies. South Africa took part for the third time in a study that was conducted in November 2002 - having earlier participated in 1995 and 1999. The Human Sciences Research Council (HSRC) played the role of coordinating and managing the South African part of the study.

(a) Design of the Study

The study measures learner achievement in mathematics and science as well as learner beliefs and attitudes towards these subjects by developing items for tests in these subjects from the curriculum. A matrix-sampling technique which involves dividing the item pool among a set of 12 learner booklets was used. Information is collected from curriculum experts, learners, their mathematics and science teachers, and their school principals.

(b) Sampling

The study involved about 9000 Grade 8 learners which was a sample representative of Grade 8 learners in South Africa. The sample was stratified by province and the language of teaching and learning (LOLT) in a three stage cluster design which involved:

- selecting a sample of schools from all eligible schools;
- randomly selecting a mathematics and science class from each sampled school; and
- sampling learners within a sampled class in cases where the number of learners in a class is greater than 40.

Testing eventually took place in November 2002 – with 255 schools and 8 952 learners participating.

(c) Results

The TIMSS results were reported in terms of mathematics and science average achievement scores. The scale average over the countries was set at 500 and a standard deviation of 100.

South Africa recorded the lowest performance in both mathematics and science of all the TIMSS participants. The international mathematics average scale score was 467 (SE=0.5) and the South African score was 264 (SE=5.5) while in science the international average scale score was 474 (SE=0.6) and the South African score was 244 (SE=6.7).

There was a large variation in scores in both mathematics and science ranging from mostly very low scores to a few high scores. The distribution of this variation in scores by province is illustrated in Table 5.6.

Table 5.6: Average Mathematics and Science Scale Scores by Province and Human Development Index (HDI) of the Province

Province	Mathematics		Science		Human Development Index (HDI) of Province
	Average Scale Score (SE)	Score Range	Average Scale Score (SE)	Score Range	
Western Cape	389 (25.3)	96-677	386 (28.1)	5-707	.77
Northern Cape	333 (13.5)	70-673	334 (13.9)	5-687	.69
Gauteng	304 (19.1)	64-579	309 (22.9)	11-666	.75
Free State	265 (8.6)	45-630	245 (9.3)	5-622	.68
Mpumalanga	261 (22.4)	24-650	239 (28.5)	5-621	.66
KwaZulu Natal	255 (13.7)	5-690	227 (16.5)	5-684	.62
North West	251 (17.2)	17-572	231 (21.5)	5-571	.64
Eastern Cape	223 (8.3)	5-570	190 (10.00	5-527	.60
Limpopo	217 (5.6)	5-455	191 (6.6)	5-506	.63
National Average	**264 (5.5)**	**5-690**	**244 (6.70**	**5-707**	**.68**

Source: Adapted from Mathematics and Science in South African Schools in TIMSS 2003 Report

Table 5.6 was sorted by the second column of average mathematics achievement scores from the highest to the lowest average score. The average achievement scores in both mathematics and science between and within the provinces showed a great variation. The Western Cape and the Northern Cape were the top performing provinces and the Eastern Cape and Limpopo were the lowest performing provinces in both mathematics and science. This pattern of performance also reflected the rating of the socioeconomic conditions in the provinces as measured by the Human Development Index. The top performing provinces had highest HDI ratings than the poorer performing provinces.

In this chapter, an overview of all important research initiatives identified in the field of the quality of education conducted in the South Africa's Provincial Education Systems have been given.

The key finding in all the studies reviewed in this chapter was that there is a strong link between learner achievement and the socioeconomic background of learners as well as school resources. These findings provide a very complex picture of the strengths and weaknesses of

South Africa's Provincial education systems and offer guidance for decisions relating to their desirable development. This is the information not intended for consumption by researchers and policy makers only, but by all stakeholders involved in education.

The author is concerned by the general lack of adherence to basic technical research requirements when reporting research results in the review of three reports in this thesis, namely the MLA, Systemic Evaluation Grade 3 and Systemic Evaluation Grade 6 with respect to, for example, sampling errors. Except for the TIMSS (2003) report, none of the three other reports reported on sampling errors. This is a serious shortcoming as far as research is concerned as it impact on the technical soundness of the findings of the research.

The Link between the Socioeconomic Status of Pupils and Achievement: Evidence from Research: International Contexts

A great deal of findings from educational research conducted around the issue of pupil achievement concurs on the existence of a relationship between the socioeconomic status of parents and pupil achievement at primary school. However it should be noted that the same kind of research has also established that there are variations as to what accounts more for the difference in pupil achievement scores between the "school" and the socioeconomic environment of the pupil intakes depending on the socioeconomic development of the country. There are therefore two schools of thought with regard to this issue of the relationship between socioeconomic status and pupil achievement.

The Coleman Study and its Critique

Studies conducted prior to 1983 on the effects of schooling concluded that "the effect of school or teacher quality on academic achievement is less than that of family background or other characteristics of the students that predate entry into school" (Heyneman and Loxley 1983, p. 1162). Loosely translated, these studies showed that the traditional input measures of school quality were not strongly related to achievement of students.

This conclusion emanated from a long period of rapid expansion of surveys focussed on academic achievement. The general principle during this period was based on the production function models of economics where the main aims of these surveys were to test whether the quality of schools and teachers was able to explain to a greater extent the variance in academic achievement than could the characteristics over which the school has presumably little or no control – like the student's sex, age and socioeconomic status. The key objective of these surveys was to identify those goods and services that were most likely to raise the levels of learning and then invest in them.

The discovery stemming from the Coleman Report (Coleman et al, 1966) and the Plowden Report (Peaker, 1971), that the amount of variance in academic achievement accounted for by student experience prior to entering school – called "preschool influence" – has substantially exceeded the impact of all the elements of school quality taken together set a tone for subsequent investigations.

The Coleman study was confined to North America, and the Plowden study focused in the United Kingdom Their main conclusions were that goods and services, over which the school

has control, were comparatively weak as determinants of achievement. The only question from a scientific point of view was to what extent, these conclusions could be generalized to other countries – especially to developing countries.

A study carried out by Heyneman and Loxley in 1983 provided an answer to this challenging dilemma. Their study focussed on 29 high and low income countries in Asia, Africa, the Middle East, and Latin America. In contrast to the Coleman Report, these researchers concluded that "school and teacher quality appear to be the predominant influence on student learning around the world; and the poorer the national setting in economic terms, the more powerful this school effect appears to be" (Ratsatsi,2007).

To add to that, Heyneman published an interesting article in the Economics of Education Review in 2004, which looked at the variations in academic achievements seemingly caused by the socioeconomic background status of learners. In Lewis Solomon (1986) he made a reflection on the conclusion he developed from the Coleman Report of 1966 that "the majority of the variance in academic achievement of American students could be explained by knowing the socioeconomic status of the home rather than the quality of the student experience in school".

Heyneman also noted that "children from more educated homes performed significantly better than children from less educated homes in Australia, England, and Hungary, however this assertion failed to hold convincingly true in Thailand, Columbia, and India" (Heyneman, 2004). Taken together, the studies suggested that school quality was a more important predictor of achievement in the poorer countries" (Heyneman, 2004).

To be precise, in low-income countries achievement by low socioeconomic status learners is not significantly different from achievement by the high socioeconomic status learners. Heyneman (1983) used Uganda as an example where achievement by both groups did not show any significant difference and that "there is a weak relationship between socioeconomic background and academic achievement scores on the Primary Leaving Examination" (p.135).

The variations in the trends were not only limited to the context in which comparisons were made (socioeconomic status of the country, but there also seemed to be different trends depending on the subject area that was under investigation as the assertion by Heynemann below indicate:

> In general, socioeconomic status is more powerful in predicting achievement in those subjects over which the school is one of many sources of information and knowledge. This is the case for instance with art, language, and literacy. School quality tends to be more powerful in predicting achievement on those subjects over which the school curriculum is the primary source of theoretical information and experience, such as reading and science. (Heyneman 2004, p. 443)

Equality of Educational Opportunity

In South Africa, there are large disparities in terms of student characteristics between the nine provincial education systems. These differences are also observable within provinces, between schools within provinces, and within schools. Even with efforts to increase inputs in material resources, for example, upgrading of school buildings, provision of appropriately trained teachers, equality of access, review of the curriculum, or any other intervention directed to school systems, equality of educational outcomes of better quality remains an illusive goal.

It has been established through research that, schools on their own cannot bring about the level of environmental change required to assist diverse groups of learners to reach an equal average level of educational achievement. Instead, universal educational research studies concur that the major determinants of educational attainment also include the impact of social situations, motivation and support in the family and the community

Conclusion

This chapter has highlighted the universal finding from research that the socioeconomic status of a student explains the variation in student achievement to a larger extent than the quality of the school's goods and services in developed countries while in developing countries, it is the quality of the school that explains most of the variations in student academic achievement.

The government of South Africa has acknowledged that, social and economic disadvantage in the home affect learners' performance at school, and that this situation needs to be tackled by

providing a good school education that will compensate for home background disadvantages and thereby break the cycle of poverty.

The government's pro-poor school funding, as captured in National Norms and Standards of School Funding (1998) and subsequent policies, was formulated and adopted in recognition of the fact that socioeconomically disadvantaged learners require a deliberately biased level of funding to ensure that resources are available and allocated in ways that maximize quality enhancement for all.

This study describes research that was undertaken to examine the quality and equity of the school systems that are operated and managed by Provincial governments in South Africa.

Chapter 6: Research Methodology

The Construction and Use of Socioeconomic Gradient Lines to Compare School Systems Performance[1]

Introduction

A great deal of educational research conducted over many years in many countries that has shown that children from higher socioeconomic backgrounds (that is, children from "wealthier homes" in terms of access to both human and material resources) do better on tests of educational achievement than children from lower socioeconomic backgrounds. The main reason for this difference is probably the fact that children from wealthier homes are more likely to have experienced home environments that are more supportive, more stimulating, and more rewarding with respect to the development of the kinds of knowledge, skills, values, and attitudes that are required for successful school learning.

However, when researchers compare the performance of whole school systems, the tendency has often been tone of ignoring this universal research finding and instead focusing on the use of what are widely described as "league tables" – in which school systems are ranked according to the average educational achievement scores of their pupils. Comparative judgments about the performance of school systems based on this **"traditional view"** can be very misleading because observed differences in average pupil achievement scores among school systems may simply reflect differences in the socioeconomic backgrounds of pupil intakes, thus missing the point.

A more innovative and fairer approach to comparing the performance of school systems has been illustrated by Ross and Zuze (2004). This **"alternative view"** of school system performance employed **"socioeconomic gradient lines"** to broaden the criteria for judging school system performance.

This alternative view evaluates school system performance according to: (a) "adjusted quality" – measured by the average educational achievement scores of pupils that have been

[1] Copied in Summary form from Kenneth N. Ross June 2007. Traditional and Alternative Views of School System Performance: The Construction and Use of Socioeconomic Gradient Lines

adjusted for their socioeconomic backgrounds, and (b) "equity" – measured by: (i) a "social dimension" - based on the distance between the educational achievement levels of the wealthiest and poorest pupils, and (ii) a "distributional dimension" - based on an examination of the distance between the educational achievement levels of the most able and the least able pupils.

A procedure known as the ordinary least squares (OLS) regression can be used to construct socioeconomic gradient lines. The procedure generates a linear equations (called a regression lines) in which an "independent" predictor variable (X) of socioeconomic background is mapped to a "dependent" criterion variable (Y) of pupil educational achievement (subject to the special constraint that the average socioeconomic background score for pupils across all school systems is transformed to a value of zero).

What is a Regression Line?

There are various approaches that educational researchers use when they analyse data collected on several variables for groups of pupils in order to examine relationships among variables. In the most simple case, where only two variables (X and Y) are available, one of the most popular approaches is to: (a) prepare a "scatter plot" in which each pupil is represented on a graph by a single point defined by his/her (X,Y) coordinates; and then (b) construct an equation of the form $Y = aX + b$ which describes a regression line that is positioned in order to minimize the deviations of the scatter plot points around the line. This equation can be used to "predict" values of Y from values of X.

For example Ross (2007) illustrated this approach by considering a hypothetical school system in which 10 pupils were measured on two variables: socioeconomic background (the X variable) and reading achievement (the Y variable). In Figure 6.1, the 10 pairs of scores have been plotted for the pupils. These points are denoted by small circles.

In this figure, the regression line is shown in association with the "deviations" (d_1 to d_{10}) of the points around the line. The values of a and b in the regression line equation are chosen so as to minimize the squared deviations of the points around the line. That is, the values of a and b are chosen so as to minimize the value of: $d^2_1 + d^2_2 + d^2_3 + \ldots + d^2_{10.}$

The values of a and b provide important information for educational researchers. For example, from the equation of the regression line we know that if the value of X is equal to zero then the value of Y is equal to b units. This value is often called **"the intercept"** of the regression line because it describes the height of the point where the line crosses the vertical Y axis.

The height of the intercept represents an estimate of the reading achievement that we would expect for a pupil from an "average" socioeconomic background (where the value of X = 0).

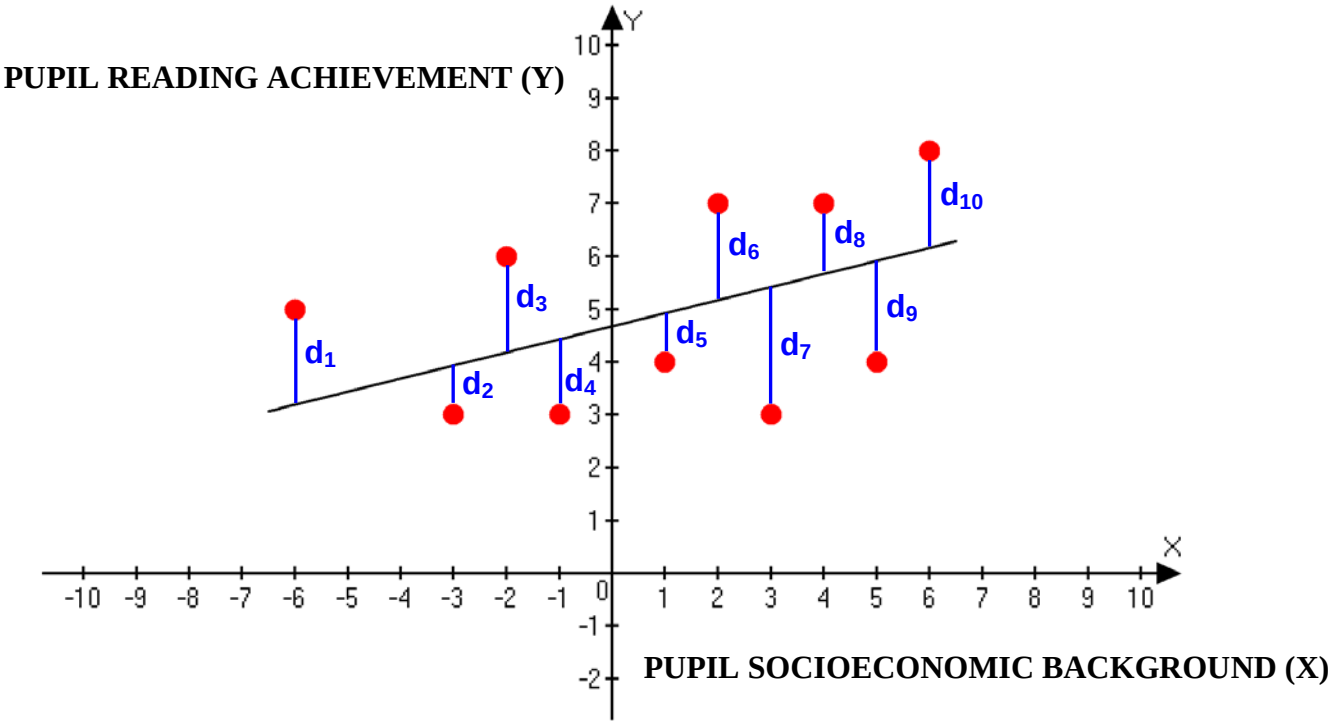


Figure 6.1: Regression Line – Showing Deviations around Line (d values)

Source: Traditional and Alternative Views of School System Performance: The Construction and Use of Socioeconomic Gradient Lines (Ross, 2007)

Also, we know that if we increase the value of X by one unit then the value of Y is increased by a units. That is, a refers to the change in Y caused by a unit increase in X. This value if often called "the slope" of the regression line because it describes the "steepness" or "gradient" of the line.

It is important to note here that some researchers use different statistical estimation methods (such as Hierarchical Linear Modeling or HLM) to construct estimates of a and b. However, the various estimation methods all give similar results if the numbers of students in the school systems are large.

We also know that increasing the value of X by one unit results in the value of Y is increasing by "a" units. That is, "a" refers to the change in Y caused by a unit increase in X. This value is usually referred to as **"the slope"** of the regression line because it describes the steepness or gradient of the line.

The slope provides an estimate of the difference in reading achievement of two pupils whose socioeconomic backgrounds differ by a single measurement unit.

What is a Socioeconomic Gradient Line?

In the same article, Ross (2007) presented some data to describe the socioeconomic background and reading achievement levels of 20 pupils located in two hypothetical school systems: School System A and School System B- in which there are 10 pupils in each school system (Table 6.1) in his attempt to describe the concept of socioeconomic gradient lines.

Table 6.1: Two Hypothetical School Systems: Data for 20 Pupils on Socioeconomic Background and Reading Achievement

System/Pupil	Pupil Characteristics		
	Socioeconomic Background (Raw)	Socioeconomic Background (Transformed)	Reading Achievement
School System A			
1	6	1	5
2	1	-4	4
3	5	0	5
4	4	-1	5
5	0	-5	3
6	3	-2	3
7	1	-4	3
8	3	-2	4
9	5	0	4
10	2	-3	4
Mean	**3.00**	**-2.00**	**4.00**
Standard Deviation	**2.00**	**2.00**	**0.82**
School System B			
11	3	-2	2
12	4	-1	1
13	5	0	4
14	1	-4	0
15	9	4	7
16	12	7	10
17	10	5	8
18	8	3	6
19	6	1	3
20	12	7	9
Mean	**7.00**	**2.00**	**5.00**
Standard Deviation	**3.80**	**3.80**	**3.50**
Overall Mean	**5.00**	**0.00**	**4.50**

Source: Traditional and Alternative Views of School System Performance: The Construction and Use of Socioeconomic Gradient Lines (Ross, 2007)

(a) Socioeconomic Background

To measure socioeconomic backgrounds of the 20 pupils (labeled "Raw" in Table 6.1) across the two school systems an index that ranged from a low value of zero to a high value of 12 was used. Compared to pupils in School System B where the pupils tended to be "wealthier" – with the average pupil having a socioeconomic index score of 7.00, and individual values for pupils ranging from a value of 1 for Pupil 14 to a value of 12 for Pupil 16, pupils in School System A tended to be "poorer" – with the average pupil having a socioeconomic index score of 3.00, and individual values for pupils ranging from a value of zero for Pupil 5 to a value of 6 for Pupil 1.

Combined, the overall mean of the raw socioeconomic index scores for pupils across the two school systems combined was equal to 5.0. In an attempt to construct re-scaled socioeconomic scores (labeled "Transformed" in Table 6.1) which had an overall mean of zero across the two school systems combined, this overall mean value was subtracted from each raw score That is, the average pupil across both school systems had a transformed socioeconomic score of zero.

(b) Reading Achievement

In order to measure the reading achievement levels of the pupils across the two school systems illustrated in Table 6.1, a scale that ranged from a low value of zero to a high value of 10 was used. Pupils in School System tended, on average, to be less able readers – with an average reading achievement of 4.0, and individual values ranging from 3 (for pupils 5, 6, and 7) to 5 (for Pupils 1, 3 and 4) compared to pupils in School System B who tended, on average, to be more able readers (although there was a greater diversity in their reading scores) – with an average reading achievement of 5.0, and individual values ranging from zero (for Pupil 14) to 10 (for Pupil 16).

The transformed pupil socioeconomic scores have been plotted in Figure 6.2 against their corresponding pupil reading achievement scores. The diamonds in Figure 6.2 illustrate the ten pupils in School System A, whereas the circles illustrate the ten pupils in School System B.

(c) Socioeconomic Gradient Lines

To use the information presented in Table 6.1 to provide a more comprehensive graphical method for comparing the performance of education systems, socioeconomic gradient lines are constructed. This is achieved by first summarizing the available information with

regression lines which seek to capture – in a more visual fashion – the underlying trends in the data.

In Figure 6.3 the regression line for each school system has been presented. The equation of the regression line for School System A is Y = 0.3 X + 4.6) and the equation of the regression line for School System B is Y = 0.9 X + 3.2). Linear regression lines have a common characteristic to always pass through points defined by the means of the two variables from which they were derived. The boxes in Figure 6.3 show these points. For School System A coordinates of this point are (-2,4), and for School System B this point has coordinates of (2,5).

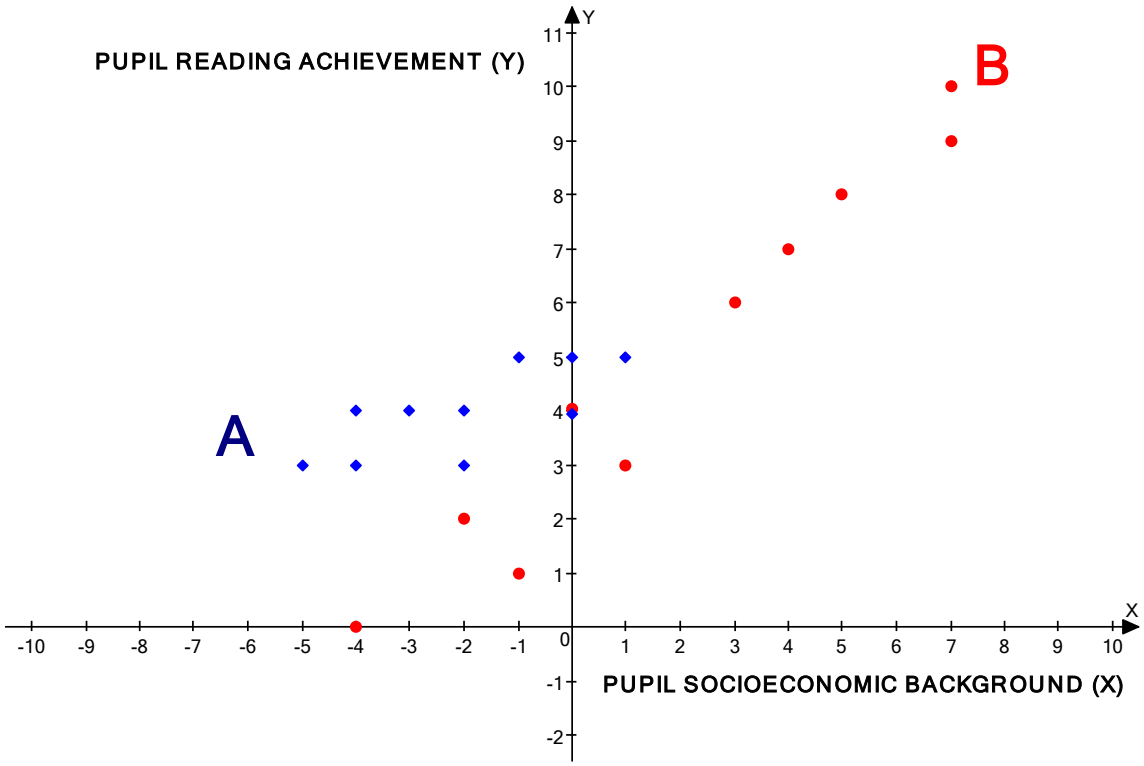


Figure 6.2: Scatterplot for Two Hypothetical School Systems

Source: Traditional and Alternative Views of School System Performance: The Construction and Use of Socioeconomic Gradient Lines (Ross, 2007)

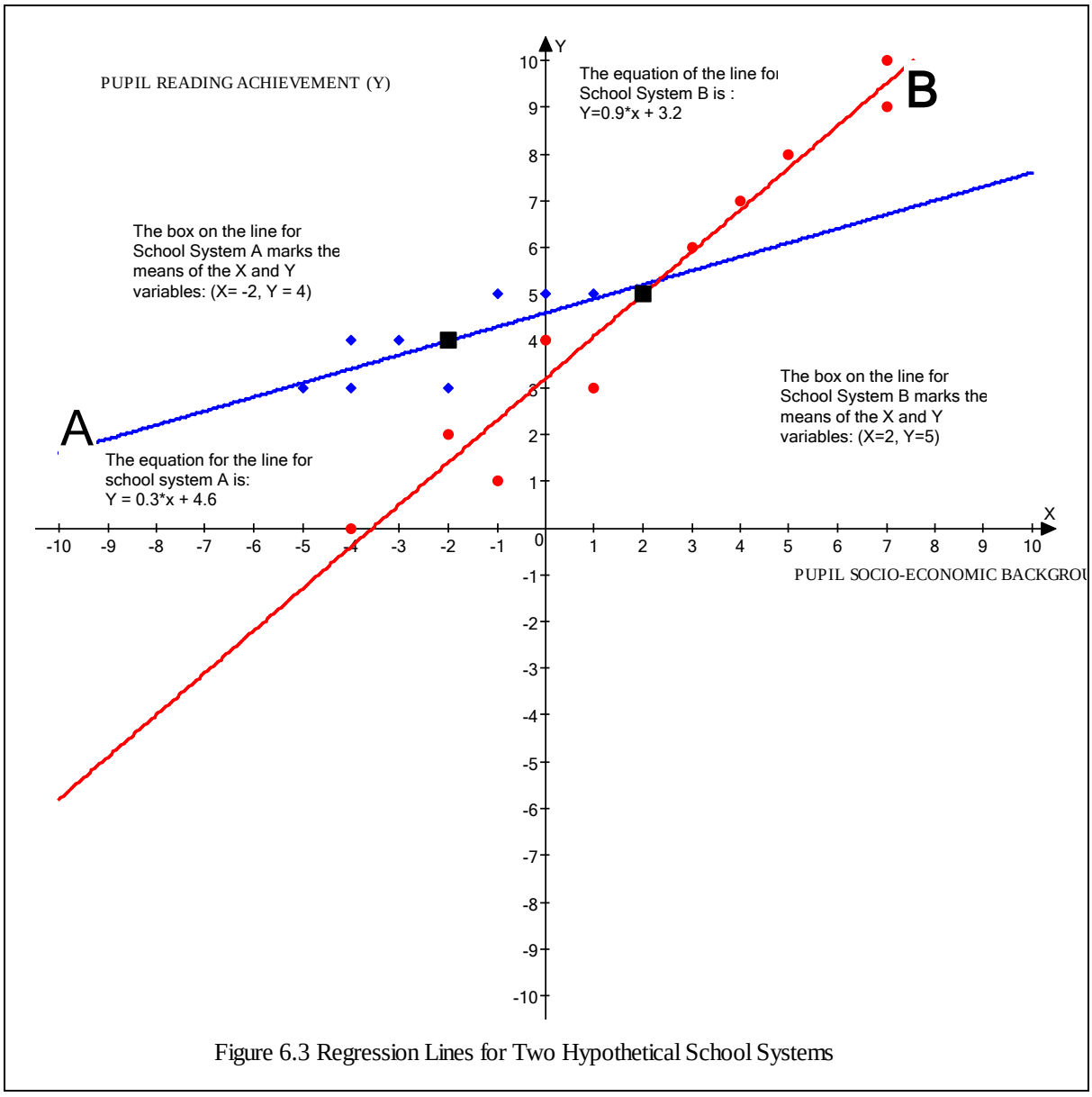


Figure 6.3 Regression Lines for Two Hypothetical School Systems

Source: Traditional and Alternative Views of School System Performance: The Construction and Use of Socioeconomic Gradient Lines (Ross, 2007)

In Figure 6.4 the scatterplots have been removed and replaced by truncated sections of the original regression lines (theoretically, this lines have infinite lengths) . In this figure, the lengths of the socioeconomic gradient have been adjusted based on the "longest line" for the school system where the spread of pupil reading achievement scores (this is usually measured by either the variance or the standard deviation) is greatest.

At a glance, Table 6.1 has clearly shown that School System B had the largest spread of pupil reading achievement scores. A procedure in which a line length for School System B that covered the range of values in the scatter plot was used to move from Figure 6.3 to Figure 6.4. This purpose was achieved by a line of length 15 units . The calculation of the corresponding line length for School System A was made on the basis of the ratio of standard deviations in pupil reading scores between the school systems.

It emerged from the calculations based on values in Table 6.1 that the standard deviation of pupil reading scores in School System B was 4.27 times larger (3.5/0.82) than the standard deviation scores of pupil reading scores in School System A. In order to preserve this ratio, the length of the socioeconomic gradient line was set at 3.51 (15/4.27).

Various ways may be used to determine the relative lengths of the socioeconomic gradient lines. For example, Ross and Zuze (2004) used the same approach described above – with the only difference being that they employed variances instead of standard deviations. In contrast, Wilms (2001) employed a strategy through which the line lengths were limited to the points that indicated the 5^{th} and 95^{th} percentiles for the measure of pupil socioeconomic background.

Using either variances or standard deviations in these calculations offered the benefit that the comparison of line lengths provided information about the level of distributional equity because it provided a graphical display of the distance between the more able and less able students in reading achievement among the schools systems.

How can Socioeconomic Gradient Lines be Interpreted for Policy Purposes?

Once socioeconomic gradient lines have been constructed, the challenge that remains is to address the question as to "How can socioeconomic gradient lines be used to make meaningful comparisons among the performance levels of different school systems?"

To address this question there are five main characteristics of socioeconomic gradient lines that are required.

(a) Height of the Line Centre = Traditional Quality

The height of the centre point of a socioeconomic gradient line above the X axis is represents the average pupil reading score. This measure may be used to make "traditional" or "league table" comparisons of the quality of education delivered by school systems. However, such comparisons fail to take into account the fact that differences among school systems in average pupil achievement can be strongly influenced by the other factors such as the socioeconomic backgrounds of the pupil intakes.

In Figure 6.4 the heights of the line centres (indicated by boxes) for the two school systems showed that, from a "traditional view" of quality, School System B had a "better" level of performance than School System A.

(b) Lateral Position of Line Centre = Average Wealth of Pupils' Homes

The lateral position of the centre of a socioeconomic gradient line represents the average socioeconomic level of the home environments of the pupil intakes. It should be noted that the further a line centre is located to the right hand side of the graph, the wealthier is the pupil intake for the school system.

In Figure 6.4 the lateral position of the line centres indicated that School System B (with an average pupil socioeconomic score of +2 units) tended to have pupils from wealthier socioeconomic backgrounds than School System A (with an average pupil socioeconomic score of -2 units).

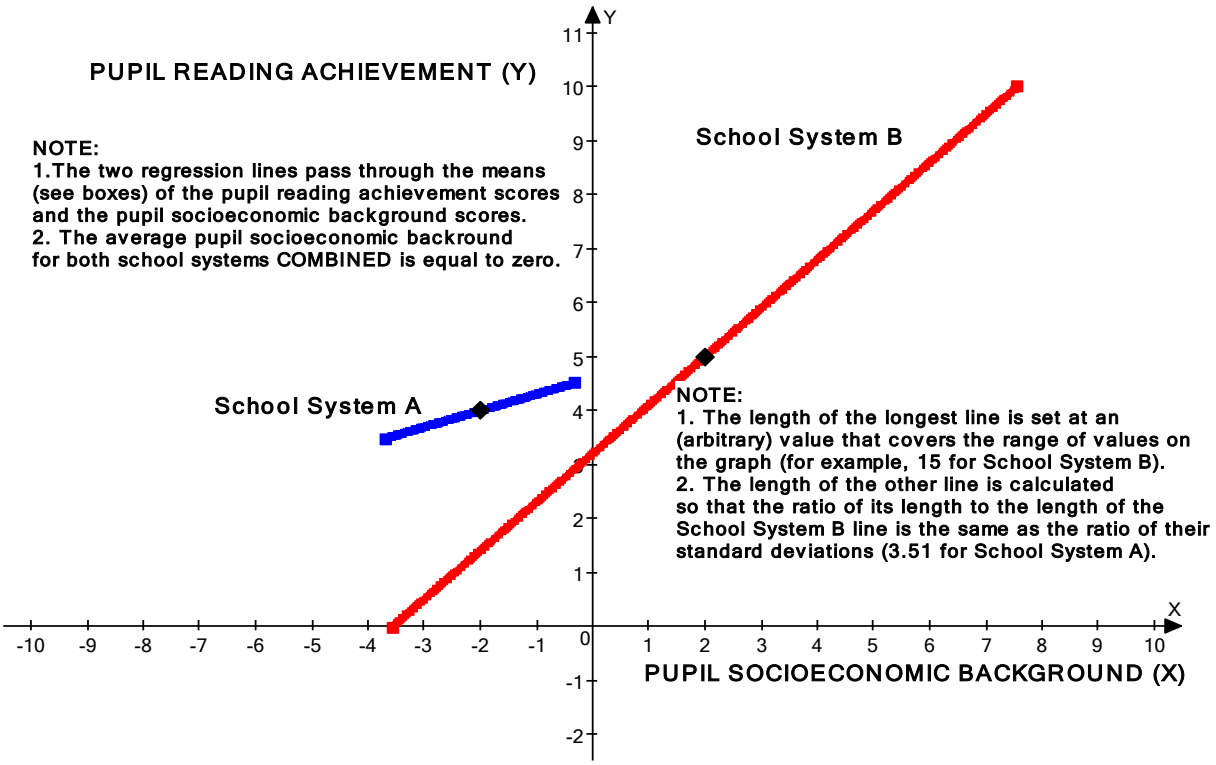


Figure 6.4: Socioeconomic Gradient Lines for Two Hypothetical School Systems

Source: Traditional and Alternative Views of School System Performance: The Construction and Use of Socioeconomic Gradient Lines (Ross, 2007)

(c) Height of the Line Intercept = Adjusted Quality

The height of the intercept of a socioeconomic gradient line for a school system is equal to the values of the Y coordinate where the line (or its extension) crosses the point where X = 0 (the average pupil socioeconomic background for all school systems combined).

The heights of the line intercepts for several school systems may be interpreted as the "expected" (or "predicted") average pupil educational achievement scores for these school systems in the special case where the socioeconomic background of pupil intakes were the same, and were equal to the average for all school systems.

These intercepts provide more meaningful measures of the added values of school systems to the quality of education – as they adjust for the situation of different school systems drawing their pupils from communities with different socioeconomic profiles.

In Figure 6.4 the intercept for School System A had a value of 4.6, which was higher than the value of 3.2 for School System B.

That is, from an "alternative view" of educational quality, School System A could be considered as having a "better" level of pupil reading achievement than School System B with respect to the dimension of "adjusted quality".

(d) Slope of the Line = Social Equity

The slope or gradient of a socioeconomic gradient line represents the number of units of increase in pupil reading score that would be expected to be associated with a one unit change in pupil socioeconomic background scores. The slope of a line may also be thought of as representing the expected difference in reading scores of two pupils whose socioeconomic background scores differ by one unit. Major differences in pupil reading achievement across different socioeconomic groups are indicated by Steeper slopes – with the potential danger that pupils from poorer backgrounds might be left far behind in reading achievement compared with pupils from wealthier backgrounds.

The slope of the socioeconomic gradient line for School System A (0.3) was only one third of the slope of the socioeconomic gradient line for School System B (0.9). This indicated that socioeconomic differences among pupils in School System B were much more likely to be associated with large differences in their reading achievement.

That is, from an "alternative" point of view School System A could be considered to be performing much better than School System B with respect to the dimension of "social equity"

(e) Length of the Line = Distributional Equity

The length of a socioeconomic gradient line represents a measure of diversity in pupils' reading achievement scores - where longer lines indicate greater differences in reading achievement between the more able and less able pupils – with the potential danger that some pupils might succeed in reading while many other pupils are left far behind.

In this hypothetical situation, the length of School System A's socioeconomic gradient line (3.51 units) was less than a quarter of the socioeconomic gradient line for School System B (15 units) – indicating that there was much greater distance between the reading achievements of more able and less able pupils in School System B.

That is, from an "alternative" point of view School System A could be considered to be performing better than School System B with respect to the dimension of "distributional equity".

Which is "the Best School System?"

Based on the discussion above, Ross and Zuze translated their "alternative view" of school system performance into an operational definition based on three benchmarks that needed to be addressed in order to identify high performance school systems.

> ***"High performance school systems should demonstrate:***
>
> ***(i) High adjusted quality – illustrated by high values on an indicator of expected average pupil reading achievement in the special situation where the***

socioeconomic backgrounds of pupil intakes to each school system are equal to the average across all school systems;

(ii) High social equity – illustrated by relatively low values on an indicator of the impact of socioeconomic background on pupil reading achievement; and

(iii) High distributional equity – illustrated by low values on an indicator of the spread between higher and lower levels of pupil reading achievement."

Applying these three benchmarks to School System A and School System B the results in a major difference in the traditional and alternative views of the performance of these school systems.

From a traditional point of view School System B had the best performance because the average reading score of its pupils was higher than the corresponding average for School System A.

In contrast, from an alternative point of view, the reverse was the case. School System A had the best performance as it satisfied all the three benchmark conditions that were specified earlier for "high performance school systems". That is, this school system had relatively better performance in terms of: higher adjusted quality, better social equity, and better distributional equity.

From the above discussion a conclusion can be drawn that the narrow "traditional view" of school system performance based on average pupil reading scores can be very misleading. This approach fails to take account of the socioeconomic characteristics of pupil intakes to school systems, and it completely avoids the issues of social and distributional equity. In contrast the "alternative view" takes due account of the impact that different pupil intakes have on pupil achievement, and also broadens the assessment of school system performance to address the issues of social and distributional equity.

Regression Analysis

The concept of regression was described in the previous section of this thesis and it was applied here to get values that would be used to construct socio-economic gradient lines. A regression analysis was run on the data. The variables used were ZRALOCP – a variable for the pupil reading scores and ZPSES – a variable for the socioeconomic levels of pupils. Data were

weighted at the pweight2 and split by provinces to allow for comparisons between all the 9 provincial school systems. In the regression analysis, the ZPRALOCP was used as the dependent variable while the variable ZPSES was used as the independent variable. The results of the regression analysis are shown in Table 6.2.

Table 6.2: Regression Analysis of ZRALOCP and ZPSES

Province	Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
			B	Std. Error	Beta		
Eastern Cape	1	(Constant)	459.136	3.806		120.624	.000
		ZPSES	37.709	3.848	.396	9.800	.000
Free State	1	(Constant)	453.465	4.590		98.784	.000
		ZPSES	32,946	4.949	.405	6.658	.000
Gauteng	1	(Constant)	531.012	5.891		90.136	.000
		ZPSES	64.679	5.220	.496	12.391	.000
KwaZulu Natal	1	(Constant)	513.245	3.792		135.336	.000
		ZPSES	76.037	3.870	.614	19.648	.000
Limpopo	1	(Constant)	460.650	5.206		88.486	.000
		ZPSES	53.443	5.475	.409	9.761	.000
Mpumalanga	1	(Constant)	435.814	5.680		76.727	.000
		ZPSES	21.111	5.795	.228	3.643	.000
Northern Cape	1	(Constant)	474.780	12.269		38.699	.000
		ZPSES	28.872	14.185	.267	2.035	.000
North West	1	(Constant)	429.297	4.318		99.425	.000
		ZPSES	6.366	5.563	.073	1.144	.000
Western Cape	1	(Constant)	561.997	9.605		58.511	.000
		ZPSES	72.111	8.211	.464	8.782	.000

The “B” value for constant under the unstandardised coefficients is equal to the line height while the “B” value for the ZPSES under the unstandardised coefficients is equal to the line slope. These two values were translated into regression lines using the:

$Y = aX + b$

Where a = slope

and b = line height – when ZPSES is zero.

Equations for all the 9 provinces were therefore represented by regression lines:

ZRALOCP = 37.709(ZPSES) + 459.136 for the Eastern Cape

ZRALOCP = 32.946(ZPSES) + 453.465for the Free State

ZRALOCP = 64.679(ZPSES) + 531.012for the Gauteng

ZRALOCP = 76.037(ZPSES) + 513.245 for the KwaZulu Natal

ZRALOCP = 53.443(ZPSES) + 460.650 for the Limpopo

ZRALOCP = 21.111(ZPSES) + 435.814 for the Mpumalanga

ZRALOCP = 28.872(ZPSES) + 474.780 for the Northern Cape

ZRALOCP = 6.366(ZPSES) + 429.297 for the North West

ZRALOCP = 72.111(ZPSES) + 561.997 for the Western Cape

Descriptive Analysis

After the regression analysis, a descriptive analysis was run of the data using the ZRALOCP variable to obtain the mean pupil reading score and the variance for each of the 9 provincial education systems. Again data were weighted at the pweight2 and split using the provincial system variable. The options mean, maximum, minimum, and variance were selected and the results of such an analysis are presented in Table 6.3. These results were used to determine the line lengths of the socioeconomic gradient lines (from the variance) and the ZPSES of the midpoints of these gradient lines (from the pupil mean reading scores).

To determine the lengths of the socioeconomic gradient lines for each provincial school system, the variance of each was divided by 100. For example for the Eastern Cape a variance of 7450.488 divided by 100 yields a line length of 74.4.

Table 6.3: Descriptive Analysis of ZRALOCP

Province		N	Minimum	Maximum	Mean	Std. Deviation	Variance
Eastern Cape	ZRALOCP	519	122.75	782.00	**444.0688**	86.31621	**7450.488**
	Valid N (listwise)	519					
Free State	ZRALOCP	228	78.21	690.92	**446.1736**	73.44398	**5392.550**
	Valid N (listwise)	228					
Gauteng	ZRALOCP	473	155.56	947.10	**576.4243**	115.37389	**13311.134**
	Valid N (listwise)	473					
KwaZulu Natal	ZRALOCP	639	222.61	877.95	**517.4890**	121.19104	**14687.269**
	Valid N (listwise)	639					
Limpopo	ZRALOCP	477	5.72	1061.84	**436.7308**	109.83610	**12063.970**
	Valid N (listwise	477					
Mpumalanga	ZRALOCP	245	78.21	877.95	**428.1143**	84.49421	**7139.272**
	Valid N (listwise)	245					
Northern Cape	ZRALOCP	56	181.69	744.52	**470.3044**	92.90592	**8631.510**
	Valid N (listwise)	56					
North West	ZRALOCP	243	203.63	634.07	**427.6715**	63.66408	**4053.115**
	Valid N (listwise)	243					
Western Cape	ZRALOCP	283	394.29	877.95	**629.3245**	109.65981	**12025.273**
	Valid N (listwise)	283					

To calculate the ZPSES for the midpoints of the socioeconomic gradient lines, the mean pupil reading scores were substituted into equations for each provincial school system and the value was multiplied by 100. For example for the Western Cape with a mean pupil reading score of 629.3245:

ZRALOCP = 72.111(ZPSES) + 561.997 so that;

ZPSES = (629.3245 – 561.997)/72.111

ZPSES = 0.93367715.

Multiplied by 100, ZPSES= 93.367715= 93.

The same procedures were used for the other provincial school systems and the results for the line lengths of the socioeconomic gradient lines and the ZPSES for the midpoints of the socioeconomic gradient lines were recorded in Table 6.4

Table 6.4: Line length and ZPSES for the Midpoint of the Socioeconomic Gradient Line

Province	Line Length	ZPSES for the Midpoint	$ZPSES_{min}$	$ZPSES_{max}$	$ZRALOCP_{min}$	$ZRALOCP_{max}$
Eastern Cape	74.50488	-39.9565091	-77.208949	-2.7040691	430.0212774	458.1163226
Free State	53.92550	-22.1313665	-49.094116	4.8313835	437.2904524	455.0567476
Gauteng	133.1113	70.21181527	3.65614527	136.76749	533.3767582	619.4718418
KwaZulu Natal	146.8727	5.58149322	-67.854852	79.017838	461.6502064	573.3277936
Limpopo	120.6397	-44.7564695	-105.07632	15.56338	404.4940626	468.9675374
Mpumalanga	71.39272	-36.4724551	-72.168815	-0.7760951	420.5784414	435.6501586
Northern Cape	86.3151	-15.501524	-58.659074	27.656026	457.8439522	482.7648478
North West	40.53115	-25.5340873	-45.799662	-5.2685123	426.3813935	428.9616065
Western Cape	120.2527	93.36647668	33.2401117	153.49284	585.9667769	672.6822231

The values presented in second and third columns of Table 6.4 were further used to compute coordinates of the end points of the socioeconomic gradient lines. Applying the distance and mid-point formulae learnt in Analytic Geometry helped to determine these end points. Each point has coordinates (ZPSES;ZRALOCP). The minimum and maximum end points of the socioeconomic gradient lines have coordinates ($ZPSES_{\mathbf{min}}$;$ZRALOCP_{min}$) and ($ZPSES_{\mathbf{max}}$;$ZRALOCP_{\mathbf{max}}$) respectively. The distance from the midpoint to the minimum point of a straight line is equal to the distance from the midpoint to the maximum point. Hence the total length of the line is twice the distance between the minimum point and the midpoint or twice the distance between the midpoint and the maximum point. The distance between the minimum point and the

midpoint in terms of ZPSES $= \sqrt{(ZPSESmidpo\,\text{int} - ZPSES\,\min)^2}$

Therefore the line length $= 2\sqrt{(ZPSESmidpo\,\text{int} - ZPSES\,\min)^2}$

This implies that half the line length $= \sqrt{(ZPSESmidpo\,\text{int} - ZPSES\,\min)^2}$

But $\sqrt{(X)^2}$ =X

Thus half the line length $= (ZPSESmidpo\,\text{int} - ZPSES\,\min)$ or

$(ZPSESmidpo\,\text{int} - ZPSES\,\min)$ = half the line length

$$-ZPSES\min = \text{half the line length} - ZPSESmidpo\text{int}$$

$$\text{So that } ZPSES\min = ZPSESmidpo\text{int} - \text{half the line length}$$

This means that $ZPSES_{\mathbf{min}}$ was determined by subtracting half the line length from ZPSES for the midpoint.

The same reasoning was applied to determine with the only difference being that $ZPSES_{\mathbf{max}}$ determined by adding half the line length from ZPSES for the midpoint as in this case the formula changes to:

$$\left(ZPSES\max - ZPSESmidpo\text{int}\right) = \text{half the line length}$$

$$\text{So that } ZPSES\max = \text{half the line length} + ZPSESmidpo\text{int}$$

. For example, for Limpopo:

$ZPSES_{\mathbf{min}} = (-44.7564695-120.63970/2) = -105.076319$

$ZPSES_{\mathbf{max}} = (-44.7564695+120.63970/2) = 15.56338$

To calculate coordinates of the independent variable (ZRALOCP), coordinates of the dependent variable were substituted into the regression equations to yield the following results for the Limpopo province:

$ZRALOCP_{min} = 53.443(ZPSES_{\mathbf{min}})/100 + 460.650$

$ZRALOCP_{min} = 53.443(-105.076319)/100 + 460.650$

$= 404.4940626$

$ZRALOCP_{\mathbf{max}} = 53.443(15.56338)/100 + 460.650$

$= 468.9675374$

This procedure was repeated to compute values for the other 8 provincial schools systems. For the purpose of presenting socioeconomic gradient lines on a Cartesian plane that uses the X and Y axes, the values for all the 9 provincial school systems are summarized in Table 6.4 columns 4, 5, 6, and 7.

Conclusion

To construct the socioeconomic gradient lines, a graphics programme called Advanced Grapher (Version 2.06) was used. A suitable scale was predetermined in order to cover the highest and lowest values in both the X and Y axis by determining the minimum and maximum values

overall by referring to Table 6.4 columns 4, 5, 6, and 7. Using these Values, Table 6.5 was completed by opening the Document Properties dialogue box in the Advanced Grapher. The values calculated for each provincial school system were captured into a table in the Advanced Grapher to plot the socioeconomic gradient lines.

Table 6.5: Coordinates for the Socioeconomic Gradient Lines

Interval		**Plot Options**	
Minimum of X	-110	Number of steps	10
Maximum of X	160	Maximum gap	10
Minimum of Y	400		
Maximum of Y	675		
Coefficients		**Logarithmic Scale**	
Coefficient on X-Axis 1		X-Axis	Base 10
Coefficients on Y-Axis 1		Y-Axis	Base 10

Chapter 7: A "Traditional" Analysis of the Quality of Education in South Africa's Provinces: Cross-National and Provincial Comparisons.

Introduction

In this chapter, the performance of the SACMEQ school systems and of provincial school systems in South Africa was compared using the traditional approach to comparing the school systems on the basis of the performance of their pupils – without taking into account the socioeconomic characteristics of their pupils intakes.

Two approaches were used – first the comparisons of pupils' average reading achievement scores, and second, the percentage of pupils who reached a minimum level of reading achievement. The cut-off scores for the minimum reading level were established by SACMEQ researchers on the basis of an examination by committees - consisting of curriculum specialists, researchers and experienced educators from respective member countries - of the reading test items to identify items that were central to their respective school curricula.

These items were referred to as "essential" items and they indicated how many of those items would a pupil be expected to answer correctly in order to (a) **barely survive** during the next year of schooling and (b) to be **guaranteed to succeed** during the next year of schooling. Pupils who answered the first set of items correctly were said to have reached the 'Minimum level of mastery' and those who answered the second set correctly were at the 'Desirable level of mastery'. The calculated cut-off score for the minimum level 487.6 and for the desirable level of mastery it was 592.8 (Moloi and Strauss, 2005). Detailed information about the construction of the SACMEQ reading test was presented in Chapter 2.

The "Traditional view" of school system performance

According to the "traditional view", the performance of school systems is compared by ranking schools systems according to the average scores of their pupils arranged from the highest scoring school system to the lowest. These results are usually displayed in what are widely-known as "league tables". The school system having the highest ranking is considered the best school

system while the school system having the lowest ranking is considered the poorest school system

Cross-National and Provincial Comparisons

It was decided that the traditional comparison of South Africa's Provincial School Systems should be presented in association with data obtained from the countries that participated in the SACMEQ II project.

In Table 7.1 the average pupil reading scores and the percentage of pupils who reached the minimum reading level for all the SACMEQ education systems and South Africa's provincial education systems have been presented. On the basis of these comparisons, judgements about the achievements of learners were made and the best school systems were identified.

The information about the average pupil reading scores and the percentage of pupils who reached a minimum reading level in the pupil reading test for each of the SACMEQ II countries' school systems in Table 7.1 has been sorted according to the values of the first column of figures ranging from the highest average pupil reading score of 629 in South Africa's Western Cape provincial education system down to the lowest average pupil reading score of 428 in South Africa's North West provincial education system.

In the last row of figures in Table 7.1 the average SACMEQ pupil reading score and the average percentage of pupils reaching the minimum reading level in the test have been presented. The results showed that for SACMEQ overall the average pupil reading score was 500 and that 43 percent of the pupils reached the minimum reading level.

The results varied by school system - with Seychelles (582), Kenya and Tanzania (546), Mauritius (536), Swaziland (530), Botswana (521), and Mozambique (517) having average pupil achievement scores (as well as percentages of pupils reaching the minimum reading level) above the overall SACMEQ average. From a "traditional view" of school system performance, these school systems could therefore be judged as SACMEQ's best performing school systems.

Similarly, Malawi (429), Zambia (440), Namibia (449), Zanzibar (478), Uganda (482), and South Africa (492) could be viewed as poorer school systems because their average pupil reading scores were below the SACMEQ average.

The results of Table 7.1 have revealed a familiar reality for the school system of South Africa. Not only were South Africa's pupils outperformed by pupils from most school systems in the region, their performance was also below the average SACMEQ reading achievement. This has necessitated a closer analysis of this performance disaggregating the data by provincial school systems.

In Table 7.1 information about the average pupil reading scores of South Africa's provinces has been shaded in grey. The average national pupil reading score for South Africa was 492 – with only 37 percent of pupils in the sample having reached the minimum reading level in the test. These results varied by provincial school system. The average pupil reading scores ranged from the highest score of 629 in the Western Cape down to the lowest average of 428 in the North West.

There were three provinces that had average pupil reading achievement scores above the overall average: Western Cape (629), Gauteng (576), and KwaZulu Natal (518). Percentages of pupils in these school systems who have reached minimum reading levels were respectively, 86 percent, 68 percent, and 46 percent.

Not only were these values above the average South African values but were also above the SACMEQ average value. From a "traditional view" of school system performance,
these provinces could therefore be judged as South Africa's best performing provincial school systems.

Table 7.1: A Traditional View of School System Performance based on Average Pupil Reading Test Scores and Percentage of Pupils Reaching the minimum Reading Level (SACMEQ II Countries and South African Provinces

School System	Mean Score	% Reaching Minimum Reading Level
SA: Western Cape	**629**	86
Seychelles	**582**	71
SA: Gauteng	**576**	68
Kenya	**546**	68
Tanzania	**546**	68
Mauritius	**536**	56
Swaziland	**530**	64
Botswana	**521**	56
SA: KwaZulu Natal	**518**	46
Mozambique	**517**	62
South Africa	492	37
Uganda	482	35
Zanzibar	478	37
SA: Northern Cape	470	32
Lesotho	451	16
Namibia	449	18
SA: Free State	446	18
SA: Eastern Cape	444	20
Zambia	440	21
SA: Limpopo	437	16
Malawi	429	09
SA: Mpumalanga	428	14
SA: North West	428	11
SACMEQ	**500**	**43**

Conclusion

The “traditional view” of school system performance described above followed the average pupil reading scores that were presented in the first column of figures. Therefore according to the traditional view, the two best school systems were Western Cape and Gauteng - with average pupil reading scores of 629 and 576, respectively. And the two poorest performing school systems from the traditional view were North West and Mpumalanga with average pupil reading scores of 427.7 and 428.1, respectively.

Chapter 8: An "Alternative" Analysis of the Quality of Education in South Africa's Provinces: Which is the Best School System?

Introduction

In this chapter a set of socioeconomic gradient lines have been generated for South Africa's provincial education systems, and these were then used to make comparisons of performance of these school systems. On the basis of these comparisons, judgements about the achievements of learners were made and "the best" school systems were identified.

The data used to generate the socioeconomic gradient lines included measures of the socioeconomic level and reading achievement of Grade 6 learners in South Africa during 2000. The socioeconomic gradient lines provided graphical representations of the relationships between the reading achievement scores of pupils and the socioeconomic levels of their homes.

Alternative Views of Provincial School Systems Performance

In Table 8.1, the statistical information used to construct socioeconomic gradient lines for each of South Africa's provinces has been presented for each province. The entries in the table were sorted according to the values of the first column of figures. These ranged from the highest average Grade 6 pupil reading score of 562 in the Western Cape down to the lowest average of 429 in North West. The results in the table showed that the socioeconomic gradient lines varied across the school systems in terms of lateral positions, height, slope, and length.

The values used for the construction of the socioeconomic gradient lines were derived from ordinary least squares (OLS) calculations – which provided results that were almost similar to those obtained by using an alternative technique called Hierarchical Linear Modelling (HLM). The reason preference was given to (OLS) over (HLM) was that The OLS lines had the desirable characteristic of passing through the averages of the pupil reading scores and socioeconomic index scores. This feature added an interesting supplementary piece of information to the interpretation of the graphical representation.

Table 8.1: Alternative Views of School System Performance

School System	"Alternative" view		
	Adjusted Quality	**Social Equity**	**Distributional Equity**
Western Cape	**562**	72	120
Gauteng	**531**	65	133
KwaZulu Natal	**513**	76	147
Northern Cape	**475**	**29**	**86**
Limpopo	461	53	121
Eastern Cape	459	**38**	**75**
Free State	454	**33**	**54**
Mpumalanga	436	**21**	**71**
North West	429	**6**	**41**
Average	**480**	**44**	**94**

The first row of the table has represented the results for Western Cape. In this province, the height of the intercept ("adjusted quality') was 562, the slope of the line ("social equity") was 72, and the length of the line ("distributional equity" was 120. By using this information it was possible to construct the equation of the socioeconomic gradient line for Western Cape: Y = 72X + 562. In the same way, equations for the socioeconomic gradient lines for the other provinces were constructed.

The socioeconomic gradient line for each province has been presented in graphical form in Figure 8.1. The vertical (Y) axis represents pupil reading scores and the horizontal (X) axis represents the pupil socioeconomic background. The meaning of each of these features of the socioeconomic gradient lines was described in the previous chapter.

The main features of each of these lines and their implications for policy have been discussed in Chapter 6 of this study. However, before commencing this discussion it is useful to point out some of the general patterns that emerge from an initial general impression of Figure 8.1.

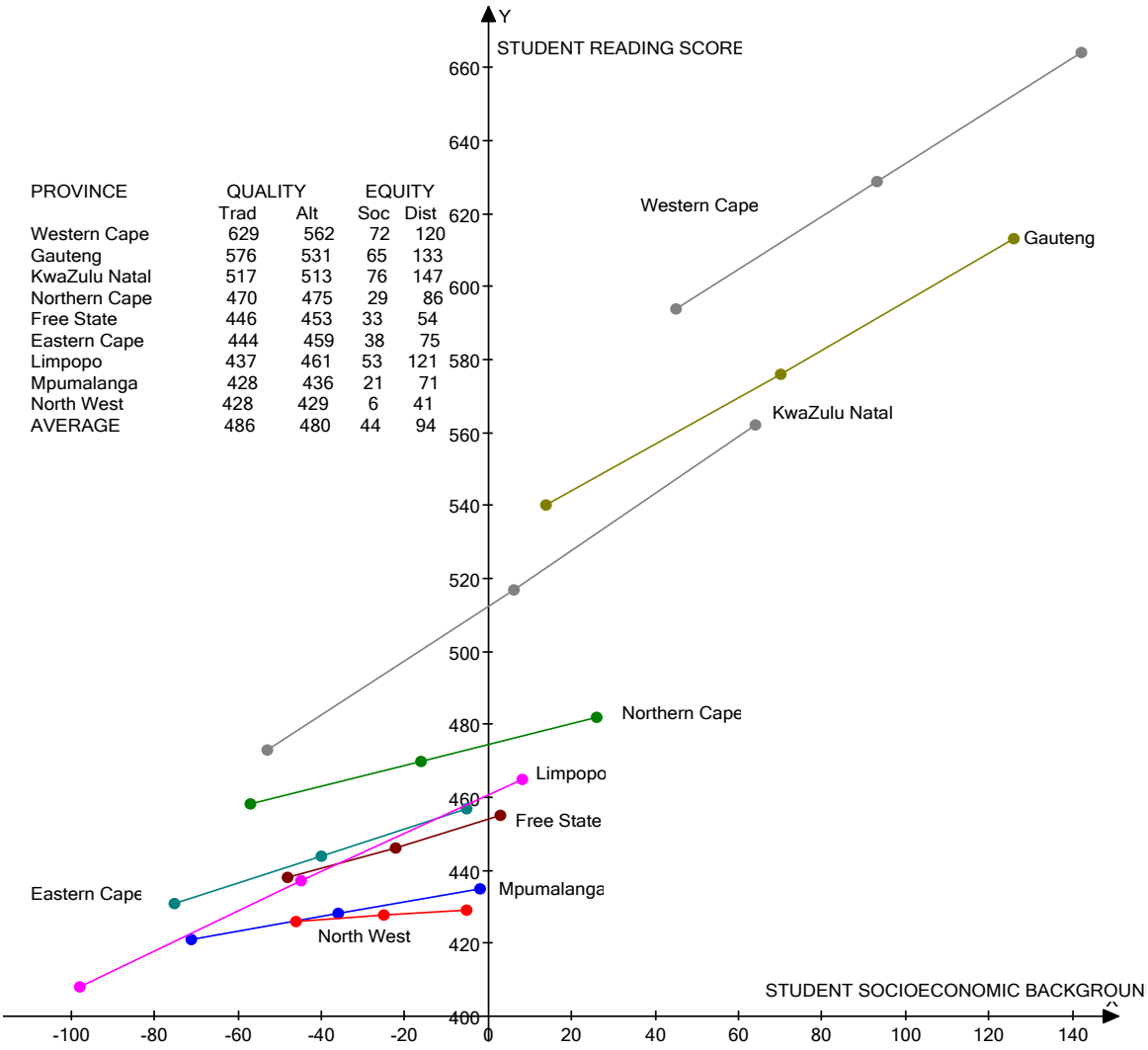


Figure 8.1: Socioeconomic Gradient Lines for Provincial School Systems in South Africa

First, the lines for Western Cape, Gauteng and KwaZulu-Natal tended to be (i) much longer, (ii) generally steeper, and (iii) placed further to the right hand side of the figure - in comparison to the lines for the other six provinces.

Second, the "height" of the centre of the lines for Western Cape, Gauteng, and KwaZulu Natal was greater that the intercept where these lines (or their extensions) crossed the vertical Y-axis. In contrast, the height of the centre of the lines was less than the height of the intercept for the other six provinces. These key features of the nine socioeconomic gradient lines and their

differences across the provinces have major implications for the way in which we make judgements about school system performance.

In the analysis, socioeconomic background scores for Grade 6 learners were transformed so that the mean for all provincial school systems combined was zero and the standard deviation was 100. It must be recalled that this transformation (or "centring") of the socioeconomic variable meant that the value of zero for this variable was equal to the socioeconomic background level of the average Grade 6 South African pupil.

The pupil reading test scores were transformed to an overall SACMEQ mean of 500 and a standard deviation of 100

(a) The Socioeconomic Level of the Pupils

The lateral position of the centre of the socioeconomic gradient lines in Figure 8.1 illustrated the average socioeconomic level of pupils for the school systems. The line centres for the Western Cape and Gauteng provinces were placed far to the right, illustrating that these provinces were clearly the "richest" in terms of the socioeconomic backgrounds of the pupil intakes. The line centre for KwaZulu Natal was slightly to the right of the vertical axis – which indicated that this province was a little above the national average in terms of socioeconomic background of pupils. All other provinces fell below the national average for pupil socioeconomic background

(b) Adjusted Quality

The height of the intercept of a socioeconomic gradient line is equal to the value of the Y coordinate where the line (or its extension) crosses the Y axis. Because the socioeconomic level index is centred, the intercept for each province described the expected average pupil reading score for the special situation where the home environments of pupil intakes for each school system had a socioeconomic level equal to the average for all provinces combined.

This “adjusted quality” measure provided a fairer and more meaningful alternative approach to comparing the contributions of school systems to the quality of education because it adjusted for the situation of different school systems drawing their pupils from societies with different socioeconomic profiles. The average height of the line intercepts across all provincial school systems was 480 points. The heights of the line intercepts ranged from a low of 429 points for North West to a high of 562 points for Western Cape.

In six provinces (Northern Cape, Free State, Eastern Cape, Limpopo, Mpumalanga, North West), the “adjusted quality” scores defined by the intercepts in the second column of figures in Table 7.2 were slightly better than the traditional quality scores defined by the average pupil reading scores. That is, if the socioeconomic background of the pupil intake to each of these provinces was equal to the national average, then we would expect that the average pupil reading scores for the six provinces would be higher than the simple average pupil reading scores.

Another way of interpreting this result is to say that the traditional view of the educational quality (as measured by the average pupil reading achievement) in these provinces did not take into consideration the fact that these provinces were dealing with pupils from much poorer socioeconomic backgrounds.

In the KwaZulu Natal province, the level of adjusted quality was quite similar to the traditional level of quality. That is, the average pupil reading achievement in this province was more or less the same as one would expect if the socioeconomic background of the pupil intake to the province was exactly the same as the national average. This occurred because the average socioeconomic level of the pupil intake to this school system was almost the same as the average for South Africa overall.

The results for the Western Cape and Gauteng provinces were quite different from all other provinces. In these two provinces the level of adjusted quality fell far below the level of traditional quality. For example, in Gauteng the expected pupil reading level for a pupil intake with socioeconomic background the same as the national average was 531 - which was 45 reading points below the average pupil reading achievement score. The result for Western Cape

was even more dramatic with an adjusted quality level of 562 - which was 67 reading points below the average pupil reading achievement score.

It should be noted here that, while the adjusted quality scores for KwaZulu Natal, Gauteng, and Western Cape were below their average pupil achievement scores, the adjusted quality scores were still above the national average adjusted quality score of 480. That is, even though the expected average reading scores for pupils in these provinces dropped dramatically after the socioeconomic background was taken into account, the adjusted quality scores still remained above the national average adjusted quality.

In Table 8.1, the adjusted quality scores that were very near to or higher than the national average of 480 have been presented in bold. The school systems in these provinces (Western Cape, Gauteng, KwaZulu Natal, and Northern Cape) were "the best" in terms of adjusted quality because they were doing as well, or better, than the national average adjusted quality.

(c) Social Equity

In the third column of figures in Table 8.1, the slopes of the socioeconomic gradient lines have been presented in a form that is multiplied by 100. This format was selected because the figures then represented the increase in pupil reading scores that would be expected to occur for a one standard deviation unit change (100 points) in pupil socioeconomic background.

The slopes of the lines provided measures of the impact of pupil socioeconomic level on pupil reading achievement. Steeper slopes indicated major differences in average pupil reading achievement across different socioeconomic groups - with the danger that pupils from poorer backgrounds might be left far behind in reading achievement compared with pupils from wealthier backgrounds.

The figures presented in Table 8.1 showed that KwaZulu Natal province had the steepest slope at 76, followed by Western Cape with 72, and then Gauteng with 65. These slopes were well above the average value of 44 for all nine provincial school systems.

North West provincial school system had by far the lowest value for the slope at 6 followed by the Mpumalanga and Northern Cape provincial school systems with slopes of 21 and 29, respectively. These three provinces were far below the average value for all nine provincial school systems.

The five school systems with the "best" levels of social equity have been identified in bold in the third column of figures in Table 7.2. These school systems (Eastern Cape, Free State, Mpumalanga, Northern Cape, and North West) all had average slopes that were below the national average of 44.

Much poorer levels of social equity were associated with Gauteng, KwaZulu Natal, Limpopo, and Western Cape-where the slopes ranged from 55 to very high values of 72 and 76 from Western Cape and KwaZulu Natal, respectively.

(d) Distributional Equity.

The lengths of socioeconomic gradient lines represented the degree of distributional equity in pupil reading achievement. These values were scaled to be equal to the variance (divided by 100) of the pupil reading scores. The average line lengths for all school systems was 94 and the school system line lengths ranged form a low of 41 for North West to a high of 147 for KwaZulu Natal.

The five school systems with the "best" levels of distributional equity have been identified in bold in the fourth column of figures in Table 8.1. The school systems (Eastern Cape, Free State, Mpumalanga, Northern Cape, and North West) all had line lengths that were below the national average of 94.

Much lower levels of distributional equity were associated with Gauteng, KwaZulu Natal, Limpopo, and Western Cape - where the line lengths ranged from 120 for Western Cape to 147 for KwaZulu Natal.

Which is the Best School System?

The "alternative view" of school system performance was defined in the previous chapter. This definition specified that: " High performance school systems should demonstrate:

(i) ***High adjusted quality - illustrated by high values on an indicator of expected average pupil reading achievement in the special situation where the socioeconomic background of pupil intakes are equal to the average across all school systems;***

and

(ii) High social equity - illustrated by low values on an indicator of the impact of pupil socioeconomic background on reading achievement;

and

(iii) High distributional equity - illustrated by low values on an indicator of the spread between higher and lower levels of pupil reading achievement."

The operational definition of the alternative view of school system performance was combined with research results in Table 8.1. This resulted in a high performance school system being defined as one that satisfied all three of the following benchmarks.

High adjusted quality - with line heights (intercepts) being near to or greater than the national average of 480.

High social equity - with line slopes being less steep that the national average of 44.

High distributional equity - with line lengths being less than the national average of 94.

Conclusion

The figures in bold in the final three columns of Table 8.1 designated benchmarks that were satisfied by the school systems.

Only one school system (Northern Cape) satisfied all three benchmarks for high performance. This school system was ranked as only "medium" performance according to the traditional view. The three best school systems from the traditional view (Gauteng, KwaZulu Natal, and Western Cape) were those at the top of Table 8.1 because they had the highest average pupil reading achievement. However none of these school systems satisfied all three of the high performance

benchmarks under the alternative view – because none of them satisfied the requirements associated with social and distributional equity.

Chapter 9: Conclusion and Recommendations

Introduction

This thesis commenced with a brief background discussion about South Africa and the context under which its education system developed and operated. This discussion showed that the South African education system was undergoing a process of transformation in a very difficult financial environment. As a result the government has been required to focus and prioritise its reform program. The two main challenges now facing the government are concerned with access to education and the quality of education.

(a) Access to Education

The "access to education" challenge had three important components: school fees, school feeding programmes, and distance to school.

School fees are locally determined, but not affordable for some unemployed parents who in many instances have more that one child in school. The government has to either make provision, or to specify certain disadvantaged schools that will receive allocations of R692 per learner to fully cover student fees from 2007.

School feeding progammes have the capacity to minimize the situation whereby pupils come to school without having had at least breakfast to sustain them. The government has established a system whereby one balanced meal is provided each day for pupils who would otherwise be attending school on an empty stomach.

The distance from home to school has been a major concern – especially in rural areas where the majority of pupils in travel long distances to school. The government conducted a feasibility study on the introduction of a National Student Transport Assistance Scheme to help learners who travel more that 5km to school.

(b) Material and Human Resources

The effectiveness of South Africa's education system has often been straddled by the limited availability of human and material resources, and these constraints have had an impact on the quality of what was taught and learnt.

Although textbooks and other learning materials were provided free of charge to schools, strategies to recover and re-use these textbooks have sometimes proved to be very illusive, and in many instances led to conflicts between parents and school governing bodies - especially when sanctions were imposed on parents whose children fail to return textbooks. An efficient textbook recovery system could help the Department of Education to save on replacement costs, thereby using the savings to finance other projects geared towards the improvement of quality.

The Department has been faced with an almost irreversible loss of qualified and experienced and teachers in key subject areas due to two main reasons: (a) illness and deaths related to HIV and AIDS, and (b) the movement of teachers to other sectors for attractive and competitive benefits. The Department of Education has responded by initiating teacher recruitment programmes that offer all-inclusive bursaries linked with teaching degrees at university in Mathematics, Science, Technology, and African languages. In addition, practicing teachers have been given incentives to remain in the profession through the provision of better pay progression schemes and promotions to senior teacher and master teacher levels.

The Conduct of the Study

(a) Objectives of the study

The main objectives of the study were to examine the performances of South Africa's provincial school systems by using two approaches to determine "the best" school system. First – the "traditional" approach was used, and second – the "alternative" approach was used. Based on the perceived fairness and meaningfulness of each of the approaches, a comparison was made between the two approaches.

(b) Source of the Data

The study used data from the SACMEQ II Project Data Archives. An outline of how the SACMEQ II project was conducted was given in Chapter 2. For South Africa, data were collected during September 2000. The sample comprised 3163 Grade 6 pupils from 169 schools. Probability proportional to size (PPS) sampling was used to select sample schools within provinces. This was followed by the selection of a simple random sample of 20 pupils within each selected school. Questionnaires were given to pupils, teachers and school heads to complete. In addition to this, pupils were given reading and mathematics tests.

(c) Research Methodology

Regression and descriptive analyses were conducted on the data and the results were interpreted. Two approaches to judging school system performance ("traditional" and "alternative") were applied to the data. The results of these analyses were used to identify "the best school system".

Review of Literature

(a) The Concept of the Quality of Education

Ministries of Education have become increasingly inclined to view the evaluation of the performance of their education systems as a key element in strategies for improving the quality of education delivered by schools.

However, systemic attempts to improve the quality of education require that educational planners and decision-makers have reached an agreement on an operational definition of the concept of the "quality of education". For example, should this concept concern only average academic achievement presented for school in the form of "league tables", or should it also take into account that some school systems face greater challenges than others because of the nature of their pupil intakes.

In addition, education planners and decision-makers need to seek clarity on what factors affect the quality of education, which of these factors are amenable to policy intervention (such as

textbook design, production, and distribution), and which important factors fall outside the reach of educational policy (such as the home circumstances of children).

The place of "equity" in interpreting the quality of an education system also needs to be acknowledged. Equity can be concerned with many dimensions. However, two of the most important are concerned with (a) ensuring that achievement levels between socioeconomic groups are not exceedingly large, and (b) ensuring that poorer students are not left far behind better students.

(b) The Relationship between the Quality of School Resources, Pupils' Socio-Economic Backgrounds and Pupils' Academic Achievement

In an attempt to locate the study within a relevant practical context, a review has been presented of some important research initiatives in the field of the quality of education conducted in South Africa's Provincial Education Systems.

Key findings in all the studies reviewed pointed to the existence of a strong linkage between learner achievement and (i) the socio-economic background of learners and (ii) school resources. These findings provided a picture of the strengths and weaknesses of South Africa's Provincial education systems and offered guidance for decisions relating to their desirable management.

It also emerged from these studies that the government of South Africa had acknowledged that social and economic disadvantage in the home affect learners' performance at school, and that this situation needed to be tackled by providing a good school education that would compensate for home background disadvantages and thereby break the cycle of poverty.

Main Research Findings

(a) The Traditional View of School System Performance: Which is "the best" School System?

A descriptive analysis of the results of the pupil reading test was done to obtain the average pupil reading scores for each provincial school system. The average pupil reading scores were tabulated and sorted from the highest to the lowest score.

From the table, "the best" school systems were identified as the school systems with the highest average pupil reading scores - in this case it was the Western Cape followed by Gauteng and KwaZulu Natal. This criterion of judging the performance of a school system is referred to as the "traditional view" of school system performance.

This is a narrow approach based on average achievement scores only and can be very misleading. The approach fails to take into account the socio-economic characteristics of the pupil intake to schools and completely avoids the issue of equity.

(b) The Alternative View of School System Performance: Which is "the best" School System?

Data collected for the SACMEQ II project on which this study is based included variables that were used to construct a composite index for the socio-economic status of the pupils. The concept of linear regression was employed to construct what is referred to as the socio-economic gradient lines for each school system by incorporating the average pupil reading scores as dependent variables and the pupil's socio-economic status scores as the independent variables in linear regression equations.

The resulting graphical representations of the socio-economic gradient lines and the SACMEQ researchers' proposed operational definition of a best performing school system were used to determine the best school system. This approach is referred to as the "alternative view" of school system performance.

For a school system to be considered "the best" under the "alternative view", it has to meet all the three conditions of (a) high adjusted quality, (b) high social equity, and (c) high distributional equity. Unfortunately, from the analysis, none of the provincial school systems met all the three conditions. However, the Northern Cape just fell short of meeting all the three conditions – where it fell short of meeting the condition for high adjusted quality. The Northern Cape was thus considered a better school system relative to the other 8 provincial school systems.

The "alternative view" takes due account of socio-economic differences in pupil intakes and also extends the assessment of the school system background to cover the important areas of social and distributional equity.

Recommendations

It emerged from the review of literature as well as the findings of this study that a relatively strong relationship exists between pupils' reading performance and the socioeconomic levels of the pupils' home environments.

Differences in the socioeconomic levels of the pupils' home environments were shown to explain the differences in the pupils' reading scores and thus achievement between the provincial school systems and between the schools within the provincial school systems. This is despite the allocation of resources through the Equitable Share Formula for funding to the provincial school systems.

The challenge is in designing strategies to reduce and ultimately level the gap that exists between the socioeconomic statuses of the pupils' homes. This is a challenge not entirely within the scope of the Department of Education as its mandate is limited to the school.

Based on evidence that emerged from the review of the literature and the findings of the study, the following recommendations are made:

- that, in addition to home intervention strategies within the mandates of partners in the social cluster of government to reduce poverty levels and thus impact on the achievement levels of learners, the government formulate and roll out a Public Learning Resources Programme through

the establishment of public learning resource centres accessible to all pupils – especially in formerly disadvantaged areas like the Presidential Nodal Areas.

- that, in view of the fact that one of the limitations of this study has been identified as the lack of a deeper analysis into the areas of the reading test where the pupils faired best or the worst and the levels of skills they needed to have to respond correctly to the test items, it was not possible to recommend strategies to address the poor performance levels of learners in the SACMEQ II project. This thesis recommends therefore that the National Department of Education or the Provincial Departments of Education conduct further analyses of the performance of pupils in the reading tests to identify the levels of skills required to respond to the test where the pupils had the most difficulties and then design relevant intervention strategies. Those areas of the test where the pupils faired better need also need to be identified and the pupils behaviours that enabled them to respond so well need to be reinforced so as to improve the quality of education in all the school systems.

- that since South Africa did not take part in the SACMEQ I project, thus denying South Africa data for making comparisons to track progress made on learner performance and the fact that South Africa is participating in the SACMEQ II project, the socioeconomic gradient lines need to be recalculated using the new SACMEQ III project data when it becomes available. This will enable South Africa to empirically test whether - (a) there has been any improvement in quality in terms of pupils' reading scores after allowing for differences in the socioeconomic levels of the pupils' intakes, (b) there has been any improvement in equity with respect to the two dimensions of distributional and social equity.

Comparisons will also be made possible with respect to the proportions of pupils who have reached the minimum required reading levels for the test items in the pupils reading test.

- that, in view of the fact that no basic technical research requirements were adhered to in the three reports reviewed for the purpose of this thesis, the Department of Education makes it mandatory for any research conducted by or on behalf of the Department of Education complies with the basic requirements of research both in its design and reporting of the findings.

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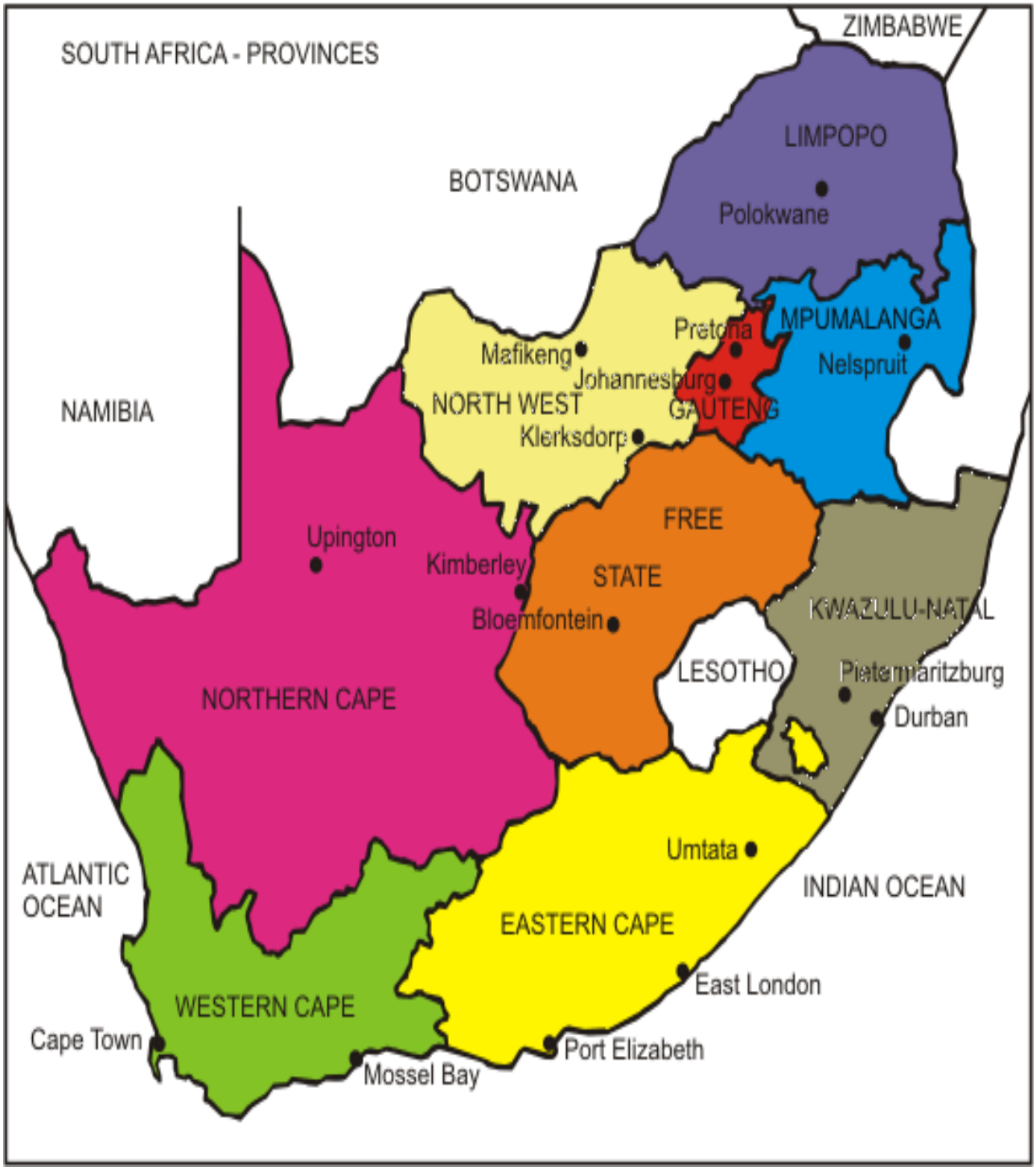
APPENDICES

Appendix A

The Map of Republic of South Africa



Appendix B: Context

(a) Geography

South Africa, on the continent's southern tip, is bordered by the Atlantic Ocean on the west and by the Indian Ocean on the south and east. Its neighbors are Namibia in the northwest, Zimbabwe and Botswana in the north, and Mozambique and Swaziland in the northeast. The kingdom of Lesotho forms an enclave within the southeast part of South Africa, which occupies an area nearly three times that of California.

The southernmost point of Africa is Cape Agulhas, located in the Western Cape Province about 100 mi (161 km) southeast of the Cape of Good Hope.

South Africa is divided into nine provinces, each with its own legislature, premiers, and executive councils. The provinces, with their own distinctive landscapes, vegetation, climate, and social contexts are the Western Cape, the Eastern Cape, KwaZulu-Natal, the Northern Cape, Free State, North West, Gauteng, Mpumalanga, and Limpopo.

(b) Demographics

According to Statistics South Africa's mid-year population estimates, as of July 2006 there were approximately ***47.4 million*** people in South Africa spread across 9 provinces. This is up from approximately ***44 819 778*** and ***40 583 573*** people, in 2001 and 1996 respectively. This population occupies an area of 1 219 090 km^2 which translates to a population density of 39 people per square kilometer. It must be noted that the population is not evenly spread across the land as some portion are inhabitable and for some other obvious reasons.

Until 1991, South African law divided the population into four major racial categories: blacks (African), whites, coloureds, and Asians. Although this law has been abolished, many South Africans still view themselves and each other according to these categories.

Black Africans comprise about seventy-five percent of the population and are divided into a number of different ethnic groups including those from Angola and Mozambique who are descendants of refugees who have settled South Africa.

Whites comprise about thirteen percent of the population. They are primarily descendants of Dutch, French, English, and German settlers who began arriving at the Cape in the late 17th century. There is a Portuguese minority including the descendants of the first European explorers and the Portuguese who left the former Portuguese colonies of southern Africa (Angola and Mozambique) after their independence in the mid-70s.

Coloureds are mixed-race people primarily descended from the earliest settlers, their slaves, and the indigenous peoples. They comprise about nine percent of the total population.

Most Asians descend from Indian indentured workers who came to South Africa in the mid-19th century to work on the sugar estates in Natal. Others include the descendants of Indian traders who migrated to South Africa at around the same time. They constitute about three percent of the population and are concentrated in the KwaZulu-Natal Province. There is also a small Chinese population of approximately 100,000 people.

(c) Economy

South Africa is the economic powerhouse of Africa, with a gross domestic product (GDP) four times that of its southern African neighbours and comprising around 25 percent of the entire continent's GDP. The country leads the continent in industrial output (40 percent of total output) and mineral production (45 percent) and generates most of Africa's electricity (over 50 percent).

South Africa's economy has been in an upward phase of the business cycle since September 1999 - the longest period of economic expansion in the country's recorded history. During this upswing - from September 1999 through to June 2005 - the annual economic growth rate averaged 3.5 percent. In the decade prior to 1994, economic growth averaged less than 1 percent a year.

According to the South African Reserve Bank, there is no sign of this period of expansion coming to an end. Gross domestic product (GDP) growth was running at an annualized 4.8 percent in the second quarter of 2005 (compared to 3.7 percent in 2004 and 2.8 percent in 2003).

Consumer inflation has been on a downward trend since 2002, when consumer prices increased to an average 9.3 percent following the September 11 tragedy in New York. Consumer inflation averaged 6.8 percent in 2003 and 4.3 percent in 2004 - compared to 9.8 percent in 1994.

At the same time, prudent fiscal management has seen South Africa's budget deficit come down from 5.1 percent of GDP in 1994 to 2.3 percent of GDP in 2004. In the first quarter of 2005, this figure fell to 1.6 percent, with the SA Revenue Service collecting nearly US$3.5-billion more than expected. Per capita GDP is US$3160.

Appendix C

Construction of the Learner Background Measures: The SEL Index

Introduction

The study included some analyses and reviews on the impact that the socioeconomic status of Grade 6 learners have on their educational achievement. The findings have pointed to the existence of large variations in pupil reading achievements between the provinces by socioeconomic level – with learners from lower levels of socioeconomic background achieving well below their counterparts from higher levels of socioeconomic backgrounds. The main challenge though is finding a universally applied measure of the socioeconomic level of the learners.

The main aim of this Appendix is to discuss the design of a measure of socioeconomic level referred to as the index of socioeconomic level (SEL Index) that was developed for learners in the SACMEQ education systems.

The Definition of the Socioeconomic Level (SEL)

The socioeconomic level is a multi-dimensional measure that tries to indicate the relative position of individuals with regard to their social background and social status in terms of certain characteristics. However there is no consensus or universal agreement on which specific characteristics should be used to determine the SEL. Various types of indicators have been used to define the SEL index and these differ form country to country as the index is determined by indicators which are not common across countries. An example would be “access to electricity” as an indicator of social status in developing countries while it is taken for granted in the developed world.

The occupational level is one of the most widely used indicator of SEL due to its close association with characteristics like, the level of skill required, which in turn is linked to the level of education necessary to engage in the occupation, which itself determines the income received form regular employment in the occupation. Coupled to the occupational level are other

indicators of SEL that have been combined into an index that incorporates factors like: family background indicator (for example, education of parents), environmental factors like the quality of housing, and economic status denoted by the income of parents. “These dimensions may be enriched by other family factors, such as parents’ interest in learning or the educational resources available within the family and adapted to the context” (Dolata, 2005)

The Definition of the SEL Index Used in other Studies: PISA and TIMSS

Depending on the context in which learner achievement studies are conducted, these studies have defined the measure of the socioeconomic level by using combining different indicators into SEL indices.

The programme for International Students Assessment (PISA) used an SEL index created to capture wider aspects of the student’s family home background in addition to occupational status. The characteristics used to construct the SEL Index were: the highest international socioeconomic index of the occupational status of the mother or father; the highest level of education of the father or mother converted into years of schooling; the number of books at home as well as access to home educational and cultural resources.

The trends in International Mathematics and Science Study (TIMSS) used a different set of variables from the PISA study, which included: books at home; possessions in the home; regularity of meals; and the use of the test language at home. They could not use the measures of occupational status, income level, and educational attainment for reasons ranging from the inability of nine-year olds to accurately provide data on these variables, to the fact that in some countries, access to such information was prohibited.

The Definition of SEL Index Used in the SACMEQ Study

The SACMEQ index of the learners’ socioeconomic level was constructed from component items that had to meet two criteria: (a) the data were to be linked to the concept of the “socioeconomic status”, and (b) the data were to be obtained at the “pupil” level.

The SACMEQ socioeconomic level (SEL) index of learners was built on the level of education of parents or guardian, the family's goods, and the quality of the structure of the home. These indicators were combined into an index that could be used to rank the socioeconomic level of the learners in the sixth year of primary school in the education systems of SACMEQ and to permit international comparisons.

Variables Used to Measure the SEL in the SACMEQ Study

The SACMEQ study identified a certain number of social and socioeconomic characteristics connected to performance on achievement tests. Eight variables were selected according to three main dimensions:

(i) "Educational level of the parents" – constituted by two ordinal variables having the same six modalities.

(ii) "Quality of the family home" – constituted by four ordinal variables: quality of lighting, flooring, outside walls and the roof of their home – each with three modalities on the quality of the materials.

(iii) "Family goods" – constituted by twelve dichotomous items (no = 0/yes = 1) on the availability of goods at the learners' home.

The Combination of Variables to Form the SACMEQ SEL Index

The dimensions above were combined into a SACMEQ SEL Index. For each dimension, the learners' answers to the items were added up to obtain a score. For example, I both the parents have never been to school, then the score of the indicator of the education level of the parents is 2. Details for the constructions of the three dimensions and the scores apportioned each variable are represented in Figure C.1, Figure C.2, and Figure C.3.

Figure C.1: Construction of the Dimension of Family Goods for the SACMEQ SEL Index

Variable	Question	Description	Value	Dimension	Value
PPOS01	PQ7.01	p/possession-newspaper	1 = do not have, 2 = have	ZPTOTP12	PPOS01 +
PPOS02	PQ7.02	p/possession-magazine	1 = do not have, 2 = have		PPOS02 +
PPOS03	PQ7.03	p/possession-radio	1 = do not have, 2 = have		PPOS03 +
PPOS04	PQ7.04	p/possession-tv	1 = do not have, 2 = have		PPOS04 +
PPOS05	PQ7.05	p/possession-vcr	1 = do not have, 2 = have		PPOS05 +

PPOS06	PQ7.06	p/possession-cassette	1 = do not have, 2 = have		PPOS06 +
PPOS07	PQ7.07	p/possession-telephone	1 = do not have, 2 = have		PPOS07 +
PPOS08	PQ7.08	p/possession-fridge	1 = do not have, 2 = have		PPOS08 +
PPOS09	PQ7.09	p/possession-car	1 = do not have, 2 = have		PPOS09 +
PPOS10	PQ7.10	p/possession-water	1 = do not have, 2 = have		PPOS12 +
PPOS11	PQ7.11	p/possession-electricity	1 = do not have, 2 = have		PPOS13 +
PPOS12	PQ7.12	p/possession-table	1 = do not have, 2 = have		PPOS14-12 (max. 12)

The items in the pupil questionnaire that were related to the SES concept were questions 7.01 to 7.14. Two variables, motorcycle and bicycle were left out as they did not seem to correlate well with the dimensions of Family Goods. Only the remaining 12 variables were used to calculate the dimension. To do so, the values obtained for each of the 12 variables were added and 12 was subtracted from 12 meaning that a learner who obtains 1 for each of the variables will get 12 – 12 = 0, whereas a learner who gets 2 for each of the variables will bet 12 – 12 = 12- thus giving a maximum of 12 for the dimension of family goods represented by the combined variable ZPTOTP12.

Figure C.2: Construction of the Dimension of <u>Education Level of Parents</u> for the SACMEQ SEL Index

Variable	**Question**	**Description**	**Value**	**Recorded Variable**	**Value**	**Dimension**	**Value**
PMOTHER	PQ11	p/mother's education	1 = no school 2 = some primary 3 = all primary 4=some secondary 6 =completed univ 8 = do not know 9 = do not have	ZPMOTHER	1=1 2=2 3=3 4=4 5=5 6&7=6 (max.=6)	ZPFAMOED	ZPMOTHER + ZPFATHER (Max. 12)
PFATHER	PQ12	p/father's education	1 = no school 2 = some primary 3 = all primary 4=some secondary 6 =completed univ 8 = do not know 9 = do not have	ZPFATHER	1=1 2=2 3=3 4=4 5=5 6&7=6 (max.=6)		

The dimensions "education level of parents" was constructed from variables from PMOTHER (pupil mother's education) and PFATHER (pupil father's education) obtained from questions 11 and 12 of the pupil's questionnaire respectively. The two variables were recorded as ZPMOTHER and ZPFATHER, each with a maximum value of 6 as shown in Figure C.2. The dimension "education level of parents", represented by the variable ZPFAMOED, was arrived at by adding ZPMOTHER and ZPFATHER. The maximum value for this dimension was also 12.

A combination of four variables: PLIGHT (pupil's source of lighting), PFLOOR (floor at pupil's home), PWALL (wall material at pupil's home), and PROOF (roof material at pupil's home, was used to derive the dimension of "quality at the family home and illustrated in Figure C.3. These variables are transformed into four other variables: ZPLIGHT, ZPFLOOR, ZRWALL, and ZPROOF. Each of these variables has a maximum value of 4. The four derived variables were then added together and 4 was subtracted from the sum to give a maximum value of 12 like the other two dimensions.

Figure C.3: Construction of the Dimension of Quality of the Family Home for the SACMEQ SEL Index

Variable	Question	Description	Value	Recorded Variable	Value	Dimension	Value
PLIGHT	PQ8	p/source of lighting	1=fire, 2=candle, 3=paraffin Or oil lamp, 4=gas lamp, 5=electric light, 6= no light	ZPLIGHT	1,6=1 2,3=2 4=3 5=4	ZPHMQUAL	ZPLIGHT+ ZPFLOOR+ ZPWALL+ ZPROOF-4 (max.12)
PFLOOR	PQ13	p/floor material	1=earth or clay, 2= canvas, 3= wooden planks, 4= ement,5= carpet/tiles	ZPFLOOR	1,2=1 3=2 4=3 5=4		
PWALL	PQ14	p/walls material	1=cardboard/plastic/canvas, 2=reeds/sticks/grass, 3=stones, mud bricks 4=metal/asbestos, 5=wood, 6=cut stone/concrete/bricks	ZPWALL	1,2=1 3=2 4,5=3 6=4		
PROOF	PQ15	p/roof material	1=cardboard/plastic/canvas, 2=grass thatch and mud, 3=metal/asbestos, 4=cement/concrete,5=tile	ZPROOF	1,2=1 3=2 4=3 5=4		

The SACMEQ SEL Index is constructed from the three dimensions of "family goods", "education level of the parents", and "quality of family home" by adding the derived variables ZPTOT12, ZPFAMOED, and ZPHMQUAL as illustrated in Figure C.4. These variables gave a minimum value of 6 and a maximum value of 36. Finally 15 levels are constructed from 60 to 36 at intervals of 2 except for the first level and the last level. In this scale, a pupil who gets a value of the SES of from 6 to 9 will be classified under level 1 in the SEL index. The level 1 to 15 represents the SACMEQ SEL Index which was used to analyse the socioeconomic background of Grade 6 pupils in all SAMEQ countries.

Figure C.4: Construction of the SACMEQ SEL Index

Variable	**Value**	**SES Values**
ZPSES (max.15)	**ZPTOT12 + ZPFAMOED + ZPHMQUAL (between 6-36)**	9 thru 9 = 1
		10 thru 11 = 2
		12 thru 13 = 3
		14 thru 15 = 4
		16 thru 17 = 5
		18 thru 19 = 6
		20 thru 21 = 7
		22 thru 23 = 8
		24 thru 25 = 9
		26 thru 27 = 10
		28 thru 29 = 11
		30 thru 31 = 12
		32 thru 33 = 13
		34 thru 35 = 14
		36=15

Appendix D

The SACMEQ SEL Index and Grade 6 Pupils' Reading Achievement

Introduction

The concept of the SEL index was adequately dealt with in the previous section while the link between the SEL index and achievement has been well documented in chapter 6 of this study.

In this Appendix, an attempt is made to represent correlations between the SEL index (a) measure of the pupil's socioeconomic background) and the pupil's average reading achievement score.

The Presentation of the Measure of Socioeconomic Level (SEL Index) and Pupil Reading Achievement in South Africa

In Table D.1 is presented the SACMEQ Index of the socioeconomic level SEL of Grade 6 pupils in South Africa, their proportion in percentages for each SEL level, and their performance in reading.

Table D.1: SACMEQ Index of the Socioeconomic Level of Pupils, Percentage of pupils in each SEL Level and their Average Reading Scores.

Level	% of Students	Average Pupil Reading Score	Std. Error of Mean (SE)
1.00	.4%	388.4	14.6
2.00	1.5%	422.1	6.3
3.00	4.6%	417.8	4.8
4.00	8.2%	422.1	4.0
5.00	8.5%	431.5	4.2
6.00	8.9%	437.3	4.3
7.00	9.1%	440.9	4.5

8.00	8.5%	437.4	5.0
9.00	9.0%	464.6	5.6
10.00	9.4%	493.7	5.7
11.00	8.1%	536.2	7.8
12.00	7.4%	569.8	8.9
13.00	7.7%	609.8	7.4
14.00	7.3%	655.8	7.6
15.00	1.1%	695.5	17.7
South Africa	**100.0%**	**492.3**	**2.2**

Table D.1 shows that 44.8% of the in the sample of Grade 6 pupils in South Africa have SES level in the interval 1 to 7 while 50% are between levels 9 and 15 have achieved an average score of 422.9 in the reading test. On the contrary, the 50% who are in the upper levels of SEL obtained an average of 575.1. According to these results, there is a positive relationship between SEL and pupil reading scores as pupils with a low SEL index tended to perform poorly compared to their more affluent counterparts.

Correlations between the Measure of Socioeconomic Level (SEL Index) and Pupil Reading Achievement in South Africa

Table D.2: SACMEQ Index of the Socioeconomic Level of Pupils, Percentage of pupils in each SEL Level and their Average Reading Scores.

Province	Coefficient of Correlation
Eastern Cape	.**394**
Free State	.**384**
Gauteng	.**485**
Limpopo	.**408**
KwaZulu Natal	.**579**
Mpumalanga	.**179**
Northern Cape	.**264**

North West	.**098**
Western Cape	.**505**
South Africa	.584

The correlation is significant at the 0.01 level of significance

Appendix E

Theme A: Pupils' Characteristics and Their Learning Environments

General Policy Concern 1: What were the personal characteristics (for example, age and gender) and home background characteristics (for example, parent education, regularity of meals, home language, etc.) of Grade 6 pupils that might have implications for monitoring equity, and/or that might impact upon teaching and learning?

General Policy Concern 2: What were the school context factors experienced by Grade 6 pupils (such as location, absenteeism (regularity and reasons), Grade repetition, and homework (frequency, amount, correction, and family involvement)) that might impact upon teaching/learning and the general functioning of schools?

General Policy Concern 3: Did Grade 6 pupils have sufficient access to classroom materials (for example, textbooks, readers, and stationery) in order to participate fully in their lessons?

General Policy Concern 4: Did Grade 6 pupils have access to library books within their schools, and (if they did have access) was the use of these books being maximized by allowing pupils to take them home to read?

General Policy Concern 5: Has the practice of Grade 6 pupils receiving extra lessons in school subjects outside school hours become widespread, and have these been paid lessons?

Theme B: Teachers' Characteristics and their Viewpoints on Teaching, Classroom Resources, Professional Support, and Job Satisfaction

General Policy Concern 6: What were the personal characteristics of Grade 6 teachers (for example, age, gender, and socioeconomic level), and what was the condition of their housing?

General Policy Concern 7: What were the professional characteristics of Grade 6 teachers (in terms of academic, professional, and in-service training), and did they consider in-service training to be effective in improving their teaching?

General Policy Concern 8: How did Grade 6 teachers allocate their time among responsibilities concerned with teaching, preparing lessons, and marking?

General Policy Concern 9: What were Grade 6 teachers' viewpoints on (a) pupil activities within the classroom (for example, reading aloud, pronouncing, etc.), (b) teaching goals (for example, making learning enjoyable, word attack skills, etc.), (c) teaching approaches/strategies (for example, questioning, whole class teaching, etc.), (d) assessment procedures, and (e) meeting and communicating with parents?

Appendix E (Ctd):

General Policy Concern 10: What was the availability of classroom furniture (for example, sitting/writing places, teacher table, teacher chair, and bookshelves) and classroom equipment (for example, chalkboard, dictionary, maps, book corner, and teacher guides) in Grade 6 classrooms?

General Policy Concern 11: What professional support (in terms of education resource centres, inspections, advisory visits, and school head inputs) was given to Grade 6 teachers?

General Policy Concern 12: What factors had most impact upon teacher job satisfaction?

Theme C: School Heads' Characteristics and their Viewpoints on Educational Infrastructure, the Organization and Operation of Schools, and Problems with Pupils and Staff

General Policy Concern 13: What were the personal characteristics of school heads (for example, age and gender)?

General Policy Concern 14: What were the professional characteristics of school heads (in terms of academic, professional, experience, and specialized training)?

General Policy Concern 15: What were the school heads' viewpoints on general school infrastructure (for example, electrical and other equipment, water, and basic sanitation) and the condition of school buildings?

General Policy Concern 16: What were the school heads' viewpoints on (a) daily activities (for example, teaching, school-community relations, and monitoring pupil progress), (b) organizational policies (for example school magazine, open days, and formal debates), (c) inspections, (d) community input, (e) problems with pupils and staff (for example, pupil lateness, teacher absenteeism, and lost days of school)?

Theme D: Equity in the Allocation of Human and Material Resources Among Regions and Among Schools Within Regions

General Policy Concern 17: Have human resources (for example, qualified and experienced teachers and school heads) been allocated in an equitable fashion among regions and among schools within regions?

Appendix E (Ctd): SACMEQ II: General Policy Concerns of Ministry Decision-Makers

Appendix E (Ctd):

General Policy Concern 18: Have material resources (for example, classroom teaching materials and school facilities) been allocated in an equitable fashion among regions and among schools within regions?

Theme E: The Reading and Mathematics Achievement Levels of Pupils and Their Teachers

General Policy Concern 19: What were the levels (according to descriptive levels of competence) and variations (among schools and regions) in the achievement levels of Grade 6 pupils and their teachers in reading and mathematics – for my country and for all other SACMEQ countries?

General Policy Concern 20: What were the reading and mathematics achievement levels of important sub-groups of Grade 6 pupils and their teachers (for example, pupils and teachers of different genders, socioeconomic levels, and locations)?

Appendix E SACMEQ II: General Policy Concerns of Ministry Decision-Makers

Appendix F **General Policy Concern 1**

What were the personal characteristics (for example, age and gender) and home background characteristics (for example, parent education, regularity of meals, home language, etc.) of Grade 6 pupils that might have implications for monitoring equity, and/or that might impact upon teaching and learning?

↓

Specific Research Questions

What was the age distribution of pupils?

What was the gender distribution of pupils?

How regularly did pupils eat meals?

How far did pupils travel to school?

What percentage of pupils spoke the language of the test at home?

What was the level of the parents' education?

What support did pupils get at home regarding homework and interest in schoolwork?

Did teachers ask parents to sign that homework assignments have been completed?

Where did pupils live during school days, i.e., when school is on?

How many books were there in pupils' homes?

What access to reading materials and electronic media did pupils have in their homes?

What was the socioeconomic status of pupils' parents?

↓

First Dummy Table for General Policy Concern 1

Dummy Table : Grade 6 Pupil Age, Gender, and Home Background Characteristics

Province	Age (months)		Gender (pupils)		**Books at Home** (books)		**Possessions at Home** (index)		Meals (index)		**Parent Education** (index)	
	Mean	SE	%	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
EC												
FS												
GA												
KZN												
MP												
NC												
LIM												
NW												
WC												
RSA												

Variable Names for SACMEQ I = XPAGEMON, XPSEX, XPBOOKSH, XPTOTP, XPREGME, XPFAMOED.
Variable Names for SACMEQ II = ZPAGEMON, ZPSEX, ZPBOOKSH, ZPTOTP, ZPREGME, ZPFAMOED.

Appendix F: An Example of Transforming a General Policy Question into Twelve Specific Research Questions and One (of Two) Dummy Tables