Public Expenditure Management and Education Outcomes

Micro-evidence from primary schools and public officials in Gauteng and North West provinces, South Africa

by

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A thesis submitted to the Faculty of Commerce, Law and Management, University of Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

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March 2012

ABSTRACT

The overarching aim of this study is to examine the significance of public expenditure management (PEM) for primary education outcomes in public schools in two South African provinces (Gauteng and North West). The study examines whether technical and allocative inefficiencies in public spending have a significant impact on education outcomes (measured by pass, repetition and dropout rates). In doing so, the study makes an important contribution to the economics of education literature, where the determinants of good education outcomes remain ambiguous. Using cross-sectional data from 175 public primary schools, the study finds evidence of technical inefficiencies in terms of misappropriation of education funds (leakages) and delays in remitting funds. While the occurrences of leakages are not strongly associated with poor education outcomes, the study finds a strong positive correlation between delays and Grade 1 repetition. In terms of allocative efficiency, the study finds no evidence that public expenditure is significantly associated with education outcomes. This remains true for public spending even when the redistributive component (the disproportional allocation of funds to disadvantaged schools) is taken into account. Total resource wealth (including public and private contributions) only matters when interacted with certain poverty quintiles and class sizes. The findings from the OLS and negative binomial regression analyses reveal that increased spending on learning and teaching support (LTSM) materials is strongly associated with lower Grade 1 repetition rates. The relationship is even stronger when LTSM spending is interacted with socio-economic status. The study also finds that repetition rates are strongly driven by poverty indicators at the district level while dropout rates are strongly driven by district and school inefficiency.

Keywords: public expenditure management, education expenditure, governance, primary education, education outcomes, economics of education, South Africa, Gauteng province, North West province, PETS, QSDS.

ACKNOWLEDGEMENTS

This doctoral thesis would not have been completed without immeasurable support and encouragement from various mentors, friends, family and colleagues. Key among these are: Dr. Tia Linda Zuze, for her unfailing guidance and supervision, for challenging me and being generous with her time; Prof. Stephen Gelb, for mentoring me during the early stages of conceptualising the study and during the difficult period of data collection. I am also indebted to Dede Houeto for the detailed comments on my drafts and more importantly, for the words of encouragement.

I thank the Department of Economics at Wits University and the Economics faculty at the University of Stellenbosch for giving me the opportunity to present my work and for the helpful comments. I benefited tremendously from the Department of Basic Education, particularly, the district education offices, for cooperating in the interviews and providing supplementary information.

I am also indebted to the following: Eunice Kamwendo, Evelynne Change, Mufor Atanga, Dalmar Jama, Richard Esin, Bernard Dasah, Namawu Alolo, Kay Brown, George Larbi and my colleagues at GIZ and CABRI for their input, support and encouragement to stay focused despite the many challenges.

Last but not least, I wish to acknowledge my wonderful parents, Eric and Gladys Boateng, my sister and brother-in-law, Adwoa and Danson Nganga; my precious nephew, Daniel and my brother, Yaw for all their love, support, prayers, for believing in me and without whom none of this would be possible.

DECLARATION

I declare that this thesis is my own, unaided work. It is being submitted for the Degree of Doctor of Philosophy in the University of the Witwatersrand, Johannesburg. It has not been submitted for any degree or examination in any other university. Where other sources of information have been used, they have been acknowledged.

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CHAPTER ONE

OVERVIEW OF STUDY

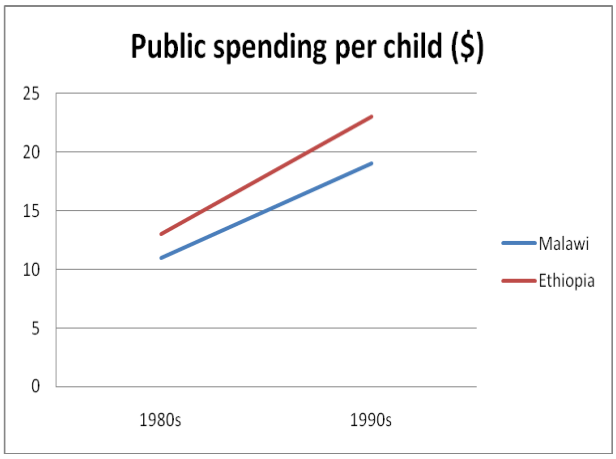
1.1 Introduction

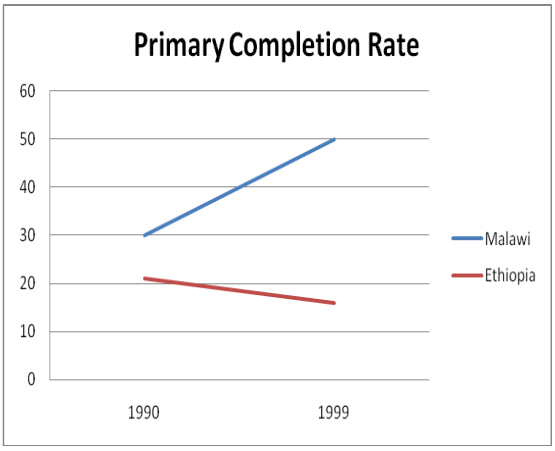
Primary education has long been established as the cornerstone of poverty alleviation and socio-economic development (Birdsall, 2001, 2006; Duflo, 2001; Hanushek & Wossman 2007a; Psacharopoulos, 1985, 1994, 2002, 2004; Su 2006). In most national development strategies in Africa, relatively large proportions of development resources have been allocated to education. In the 1990s, education budgets in developing nations were absorbing 15 to 27 percent of total government recurrent expenditure (Todaro, 2000). Public spending on primary education in sub-Saharan Africa rose by 29 percent in real terms between 2000 and 2005 (UNESCO, 2010). The reasons for sizable investments in education are numerous: young people with at a least primary level education are less likely to contract HIV than those with no schooling. Greater female education leads to more productive farming and significant decreases in malnutrition. An additional year of schooling results in higher wages and education supports democratic growth and political stability (Birdsall, 2006).

Nevertheless, there is a paradox. While large proportions of GDP are consistently allocated to the education sector, the desired outcomes such as high pass and completion rates, strong academic achievement, absorption into a skilled labour force and competitive wages are severely lacking in many African countries. In fact, education enrolments and quality in about half of the countries in sub-Saharan Africa have

deteriorated since 1990 (Al-Samarrai, 2003). It has traditionally been thought that poor education outcomes are caused by under-spending by governments or high unit costs of schooling, but researchers are increasingly finding that there is still some ambiguity in the factors that yield good education outcomes and moreover, increasing spending does not automatically generate the desired outcomes as illustrated in Figure 1.1 below.

Figure 1.1 Public Spending on Education and Primary Completion Rates for Malawi and Ethiopia





Source: Andrews and Campos (2003)

Both Malawi and Ethiopia were increasing education spending between 1980 and 1990, but had very divergent outcomes a decade later. While Malawi witnessed increasing primary completion rates, Ethiopia experienced declining completion rates. Notably, both countries had introduced free primary education in 1994 to boost enrolment (Oumer, 2009). According to Andrews and Campos (2003) the education sector in Ethiopia may have been plagued by inefficiencies or by misappropriation of resources or both, which explains the dire education outcomes despite increased resources.

It is the decline of education outcomes despite increased expenditure coupled with the ambiguity surrounding the determinants of education outcomes that motivate this study. Given the scarcity of resources in Africa, it is worrying that many countries commit substantive amounts to education, particularly at the primary level and yet do not fully reap the expected rewards. Clearly, a systematic analysis of the efficiency of public spending is important.

The mixed trends in education outcomes depicted in Figure 1.1, raise important questions. Why does money matter for education in some countries and not in others? Are there salient features such as the functioning of institutions, political economy constraints and country-specific contexts that explain the divergence in outcomes? It is therefore important to have country-based studies that take the local context into account. Indeed, such analysis will be important in the South African context given the words of Nick Taylor from JET Education Services in South Africa (2001, p.15):

> "*Despite high levels of spending as a percentage of GDP, off a base that is significantly higher than that of the overwhelming majority of developing countries, learning outcomes [in South Africa] are either worse than or comparable with those of the poorest nations.*"

The statement by Taylor is substantiated with statistical evidence presented in Chapter 3 on spending trends, which point to potential gross inefficiencies in public education spending in South Africa. While not discounting the importance of expenditure in the social sector, this study essentially argues that a focus on public spending alone is misleading. Attention should also be placed on the management of public expenditure as

it potentially plays an important role in making spending more efficient and fostering good education outcomes.

Public Expenditure Management (PEM) is essentially about good governance; it addresses accountability, transparency, predictability and participation. Its central objective is to ensure (i) that governments spend within their budgets (also known as aggregate control or fiscal discipline), (ii) that resources are channelled towards highest impact activities (allocative efficiency or strategic prioritisation) and (iii) that services are delivered in the most efficient and effective manner (technical efficiency or good operational management) (World Bank, 1998). Indeed, the prudent management of resources is often argued to be paramount for efficient and effective delivery of public services and therefore an analysis of PEM as it pertains to education could provide useful insight in the framework of improving education outcomes.

The study is especially inspired by the numerous studies conducted by the World Bank on public expenditure and education outcomes (reviewed in Chapter 2), which find that public spending alone does not guarantee good education outcomes; the key issue is how funding is managed. The World Bank's first study of this nature was conducted in Uganda in 1996, where the Government of Uganda, in partnership with the World Bank, sought to understand why despite substantial increases in public spending on basic education, education outcomes remained stagnant. The hypothesis for the poor results was that public resources did not actually reach the schools. Therefore a public expenditure tracking survey (PETS) was implemented to track resources from central government to the primary schools. PETS are survey instruments that track the flow of

resources through various strata of government (from central to provincial to local) in order to determine how much of the originally allocated public resources reach each level (IIEP, 2004). The survey is a useful tool for locating and quantifying political and bureaucratic obstacles, leakage of funds (funds that are misappropriated or cannot be accounted for) and problems in the deployment of resources. The PET surveys highlight not only the use and abuse of money, but also give insights into concepts of cost efficiency, decentralisation and accountability. The results for Uganda showed extensive leakage and corruption and thus confirmed that the hypothesis linking poor learning outcomes to a leakage of resources could not be rejected.

Since the Uganda report, there have been education tracking exercises conducted in Cameroon (2004), Kenya (2004), Madagascar (2003), Mali (2005), Namibia (2003), Nigeria (2006), Rwanda (2000), Senegal (2002), Sierra Leone (2000) and Zambia (2001) (Gauthier, 2006). Significant leakages in education funding have been found in several countries as per Table 1.1 below.

Table 1.1 Nonwage Funds Not Reaching Schools: Evidence from Public Expenditure Tracking Surveys (PETS)

Country	*Mean percentage*
Ghana 2000	49
Madagascar 2002	55
Peru 2001 (utilities)	30
Tanzania 1998	57
Uganda 1995	78
Zambia 2001 (discretionary funds/legislated funds)	76/10

Source: Reinikka (2004)

Evidently, there are alarming proportions of leakages in education funds as shown in the table above. Over three-quarters of education funding allocated to schools in Uganda and Zambia were "leaked" and were therefore, not reaching the schools. In Madagascar and Tanzania, more than half of the education funding was embezzled before it reached the schools. These case-studies (see literature review chapter) show the importance of tracking the flow of funds to determine whether resources reach the intended beneficiaries.

Interestingly, South Africa has never conducted a PET survey, although it has conducted some public sector reviews. This is because PET studies are largely driven by the World Bank and tend to focus on countries with very weak governance institutions and public finance management systems, low growth rates, high levels of corruption and poor service delivery. South Africa is a unique category because in many ways it fits the profile of an emerging economy with robust systems and impressive growth rates. At the same time, the country is burdened with poor service delivery and a significant deficiency in human resource capacity in the public sector despite increased public spending over the past decade.

Therefore, a tracking exercise forms an important part of this study and is appropriately the starting point of the empirical analysis. The tracking instrument tends to be effective in answering questions on the impact of governance reforms on service delivery. Presumably, if PEM is being adequately implemented, there should be no leakages in the flow of funds. Proper PEM practices should ensure that resources reach the targeted

beneficiaries and moreover, that these resources are used in a manner that optimally enhances the quality of social services. In the absence of sound PEM, leakages may occur and this could adversely affect service delivery efforts. By using the data to explore empirically whether poor outcomes can be attributed to PEM shortcomings, this study goes beyond an assessment of bureaucratic inefficiencies, which has largely been the scope of the World Bank studies.

South Africa is very much appropriate for this study because it is a young democracy with an enormous challenge of correcting historical injustices that oppressed and purposefully stifled human resource development prospects for about 90 percent of the population. In responding to the massive challenge, South Africa has shown itself to be an aggressive reformer and commits substantive funding to restoring human resource capacity by investing in education. Nonetheless, the education challenge is enormous and the outcomes (discussed in Chapter 3), so far, do not correspond to the financial investments made to improve education.

Due to the vastness of the country, two provinces (North West and Gauteng) that are immensely different in many respects are deliberately selected for this study.[1] These differences allow for comparative analyses and for lessons to be drawn from both contexts. While the findings may have relevance to other parts of South Africa, they are not generalised at the country level and speak to the specific contexts of the two provinces.

[1] The North West Province's contribution to GDP was 4.9 percent in 2004. In Gauteng, it was 33.3 percent for the same year. Literacy rates were 70 percent and 95 percent in North West and Gauteng respectively StatsSA (2004a) and StatsSA (2004b).

1.2 Aim

The aim of this study is to twofold: (i) it aims to identify the key challenges experienced by the Government of South Africa in managing funds allocated to primary education in terms of transparency, accountability and efficiency and (ii) to assess whether PEM practices are significant in explaining education outcomes. The two parts to this research are elaborated below.

Identification of PEM Challenges

The study addresses two research questions in this part of the thesis: (i) to what extent is the flow of resources from government to primary schools efficient and (ii) to what extent is the management of education funds at the sub-national level of government efficient and effective? In the case of the former, the study will not only elucidate the mechanisms by which public resources are channelled from the central government to the end-user, but through a tracking survey instrument (see appendices 1 and 2), determine the effectiveness of this flow, in light of the recent reforms to make this channel efficient. This section will assess how much of the original allocation reaches the intended beneficiaries. The discrepancy will be an indication of leakage. The survey will also determine if there are substantial delays in channelling funds as this may have important implications for efficient and effective service delivery.

The second research question takes cognizance of the fact that South Africa has a decentralised approach to social service delivery whereby sub-national governments (the provincial and district/regional education offices) are largely responsible for the

management of education resources and service delivery in primary education. The objective is to examine the extent to which provinces and districts implement sound PEM principles such as, adopting managerial practices that lead to efficiency, adhering to the legislated constraints on aggregate spending and involving civic and private partners in service delivery. In addition to desk research, policymakers and administrators in the various levels of government are interviewed to gain information on the existence and application of practices that lead to technical and allocative efficiency as well as fiscal discipline. Existing development budgets and expenditure statements are analysed systematically to assess whether resources are targeted where they are needed most. This section relies mainly on qualitative analysis and will particularly be useful in shedding light on institutional and political economy constraints that may impede service delivery.

Assessing the Importance of PEM in explaining education outcomes

The second part of this study aims to assess empirically the relationship between PEM and education outcomes. In doing so, it addresses the overarching research question of the thesis: is PEM a significant determinant of education outcomes? This is further broken down into five specific research questions that will be addressed empirically in the analysis:

(i) Is there a significant relationship between leakage of funds (misappropriation) and education outcomes?

(ii) Is there a significant relationship between delays in the disbursement of funds and education outcomes?

(iii) Is there a significant relationship between public expenditure (government subsidies) per capita and education outcomes?

(iv) Is there a significant relationship between a school's total resource wealth per capita and education outcomes? and

(v) Is there a significant relationship between LTSM (learning, teaching and support material) expenditure per capita and education outcomes?

Education outcomes are measured by: pass, repetition and dropout rates (see section 1.4 below for a brief discussion of these outcome variables and Chapter 2 for a detailed review). The research questions are addressed qualitatively through an institutional analysis at the district level and quantitatively though a regression analysis of the school level data. In order to isolate the effect of PEM on education outcomes, other factors that are also potentially important in explaining education outcomes such as socio-economic status and other school inputs, are identified and controlled for in the empirical analyses. A brief overview of the methodological approach is outlined below.

1.3 Overview of Methodology

Given that there is no existing dataset capturing both education and PEM variables, cross-sectional data were collected with the assistance of field researchers for a sample of 175 public primary schools (7 percent of the school population) in Gauteng and North West provinces. The schools were stratified into districts to allow for a school in every district to have an equal chance of being selected into the study. At the district education office level, 13 local education offices (out of a total of 19) in the two provinces were surveyed. Both school and district data were collected through two micro-level surveys: a Public Expenditure Tracking Survey (PETS) and a Quantitative Service Delivery Survey (QSDS).

The PETS is an instrument that tracks the flow of funds and exposes bureaucratic inefficiencies while the QSDS collects information on the service provider and on various agents in the system in order to allow for an examination of the efficiency of service delivery on the frontline as well as dissipation of resources. The two instruments were conducted jointly in order to obtain a complete picture of education quality, financial management and other governance processes involved in the delivery of primary education services. The surveys were supplemented by information obtained from published reports pertaining to public expenditure management and education.

In terms of analyses, this study uses both quantitative and qualitative methods. The qualitative analysis involves institutional analysis mainly at the district education office level in order to provide insight into the functioning of institutions, the level of efficiency and accountability in sub-national government and the impact these have on education outcomes. In the quantitative analysis, bivariate correlations are first used to assess the strengths of the relationship between PEM variables and the education outcome variables without conditioning for other factors. Then regression analysis is used to isolate the PEM variables that influence education outcomes while conditioning for both school and non-school inputs.

1.4 Limitations of Study

It is important to underscore that the aim of this study is not to explain all the key factors that determine education outcomes as done in education production function studies. The focus is placed on examining the strengths of PEM variables in determining good education outcomes. Therefore, this study does not exhaustively explore the respective

strengths of all the factors that engender good learning outcomes. What the study does do is to provide input into other non-PEM variables that matter for education and ones that do not matter.

As with most research studies, the methodology selected comes with a number of limitations. For one, the study uses two micro surveys (PETS-QSDS) which require accurate or truthful information from the respondents in government and in schools. The nature of the study is such that there is an incentive for agents to misreport (Dehn, Reinikka & Svensson, 2003). For example, where resources are used for other purposes, a district education officer or school head teacher may not provide an honest account. The study has tried to overcome this limitation by requesting copies of audited financial statements to complement the surveys and also through data triangulation, whereby the same information is sought from different sources. This serves the purpose of cross-validating the information obtained. Generally, this study requires a culture of good recordkeeping within the concerned sectors. Incomplete or unreliable data posed a real challenge in this study which increased the level of non-sampling errors.

It is important to acknowledge that studies that seek to explain education outcomes in the economics of education literature are increasingly using nationally or internationally comparable test scores as proxies for education outcomes. The argument is that an outcome of education should generally be an indication of learning achievement. In that regard, the study is potentially limited in its use of alternative indicators, namely, pass, repetition and dropout rates as opposed to test scores. Test scores were not incorporated into this study due to the simple fact that not all schools selected in the sample for this

study would have participated in the only two international standardised tests available at primary level in South Africa: the Progress in International Reading Literacy Study (PIRLS) and Southern and East African Consortium for Monitoring Education Quality (SACMEQ) and the one national test, namely, Systemic Evaluations, that assess a sample of primary school students in South Africa in literacy and numeracy.

The test scores from secondary leaving school exams (matric) would have been the next best option as these tests are set nationally and therefore, comparable across schools. This option was not explored because it would have changed the study's focus from primary to secondary education. Primary schools are of critical interest not only because primary education is arguably the cornerstone of poverty reduction and socio-economic development but also because of the importance the Government of South Africa places on primary education as evidenced by the substantive spending in that sector (see Chapter 3). Therefore, notwithstanding its methodological difficulties, primary education, especially in the South African context, deserves analytical attention.

The methodological difficulties with the use of pass, repetition and dropout rates are discussed at length in Chapter 2. In summary, pass rates, while indicative of achievement, suffer from a lack of comparability due to the arbitrary setting of examinations by schools. Repetition rates may reflect weak learning abilities but in South Africa's context these rates could be inflated at the Grade 1 level due to underage enrolment. Conversely, artificially low repetition rates at the Grade 7 level could be due to policy restrictions on the number of repetitions allowed and restraints on overage repetition. Dropout rates on

the other hand, do not distinguish between pupils who leave the school system never to return and those who leave a school to transfer to another school.

Notwithstanding these shortcomings, dropout rates as well repetition rates are considered by the Department of Education as important indicators to monitor as they also reflect problems with internal efficiency in schools in addition to the pupil-related characteristics (Department of Education, 2009). There is also quantitative evidence showing that low test scores are correlated with high repetition and dropout rates, thus making the latter variables valid indicators of learning outcomes (see Chapter 2 and Appendix 4). It is also important to underscore that many credible studies have used completion, repetition and/or drop-out rates (see for instance, Bruns & Mingat, 2003, Lee & Barro, 1997; McMahon, 1999; Rajkumar & Swaroop, 2008 and Serra, Barr & Packard, 2011). The study also incorporates other measures of educational outputs that illustrate school quality, specifically, measures of school infrastructure to supplement the analyses.

1.5 Structure of Thesis

Chapter 1 of this thesis has focused on providing a background to the study and has established the importance of and motivation for the research. It also presented the aim of the study, research questions to be investigated and a brief discussion of the methodology to be employed. An overview of the limitations of the study was also presented. Chapter 2 provides a detailed literature review of the relationship between PEM and primary education. It reviews the theoretical considerations and debates around the importance of school and non-school inputs for education outcomes as well as the theoretical considerations around pass, repetition and dropout rates as indicators of education

outcomes, particularly in the South African context. The literature review chapter essentially shows that the relationship between public spending and education are inconclusive and that PEM is potentially key in the pursuit of desirable education outcomes.

Chapter 3 discusses the context of South Africa, highlighting the governance and primary education frameworks in South Africa. In this chapter, there is a detailed review of the structure of government; capacity constraints at the sub-national level, inter-governmental fiscal relations; public expenditure management reforms; school-based governance and the state of primary education. This chapter provides a contextual background for the analysis. Chapter 4 provides the theoretical considerations for the relationship between PEM and education outcomes. It relies mainly on the theories of economics of education and the education production function model.

The research methodology is presented in Chapter 5. It covers the research design, data collection, sampling, data triangulation, implementation of the questionnaire and data analysis. Descriptive analysis of the data from the school survey findings are presented in Chapter 6, where the general findings on education outcomes, school funding, school facilities, governance of schools, among others, are discussed. It also presents a detailed discussion of the key findings of the PETS in terms of leakage and delays. Chapter 7 examines the extent of technical efficiency in the management of resources and accountability at the sub-national level. By using the findings of PETS-QSDS surveys as well as interviews of public officials, this chapter examines the extent to which provinces and districts adopt managerial practices that lead to efficiency in service delivery.

Chapter 8 analyses the impact of PEM on service delivery in primary education. This chapter focuses on empirical analyses to establish if there is a significant relationship between PEM variables and primary education outcomes. It presents the findings of the correlation and regression analyses between PEM and education outcomes. Chapter 9 presents a summary of findings, limitations of study, areas for further research, policy implications and conclusions.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The introductory chapter set the context for this study by demonstrating that spending alone does not guarantee good outcomes and public expenditure management (PEM) may be instrumental for achieving good education outcomes. It is clear however, that there continues to be some ambiguity in the factors that yield good outcomes in education. Increasingly, education economists are finding that governance blockages may be significant in explaining poor outcomes in education. The literature, however, has been fairly silent on this given the lack of education production function models that incorporate governance deficiencies at the state level. By discussing and analysing the key studies on the economics of education, this chapter aims to shed light on the following key questions: What are the key determinants of education outcomes? What are the appropriate indicators of education outcomes? Does public expenditure management (PEM) matter for education outcomes? The literature on these topics is vast, but it does reveal ambiguities and inconsistencies as well important gaps in the factors that determine education outcomes.

The chapter begins with a critical review of the economics of education literature. It elaborates on the various proxies for education outcomes applied in the international literature as well as in the South African context, while highlighting their strengths and limitations. The chapter then discusses the findings on the explanatory variables for

education outcomes. This is followed by a review of some country case-studies in Africa that have implemented a public expenditure tracking survey in the education sector.

2.2 The Economics of Education

Introduction

The importance of education for growth and development is rooted in the early human capital theory, where emphasis was placed on education as an input to economic production, rather than an outcome of economic production (Becker, 1964; Mincer, 1970). Primary education, in particular, has long been argued to be the cornerstone of poverty reduction and socio-economic development. Psacharopoulos (1994, 2002) in his review of empirical studies shows that both private and social rates of return to investment in education were highest at the primary level, regardless of the number of students.

Education economists have raised important policy questions on the role of education in improving the welfare of the 5 billion people living in developing countries. There are some macroeconomists (Barro, 1991; Mankiw, Romer & Weil, 1992) that have examined the impact of education on economic growth. Other economists (Psacharopoulos, 1985, 1994; Duflo, 2001) have used regressions and natural experiments to estimate both the private and social returns to education. Education has been found to be instrumental in the adoption of new agricultural technologies (Foster & Rosenzweig, 1996) and also as a means to improve health and reduce fertility (Straus & Thomas, 1995). Sen (1999) describes education as an intrinsic good in itself.

Research has shown that the major issues with regard to primary education are often quality, equity and efficiency. The quality of education may be constrained by poorly equipped educators and inadequate supervision. Equity may be limited by geographical disparity in access and efficiency may be compromised by limited relevance of the curriculum or again, persistent lack of school facilities. In this regard, Behrman and Birdsall (1983) argue that a focus on expansion of primary schools is misleading; the optimal social investment strategy would be to improve the quality of existing primary schools. Birdsall (2001) takes the argument further by emphasising that the value of human capital in part depends on its owners ability to deploy it in a competitive market in which the rules of the game reward innovation, entrepreneurship and higher productivity.

As the importance of education has been firmly established in the literature, researchers have endeavoured to understand the precise inputs that yield good education outcomes. Education inputs may be defined as the resources provided by parents, school management and government authorities to facilitate learning in schools. These include: qualified and well-paid teachers, classrooms, learning materials, facilities, organisation, curriculum, tuition fees, government subsidies and technical support to schools. Their importance may seem obvious for education outcomes. Nonetheless, their significance has been the subject of intense debate among economists and the findings have been largely contradictory.

In the literature, education outcomes are typically grouped into: completion rates, learning achievement (for example test scores), average years of education of the adult

population and labour force and earnings and productivity (Boissiere, 2004). In practice, a number of other variables have been used in the education literature, some more often than others. In the section below, the key outcome variables are reviewed and their appropriateness especially for the South African context, discussed.

Review of Education Outcome (Dependent) Variables

Inputs are relatively straight forward to identify in the education production function process but, outputs or outcomes are extraordinarily difficult to be precise about. This is well illustrated in the extract below.

> *"Clearly, to analyze school production, it is essential to employ adequate measures of outcomes. But measuring outputs is not simple. While economic theory concentrates on varying quantities of a homogeneous output, this is not easily translated into an educational equivalent. Education is a service that transforms fixed quantities of inputs (that is, individuals) into individuals with different qualities. Educational studies concentrate as they should on "quality" differences. A majority of studies into educational production relationships measure output by standardized achievement test scores, although significant numbers have employed other quantitative measures such as student attitudes, school attendance rates, and college continuation or dropout rates. The measures used, however, are generally proxies (with varying degrees of validation) for more fundamental outcomes. Some people, including many school practitioners, simply reject this line of research entirely because they believe that education outcomes are not or cannot be adequately quantified"* (Hanushek, 1986, p.1150)

Vaizey (1971) argues that assertions about global output of education are not meaningful if they are intended to be a guide about the efficiency with which resources in education as a whole are used compared with the way resources are used in other parts of the economy. He illustrates this challenge by giving an example of a school that remains unchanged in every respect except for an additional teacher or an extra $100 to spend on equipment. A reasonable assumption can be made that changes with respect to pupils could be attributed to the extra teacher or extra $100. The reality is that in the course of

the year, pupils and teachers become a year older and there are withdrawals and additions to student body and teaching staff. Thus, changes in the cultural ambiance of the school and even within pupils' families can be explanatory factors. Education production function studies try to control for such external factors but, Vaizey's concern remains an important caveat that must be borne in mind in the analytical discussions. Indeed, the cumulative nature of learning makes it difficult to isolate indicators of education outcomes.

As observed by Leclerq (2005), education outcomes are truly diverse and there is a great deal of arbitrariness in their definition. Several studies such as Case and Deaton (1999); McMahon (1999); Colclough with Lewin (1993) and Schultz (1995) have used enrolment rates or attainment as their measures of outcomes. Jones, Toma and Zimmer (2006) used school attendance – an output variable influenced by enrolment and number of schools in a district. Rajkumar and Swaroop (2008) used failure to complete an adequate level of primary schooling. Other notable studies such as Al Samarrai (2003); Gupta, Verhoeven and Tiongson (1999); Lee and Barro (1997) and Rumberger & Thomas, 2000) have used survival, repetition and dropout rates in their analyses. The most recent of these studies, however, have used test scores (Duflo, Dupas & Kremer, 2008; Glewwe, Ilias & Kremer 2010; Holmlund et al., 2008; Van der Berg, 2008).

The emerging consensus from a review of recent literature is that outcome variables should be an indicator of student achievement, preferably measured by internationally or nationally comparable test scores. According to Hanushek, Rivkin & Jamison (1992), these tests provide a convenient quantitative measure of differences in performance.

Hanushek et al. argue that, as a consistent instrument, test scores allow for a comparison of student performance in different environments, their strongest point being their ability to evaluate changes in the organisation and character of the school environment.

Hanushek et al. do however acknowledge the weaknesses of tests as a measure of education outcomes. They note the following limitations: (i) every available test evaluates only a very limited range of skills; (ii) there is no reason to be sure that mastery of skills tested is highly correlated with other skills which may be important in the labour market; and (iii) real skills in other areas may not be tested. The shortcomings of test scores are also corroborated by Deller and Rudnicki (1993) who argue that "knowledge", the true output of education, is not limited to the simple recall of facts but, it is also composed of the ability to reason and understand.

Attainment or simply years of schooling completed, has been frequently used in older studies. While attainment as a rough measure of individual skill in the labour force has been verified in many studies such as Mincer (1970) and Psacharapoulos and Patrinos (2004), it is a problematic indicator because it simply counts the time spent in school without judging what happens in school (Hanushek, 2007). For example, it assumes that a year of schooling produces the same skills or pupil achievement across the board. One can therefore infer that a good indicator of outcome should incorporate what happens within the school. A pass rate would meet this requirement as it involves the successful undertaking of the primary school-leaving exam. Repetition and dropout rates would also meet this requirement if they reflect academic challenges experienced by pupils as argued by Brophy (2006), Lee and Barro (1997) and the Ministerial Committee (2008). The three

indicators therefore have strengths but also suffer from limitations as measures of education outcomes.

Repetition rates can be problematic because there are two schools of thought on how repetition relates to achievement. One school espouses that schools with higher levels of repetition may generate better learning outcomes because repeating a grade may enable the retained student to do better on tests the second time around (Eide & Showalter, 2001). The second school of thought argues that any improvements from repetition are temporary and actually misleading because mastering the same curriculum for the second time around does not translate into a general advancement in knowledge (Jimmerson, Pletcher & Graydon, 2006; Brophy, 2006). In the latter argument, repetition rates are symptomatic of learning difficulties and are therefore associated with poor outcomes. This study is aligned with the second school of thought partly because of the existing evidence showing grade repetition to be associated with low achievement and dropping out (Alexander, Entwisle & Dauber, 1994; Brophy, 2006; Corman, 2003; Jimmerson, 2001) and partly because of its suitability to the context of this study, whereby an influential report on learner retention in South Africa acknowledged that grade repetition is symptomatic of learning abilities and internal inefficiencies with the schools and also that grade repetition in South Africa is generally ineffective as intervention to address early learning problems (Ministerial Committee, 2008).

The dropout rate as an indicator of outcomes is also not without controversy in the sense that students may drop out of the school not because they are weak students but for several other reasons such as dissatisfaction with school quality (Hanushek, Lavy &

Hitomy, 2006) or socio-economic conditions (Levy, 1871; UNESCO, 1984) – essentially reasons that are independent of ability. In this context, one could argue that high cases of dropouts in one school do not necessarily equate to poor outcomes. The literature concludes that the dropout phenomenon, in the end, is a complex interplay among student, family, school, and community variables, as well as risk and protective factors (Christenson & Thurlow, 2004). Cairns, Cairns and Neckerman (1989) in a US study using census data find evidence that high levels of aggression and low academic performance are highly associated with early dropouts. This would lend support to the association of dropout with poor outcomes. This is corroborated by Goldschmidt and Wang (1999) who find that early dropouts are linked with "student risk factors" such as, history of repetition, behaviour and test scores. To conclude, there is evidence that ability plays a part in the dropout phenomenon, but other reasons such as socio-economic status have been put forward. Therefore, dropout data must be interpreted holistically.

Review of Pass, Dropout and Repetition Rates in the South African Context

In South Africa, there is much controversy centring on several of the education outcomes that are widely used in the global literature. Virtually, all variables, with the exception of the limited nationally and internationally comparable test scores[2] are subject to scrutiny. Pass rates refer to the passing of primary leaving exams, usually Grade 7. In South Africa, however, these exams are not set nationally: they are set by individual schools so

[2] There are two international test scores that South Africa has participated in at the primary level: the Progress in International Reading Literacy Study (PIRLS) and Southern and East African Consortium for Monitoring Education Quality (SACMEQ). Both were done for a sample of schools, which are different samples to the one used in this study. A new dataset of primary tests scores for all public schools in South Africa was done in 2010. This dataset would be been highly useful but the Department of Education did not made this data available for use in this study.

it is an imprecise estimator. Pass rates are likely to be high on an aggregate level as weaker schools are less likely to set very competitive exams, which in turn could allow for inflated pass rates. Nonetheless, there are still cases of pupils failing the primary-leaving exam. For that reason, pass rates were incorporated into the study. The other outcome variables (repetition and dropout rates) are explored below.

Repetition Rates in South Africa

According to the Department of Education (2009), a repeater is a child who has to be held back in the same grade for reasons such as examination failure or low attendance record. Repetition rates in South Africa also tend to be problematic for four reasons. Firstly, they will be underreported at the Grade 7 level if overage pupils cannot be held back. Secondly, they can be overreported at Grade 1 level due to underage enrolment whereby Grade 1 is used as Grade R (pre-school) in cases where early childhood learning facilities are out of reach for poorer parents. The third problem is linked to South Africa's admission policy for public ordinary schools, which makes provision for a pupil to repeat only once per school phase or a maximum of four times in the twelve years of schooling (Fleisch and Shindler, 2009). The implication is that, knowing the limitation placed on repetitions, a weak pupil may only be held back in the middle or later grades when repetition is absolutely necessary rather than the early stages. Alternatively, some schools prefer to hold back a child in the Grade 1 rather than in later grades. Either case will lead to excessive or conservative repetition rates. Fourthly, according to Crouch (2005) and the Department of Education (2009) repetition rates may capture re-enrolment and not always repetition. For example, when pupils stop attending after a short period with the

intention of re-enrolling the following year, it raises the question: is the child a repeater or a new enrolee?

Concerning the fourth point, the Department of Education does not delve into the reasons why a parent would remove a child with the intention of re-enrolling the child. The underlying reasons would determine whether the child was repeating or actually re-enrolling. More often than not, the child would have been ill-prepared in terms of the foundations of social, physical, intellectual and emotional development and would need to start the phase again as was stated in the Ministerial Committee's report of 2008. Therefore, this study does not agree with the re-enrolment argument as a distinct phenomenon from repetition. In the same token, while the admissions policy and underage enrolment have to be acknowledged as influencing factors, they do not diminish repetition rates as credible indicators of learning outcomes because schools have to assess all pupils on the level of ability regardless of other extenuating circumstances. The problem would arise if a school held back a child purely because he or she was underage or any other reason outside of ability. As long as this is not the case, repetition remains a good indicator of education outcomes. The credibility of repetition rates as an indicator of ability is further demonstrated in Table 2.1 in Appendix 4 where SACMEQ data on South African schools show that low test scores and high repetition rates are strongly correlated.

Dropout Rates in South Africa

What is more controversial in the South African context is the use of dropout rates as a measure of outcome variables. According to the Department of Education (2009), the dropout rate refers to the percentage of learners who drop out of a given grade in a given

school year. The Department of Education does not collect actual numbers of learners that drop out each year. This information is calculated as a residual figure after repetition and promotion rates are estimated, which makes it unreliable given the tendency of significant under-reporting of repetition rates (Department of Education, 2009). The Department of Education's only discomfort with the statistic of dropout stems from its calculation as a residual figure.

The Department therefore proposes a non-conventional calculation of dropout rates using a life table with grade attainment. For this, a survey was conducted in 2007 using four age categories: those born between 1970 and 1974 (age 33 to 37 at the time of the survey); between 1975 and 1979 (28 to 32 years); between 1980 and 1984 (23 to 17 years) and between 1985 and 1989 (18 to 22 years). Participants of the survey were asked to specify their highest education level up to Grade 11. Therefore, a person who had only completed Grade 5 would be recorded as a dropout in Grade 6. The benefit of this method is that it would capture data of those who have left the schooling system, not to return and not just transferred to another school. The disadvantage is that it provides only historical data and does not reflect the current situation in education and therefore not helpful in policy recommendations.

In Crouch's (2005) study on the dropout phenomena, he argues that dropout rates are grossly overstated and moreover they are subsumed under repetition rates. In his illustration, if 1.6 million pupils enrol in Grade 1 and only 1 million enrol in Grade 2 the following year, it does not necessarily mean 600 000 pupils dropped out. Crouch explains that this would mostly be due to large numbers repeating Grade 1.

This study circumvents this problem in the manner in which the question is asked (see appendix 1): "*How many students did not return after completing Grade 1 last year*?" The number given would not capture repeaters; however, the shortfall is that it may capture other reasons that have nothing to do with learning abilities or problems with the school system such as a family relocating to another area. Therefore the dropout statistic has important limitations which must be acknowledged. At the same time, they also do reveal academic challenges that are triggered by the pupil's own learning abilities of inefficiencies in the school system. Table 2.2 in Appendix 4 is provided as additional evidence on the strengths of dropout rates as an indicator of education outcomes in the South African context.

Grade Variations in Repetition and Dropout Rates

Using UNESCO indicators, Fleisch and Shindler (2009) show that most repetition occurs between Grades 1 and 2 in both primary and secondary education cycles. According to the Ministerial Committee on Learner Retention (2008), repetition occurs most frequently in Grade 1 due to inadequate school readiness programmes, problems with learning abilities and high enrolments not accompanied with appropriate levels of provisioning. The Ministerial Committee (2008, p.xix) further notes: "*A problem that seems to plague Grade 1 is high repetition of the Grade, a phenomenon which is not peculiar to South Africa*". This makes analysis at the level of Grade 1 appropriate for this study. The international literature also places a great deal of emphasis on Grade 1. For example, proponents of repetition have argued that while it is counterproductive to make older

students repeat, it is helpful to hold back children in kindergarten or Grade 1 (Brophy, 2006). Therefore, Grade 1 level is used in this study for both repetition and dropout rates.

Additionally, the study uses Grade 5 dropout rates in accordance with the Ministerial Committee on Learner Retention (2008, p.4), which states "*the survival rate to Grade 5 of primary education is of particular interest since this is commonly considered as a prerequisite for sustainable literacy*". Survival rate to Grade 5 is also used as one of the dependent variables in Al-Samarrai's (2002) cross-country study. The questionnaire used in this study asks: "*How many students did not return after completing Grade 5 last year?"* Again, the potential shortfall is the overestimation of dropouts if students are in fact transferring to another school.

Finally, the study incorporates Grade 7 repetition to supplement the pass rates variable. A pupil would repeat Grade 7 if they did not perform well in the course of the academic year and also performed poorly in primary leaving exam and were also still within primary school age threshold. Therefore Grade 7 repetition is also a measure of achievement in the absence of actual scores but, it may also be a conservative estimate because would-be repeaters who are over the primary school age threshold cannot repeat and would have to transfer to an adult learning institution.

An important question that arises is: why would we find variations in outcomes by grade level? Why for instance would there be an impact in terms of Grade 1 repetition but not in Grade 7 repetition? Why should grade level matter? In Guryan's (2001) study where he finds significant outcomes for Grade 4 test scores but not in Grade 8, he is unable to

provide a clear explanation and defers it as an area for further research. Hanushek (2007) in his review of EPF studies, emphasises the difficulty in interpreting the results of the study by Word et al. (1990) where class size emerges to have an impact in the first year of schooling on student outcomes but not in later years of schooling.

Alexander, Entwisle and Dauber's (1994) review of retention in Baltimore's public schooling system offers some insight. They note that Grade 1 retention is distinctive because of the stresses around entry into a school. Grade 1 pupils must learn what kinds of behaviours are acceptable, adjust to school routine and begin serious academic work, whereas children retained later would have had some years of satisfactory performance. In comparing the performance of Grade 1 repeaters to Grade 5 repeaters, they find a striking difference. While both groups exhibit academic challenges, Grade 1 pupils have poorer academic skills on average. In addition, they are less invested in classroom activities; they are less popular with their peers and behave badly in classrooms.

Therefore, Grade 1 retainees' profile reflect challenges on many fronts, which is why analysis of outcomes should be distinguished by early and advanced grades in the primary school system. Grade 1 repetition is potentially the most relevant outcome variable for this study and would seem to be the most appropriate indicator to base policy recommendations on because of the pervasiveness of repetition at this level not only in South Africa but globally and its accuracy compared with the other outcome variables in capturing cognitive challenges. The other outcome variables are still used and additionally, the empirical analyses incorporate educational outputs, specifically measures of school facilities – an indicator of school quality – in the quantitative analysis.

Review of Education Input (Explanatory) Variables

Introduction

> *"Such a seemingly straightforward question – what determines the outcomes of education? – has generated volumes of controversial research over the years, and the end is still not in sight. Education policymakers and administrators have looked into this literature for guidance and found few clear-cut results to guide them. In the end, education is a complex enterprise and decision-makers still have to fall back on their experience and practical judgement" (Boissiere 2004, p.1)*

The statement by Boissiere sets the tone for the complexity and continuing ambiguity in our understanding of the factors that yield desirable education outcomes. Many researchers trace the origin of empirical studies of education outcomes to the 1966 Coleman report, which stirred some controversy by asserting that variations in school resources did not explain variations in academic achievement. Coleman et al. (1966) argued that socio-economic status (SES), as determined by parental education, profession and income were the critical factors that determined outcome when compared to other school inputs. Since the Coleman report, several studies have been conducted; some are in-country studies (mainly in the USA and UK) and others are cross-country studies but all have varying methodologies and wide ranging and often conflicting results. The controversies have often centred on key explanatory factors such as the roles of socio-economic factors, additional resources, especially public spending and specific school inputs such as, class size, school governance and teacher characteristics. These are critically reviewed in the sections that follow.

The Role of Socio-economic Status

Socio-economic status (SES) usually refers to a number of family background characteristics such as parental education, profession and income (Boissiere, 2004). As previously mentioned, the Coleman report was the first report that placed socio-economic status at the heart of the debate. In a review of the education production literature, Leclercq (2005) reviews an influential UK report conducted a decade after the Coleman report by Ruter et al. (1979) which also showed that school inputs had a modest but significant impact on learning outcomes but again family circumstances, socio-economic background and individual ability mattered far more than school inputs. The importance of SES was however put into question by Heyneman (1979), who surveyed a large sample of students in Uganda and found socio-economic status not to be an important factor in determining outcomes. Heyneman found that the socio-economic status of Ugandan children had little influence on their academic performance. What was a more significant determinant of education outcomes was their level of self-confidence – a characteristic that was found to be independent of socio-economic background.

Many other studies however, have found SES to be important. In Deller and Rudnicki's (1993) education production function analysis of schools in Maine, USA, peer and family influences were found to be the most important factors in determining student achievement. Lee and Barro (1997) also found family background as measured by income and education of parents to be important for education outcomes. Similarly, Bishop (2003) in a cross-country study, using TIMMS data, found parental education to be a significant explanatory factor in education performance. He also found that students

in geographically isolated communities performed worse than those in urban areas and GDP per capita to be positively correlated with mathematics achievement.

In the South African literature, SES seems to matter fairly consistently. Case and Deaton (1999) found that pupils in better-off black households do better in their education. In their findings however, SES had no impact on the white population. The only explanation offered by Case and Deaton for the lack of impact on the white population is the small sample size. It may also be linked to the little variation in SES among the white population. Thomas (1996) using 1991 census data found parental education to be important for schooling outcomes. This finding was also corroborated by Lam (1999). Thomas (1996) further found that among the black population, the impact of a mother's education on a daughter's schooling was significantly larger than the impact of the father's education. In Van der Berg's (2008) study, socio-economic differentials at the school level played a major role in educational outcomes at the primary school level in South Africa. Using hierarchal linear modelling and quantile regressions, he controlled for geographic location, school equipment and school building and found that students in rich schools performed better in reading and mathematics. This was not the case for students in poor schools. On the whole, the literature appears to support the claim that SES matters for education outcomes in South Africa but it matters more in certain groups and the relationship may be non-linear whereby the relationship between SES and achievement is stronger in the poorest quintile (van der Berg, 2008).

Class Size

Class size is often used interchangeably with pupil-to-teacher ratio but the two differ conceptually. Class size refers to the number of students under the instruction of a teacher whereas the pupil-to-teacher (PT) ratio refers to the proportion between the number of students in a school and the total number of educators, including administrative staff (Zuze, 2008). This distinction, however, is not applied in many studies. For example, in Lee and Barro's (1997) calculation of PT ratio, they specify that teachers refer directly to persons engaged in instructing a group of students; these may be full or part time teachers. Therefore, supervisory and other personnel are only included if they have regular teaching responsibilities. In the literature review, a distinction is not made between class size and PT ratio. The two are used interchangeably. The definition becomes more important in the data analysis (Chapters 6 and 8) whereby the PT ratio is defined in line with Lee and Barro's definition and further includes a secondary measure (ratio of pupils to classrooms) to equally capture the effect of class size.[3]

Advocates of small class sizes argue that they are associated with better learning outcomes as smaller classes allow for individualised instruction, higher quality instruction, greater scope or innovation, student-centred teaching and increased teacher morale (Hattie, 2005). Another argument in favour of small class sizes is that there is a tendency for teachers in large classes to promote rote learning (learning something by repeating it many times rather than by understanding it) as compared with problem solving skills (Lee & Barro, 1997). Additionally, smaller classes reduce a student's

[3] Crouch and Mabogoane (1998) also use this variable, which they refer to as Learner-Classroom Ratio.

propensity to disrupt class due to closer supervision and enables teachers to better tailor instruction to individual students (Krueger, 2002).

However, there are also counter claims against the purported benefit of small class size by scholars who argue that the evidence in support of class size is weak and the effects of reducing class size are small and not significantly different from large class sizes (Hattie, 2005; Hanushek, 1998). The literature on class size typically make reference to Eric Hanushek (1981, 1986, 1995, 1998 and 1999) who has long argued that school inputs, including class size have no systemic impact on student performance. In a vote counting exercise, Hanushek (1999) found only 13 percent of studies on class size to be statistically significant and in favour of smaller classes; 15 percent were negative and 72 percent were not different from zero. Krueger (2002) disputed these conclusions arguing that Hanushek did not define his criterion for strong or consistent relationships and drew conclusions from sample estimates that were likely to find positive effects of small class sizes on achievement as they were to find negative effects. Furthermore, Krueger argued that a majority of Hanushek's estimates were statistically insignificant. If focus was placed on studies with large samples, it would reveal a clear trend that class size matters.

In other studies, Card and Krueger (1992) found PT ratio to be important in determining education outcomes in the US if measured by the rates of return to education (earnings). Akerhielm (1995), Krueger (2002) and Lee and Barro (2001) all found smaller classes to be associated with achievement. Similarly, Jones, Toma and Zimmer (2008) found that in addition to class size, school size and district size have an inverse relationship with school attendance rates – an alternative measure of education output. Hoxby (2000)

however, found no systematic effect of class size in her regression discontinuity estimation of Connecticut schools. In a review of nine studies in developing countries, with a mean class size of 44, Fuller (1987) found no difference in learning outcomes relating to class size. Wossman and West (2006), in examining the effect of class size on achievement in 11 countries, found beneficial effects of small class sizes in only two countries. They noted that the class size reduction has an impact in the context of good quality teaching. Therefore a policy focus on capable teachers is more useful than reducing class size.

It is important to emphasise that the studies that dispute the benefits of small class sizes do not present evidence showing that small classes result in poor outcomes; they simply argue that there is lack of evidence showing a strong association between small class size and good learning outcomes. Moreover, the effects of class size on achievement may be non-linear. Glass and Smith (1978) found a reduction of class size from 40 to 20 resulted in a close to zero increment in achievement, but when further reduced to 15 pupils or lower, the increments were much larger. According to Hattie (2005), the lack of evidence is explained by the tendency of teaching methods to remain the same regardless of changes in class size. Finn, Gerber, Achilles and Boyd Zacharias (2001) provide evidence to the effect that actual impact on achievement as a result of class size reductions have more to do with peer influences. In this context, smaller classes provided more visibility of the individual and there is more pressure to participate and therefore benefits of small classes relate more to student effects rather than teacher effects.

Class size: Evidence for South Africa

The evidence for South Africa also appears to be mixed. Crouch and Mabogoane (1998) found PT ratio to be insignificant in explaining outcomes and learner-classroom ratio to be only relatively slight in its effect. Case and Deaton (1999) found strong and significant effects of PT ratio on enrolment and numeracy test scores, although, this was only true for black students and not of other racial groups. Van der Berg and Louw (2006) however, pointed out that Case and Deaton's finding for black students can be explained by the timing of the study: it was shortly before the end of apartheid when PT ratios were considerably higher in black schools. Van der Berg and Louw (2006) in their analyses of data from the Southern African Consortium for Monitoring Educational Quality (SACMEQ) also found class size to be statistically insignificant in explaining outcomes.

Teacher Characteristics

The impact of teacher characteristics on education outcomes is one of the most heated areas in the education literature. Teacher characteristics may include teacher qualifications, experience, training, salary (if determined by qualification), level of preparedness, teaching approach and absenteeism. It would seem logical that poorly remunerated teachers may lack the incentive to teach; poorly trained and inexperienced teachers would undermine the quality of instruction and not meet the needs of the students and chronically absent teachers would adversely impact learning. The literature is inconclusive on these arguments. The much cited studies by Hanushek (1986, 1981 and 1995) found that many attributes of teacher characteristics have no real impact on academic achievement. In Hanushek's (1995) study that summarises 96 studies on the

estimated effects of resources on education in developing countries, the majority of studies that focused on teacher education were statistically significant and positive but, the majority of studies on teacher experience and salary were statistically insignificant. In his view, differences in school quality are better explained by teacher "skills" – an indicator that captures background and training, and also choices on presentation styles and curricular materials (Hanushek 1981).

In contrast to Hanushek's findings, Lee and Barro's (2001) cross-country study of 58 countries found that teacher salary had a positive impact on reading scores. The impact of teacher incentives was found to be mixed. In a study on schools in Kenya, Glewwe, Illias and Kremer (2010) found that increasing incentives for teachers had little or no effect on dropout rates and test scores but in Israel, an incentive programme in the form of cash prizes to teachers improved test scores and participation in high school matriculation exams (Lavy, 2002). In Botswana, Zuze (2010) found a clear association between teacher content preparation and student achievement, suggesting that teacher preparation is important in outcomes. Bishop (2003) also found teacher influence (ability of individual teachers to influence curriculum and decide on teaching methods) as significant in generating good learning outcomes.

Given the prevalence of teacher absenteeism in developing countries, for example, on an average day, 27 percent of teachers in Uganda do not report to work (JPAL, 2009), there is a fair amount of literature examining whether interventions to curb absenteeism results in improved learning outcomes (see for instance, Duflo and Hanna, 2005 and Chaudhury, Hammer, Kremer, Muralidharan, & Rogers, 2006). Duflo, Hanna and Ryan (2008) found

that in a programme that increased teacher attendance from 58 to 79 percent, 7 percent more girls were able to write. In rural India, the installation of cameras at the schools led to a reduction of absenteeism by 20 percent and a year later, test scores were significantly higher (MIT, 2009).

Teacher Characteristics: Evidence for South Africa

In the South African literature, the research on teacher characteristics has also produced mixed results. Van der Berg and Louw (2006) found teacher absenteeism and teacher quality (measured by a dummy variable indicating that the mathematics teacher has a degree and another indicating that the teacher has teaching training) to have a large effect on test scores. In an earlier study, however, Van der Berg and Burger (2002a) found that teacher salary did not explain the differentials in the performance of black students in the Western Cape. Crouch and Mabogoane (1998) found little evidence that teacher experience mattered for education outcomes although additional teacher training does matter. Crouch and Mabogoane's regression results show that one more year of additional training yields a 16 percent increase in pass rates. In a later study, Crouch and Mabogoane (2001) find that increasing "quality-oriented" resources such as teacher qualifications and teacher behaviour is useful for outcomes.

Fiske and Ladd (2005) in their study of academic achievement and resources at the secondary level in South Africa, found evidence to support the argument that teacher characteristics matters. Using 2001 data on matriculation results, enrolment statistics and 4 teacher variables (ratio of state-paid teachers to learners, ratio of SGB funded teachers to state-paid teachers, average quality of unqualified teachers and proportion of

unqualified teachers) in the Western Cape, they found a strong statistically significant relationship between weighted test scores and three out of four teacher variables. Controlling for socio-economic status, the study revealed that increasing teaching staff by more than 30 percent resulted in 5 to 7 percent difference in pass rates.

School-Based Management

School-based management (SBM) – the devolution of authority from central government to principals, teachers, parents, communities and sometimes students – is gaining widespread acceptance globally. The theoretical appeal is strong: through participative decision making and autonomy, schools under SBM can be more efficient in the use of resources and respond better to local needs (Santibanez, 2006) and schools and parents who are interested in maximising their children's learning outcomes have incentives to make decisions that will impact positively on the learning process (Hanushek & Wossman, 2007b). It is from these arguments and the empirical evidence (discussed below) that SBM interventions in South Africa, namely, Student Governing Bodies (SGBs) and Parent Teacher Associations (PTAs) are incorporated in this study as potential explanatory variables.

The existing empirical evidence demonstrating a relationship (or lack of one) between SBM and education outcomes is limited and mixed at best. Wossman (2003) in his cross-country analysis of education outcomes concluded that the following elements of SBM were significant in student performance in terms of cognitive tests: school autonomy in process and personnel decisions; individual teachers having both incentives and powers to decide on appropriate teaching methods and encouragement of parents to take interest

in teaching matters. He argued that it is these differences in educational institutions that explain variations in student performance and not differences in school resources.

Barera-Osorio et al. (2009), in their comprehensive review of SBM initiatives across the globe, found that several of the studies that they reviewed, showed positive results of SBM interventions in reducing repetition and failure rates but were associated with mixed results in terms of impact on test scores. In Latin American countries, where the most extensive empirical analysis has been conducted, there was evidence of a positive and significant impact of SBM in reducing repetition, failure and to a lesser extent, dropout rates in countries such as Brazil, El Salvador, Honduras and Mexico but in two of those countries, Honduras and in Brazil, there were no improvements in test scores. What is evident from the reviews is that SBMs appear to have a positive impact if measured by repetition and failure but yield mixed results when measured by standardised test scores. The authors attempted to explain the anomaly by attributing it to timing: in their estimation, SBM need more time (at least 8 years) in order for the benefits to manifest in test scores. The timing explanation is limited as Brazil was assessed after 11 years of reform and Honduras, 13 years. Therefore, the relationship between SBM and outcomes remained ambiguous.

The evidence for African countries is very limited. Barrera-Osorio et al write extensively about the Kenya experience, drawing from Duflo, Dupas and Kremer's (2008) randomised experiment in which school committees appointed and evaluated teachers, leading to significantly improved test scores after 18 months. This study was actually about assessing the impact of "tracking" (dividing students to different classes by initial

ability) and was not designed to isolate the impact of SBM on learning outcomes. There are other studies that evaluate SBM (for instance, Chapman, Barcikowski, Sowah, Gyamera & Woode, 2001; Kai-Ming, 1994), but while they reveal interesting findings such as limited effectiveness of SBMs due to lack of understanding of the educational process by community members, these studies do not give much information on the actual impact on education outcomes. The South African literature presents the same dilemma where a number of scholars have analysed the effectiveness of SGBs (Bush et al., 2008; Lewis & Naidoo, 2006; McPherson, 2001 In Karlson, 2002; Sayed, 1997) but presented virtually no empirical evidence on their impact on outcomes. This is a topic that would require extensive research in the future. This study presents preliminary findings on the relationship between SGB/PTAs and education outcomes in Chapter 8.

Role of Public Expenditure

There is real scepticism about resources being an important determinant of education outcomes. This concern is well captured in the quote below:

> *"It is widely argued that the great need in schooling is more money to build more facilities and to pay higher salaries to teachers in order to attract better teachers. This seems a false diagnosis. ... The problem is not primarily that we are spending too little money – though we may be – but that we are getting so little per dollar spent." (Friedman, 1962, p. 93).*

Milton Friedman's concern about resources is still valid today as evidenced by continuing contradictory findings on this topic. Proponents of resources as an important input in education outcomes, such as Case and Deaton (1999) argue that the work by Hanushek and other similar studies that find inputs ineffective are fundamentally flawed and are of very mixed quality. Aside from their tendency to focus on developed countries, many of

these studies were never peer reviewed and for those still available, it is difficult to find what data were used and how the analysis was done. Case and Deaton further argue that the econometric procedures, including the Gauss-Markov theorem are too "exotic" and raise doubts about the validity of the results. This methodology also does not tell us what variables are being controlled for. In reviewing the various studies, Case and Deaton concluded that a closer look at the individual studies showed findings that are often far from suggesting that resources do not matter. In fact, there are various high quality studies that suggest resources do matter.

One study that finds resources to be important is Guryan's (2001) study on education finance in Massachusetts, where he found that increased educational funding for historically low-spending districts led to improved student performance. Public schools in the US are traditionally controlled and funded at the local level, which means that the taste for education, property tax rates and labour costs understandably drive much of the variation in education spending. Guryan's study however, showed state equalisation schemes (a formula designed to redistribute income by giving more aid to poorer districts) could be a source of variation that explains the causal relationship between spending and student outcomes. According to the study, estimates based on variation in spending caused by state aid formulas result in improved Grade 4 test scores and improved performance by low scoring students even though the results for Grade 8 pupils showed no evidence of an effect of spending on mean test scores.

In a UK study, using Panel data of 13,000 primary schools, Holmlund, McNally and Viarengo (2008) found a positive and significant effect of expenditure on achievement.

Given the concerns raised about the quality of data as one of the major problems in EPF studies, this particular study adds value to the body of literature because of the use of a comprehensive census data. Their findings are based on OLS regressions and a falsification test which essentially compares the impact of expenditure inputs during pupils' enrolment and after pupils leave primary schools. They concluded that resources matter (taking endogeneity of education funding into account) but they mattered even more for economically disadvantaged pupils. McMahon (1999) found the impact of public spending on enrolment to vary depending on male or female enrolment and whether the explanatory variable is recurrent expenditure or recurrent expenditure per capita.

Evidence from Developing Countries

A review of the literature focusing on developing countries shows the same inconsistency on the importance of resources. A cross-country study by Al-Samarrai (2002) relied on a dataset containing between 33 and 90 developed and developing countries (depending on the dependent variable used). The study explored the extent to which differences in the resources allocated to education explained differences in educational access and performance across countries. In measuring public spending, the study used three different variables: public primary education spending as a proportion of GNP, primary education expenditure per pupil and primary student-teacher ratio. Four dependent variables were also used in the analysis: primary gross enrolment ratio; primary net enrolment ratio, survival rate to primary Grade 5 and primary school completion rate.

Levels of urbanisation, the Muslim population and a set of regional dummies were included as additional control variables.[4]

The cross-country analysis showed a weak relationship between public spending and education outcomes. Of the three measures used for public resources, only per pupil spending showed some significance in explaining cross-country variations in education outcomes. Nonetheless, the impact was small; large increases in per pupil spending resulted in small improvements in primary education outcomes (enrolment and completion rates).

In a cross-country study of 50 developing and transition countries, Gupta, Verhoeven and Tiongson (1999) found that total education spending hardly affects outcomes but the proportion of primary and secondary spending in total spending has a positive and significant impact. Pritchett and Filmer (1999) found in their survey of developing countries, that resources only marginally affect education quality, however, they also found that there could be significant efficiency and productivity gains by allocating expenditure to areas of high marginal productivity, such as learning materials (textbooks and other types of instructional materials).

The evidence in Africa specifically, is also mixed. In examining the relationship between public spending and education outcomes in African countries, Al-Samarrai (2003) found that in Malawi and Botswana, when dropout rates were regressed against per pupil

[4] In the case of urbanization, it was included as it is easier to provide educational services to more densely populated areas and household travel costs may be lower in urban than rural areas; some studies have shown that countries with large Muslim populations tend to have poorer education outcomes (Al-Samarrai, 2003).

expenditure, the regression line actually showed higher expenditure to be associated with *higher* dropout rates, thus, confirming a lack of consistency in the link between resources and education and the direction of the relationship between public spending and education outcomes.

In South Africa, there is an ongoing debate among academics on the value of resources. Advocates of resources as a key input in education outcomes argue that education expenditure, even if increasing, is still inadequate to meet educational demands. According to Reschovsky (2006, p.43), "*Although more money alone will not guarantee an improvement in the quality of education, the absence of sufficient financial resources devoted to education almost certainly ensures that students will remain undereducated*". There are also researchers such as Crouch (1998) who attribute educational problems to a combination of resources constraints and poor management at school and/or district levels. Then, there are those who link poor education outcomes exclusively to bad management. According to Taylor (2001, p.15), "*All the evidence at our disposal indicates that the disparities in learning outcomes between successful schools and their less successful neighbours are essentially due to differences in their management practices.*"

Summary of public spending and education outcomes: cross-country evidence

In summarising various multiple regression results that try to explain education outcomes, Fiske (2000) arrived at the conclusion that increasing specific education inputs generally matters more for low-income countries than for higher-income ones. In other words, resources matter when they are added to an already low resource base. Then, at a

certain level, one observes diminishing returns – this aligns with general interpretations of production functions. In the end, cross-country estimates of the impact of resources on education outcomes show no consistency.

In reviewing the cross-country evidence, Al-Samarai concluded that the levels of household spending, the effectiveness of PEM and the composition of public education spending are more important factors in explaining this weak link. He cautioned, however, that the findings do not mean resources are unnecessary and it would be misleading to conclude that resources are unimportant for education as schools require buildings, books and other learning materials. Al-Samarrai arrived at the conclusion that that cross country studies are limited.[5] Country case-studies would therefore be required to unpack the relationship between public expenditure and education outcomes. Wossman (2003) argued that in-country studies are however, limited. For instance, examining institutional effects in educational production can hardly be tested using country-specific data as there is no significant variation in many institutional features within a single country. Rather, international evidence, encompassing many educational systems with varying institutional structures can explain variations in education outcomes. Indeed, this is an important strength to cross-country studies despite their many limitations already mentioned. This study aims to test for institutional variation in a single-country while arguing that there is substantive variation at the sub-national level, where local education

[5] The author had also noted that although cross-country econometric analyses are useful in establishing the importance of variations in public spending in explaining education outcomes, many key variables are not available on a cross-country basis. In addition, cross-country relationships may be very different from those within a country over time. Furthermore, there is a lack of cross-country data to measure the effectiveness of PEM on education outcomes. Therefore cross-country analyses are limited and do not give a picture of the dynamics of educational financing and progress for any particular country.

offices have some operational autonomy and therefore exhibit differences in carrying out their service delivery functions.

2.3 Public Expenditure Management and Education Outcomes: Review of Selected Case-Studies

This section will review some of the country case studies, particularly those countries that have successfully implemented a public expenditure tracking survey (PETS) to address questions of governance in the areas of efficiency and equity of public spending and service delivery. To date, PETS have been conducted in many countries including but not limited to: Albania, Cameroon, Chad, Ghana, Honduras, Indonesia, Kenya, Madagascar, Mali, Mozambique, Namibia, Nigeria, Papua New Guinea, Peru, Rwanda, Senegal, Sierra Leone, Tanzania, Uganda and Zambia. From these, the discussion below will review the cases of the African countries where a PETS has been conducted in the education sector. The findings will be discussed around three main themes: leakages, delays and accountability.

Findings on Leakage

Leakage refers to the misappropriation of funds whereby local officials divert education resources for other purposes or for private gain. It is perhaps the most significant and astounding finding from the various PET surveys conducted in Africa. As discussed earlier, Uganda was the first country to implement a PETS in 1996. The study revealed that on average, only 13 percent of the annual capitation grant[6] from the central government reached schools between 1991 and 1995 (Reinikka & Svensson, 2001).

[6] Capitation grants are subsidies provided to public schools on a per student basis.

District officials captured 87 percent for purposes unrelated to education. This level of leakage confirmed initial suspicions and led to policy changes. It also led other countries to emulate the PETS.

The Uganda Case-study is particularly interesting and inspiring for this thesis because it demonstrated clearly, the extent to which inefficiencies at the local level can allow for misappropriation of funds. What the study did not show strongly were the salient elements that allow leakage to thrive in specific contexts as evidenced by the case of Zambia. In Zambia, when funds were disbursed through "legislative" funding (a fixed amount of $600 per school), more than 90 percent of schools received their funding (Das, Dercon, Habyarimana & Krishnan, 2004). When funds were channelled to schools at the discretion of district authorities, less than 20 percent of schools received their funding. This showed that allowing districts to disburse funds at their discretion potentially facilitates misappropriation. There was also evidence that in-kind transfers also facilitated leakages. In the PETS experiences of Ghana and Madagascar, the propensity for leakage was greater for in-kind transfers rather than cash transfers (Gauthier, 2006). Additionally, in Madagascar, leakage was more rampant in schools that were far from the capital. Therefore, the more remote the location of a school, the greater the likelihood of funds being diverted for other purposes.

The PETS studies provided evidence that leakages can be rampant in countries that have a complex system of transferring funds. A PETS conducted in Tanzania in 2003 revealed leakage of less than 5 percent However, it turned out that the finding was a gross underestimation because it was not apparent to the consultants that two other ministries,

in addition to the Ministry of Finance (Ministries of Education and Local Government) were also charged with disbursing education funds. Subsequently, what initially seemed like minimal leakage, turned out to be considerable leakage of approximately 40 percent. The study attributed leakage to Tanzania's complex system of transferring funds – one that involved three separate ministries as well as distinct transferring and reporting mechanisms and channels (Sundet, 2007).

Finally, the literature review of the country case-studies showed that information asymmetry, whereby schools are uninformed about decisions taken on education resources, can allow for extensive leakages, as was found in Madagascar and Tanzania. In Madagascar, only 35 percent of schools reported that they knew what they were meant to receive (Gauthier, 2006). In Tanzania, head teachers and school committees were not knowledgeable about their entitlements (Sundet, 2007). Of the 10,000 Tsh capitation grant, schools were entitled to 6,000 Tsh (with the remaining 4,000 Tsh to be used by local government to purchase books for the schools). When asked how much schools should be receiving, the average answer was 3,200 Tsh.

Findings on Delays

Delays and bottlenecks in the allocation of resources through public administrations have been identified in tracking surveys as a potentially serious problem affecting quality of services. In Tanzania, there was evidence of delays in disbursing school subsidies and the processing of non-wage funds, ranging from 6 to 42 days at the Treasury (Gauthier, 2006). When Rwanda conducted a PET survey in 1998, it was observed that delays in the payment of capitation grants occurred between the submission of a funding release request

by the line ministry and the authorisation by the Ministry of Finance and most of the money arrived in the fourth quarter of the budget year (Fofack, Obidegwu & Ngong, 2003). Explanations for delays were linked to the unpredictable pattern of fund inflows to the Government due to the volatility of external budget support, the seasonality of revenues, and poor cash management in Ministry of Finance and the discretion of regional authorities.

The timeliness of payment of salaries varied among countries. In Rwanda for instance, about 13 percent of teachers did not receive their salaries regularly and 82 percent of teachers reported salary arrears in 2003 but, in Zambia, 95 percent of staff were paid on time (Gauthier, 2006). In Uganda, there was only anecdotal evidence of delays; by and large, salary payments were made on time (Ablo & Reinikka, 1998). None of the studies, however, assessed the impact of delays on education outcomes.

Findings on Accountability

Issues of accountability are vital in education. In the education sector, teachers are accountable to head teachers; head teachers to district and provincial education officers; these officers to education ministries; ministries to politicians and politicians to client-citizens (Reinnika & Smith, 2004). In most cases, schools are also accountable to parents as customers paying for a service. This is particularly true where parents are involved in school decision-making bodies. Public expenditure tracking surveys in education are instrumental in shedding light on the accountability links between schools, parents and government bodies.

PETS are able to expose weaknesses in internal controls that allow for inefficiencies in public spending. The Rwanda PETS found rampant lack of accountability in these offices, with poor bookkeeping and lack of internal financial controls and auditing requirements (Fofack, Obidegwu & Ngong, 2003). Most education officials interviewed in the study (92 percent) indicated knowledge of instructions on the utilization of public funds but 25 percent found these instructions less than clear and many of the school administrators could not provide any copy of the instructions during the survey (Fofack, Obidegwu & Ngong, 2003). Lack of accountability mechanisms in the education sector, saw some schools in Kenya, receiving more allocations than required (Gauthier, 2006). The survey also revealed that schools in Kenya maintained poor records and that funds were diverted for personal gain at the schools As previously mentioned, Tanzania's complex system of disbursement made it difficult to monitor and enforce public financial accountability.

Lessons from Case-studies

It has often been the case that the prescribed solution to poor social services is to increase resources. What these case-studies have shown is that the solution does not always lie in increasing resources as there may be blockages in the public system and other governance constraints that prevent even well-meaning governments from achieving their goals. Governments need to periodically conduct tracking surveys to find out where the problems lie so that they can be corrected. Therefore, improving PEM as a whole, rather than just focusing on budget allocations, may be critical for effective service delivery. In terms of accountability, it is important to note that the failure of accountability does not automatically lead to a failure in service delivery as an inadequately financed or

monitored agent can still perform well if motivated by a sense of duty (Reinnika & Smith, 2004). Nonetheless, the likelihoods are slim as agents may become demoralised if other colleagues are corrupt or non-performing.

2.4 Conclusion

The review of the literature presented the pros and cons of the various indicators of education outcomes, while highlighting Grade 1 repetition to be the strongest of the outcome variables internationally and in the South African context. With regards to the input variables, the literature is divided on the merits of class size reductions, teacher characteristics and public expenditure. There is wide support for socio-economic status as a determinant of education outcomes and limited evidence of school-based management as a determinant of education outcomes.

The review of country case-studies that examine the relationship between PEM and education outcomes in Africa revealed that leakages occur at an alarming rate in many African countries that have weak accountability systems and complex public financial management systems. Leakages and issues around accountability are also well documented. Nonetheless, this is a research area that has largely been dominated by World Bank economists. Therefore, there is a gap in terms of diverse contributions to the field, which is only starting to gain recognition as issues of governance and development challenges such as unemployment, weak human resource capacity and skills shortage– all of which have strong links to problems in educational quality – are brought to the forefront of the global development agenda.

With more evaluative research, it is becoming clear that merely increasing resources is not enough and good governance and the management of resources may be conditional to good education outcomes. The PEM-education nexus effectively shows that elements of accountability, transparency, technical and allocative efficiency potentially have a significant impact on education outcomes.

CHAPTER THREE

OVERVIEW OF PUBLIC EXPENDITURE MANAGEMENT AND EDUCATION IN SOUTH AFRICA

3.1 Introduction

After over 300 years of colonial and apartheid rule, South Africa consolidated democracy in 1994 and put an end to a long history of oppression of black South Africans by a white minority. The new democratic administration proceeded to establish and entrench a system of democratic governance with a strong emphasis on individual and collective rights. A significant milestone in South Africa's process of consolidating democracy was the promulgation of the 1996 Constitution – a document that has evoked world-wide acclaim. It placed high emphasis on equal opportunities for all, such as the right to education, which has led to some remarkable gains in social service delivery.

The legacy of apartheid however, left South Africa with strains of severe socio-economic problems. Many of these socio-economic problems are rooted in the history of education in South Africa because the former apartheid government had entrenched an inequitable system whereby black South Africans would receive a sub-standard level of education (referred to as Bantu education). These educational challenges and other socio-economic constraints necessitated government initiatives to address socio-economic rights as a priority while ensuring that public expenditure remained under control and properly managed through legislations on the use of public funds.

This chapter provides a contextual overview of public expenditure management and primary education in South Africa. It begins with a description of the governmental system, which was restructured in 1994 to create three spheres (central, provincial and local). These decentralised structures have important implications for both PEM and educational service delivery. It then goes on to provide a background on the state of PEM and educational quality and outcomes in South Africa.

3.2 Overview of National and Sub-National Government Structure

Introduction

The 1994 Constitution established three separate spheres of government: a national government, nine provincial governments and 284 local governments (Yemek, 2005). Each sphere was assigned its own powers, functions and responsibilities. The national government, with overall responsibilities for managing the country's affairs, would share responsibilities for service provision with sub-national governments. The national government's power to intervene in the decisions of provincial or local government is defined and limited by the Constitution. Exclusive functions for the national government includes national defence, the criminal justice system, higher education and other administrative functions such as tax collection. Provinces are largely mandated to deliver most of the basic services, including basic education, health and welfare. Local governments have the major responsibility for local services and infrastructure such as water, sanitation, and electricity.

Intergovernmental Relations

Intergovernmental relations, including the devolution of revenue and expenditure at the sub-national governmental level, are established by the Constitution. The Division of Revenue Act of 2005 annually allocates national revenues to the three spheres of government (vertical split) and among the nine provinces in a horizontal split. The intergovernmental system faces three key challenges (National Treasury, 2007). Firstly, there is a misalignment between policy objectives and resource allocation and therefore, budget items that are under-funded are rarely implemented. This is an important context for this study because it cautions that education policies set at a national level may not be fully funded and implemented at the sub-national level due to a misalignment of policy and allocation.

The second challenge pertains to accountability, whereby it is not always clear which sphere or political bearer is to be held accountable for delivering functions that are concurrent. In education for instance, implementation failure may not be the fault of the implementer, which is the provincial government; it may lie with the national sphere for not properly funding it from the onset. The third challenge raises questions as to whether the configuration of certain functions lends itself to inefficiency and ineffectiveness even though the Constitution provides for functions to be assigned to spheres that will presumably administer them most effectively. Section 3.5 of this chapter shows clearly that provinces and districts play an important role in managing education funds and delivering education services. In Chapter 7, the technical inefficiencies plaguing the effectiveness of the district education offices lend support to this last challenge.

3.3 Public Expenditure Management in South Africa

Introduction

The South African Government has established several mechanisms and legislative frameworks in accordance with the Constitution in an attempt to improve and sustain sound public expenditure management. Key developments include: the Annual Division of Revenue Act (Equitable Share Formula) for the division of revenue between provinces; the Public Finance Management Act (1999); the Municipal Finance Management Act (2003); the Intergovernmental Relations Framework Act (2005); the National Economic Development and Labour Council (1994); and the Medium Term Expenditure Framework (1997). These are elaborated below.

Policies and Institutions for Public Expenditure Management

The Equitable Share Formula is the basis by which revenue is shared among provinces. The formula contains several components – shown below with assigned weights for 2010 in brackets (Government of South Africa, 2010):

- Education share (51%) based on the size of the school age population in a province (ages 5-17 years) and the average number of learners enrolled in the public ordinary schools in the last three years;
- Health share (26%) based on the population with and without access to medical aid;
- Basic share (14%) based on each province's share in the national population;
- Economic activity share (1%) based on GDP by region;
- Institutional component (5%) divided equally among provinces; and
- Poverty component (3%) to reinforce the redistributive component of the formula

These weights are in fact guidelines as provincial governments have the flexibility in allocating funds as deemed appropriate. Furthermore, provinces may receive a higher allocation depending on certain demographic characteristics such a high ratio of school-age children. In addition to these equitable shares, provinces also receive additional grants. This will be discussed in more detail later in the chapter.

The Public Finance Management Act (1999) provides for the establishment of provincial treasuries, headed by the MEC for finance in the province. The provincial treasury is charged with (a) preparing a provincial budget (b) exercising control over the implementation of the provincial budget (c) promoting and enforcing transparency and effective management in respect of revenue, expenditure, assets and liabilities of provincial departments and provincial public entities and (d) ensuring that its fiscal policies do not materially and unreasonably prejudice national economic policies. Provincial treasuries are to submit to the National Treasury at least quarterly, a statement of revenue and expenditure for publication in the national Government Gazette.

Typically, national annual budgets are tabled for a financial year in the National Assembly by the Minister of Finance, normally before the start of the financial year. A provincial annual budget is supposed to be tabled to the provincial legislature not later than two weeks after the tabling of the annual budget (PFMA, 1999). As stipulated in the PFMA, within 30 days after the end of each month, the National Treasury must publish in the national Government Gazette, a statement of actual revenue and expenditure with regard to the National Revenue Fund.

A Medium Term Expenditure Framework was implemented in 1997. In addition, the Minister of Finance also makes a Medium Term Budget Policy Statement (MTBPS), usually in October of each year. The MTEF lays out planned government expenditure for the next budget year as well as the two years following the next budget year. By formulating and publishing the MTEF, the government aims to improve the planning of government expenditure as well as the transparency of expenditure planning.

Evidently, the country has put in place structures to promote transparency and accountability in the management of public resources. In addition to legislations and the inclusive budget formulation process, a National Economic Development and Labour Council (NEDLAC) was established in 1994. NEDLAC comprises organized business, labour, government and community groupings. The council aims to ensure that economic decisions are inclusive and promote goals of growth and social equity. Subsequently, NEDLAC reinforces good governance in public expenditure management by fostering accountability and transparency in public spending.

3.4 Primary Education in South Africa

Introduction

The State of Education in the Apartheid Era

Primary education in South Africa needs to be understood in its historical context, where racial inequality was the order of the day before democracy in 1994. During the system of apartheid, the white population enjoyed access to democratic institutions of government, a well-developed system of public infrastructure and a full array of public services that

were on par with those of the developed world. The black population on the other hand, had very few political and socio-economic rights. They did not benefit from representation in government affairs and had very limited access to government provided public services. Although whites made up less than 15 percent of the total population, 87 percent of South Africa's land area was reserved for them (Rechovsky, 2006). Blacks were relegated to "homelands" and lived in inhospitable conditions.

Under the apartheid system, the provision of education was racially unequal by design. There were 15 distinct departments of education serving different racially defined group of students. Not only were the departments racially defined, they differed significantly in terms of funding. At the peak of apartheid, schools serving white students had more than 10 times the funding per pupil than schools serving black pupils (Fiske and Ladd, 2005). Resources were lavished on white schools. Black schools were hugely deprived of resources and given poor education in order to keep black children out of the modern sector of the economy and to ensure a steady supply of cheap labour.

A fundamental aspect of education in the apartheid era was the establishment of "Bantu education" – a system of education designed for black pupils by the apartheid government and propagated as "a specialised education system that would meet the special needs of the African people and assist them to develop, along their own lines, towards their own separate national destinies" (Murphy, 1973, p.233). In reality, the architects of apartheid aspired to develop a black labour policy that would encourage white capital accumulation without endangering the legitimacy and stability of political domination (Terreblanche, 2002). Bantu education, established through the Bantu

Education Act of 1953 under the control of the then Department of Native Affairs, led to the closing of many African schools, including some of the oldest and best secondary schools run by Christian missions, in favour of a new system that placed emphasis on mother tongue instruction and enhanced community participation but was in reality, designed to protect and sustain the rule of the white minority and separate Africans farther from the mainstream of South African development (Davis, 1972).

While Bantu education saw to the expansion of schools and increased enrolment, teacher training did not keep up with enrolments; education was severely underfunded and schools were overcrowded and ill-equipped (Murphy, 1973). Worse still, the curriculum failed to provide any of the knowledge, skills, values and attitudes essential to work in a self-reliant society. In the words of Murphy (1973, p.237), "Bantu education [was] a carefully designed instrument of domination and manipulation".

Inevitably, the disparities in education between whites and blacks were vast. The Bantu Education Act required that African education be largely self-funded. Therefore, expenditure on African education was pegged to the level of African taxation and as a result, per capita expenditure fell from 13 percent of white levels in 1953 to 10 percent in 1961 and then to only 4 percent in 1975 (Terreblanche, 2002). The sharp increase to 22 percent of white levels in 1990 was the result of the Soweto Unrest in 1976, where black pupils rebelled against a new policy requiring that certain subjects be taught in Afrikaans in black schools. (Terreblanche, 2002). In this racially divided system, the pupil-to-teacher ratio remained around the teens and early 20s for 7 decades in the white schools. In the black schools, the range was between 40 and 70 (Rechovsky, 2006). There were

drastic differences in facilities, teacher salaries and other measures of educational quality. It is therefore not surprising that among South Africans at the age of 30 in 1993, whites on average had completed slightly above 12 years of education, while the average black had completed only 8 (Case & Deaton, 1999).

Education Reform in the Post-apartheid Era

The new democratic government that emerged in 1994 was faced with the daunting task of correcting this anomaly by providing equal educational opportunities to all South Africans. The new Constitution guaranteed all South Africans a right to basic education. A White Paper on Education and Training in a Democratic South Africa (March 1995), set out a new policy framework for education in the new democratic South Africa. Numerous other Acts, Bills and Policies were developed to improve the education system in South Africa. These include, among others, the National Education Policy Act No. 27 of 1996 the South African Schools Act No. 84 of 1996; and the South African Council for Educators Act No. 31 of 2000.

The curriculum was also overhauled in 1997, with the introduction of an outcomes-based education (OBE) policy (applied in countries such as the United States and Australia), whereby the end goal of schooling was measured against a set of policies such as effective communication, critical thinking and teamwork (Malcolm, 2001). OBE provided a broad framework for the development of an alternative to apartheid education that was open, non-prescriptive and reliant on teachers creating their own learning programmes and learning support materials (Chisholm, 2003). It has been deemed controversial for several reasons such as: being skewed in its structure and design; its

failure to draw sharp distinctions between inputs and outputs; the little attention given to levels of achievement; unclear performance indicators; lack of consideration around selection and sequencing in terms of content particularly in science subjects; the undue pressure on teachers to design curricula and inadequate teacher training (Chisholm, 2003; Malcolm, 2001).

A Plan of Action was established in 2003 by the then Department of Education to improve access to free and quality basic education for all. This plan included valuable strategic pointers for ensuring that the government's resources were used effectively to accomplish the country's education mission (Department of Education, 2003). The emphasis in this Plan of Action was to ensure that the poorest 40 percent of learners in South Africa continue to experience improvements in the quality of the schooling that they receive, and that all barriers to access definitively removed.

By and large, the various measures put in place to correct the distortion of education in the apartheid era were largely supported by different interest groups in the country. During the negotiations, however, a political agreement was made to the effect that there would not be a cap set on private contributions to schools (Jansen and Taylor, 2003). This meant that whites and middle class South Africans could continue to privately fund public schools through very high fees in order to maintain what was felt to be an acceptable standard of education. This agreement is arguably a contributing factor as to why inequities have been difficult to address. The government to date relies on fiscal measures to address inequity issues in education mainly through a poverty quintile system where the extent of resources allocated to schools is based on their poverty

profile. The effects of these measures on equity, outcomes and quality of education are reviewed later in this section after a review of education spending.

Education Spending in South Africa

Education is the single largest expenditure in South Africa with spending amounting to 5.5 percent of GDP. (Department of Basic Education, 2010). This proportion of spending is extremely high by global standards. The Education For All Global Monitoring Report (UNESCO, 2011) provides comparable international data on education spending in 2008[7]. In this report, South Africa had an education expenditure amounting to 5.6 percent of GNP and 17 percent of total government expenditure. In comparison, the sub-Saharan average education spending was 4.1 percent of GNP; 4.2 percent in Arab states; 4.9 percent in Latin America and the Caribbean; 5.5 percent in North America and Western Europe; 3.7 percent in South and West Asia and 5.0 Central and Eastern Europe. Therefore, South Africa can be clearly seen to spend significantly in education.

Between 2000 and 2007, the national per learner expenditure in public ordinary schools increased by 37% in real terms (Department of Education, 2009). In addition to subsidies, the South African Government also provides conditional grants to schools: the National School Nutrition Programme; the Recapitalisation of Further Education and Training (FET) Colleges and the HIV/AIDS Life Skills Education Grant. The first two are the applicable grants to public primary schools. The nutrition programme was introduced in September 1994 (initially under the Department of Health) mainly to "contribute to

[7] For a few countries, however, the data presented fall between 2005 and 2009 depending on availability.

enhanced learning capacity and school attendance" (FFC, 2006, p.25). Data on education spending is shown in Table 3.1 below.

Table 3.1 Education Expenditure: 2003/04 – 2008/09

R million	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	Average rate of increase (2003/4-2008/9)
	Outcome			Preliminary Outcome	Medium term estimates		
Public Ordinary Education Of which:	50,627	54,474 (7.6)	60,387 (10.9)	66,305 (9.8)	73,518 (10.9)	81,502 (10.9)	(10.0)
*Real rate of increase**		*6.2*	*7.5*	*5.2*	*3.7*	*-0.6*	*4.4*
Primary schools	27,853	29,703 (6.6)	32,606 (9.8)	34,370 (5.4)	38,068 (10.8)	42,395 (14.0)	(9.3)
*Real rate of increase**		*5.2*	*6.4*	*0.8*	*3.6*	*2.5*	*3.7*
Secondary schools	20,922	22,651 (8.3)	25,242 (11.4)	28,133 (11.5)	31,032 (10.3)	34,251 (10.4)	(10.3)
Real rate of increase*		6.9	8.0	6.9	3.1	-.1.1	4.8
Other sub-programmes	1,852	2,120 (14.5)	2,540 (19.8)	3,802 (49.7)	4,417 (16.2)	4,857 (10.0)	(22.0)
*Real rate of increase**		13.1	16.4	45.1	9.0	-1.5	16.4
Inflation rates		1.4	3.4	4.6	7.2	11.5	

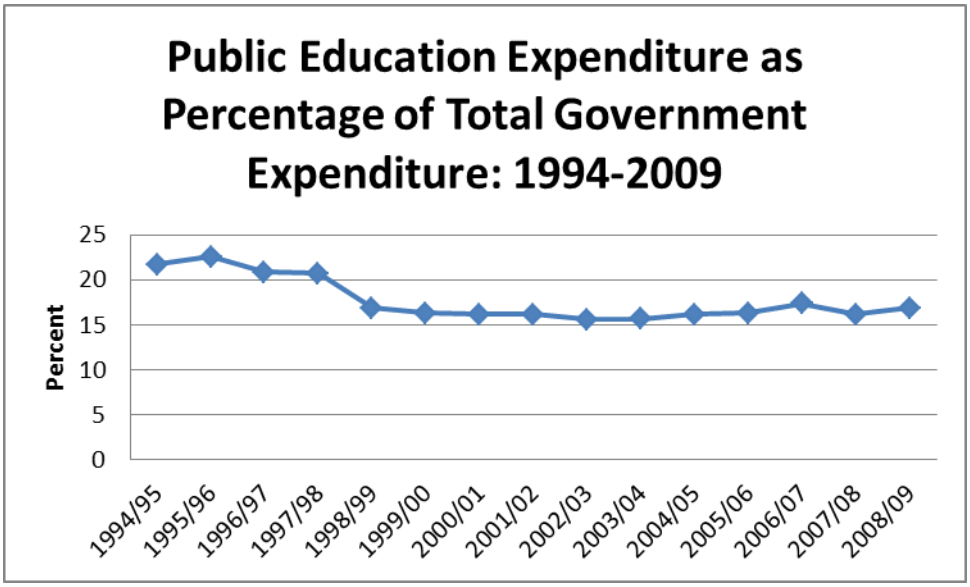
Source: Computed from National Treasury (2007) and StatsSA (CPI inflation data) 2009.
(Annual rate of increase, percentage)
* calculated by subtracting inflation rates (from last row) from actual rates of increase.

Table 3.1 shows that primary schools command the majority of public ordinary education spending. This is consistent from 2003/04 to 2008/09. The data also shows that the rate of increase in public spending in primary schools is much less than secondary and other sub programmes. Taking inflation into account, funding for primary schools has grown by about 3.7 percent on average since 2003 compared with 4.8 percent in secondary and 16.4 percent in other sub-programmes (which constitute a relatively small share of the public ordinary schools budget). Nonetheless, with the exception of 2006/07 when the real rate of increase was less than 1 percent and in 2008/09, when there was double digit inflation,

the Government appears to have been increasing spending in primary education in real terms.

Fiske and Ladd (2002) and Reschovsky (2006) argue that education financing is limited by fiscal constraint and therefore, there continues to be inadequate levels of resources in schools. Based on the spending trends (as shown in table 3.1), the assertions of fiscal constraint is questionable as the government has been increasing resources even in real terms. But, one could also argue that real increases of about 4 percent are fairly conservative and inadequate to meet the overwhelming education demands. In fact, as depicted in the chart below, a review of education expenditure as a proportion of total government expenditure shows education funding to be fairly static since 1994.

Figure 3.1 Public Education Expenditure as Share of Total Government Expenditure



Source: Taylor, Fleisch and Schindler (2008) for 1994/95-2005/06 data and World Bank Development Indicators (2012) for 2006/07-2008/09 data.

The figure shows that education expenditure at national level fell from about 21 percent in 1994 to 16.9 percent in 2009. The high levels of spending in the first few years after democracy would be expected given the huge demands to reverse the deterioration of the education system. Taylor, Fleisch and Schindler (2008) express concern that personnel expenditures continue to dominate despite effort to reduce it to 80 percent of the budget. This is shown in Table 3.2 below.

Table 3.2 Provincial Education Expenditure by Economic Category

Expenditure Type	**1995-6**	**2005-6**
Personnel Expenditure	86.9	84.3
Transfer payment (current)	1.9	3.1
Other (current)	9.0	8.4
Transfer payment (capital)	1.0	-
Other (capital)	1.3	4.1
Total	100.0	100.0

Source: Taylor, Fleisch and Schindler (2008)

While the table does not give the break-down in educational programmes, it shows that personnel expenditure continues to be above 80 percent. The section below examines the trends in education spending over a medium term in the two case-study provinces.

Education Spending in Gauteng and North West

Although education spending in South Africa was stagnant over the long term (Figure 3.1), the medium term analysis showed a real increase in expenditure (Table 3.1). In Gauteng and North West provinces, there is evidence of actual and planned increases in education spending as shown in Table 3.3 below.

Table 3.3 Provincial Education Budgets

Province	2007/8	2008/9	2009/10	2010/11	Real annual change between 2007/08 and 2010/11
Gauteng	14,649,391	16,628,082	18,461,601	19,882,314	5.2
North West	6,096,036	6,995,482	7,995,239	8,842,782	6.0

Source: Wildeman and Lefko-Everett (2008)

Table 3.3 not only shows that aggregate levels of education expenditure have been increasing in the two provinces but also shows that Gauteng province spends and plans to spend more than double that of the North West province. A review of the per learner spending shows that North West actually spends more per learner than Gauteng.

Table 3.4 Per Learner Spending in Public Ordinary Schools

Province	2005	2006	2007
Gauteng	5,160	5,327	6,740
North West	6,167	7,488	6,776
National	5,075	5,549	6,201

Source: Wildeman and Lefko-Everett (2008)

The North West per learner spending is not only higher than Gauteng, but higher than the national average. This is to be expected as North West has a larger concentration of students from poor backgrounds proportional to Gauteng.

Redistributive Measures in Education Finance

South Africa has largely relied on fiscal measures to address redistribution. These measures include: real increases in overall education expenditure; weighted funding plans to address inter-provincial inequalities; special funding programmes such as school nutrition; exemption legislation to reduce direct costs of schooling and pro-poor funding of schools according to the resource targeting list (Jansen & Taylor, 2003). Of the above mentioned measures, the two most prominent reforms are the planned increases in overall

expenditures and the pro-poor funding through the National Norms and Standards for School Funding (NNSSF), which requires that provincial departments allocate funds to books and other school supplies in a way that favours the neediest students (in terms of physical condition of schools and the degree of poverty in the communities in which the schools are located). The provincial budgets are also meant to cater for learner materials such as textbooks, pencils, paper and school maintenance. Rising teacher salaries, however, have had the effect of crowding out expenditures on learner materials in the post-apartheid era (Reschovsky, 2006).

The Department of Education bases the allocation of resources on national poverty standards (quintiles). Quintiles are categories in which schools are classified based on rates of unemployment, income and illiteracy within a school catchment area. Therefore, schools that were ranked within a lower quintile (between 1 and 3) would receive more subsidies as opposed to schools that are ranked in the fourth or fifth quintile; these schools rely through a combination of government grants and school fees.

Many schools, particularly those in the higher quintiles, are not dependent on provincial allocations for the operation of their schools. Rather, by charging school fees, which is provided for in the South Africa Schools Act, schools are able to operate almost independently. The Act, however, stipulates that the fees must be set through a vote by the majority of parents with children attending the school. The decision to allow fees to be set in public schools remains controversial. Some feel that it perpetuates inequalities, while others see a necessary supplement to scarce resources and an incentive for middle class families to keep their children in the public school system. Nonetheless, the NNSSF

also stipulates that students from low income families must be granted partial or complete exemptions from fees. In other words, no student should be turned away because they are unable to pay the school fees.

A number of schools based on their poverty ranking have been categorized as *No-fee* Schools. Essentially, these schools have been barred from charging tuition fees. The No-Fee policy was adopted by Government in 2007. The aim of the policy is to give effect to the constitutional right to basic education and respond to the need to make education truly inclusive by removing the fees barrier (National Treasury, 2007). The allocation, which is meant to fund the expenses typically funded by school fees, is based on the poverty quintile. In 2009, 55.2 percent of public schools covering 41.8 percent of learners were classified as *no-fee* schools (Department of Education, 2009).[8] The minimum allocation per learner is R554, though provinces are encouraged to a target of 738 per learner (National Treasury, 2007).

Impact on Equity

The critical question is whether the extensive redistributive measures have been able to address the equity concerns. The findings are mixed. According to Fiske and Ladd (2002), significant progress has been made towards a fairer distribution of resources across provinces and across schools. The authors, however, maintain that much less progress has been made in ensuring that schools have enough resources to meet optimal educational standards. Van der Berg and Burger (2002) argued that racial inequality in

[8] For the purposes of this study, it is worthwhile pointing out that 23 and 34 percent of public schools in the provinces of Gauteng and North West respectively are no-fee schools (National Treasury, 2007).

primary education is still a concern in post-apartheid South Africa. They noted that while the massive resource shift to black schools was successful in narrowing the pupil-to-teacher ratio gap, matriculation results remained substandard and even deteriorated in the post-apartheid era again reinforcing the notion that increased budgetary allocations do not necessary translate into outcomes. The poor pass rates further translate into limited upward mobility of poor children into the labour force.

Jansen and Taylor (2003) found that inequalities between schools persist due to the previous backlogs and lack of management for efficient and effective use of resources. The Department of Education (2003) however, argued that a reduction of 60 percent in education inequality illustrates the positive progress that has been made since 1994. According to Reschovsky (2006), differences between provinces where education is concerned, has been reducing even though the three provinces with historically the lowest levels of poverty (Gauteng, Northern Cape and Western Cape) continue to have higher levels of spending per pupil. Reschovsky argued that one of the reasons why these provinces still have higher levels of spending per pupil is that teachers in these provinces have higher average salaries.[9] To clarify, salaries are set nationally, however, more experienced and more qualified teachers are paid higher salaries. As the Department of Education cannot reassign teachers across provinces, provinces with the highest concentration of whites tend to have more experienced and more qualified teachers.

[9] The PET survey (discussed in Chapter 6) does not corroborate this argument – at least, where Gauteng and North West are concerned.

Van der Berg (2005) maintains that redistributive measures have not had the desired impact on equity. He cites the following as reasons: (i) the provincial quintile distributions do not match the national quintile distribution; (ii) provincial budgets have varying amounts for recurrent spending; (iii) provinces may top slice the recurrent expenditure before applying the NNSSF formula and many do so on a large scale; (iv) data on which provinces base their ranking is often poor; and finally, (v) the poverty status does not necessarily match those of all their pupils.

Impact on Quality and Outcomes

Though it is acknowledged that South Africa, within a short period of time, has been able to transform the educational system that was race-based and highly unequal; at best, the jury is still out on the impact on school quality and outcomes. In the words of Reschovsky (2006, p.43):

> *"Despite the large improvements in funding equity, many students, especially in rural South Africa, continue to face dilapidated schools, few, if any, textbooks and school supplies, and poorly trained teachers. Even in the absence of comprehensive data on student academic performance, it seems clear that many South African children do not yet have access to a constitutionally mandated "basic education." Although more money alone will not guarantee an improvement in the quality of education, the absence of sufficient financial resources devoted to education almost certainly ensures that students will remain undereducated*."

As a solution, Reschovsky recommends the scrapping of fee exemptions and awarding poor families with public funds such as, a needs-based scholarship or giving poor families additional weight in the equitable share formula.

In South Africa, comprehensive data on education outcomes, such as pass, repetition, dropout rates as well as test scores are quite scarce at the primary level. A comprehensive study on primary education was published in 2003. It was a study designed to gather baseline information on learners, schools and ultimately learning in the first 3 years of formal schooling (Fleisch, 2008). In the survey of some 51,000 randomly selected Grade 3 learners, the report found that Grade 3 pupils had a very poor grasp of elementary statistics (30 percent average score on numeracy) and average grasp of literacy (54 percent average score), within which the average score of reading and writing was 39 percent (Fleisch, 2008). In 2005, the Department of Education followed up with a systemic evaluation of Grade 6 learners. The report found achievement scores to be very low, with an average score of 38 percent in language, 27 percent in mathematics and 41 percent in natural sciences (Department of Basic Education, 2010).

South Africa has also participated in 3 international surveys: (i) the Progress in International Reading Literacy Study (PIRLS) in 2006, (ii) the Trends in International Mathematics and Science Study (TIMMS) in 2003 and the Southern and East African Consortium for Monitoring Education Quality (SACMEQ) in 2000 and 2007. In the PIRLS, South Africa had the lowest score despite the fact that 5th Grade pupils were tested against 4th Grade pupils in other countries and that 72 percent of pupils wrote the test in an African language (Development Bank of Southern Africa, 2009). South Africa

emerged with 2 standard deviations below the norm. South Africa's average score was lower than every other country assessed.[10]

The TIMMS captures scores from the first year of secondary school (8th Grade). The results are similar to the findings discussed above and reveal the extent to which mathematics scores lags behind when compared internationally (Mullis, Martin, & Foy 2005). The TIMMS results showed South Africa to have the lowest scores among 47 countries tested, including four other African countries. South Africa did not participate in the 2007 survey, which would have been important in determining whether progress is being made. The Development Bank of Southern Africa (2009) found from the analysis of the TIMMS study that only 1 in 40 children who started school in 1995 passed mathematics at the higher grade level in matric and moreover, 93 percent of the maths passes came from only 21 percent of the schools. The poor outcomes at the secondary level could also be a reflection of inadequate preparation at the primary level.

The 2000 SACMEQ survey focused on Grade 6 reading and mathematics scores.[11] Table 3.5 below presents data on the Grade 6 learners' scores that were analyzed using computer software that applied the Rasch Model of measurement, whereby the pre-determined mean score was 500 for the entire SACMEQ sample and the standard deviation was 100.

[10] It should be noted that South Africa was only one of two African countries participating. The other country was Morocco. There were 40 countries in total. The vast majority were European countries.
[11] Moloi and Strauss (2005) caution that the findings have to be interpreted with caution due to the small sample size of 230 pupils.

Table 3.5 Grade 6 Learner Performance on Reading and Mathematics Tests (2000)

	Learner performance on all test items			
	Reading		**Mathematics**	
	Mean	SE	Mean	SE
Eastern Cape	444.3	13.98	449.5	10.72
Free State	446.4	12.43	447.7	5.99
Gauteng	**576.3**	**35.14**	**552.3**	**25.97**
Kwazulu Natal	517.5	21.57	510.3	17.45
Mpumalanga	428.4	17.50	433.6	10.80
Northern Cape	470.5	13.33	461.1	8.23
Limpopo	437.0	19.60	446.2	18.77
North West	**428.0**	**9.59**	**419.8**	**10.58**
Western Cape	629.1	17.90	591.0	23.89
South Africa	**492.4**	**8.98**	**486.2**	**7.18**

Source: Moloi and Strauss (2005)

The results indicate that, for South Africa as a whole, the Grade 6 learners performed slightly better in Reading (mean score of 492.4) than in Mathematics (mean score of 486.2). However, both mean scores were below the pre-determined mean Rasch score of 500 for the SACMEQ countries, which shows that math and reading scores are below standard for a typical student in the SACMEQ region. In three provinces – Western Cape, Gauteng and KwaZulu Natal – the scores exceeded the overall mean of 500 for both Reading and Mathematics. The lowest mean Rasch scores were obtained by Grade 6 learners from Mpumalanga – 428.4 for Reading and 433.6 for Mathematics – and from North West where the scores were 428.0 for Reading and 419.8 for Mathematics. Gauteng and North West – the case study provinces – are highlighted in Table 3.6 to show the wide gap in achievements. The results from all three comparative tests are clear. South Africa lags behind internationally and regionally. It fares worse than countries with

only a fraction of its GDP and education expenditure. Moreover, within the country, there are regional disparities in performance.

A review of the education system by the Organisation for Economic Cooperation and Development (OECD, 2008) provides important insights into the state of educational quality in South Africa. The report essentially finds that levels of achievement especially in numeracy and literacy are still very poor; school infrastructure backlogs are huge; the shortage of teachers is growing; many teachers are ill-prepared to teach the grades they are assigned to teach; many student governing bodies in former disadvantaged schools perform poorly and the cost of education for most households has dramatically increased since 1994. The same report however, acknowledges that some improvements have been made in terms of quality as evidenced by national initiatives such as bursaries for teacher training and the "Dinaledi" project which aims to improve maths and science pass rates in a limited number of schools. Ultimately, quantifiable progress in education is manifested in increasing expenditure and improved gross enrolment ratios. The quality of education however, remains a key challenge.

Taylor, Fleisch and Schindler (2008) in their review of education in the past 15 years, examine the roots of poor quality of schooling in South Africa. Explanations offered include: the rapid expansion of the system, which has resulted in large numbers of poor quality institutions; systemic inefficiency, for example, the inability of some provinces to spend their budgets; substandard quality of teachers, whereby a 2004 assessment of Grade 3 teachers drawn from 24 primary schools, revealed an average score of 67 percent for maths and 55 percent for language (see also DBSA 2009); high levels of teacher

absenteeism, inadequate time allocated to reading and lack of teacher interest in using available books when teaching; and finally, lack of appropriate government interventions to address quality, as its focus has not evolved from racial inclusiveness.

3.5 Governance of Schools

Introduction

The South Africa Schools Act (SASA) of 1996 is the main legislation governing schools. The Act, in accordance with the Constitution, provides for a national system of schools, including private and public schools, free and compulsory education up to Grade 9 (or 15 years) and the prohibition of racial discrimination, among others. In consultation with the Minister of Finance, the Council of Education Ministers and the Financial and Fiscal Commission (FFC), the Minister of Education sets the norms and standards for the funding of public schools. The Act calls for each school to have a Governing Body (including parents and educators) which advises the provincial department for education on various matters such as appointment of educators; oversees the procurement management of school facilities and finds means of supplementing resources from the central government. In this arrangement, communities are obliged by law to actively participate in the affairs of the schools.

The School Governing Body

SASA prescribes that parents should form the majority of the School Governing Body (SGB) and that the SGB must include the principal and elected representatives of educators and support staff. The overarching purpose of the SGB is to allow for a

democratic and all inclusive approach to the governance of schools. The mandatory functions of school governing bodies can be demarcated as follows (Joubert, 2005):

- Policy matters (adopting a Constitution, mission statement, admissions language, religious observances, code of conduct for learners, financial policy, recommendation of appointments)
- Day-to-day matters (determining the times of the school day, support for the principal, educators and other staff members, the administration and control of the school's property, buildings and grounds)
- Financial matters (establish a school fund, prepare a budget, collect and administer school fees, financial records, appoint an accountant, supplementing resources).

The 1996 South African Schools Act (SASA) categorises public schools into two types: section 21 and non-section 21 (also called section 20 schools). The latter are schools that lack capacity and rely on the Department to handle some of the financial and managerial functions of the school. These schools will be discussed later in the chapter under the role of provinces and districts. The former are largely self-reliant and possess the capacity to manage the finances of the school. According to SASA, schools on the section 21 list receive a lump-sum per learner as subsidies and are accountable for their expenditures. If a school's bills for these services or items are lower than the lump-sum transfer, the SGB may allocate the transferred amount to the purchase of other education-related items such as maintaining and improving the school's property, buildings and grounds, purchasing textbooks and other educational materials and equipment, paying for services to the

school and providing adult basic education or other training classes. SGBs have authorisation to deal directly with suppliers and contractors for the relevant budgeted items in accordance with standard procurement procedures.

Effectiveness of the School Governing Body

There have been a number of assessments of SGBs conducted by academics, government and independent research organizations. The reviews on the whole agree that SGBs are important to educational governance and that their capacity must be continually enhanced in order to make them fully effective. In one such report, Joubert (2005) stated that some of the challenges that SGBs typically encounter include: issues of accountability, lack of a shared vision, the composition and structure of SGBs and lack of clearly defined goals. Joubert's review of literature on the effectiveness of SGBs further indicated that some parents' inability to communicate in certain languages as well as their educational/literacy levels compromised the effectiveness of SGBs and that SGB members require a basic training in financial management, fundraising and budgeting, yet these skills were sometimes lacking.

In assessing SGBs (representing a sample of 252 schools) across South Africa, Pereira and Roberts (2003) found that while many schools have begun to successfully implement the SASA where governance is concerned, a high number of schools lagged behind. Pereira and Roberts found that the vast majority of public schools had elected SGBs, which were properly constituted but, the issue of governing body composition mirroring the learner population remained problematic. For example, black parents and women in general were underrepresented.

In terms of discharging its mandatory functions, Pereira and Roberts found SGBs to be functioning fairly well in terms of holding meetings, at least once a term and keeping records (minutes) of the meetings. In terms of financial management, all the schools were found to be compliant. For instance, all had budgets and bank accounts and could present audited reports at the Annual General Assembly Meeting (AGM). In communities of high illiteracy, financial management is often delegated to the principal. This was a key finding in one region in the North West province by Pereira and Roberts, whereby an interview with the District Director revealed instances where there have been problems of financial accountability on the part of SGBs. The District Director however, noted that these cases warrant investigations and SGB members may be liable to account for financial mismanagement. On the whole, Pereira and Roberts found the perceived strengths of SGBs to include the infusion of positive values and technical leadership in education management as well as community involvement. Perceived weaknesses include skills deficits, apathy and other contextual limitations.

Role of Parent-Teacher Associations in School Governance

The 1996 SASA does not make any provision for Parent-Teacher Associations (PTAs) in the public school system. It is therefore not surprising that most schools no longer have this body. Prior to 1994, Parent-Teacher-Student Associations (PTSAs) existed in township schools as part of a broad-based resistance to apartheid, while in historically white schools, Parent-Teacher Associations (PTAs) offered parents opportunities mainly to fundraise and minimally to set school direction (Pereira and Roberts, 2003). In the new

political dispensation, schools governance were transformed and mainstreamed to ensure a minimal standard for educational governance.

Pereira and Roberts found that as many as 24 percent of the schools surveyed, considered PTAs as an important structure, which operated alongside the SGBs. The authors found this to be an issue of concern as they felt that PTAs should have discontinued in light of the introduction of SGBs. The authors however, did not elaborate on potential or actual impacts that PTAs have on educational quality and whether or how they complement SGBs.

Role of Provinces and Districts in School Governance

Provincial Departments of Education are responsible for implementing educational policies established by the central government. According to the South African Schools Act (SASA), each provincial education department (PED) must develop a "section 21 list" of schools that have been allocated functions and a list of schools that are not yet section 21 schools. The lists must also be revised each year. The SASA envisages that the section 21 list will grow as more schools acquire the requisite capacity. The SASA stipulates further that a school may be removed from the list if the governing body proves unable to undertake the additional functions, as provided in section 22 of the Act.

Provinces and districts are largely responsible for the management of non-section 21 schools. These are schools that have not been granted approval to procure their own goods and services and therefore have to procure their goods and services through existing departmental arrangements. The PED exercises administrative controls to ensure

that spending is within the budget. PEDs allocate recurrent funds to the following cost items: learning materials, maintenance and administrative costs, in accordance with the provisions of SASA. Even though PEDs manage the finances and procurement for section 21 schools, these schools are provided with a "paper" budget (not actual allocations) to help them understand actual costs of running their schools and to improve their capacity to join the section 21 list in the future.

Districts also play an important role in the delivery of services in primary and secondary education and fostering educational governance. Interestingly, there is no legislation that covers districts directly as district officers are created by provincial departments as part of their approved structures (Department of Education, 2006). Subsequently, it is important to note that district education offices are merely a deconcentration of the provincial education offices and references to PEDs may also include the districts. Typically, district offices are staffed by a Chief Director (in charge of corporate services); a Deputy Director (in charge of areas such as budget planning, human resources and procurement); a Directorate for professional and auxiliary services such as curriculum and sports and other administrative support.

Within the directorate for professional services, there are Institutional Development and Support Officers (IDSOs) whose duties are to promote the implementation of policies through overall institutional development, support and training programmes (Aheer, 2006). These duties specifically include: facilitating SGBs and school management teams as well as monitoring and assessing their performance; collecting and maintaining information on institutional and district demographics; helping to establish financial and

administrative management systems at schools; building and promoting a culture of teaching and learning and redressing historical imbalances. In Arhee's (2006) study, she concluded that the effectiveness of IDSOs in providing support to schools was being hampered by inadequate leadership and management skills such as, conflict resolutions skills; involving communities in the activities of the schools and a lack of a clearly defining job description for IDSOs.

3.6 Conclusion

This chapter has provided a broad contextual overview of public expenditure management and primary education in South Africa. It showed that the legacy of apartheid in South Africa resulted in the need for extensive governance reforms, which the country boldly embarked on. In the education sector, the impact of the reforms appears to be mixed. On the one hand, measures have been taken to correct the historical racial imbalance and regional inequities; increasing investments have been in the education sector and structures such as school governing bodies have been established in order to involve communities in the education process. Conversely, evaluative studies have found persisting racial inequalities; inadequate resources needed for optimal education outcomes; low quality of education in general and some shortcomings in the strengths and effectiveness of SGBs.

This chapter has presented a factual analysis that provides the reader with some background information on PEM and education outcomes in South Africa. It suggests that PEM reforms are having mixed results on the quality and outcomes of education. In Chapters 7 and 8, I address the central thesis question – are PEM reforms having the

envisaged impact on education outcomes? The analysis is premised on a theoretical framework that is presented in the next chapter.

CHAPTER FOUR

THEORETICAL FRAMEWORK

4.1 Introduction

The theoretical framework discussed in this chapter is ultimately intended to explain the important interrelationships between public expenditure management-related inputs and good education outcomes. The discussion to a large extent relies on education production function (EPF) models, notwithstanding its methodological limitations (see section 4.2). Nonetheless, the persistent gap in appropriate frameworks for estimating education outcomes and the prevalent application of EPFs in the economics of education literature warrants this study to build its framework from the EPF literature. The resultant framework however, incorporates lessons from other social science disciplines, including education management, public administration and political science.

This chapter begins with a discussion on education production functions and the methodological issues concerning the estimation of education outcomes. From this discussion, the author develops a framework that shows the linkages between public expenditure management (PEM) and education outcomes. It is important to mention that even though the study relies on EPF literature for conceptual guidance, the aim of this study is not to determine all the key inputs that matter for good education outcomes but to examine whether PEM is significant in explaining education outcomes. Therefore, this chapter also gives attention to methodological considerations in exploring underlying relationships between education inputs and outcomes.

4.2 Education Production Functions

Introduction to EPFs

Several of the empirical studies that have sought to explain education outcomes argue that outcomes are shaped by the behaviour of parents and community members and socio-economic backgrounds. In that regard, Behrman (1996) advocates models that control for parental characteristics that co-determine parents' direct influence on their children's learning productivity and labour market outcomes as well controlling for indirect influences on the types of communities in which children grow up and the schools they attend. Certainly, a more complete understanding of the interacting behavioural relationships that determine school outcomes would be invaluable in our understanding of the determinants of education outcomes. This further implies that insights from educational psychology and the sociology of education, which have studied the determinants of education outcomes before the more recent interests of economists, have an essential role to play (Boissiere, 2004).

Examining both supply and demand factors in the determination of education outcomes is said to provide a more comprehensive framework for assessment. Households are usually modelled on the demand side and schools as production units on the supply side. Households demand education because of its social, cultural and economic benefits. Demand for education will depend on inter alia direct and indirect costs, school quality, perceived outcomes and access to schools. Schools can be treated analytically as

production units on the supply side, but with few exceptions, they are not profit maximising firms, which leads to the issue of how to treat them in a theoretic economic model (Boissiere, 2004). Thinking of schools as producers of education services naturally leads to the application of production functions as often used in microeconomic theory. Pritchett and Filmer (1999) note that the appropriate modification needed in the education context is to treat schools like organisations that try to maximise output, for example learning in a variety of areas, subject to budget constraints. This mathematical relationship between inputs and education outputs is referred to as education production functions.

Production functions refer to explicit mathematical equation between inputs and outcomes and an econometric strategy for estimating those relationships (Boissiere, 2004). The significance of these strengths is investigated through multiple regression analysis and other sophisticated econometric methods that deal with problems of biased estimates.[12] Education Production Function (EPFs) are therefore based on the idea that:

> *'school education can be represented as a production process whereby a vector of inputs, comprising pupils' innate ability, initial achievement level and various characteristics of the schools they attend (usually teachers' education, training, experience, salaries, pupil-to-teacher ratio and learning materials) is transformed into a vector of outputs, usually cognitive achievement, most frequently measured by test scores in language, mathematics and science'* (Leclercq, 2005, p.15).

EPFs have generally risen in response to the need to guide policy makers by identifying which policy-controlled inputs have a high marginal impact on education outcomes.

[12] The empirical estimation methods tend to be parametric methods in that, they require assumptions about the functional form of mapping inputs into outputs and the error process for that formulation (Vignoles et al., 2000).

Glewwe and Kremer (2005) propose the following production function as a methodological framework for an educational outcome: A = a(S, Q, C, H, I), whereby A is the skills learned (achievement); S is years of schooling; Q is a vector of school and teacher characteristics (quality), C is a vector of child characteristics (including innate ability), H is a vector of household characteristics and I is a vector of school inputs under the control of parents, such as children's daily attendance and the purchase of textbooks and other school supplies. Using regression techniques, many empirical studies have sought to test the assumption that greater quantities of explanatory variables, such as those expressed in the above equation will translate into greater learning outcomes.

However, EPF studies have received some criticism. According to Deller and Rudnicki (1993), there are three core reasons why EPF literature has failed to identify the perceived relationship between key policy variables and student outcomes. The first questions the validity of the EPF framework as often variables that may not fit into the conceptual framework are included in the empirical analysis. Secondly, it is plausible that public policy does not have any measurable effect on student achievement. This argument is aligned with research carried out by Hanushek and others where family influences dominate in the educational production process. The third shortfall relates to the efficiency of the production process. That is, production function describes the maximum feasible output, given assorted input combinations. If the maximum output is not realised, then the school can be deemed economically inefficient. Therefore, there is an implication that resources are used to their fullest for efficiency to be realised. But, in reality, there could be inefficiencies in the data which means that conclusions drawn from such empirical models may be in error.

EPF studies also fail to capture critical qualitative details such as the cognitive process in the classroom that contribute to education outcomes. These salient aspects are often treated as a "black box" in the input-out methodology of EPF studies. According to Hanushek (1981), this is a serious problem for two reasons: (i) policies based on these studies may fail because they may not take into account the institutional factors important in implementing any change, (ii) variations in these other factors such as process choices or legal requirements may dominate the input-output relationship. The treatment of important issues as black boxes is also relevant to regression models as discussed below.

Use of Regression Models in Education Production

Regression models are the most commonly used methods to ascertain whether increased education inputs results in increased education outcomes. In most regression analysis, a single education input is regressed against various explanatory variables or inputs. It is assumed that greater quantity of certain inputs will translate into higher output, although the mechanism by which this happens is usually unknown and often treated as a black box. The earliest studies according to Vignoles et al (2000) often lacked specific data on school characteristics and therefore attempted to measure the magnitude of any schooling effect by modelling a set of dummy variables to measure the separate effect of each school in a standard regression of outcomes. Researchers then progressed from identifying school effects to analysing the effects of specific inputs such as family background and education expenditure. Nonetheless, empirical work has not brought about consensus on the specific inputs and outputs of importance in education (Vignoles et al, 2000).

Regression techniques on the whole, are riddled with methodological constraints. Mainly, institutions supplying and surrounding education have been treated as black boxes, especially schools and political bodies that finance education (Hoenack, 1996). Moreover, the typical EPF model tends to suffer from endogeneity. There tend to be unobserved variables which explain both the dependent and the explanatory variables, leading to a confusion of the true causal impact of the latter on the former (Leclerq, 2005). These problems of course are typical in quantitative economics and are often corrected through instrumental variables (discussed later in this section).

There are two specific sources of endogeneity that tend to characterise the education literature (Leclerq, 2005). One is selective migration or self-sorting, where parents can choose the schools their children attend on the basis of its resources. Therefore schools with more resources end up having pupils with more favourable family backgrounds. Similarly, better teachers may want to teach in schools where students are better. This leads to an overestimation of the impact of resources on outcomes and therefore an OLS estimation will be biased. 'Purposive programme placement' is the second problem. This is where educational resources are from a policy standpoint targeted to weaker or disadvantaged schools (Leclerq, 2005). Therefore schools with more resources may tend to have weaker outcomes leading to an underestimation of the true causal parameter. These two sources of endogeneity are important considerations for this study and addressed in the methodology chapter.

Aggregation bias is increasingly being recognised as a problem in regression models that estimate education outcomes. Education production functions are estimated at various levels of aggregation such as, across individuals, schools, school districts or the equivalent geographic regions or countries (Fertig & Wright, 2004). The aggregation bias concerns are two-fold. The first pertains to studies that mix the levels at which variables are measured in the same study. For example, some studies make conclusions about pupil attainment, which is measured at individual (pupil) level, while using school quality data measured at a higher aggregation level, for instance, at district or national levels in the same model. Therefore, the bias arises when the different levels of aggregations (aggregated levels and disaggregated levels) are interacted (Fertig & Wright, 2004; Hanushek, Rivkin & Taylor, 1996). This problem is most pervasive in resource variables which are often only available at an administrative level that includes a large number of schools and therefore do not reflect the actual resources experienced by pupils, if the intention is to make conclusions at the pupil level (Leclerq (2005).

The second concern pertains to the over-use of higher levels of aggregations in the literature. Findings have shown that high levels aggregation, for instance using multiple-state samples rather than state level data in the US (Hanushek, Rivkin & Taylor, 1996) increases the probability of positive and significant estimates. In lower levels of aggregation, for example at school and pupil level, Fertig and Wright (2004) found that the probability of positive and significant estimates of resources on outcomes decreases. The ensuing danger in using aggregate data is increased omission biases, which was recognised as a problem in the Coleman report and later discredited as a result (Rumberger & Palardy, 2003). Therefore, it would be important for this study to (i) be

consistent in the units of analysis or use alternative models that are discussed in the next section and (ii) be cognisant of the power of analysis at the level of aggregation applied in the study.

In general, EPFs are limited in the theoretical frameworks, inadequacy of available data and omission bias (Leclerq, 2005). All of these lead to model misspecification. According to Leclerq, the linear function form is also often used out of convenience although there is evidence of non-linearities when other regression techniques are used. The methodological issues raised lend evidence to the fact that the reliability of EPF studies are mixed depending on the specification, quality of data and the rigour in statistical and econometric analyses. Alternative methods are discussed below.

Alternative Methods for estimating Education outcomes

Given the constraints to EPF and regression techniques as discussed above, economists have begun to appreciate better the effects of school organisations and public educational priorities on education outcomes, which also speak to the need to broaden existing analytical frameworks that explain learning outcomes. Hoenack (1996) argues that the black boxes of administrative structure and political bodies that make decisions about variables affecting education are equally important, especially in the development of policies when important parental and community influences on human capital development are missing. Furthermore, in light of the shortcomings of the regression models, it is imperative to examine alternative or complementary models.

As previously established, some research findings show that an individual's innate abilities, socio-economic status and other non-schooling inputs such as the effectiveness of district education authorities, can explain learning outcomes. Isolating the effects of these variables can help to overcome the endogeneity problem. Value-added models help to improve the regression approach by including these variables so as to level the playing field at the time of school entry (Vignoles et al., 2000). The impact of additional schooling can then be measured separately from these other factors. The dependent variable would then have to be a *change* in test results over a set period of schooling. Vignoles et al. (2000) note that the value-added model improves vastly on single equation education production function models, though it by itself is not enough to overcome the endogeneity problem. In other words, even after controlling for initial ability and other non-school inputs, per learner expenditure may still be related to family background.

An alternative approach is the simultaneous equation model and the use of instrumental variables. According to Vignoles et al. (2000, p.6), "in the simultaneous equations approach, the structural relationships are made explicit and form a system of equations that permit the untangling of structural associations between multiple inputs and outputs". In other words, it can allow for the identification of both the impact of the various factors that influence the level and mix of educational inputs and the effect of these inputs on education outcomes. The main drawback pertains to identification (Vignoles et al., 2000). That is, to solve the equation system, the researcher must find a factor that influences the level of educational input for example, resources without also influencing outcomes. This is where another method – instrumental variables – becomes important.

Instrumental variables (IVs) are variables that are uncorrelated with the unobserved variables and determine the dependent variable only through their impact on the explanatory variable. It may be a more practical approach than the simultaneous equations model in that it requires just the identification of such instruments rather than specifying the full set of equations complete with feedback mechanisms between the dependent variables. Although, IVs have been used with some success to address the problem of endogeneity, they also have their limitations. For instance, identifying these variables and credibly arguing that they are uncorrelated with unobservable determinants of expenditures and outcomes is a major challenge.

Hierarchal linear modelling (HLM) (or multi-level models) is an alternative statistical technique designed to address the problem of aggregation and disaggregation bias discussed earlier. It stems from the understanding that the school system is inherently a multi-level or nested phenomenon in which activities at one level are influenced by those at a higher level (Rumberger and Palardy, 2003). HLM is a regression method that models the nesting of pupils within schools and shows the varied effects of individual schools on pupil outcomes, and in doing so, offers benefits beyond OLS models (Van der Berg, 2008). Similar to OLS models, they make assumptions around the parameters of the data such as a linear relationship and the explanatory variables not being related with each other.

Finally, randomised or experimental trials are increasingly being seen as the most effective way of evading the endogeneity problem. A carefully planned experiment cannot eliminate endogeneity issues altogether but can significantly reduce it as the

subjects and the environment are within great measure of control. There are some pitfalls, however. Firstly, it is a costly undertaking. Secondly, as with all social science experiments, it may raise ethical issues (Vignoles et al, 2000). There are also risks of "Hawthorne" effects whereby subjects involved in the experiment are generally aware of it and this may alter their behaviour (Vignoles et al., 2000).

Conclusion

From the above discussion, it is clear that model specification poses a real difficulty in estimating education outcomes. This is compounded by a lack of an established theoretical model that is widely accepted in the field. Despite its shortcomings, multiple regressions have been dominant, especially as alternative methods are not without challenges. In the end, an appropriate model would require a good data, be well specified and employ rigorous statistical techniques. This proposed model is presented in Chapter 5 based on a theoretical framework that fits within the objective of the study, which is to examine the strengths of PEM in explaining education outcomes. This framework is discussed in the next section.

4.3 Proposed Theoretical Model of PEM and Education outcomes

By incorporating elements from EPF frameworks discussed in the previous section and considering the objectives of this particular study, in this section, a theoretical framework for assessing the relationship between PEM and education outcomes is proposed. This is illustrated in Figure 4.1 below.

Figure 4.1 A Model for illustrating the Relationship between PEM and Education Outcomes

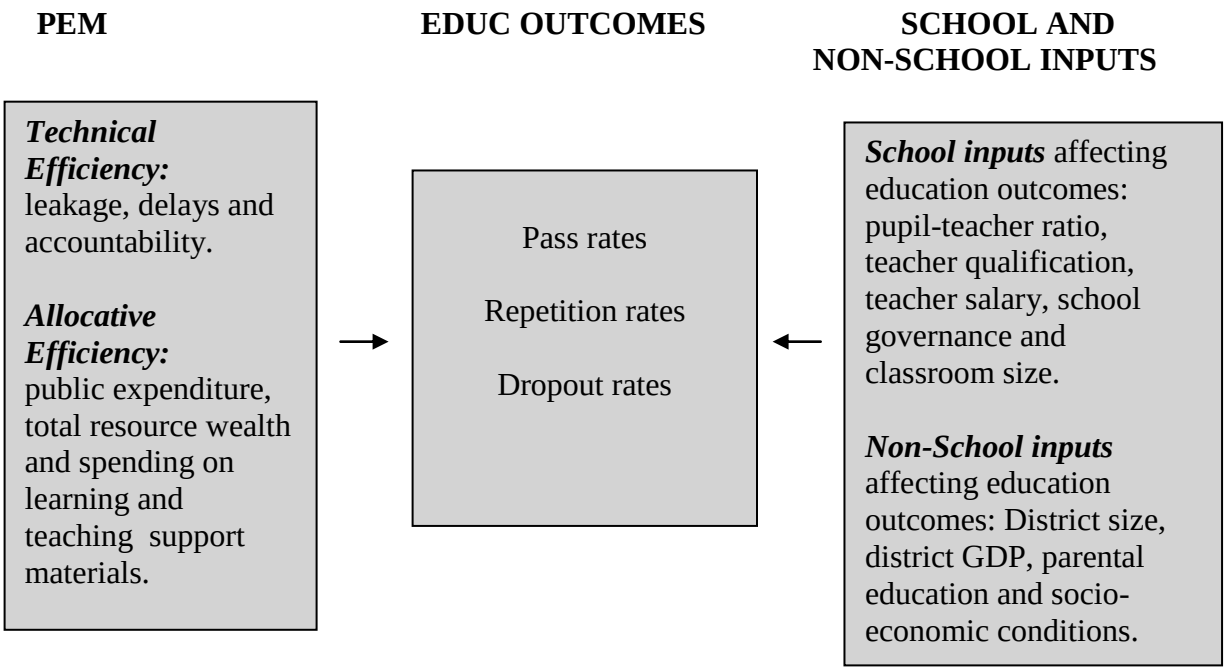


Figure 4.1 above illustrates the various factors that affect education outcomes. It isolates PEM on one side, showing how government can independently enhance education by executing their statutory functions. It also isolates non-PEM variables on the other side that have been shown in various studies to impact education outcomes. The non-PEM

variables are divided into two. One category involves factors within the remit of the school and the second category pertains to external factors involving the community and the students' background. The main task of this study is to assess the strength of PEM in fostering education outcomes, while controlling for school and non-school inputs.

The review of EPF literature revealed that model specification is a fundamental problem in these studies. It is therefore important that the variables (inputs) selected be clearly justified. The risk of selecting variables that may not be a good fit is that all the variation will be captured in the error term of the regression model. In what follows below, theoretical justifications are offered to justify the importance of PEM variables in education outcomes.

Theoretical Mechanisms by which Technical Efficiency affects Education Outcomes

Technical efficiency, simply put, is the effectiveness by which a set of inputs are used to produce outputs. It refers to the capacity of line agencies to use allocated resources in a manner that ensures an efficient and effective delivery of public goods and services. Technical efficiency should result in reliable and predictable delivery of budgetary resources to spending units as well as timely external audit. Therefore, a technically efficient government should inter alia: be performance-orientated; be able to remit funds to schools on time; ensure that all funds leaving the central government reach the intended beneficiaries; schedule supervisory visits to schools and ensure that they remain accountable by publishing and regularly auditing their accounts. The question therefore is how do these PEM qualities theoretically result in education outcomes? These are dealt

with in two parts. The first part focuses on technical efficiency (leakages, delays and accountability) and the second part focuses on allocative efficiency (education expenditure).

Technical Efficiency: Leakage and Outcomes

In the ideal flow chain, a hundred percent of funds leaving the central government will reach the intended beneficiaries – schools. As described in the literature review chapter, this seldom happens in many developing countries. In the absence of proper checks and balances or sound public financial management, money is leaked at various levels for instance, at the provincial department of education or the district education office. The remainder reaches the schools, many of whom are not aware of the amount they are supposed to receive in the first place. The question then is how does leakage adversely impact education outcomes?

In addressing this question, there are two issues to keep in mind. For one, leakage could impact education outcomes simply through reduced spending or insufficient resources needed for educational development. Therefore, mechanisms explaining this link would focus on the effect of total public education resources on education and the effect of allocative decisions on education outcomes. This is explored in the allocative efficiency section. Secondly, leakage in most findings is attributed to corruption. Therefore, the theoretical mechanisms by which corruption potentially affects social services such as education will have to be expounded upon.

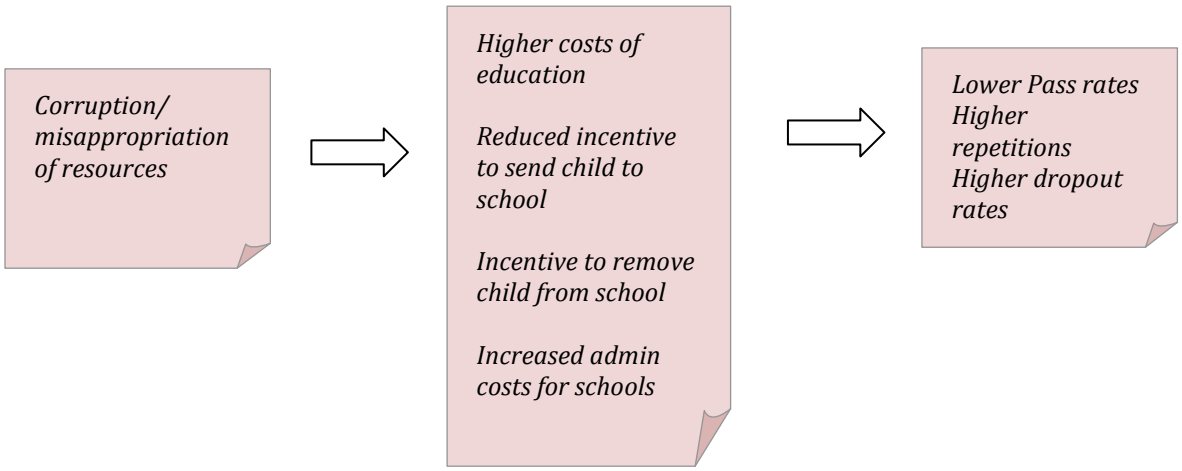
Corruption

There are a number of studies that have examined the impact of corruption on social services (see for instance, Tanzi and Davoodi, 1997, Mauro, 1998, Kaufmann, Montorriol-Garriga and Recanatini, 2008, Shleifer and Vishn, 1993, Bearse, Gloom and Janeba, 2000, Ehrlich and Lui, 1999). These studies offer insights into the underlying mechanisms by which leakage (corruption) impacts education outcomes. In Gupta, Davoodi and Tiongson's (2000) study, they argue that from a review of available studies, there are three channels through which corruption adversely impacts social service delivery. First, it can drive up the price and lower the level of government output and services. Secondly, it can reduce investments in human capital and thirdly, it reduces government revenue, which can in turn lower the quality of publically provided services.

In other words, misappropriation of education funds by government officials could drive up the price of education. This is a transfer of costs to parents as fee-charging schools may have to raise their fees given the shortage of funds. For low-income parents, this would be a form of regressive tax as it absorbs a greater share of income than wealthier parents. Furthermore, for parents who cannot afford to pay, they can be discouraged and subsequently remove their children from the school[13] (see for instance, Kaufmann, Montorriol-Garriga & Recanatini, 2008, who confirm this occurrence by finding in their research that corruption (in the form of bribery) discourages low-income users from seeking the public service). These linkages are captured in Figure 4.3 below.

[13] In theory, these parents are entitled to apply for exemption. Some findings have shown however, that schools or specifically, the SGBs, do not grant these exemptions (see also APRM 2007 Report on the Country Review of South Africa).

Figure 4.2: A Model for illustrating the Relationship between Corruption and Education Outcomes



Leakage of public funding also add an additional burden to the school governing bodies (SGBs) who have to intensify fund raising efforts possibly at the expense of other functions and it also may also serve as a disincentive to schools to provide students with the best possible education, that is funding is highly inconsistent and unreliable. Given the above discussions, leakage could have serious implications for education in South Africa and therefore should be isolated in the theoretical model explaining education outcomes.

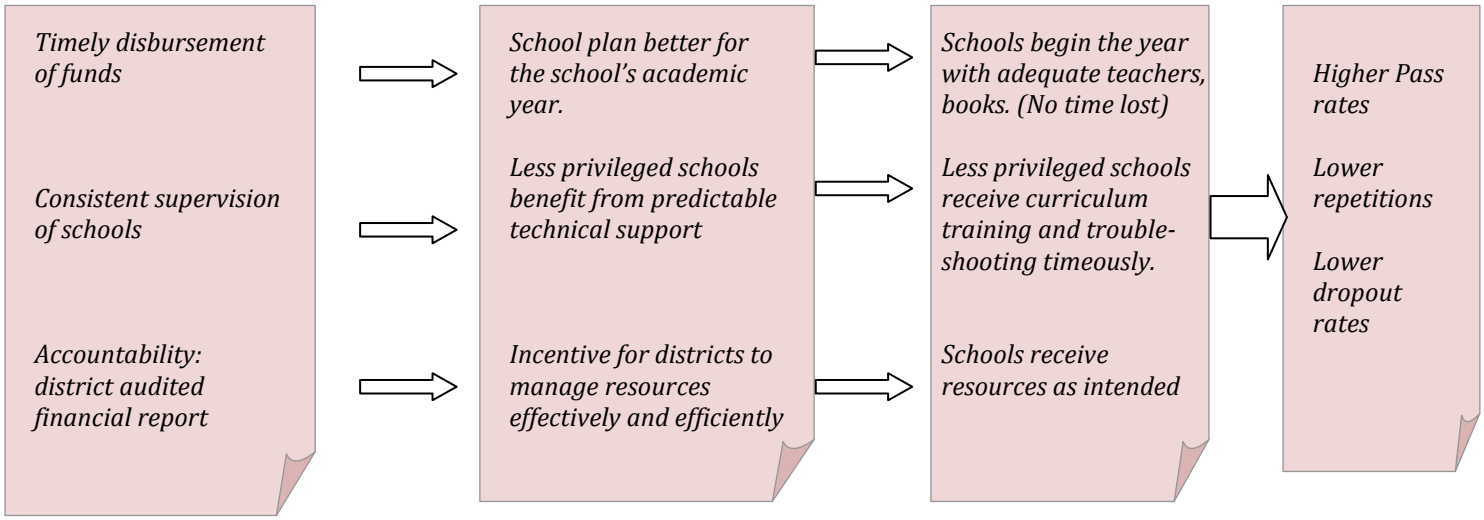
Delays, Accountability and Outcomes

Technical inefficiency that results in delays in remitting funds to schools potentially affects the school's ability to plan effectively for the academic year. Delays and bottlenecks in the allocation of resources through public administrations (for example, salaries, allowances, financing and materials) have been identified in tracking surveys as serious problems affecting quality of services and staff morale (Gauthier, 2006). In the

case of South Africa, SGBs may not be able to hire extra teachers at the start of the year due to lack of funds. The school management may not be able to invest in additional resources, such as textbooks, if the materials allocated should fall short of the required needs. A technically efficient district education office should be able to provide time and adequate technical support to all schools within the district. Lack of adequate staff members or vehicles could impede technical efficiency, in which case, some schools would not get the technical support as needed.

Accountability implies that the government has a duty to explain and justify the ways in which they have used public resources at their disposal (Heald, 1983). It forces positive behaviour. For instance, it will ensure that district education offices use their resources effectively and efficiently, knowing that there will be consequences, if they do not. The figure below illustrates the mechanisms by which the various components of technical efficiency convert to education outcomes.

Figure 4.3 A Model for illustrating the Relationship between Technical Efficiency and Education Outcomes



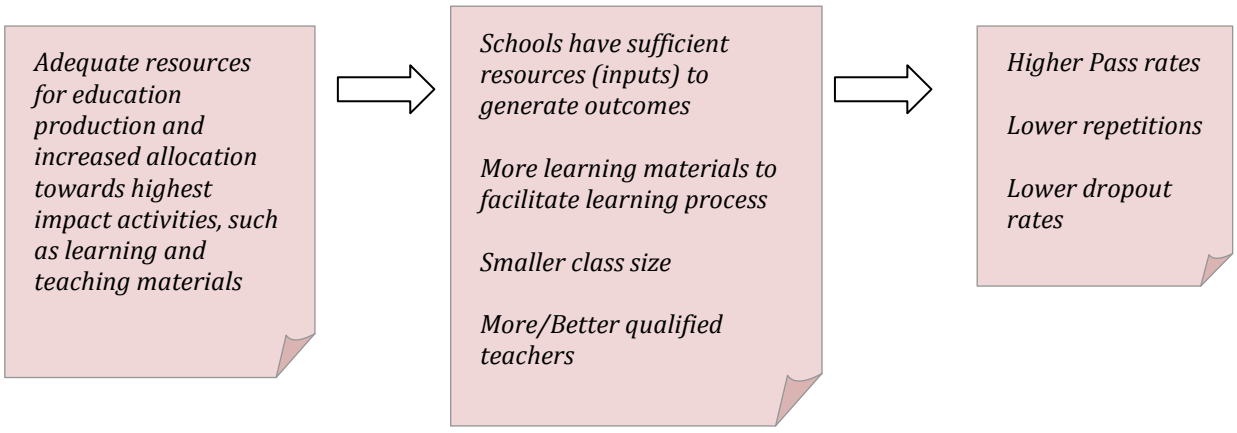
Theoretical Mechanisms by which Allocative Efficiency affects Education Outcomes

As discussed in the literature review, the question of whether resources are important for education outcomes has been a subject of long-standing debate. This debate is really about the impact of *additional* resources assuming that schools already have minimal resources to function. In the developing country context, where the minimal level of facilities such as, playgrounds and running water remains scarce, resources could play a vital role. In this case, the input-output processes and EPF provide the framework by which resources are translated into outcomes.

It is widely accepted in economic theory that a set of inputs (capital and labour) are required in producing some specific output. Schools therefore need qualified teachers, textbooks, chairs and tables, playgrounds, cafeterias to name a few requirements, in order

to educate pupils. All of these inputs are school resources and are needed to enhance learning skills despite pupil's innate abilities and socio-economic backgrounds. The application of allocative efficiency to education implies that public resources should be sufficiently provided and used where it will be most effective in promoting the education goals. In other words, it requires (i) defining the goals of the resources, for example, expanding enrolment or improving learning outcomes and (ii) determining how resources will be allocated within the sector in order to have the greatest impact in achieving these goals (Fredriksen, 2008). Whereas, technical efficiency is concerned with effectiveness of translating inputs to outputs, allocative efficiency takes into account whether the inputs are the best inputs to produce the outputs. The model assumes that allocative efficiency – basically, the adequacy of resources and the channelling of the same to activities that yield the highest impact – potentially results in improved education outcomes. This is illustrated in the figure below.

Figure 4.4 A Model for illustrating the Relationship between Allocative Efficiency and Education Outcomes



4.4 Conclusion

This chapter has discussed the theoretical premise that underpins the relationship between public expenditure management (PEM) and education outcomes. It began by explaining the results chain framework for education outcomes then proceeded to a discussion on the theoretical steps to estimating education outcomes. As an appropriate framework for examining the relationship between PEM and education outcomes is virtually non-existent, the study relied mainly on education production functions. Subsequently, the author proposed a theoretical framework that incorporated existing frameworks. The chapter also discussed empirical models that guide the methodological approach discussed in detail in the next chapter.

CHAPTER FIVE

RESEARCH METHODOLOGY

5.1 Introduction

This study uses two micro-level surveys: a Public Expenditure Tracking Survey (PETS) and a Quantitative Service Delivery Survey (QSDS) to systematically analyse the effectiveness of the public expenditure management system in improving education outcomes in two provinces in South Africa. It is the preferred instrument in this study because of the precision with which it "tracks" the flow of resources from the source to the end-user. It also allows for the collection of a comprehensive dataset on expenditure and issues around service delivery. The PETS and QSDS go beyond normal public expenditure reviews, which examine the composition of spending and sectoral allocations. They are tools that measure, quantitatively, provider incentives and behaviours and also allow lessons to be learned about the way spending is transformed into services (Dehn, Reinikka & Svensson, 2003).

The Fiscal Incidence Analysis, also known as Benefit Incidence Analysis is often used in similar studies. This methodology however, has limitations in terms of ignoring behavioural responses and relying on the cost of provision as a proxy for benefits received (Van de Walle, 1995). It is also said to be a more effective instrument for analysing policies that generate benefits in the short term, such as an education subsidy. This particular study requires a framework that can allow for both institutional and quantitative analyses. Therefore, the two complementary micro-level surveys are the

most appropriate instruments for assessing the efficiency and effectiveness of public expenditure management structures and the impact these have on education outcomes.

5.2 Research Design: Survey Instruments

Public Expenditure Tracking Survey (PETS) and Quantitative Service Delivery Survey (QSDS)

The PETS is used to track the flow of resources in order to determine how much of the original allocation reaches the intended end-users (for instance from central government to schools). While similar to qualitative surveys such as perception of consumers on service delivery, this instrument is more rigorous because it is able to capture and quantify leakage of funds and problems in the deployment of human and in-kind resources to schools such as staff and textbooks (Dehn, Reinikka & Svensson, 2003). The PETS collects data at different levels: from service providers (such as schools), local government, central government and other sources of data. Several sources are relied upon because an individual agent may keep poor records or even misreport accurate data. Therefore, the strategy serves to cross-validate information obtained separately from different sources. The PETS can also be used as a diagnostic tool: ascertaining why certain problems are occurring and how they can be solved.

The QSDS examines the efficiency of public spending and other dimensions of service delivery. It allows for the collection of data from schools on inputs (for example, teachers and books), outputs (for instance, enrolment and pass rates), school quality (for example, number of certified teachers) and more. It is also used at the local government level to

assess their operational efficiency by collecting data on issues such as human resource capacity, facility and accountability arrangements.

The tracking surveys are developed according to the following stages: (i) identification of scope, purpose and actors; (ii) design of questionnaires; (iii) sampling; (iv) execution of survey and (v) data analysis. Ultimately, the micro-level surveys show how effective resources reach educational facilities and whether the resources are efficiently utilised. The surveys also determine whether the governance reforms have allowed for resources to be directed where they are needed most.

In this study, the PETS-QSDS were applied at two levels: primary schools and district education offices. Therefore, there were two distinct questionnaires used in this study (see annexes 2 and 3 for the full questionnaires). [14] For the primary schools survey, the Head Teacher was the main respondent. A deputy head teacher was an alternative respondent as these two individuals are best placed to have a global view of the affairs of the school. In the rare event that these two educators were not available, either a long standing teacher or senior administrator was interviewed. The district survey was designed to have the District Director as the main respondent with allowance for the heads of various units to complete relevant parts of the questionnaires. Each of these two surveys are briefly elaborated upon below.

[14] A third survey was designed for provincial authorities but neither Superintendent Generals in Gauteng and North West granted an interview. Therefore, this level of analysis was not incorporated in the study.

Primary Schools Survey

There were 10 sections in this survey (see appendix 1). The first part dealt with identification. Here, data were collected on basic information about the school, for example, its geographic location, number of students, whether it was a *no-fee* or fee-charging school and the school's poverty quintile ranking. Section 2 dealt with student outcome indicators such as enrolment, pass, repetition and dropout rates. Section 3 pertained only to schools that charged fees. There were questions on the amount of fees and percentages of schools exempted either fully or partially.

Section 4 asked about the experience and qualifications of principals and teachers as well as additional information about teachers such as their salary and the degrees of absenteeism. School facilities such as adequacy of school furniture, toilets and drinking water were covered in section 5. Proximity of the schools to clinics and public transportation were covered in section 6. In section 7, questions were asked about the existence of school governing bodies (SGBs) and parent teacher associations (PTAs); the top issues discussed at these meetings, frequency of the meetings and the extent of parental participation in these bodies. Section 8 dealt with supervision of schools by district education inspectors and accountability of schools to district authorities in terms of submitting academic reports and audited financial reports. The last two sections dealt with finance, where sources of funding were requested in addition to the timeliness of the disbursements and finally what the school spent its money on and how much.

District Education Office Surveys

Section 1 collected data on the characteristics of the district education office (DEO). This information included the number of staff members in office, the number of staff currently reporting for duty in the office, the number of cars and the travelling distance to schools in the district. Section 2, on decision-making, asked questions on who makes decisions and provides funding for financially needy children, additional books and maintenance issues. The frequency of meetings with provincial authorities was covered in section 3 while section 4 dealt with shortages and requests at the district office in order to establish the constraints at the districts office. Section 5 collected data on the number of visits to a random sample of schools and information was sought about whether districts received annual reports from these schools. The latter is an example of the cross-triangulation method to verify information obtained from the schools. Section 6 involved questions on delays of receiving funding from the provincial government and the categories for which funding was earmarked. Section 7 involved district expenditures, including amounts allocated to various quintile schools. In the final section, some questions were asked to have an indication of PEM practices. These included: instances of overspending or underspending, the consequence of either, publishing of financial accounts and district director turnover rates.

Interviews

The surveys were designed for face-to-face interviews. All interviews at the district education offices in the two provinces were conducted by the PhD candidate. For the primary school surveys, 5 research assistants in Gauteng and 5 in North West – a total of

10 – were recruited. Training of the research assistants and the process of data collection are discussed in more detail in section 5.3.

5.3 Sample Design

Scope

The scope of the study is two provinces in South Africa: Gauteng and North West provinces. Concerning the district surveys, 10 district education offices out of 15 were surveyed in Gauteng. While all 15 were targeted, 5 districts (Tshwane West, Ekurhuleni South, Ekurhuleni North, Sedibeng West and Johannesburg South) declined to participate.[15] In North West, all but one district municipality (Bojanala), which declined to participate, were surveyed. In terms of the primary schools, the study attempted to cover representative sample of public schools in the province. The next sections focus on the sampling procedures.

Population

In South Africa, there are two categories of schools at the primary and secondary levels as established by the South African Schools Act: public schools and independent schools. Public schools are established by the State, controlled by the State and all receive funding

[15] Their exclusion would introduce a bias if these districts behave significantly different from the other districts, for example, having extremely strong or extremely poor performing schools on average. Researching the districts for peculiar traits proved to be difficult because of the scarcity of district level data. For example, the Gauteng Profile document only provides for data for municipalities and not districts. The only education data at district level is provided in the 2007 Annual Report of the Gauteng Provincial Government, but on matric scores. It revealed that 2 of the missing districts (Sedibeng West and Erkhurleni South) had the lowest pass rates. At 65 and 58 percent, it is difficult to say if they are statistically different from the national average of 75 percent. The 5 districts were spread out in the province and not clustered together which could indicate non-randomness. In the North West province, the missing region, Bojanala emerged to have a mixed profile. It had the highest literacy rate in the province but also had the largest population with no schooling. Therefore, from the limited information, it is difficult to conclude non-biasness however, it appears to be unlikely.

(weighted by their poverty profile) from the State. Independent schools were known as private schools in the apartheid era and catered only for white pupils. Now known as independent schools, they can be created by any individual, according to the Schools Act and remain privately governed. Independent schools are also entitled to government subsidies, if they request it. These grants come with terms and conditions such as unannounced inspections from the provincial education authorities (SASA, 1996). Therefore, not every independent school receives government subsidies. The sampling frame for this study was limited to **public primary schools** in Gauteng and North West Province. Since the premise of the study is to examine the practice of public expenditure management and how it translates into service delivery in terms of educational quality, it is appropriate that the study excludes independent schools and focuses only on the schools that are completely within the domain of government control.[16]

In the case of the two provinces, an electronic list of schools was obtained from the Department of Education in January 2008. The list was comprehensive and included primary, secondary and "combined" schools. The latter referred to schools that had both primary and secondary. Therefore, secondary schools and independent schools were deleted from the list. The end results were 1,318 schools that were entirely public but also primary or combined in the Gauteng Province and 1,114 of the same types of schools in the North West Province.

[16] Independent primary schools comprise only 10 percent of all primary schools in Gauteng and 1.5 percent of primary schools in the North West (Department of Education, 2009).

Sampling

The study used a stratification technique in selecting the sample to ensure regional/district representativeness of all schools in the two provinces. Stratification entails the division of a study population into strata and a random selection of subjects within each stratum (Duclos, 2002). Districts/Regions in South Africa are well defined administrative classifications within a province. In Gauteng province, there are 15 districts, though technically, 3 are metropolitan municipalities, 3 are district municipalities and the remaining 9 are local municipalities. In North West, there are only 4 district municipalities and because of their size, commonly referred to as regions. Within these regions, there are 21 local municipalities. Therefore, functionally, districts and regions are not dissimilar except for size. Hence, the sampling frame was stratified according to the 15 districts in Gauteng and 4 regions in North West.

In order to ensure that the sample selection took into account the number of schools in each strata, 8 percent of schools in each of the districts in Gauteng were selected using a simple random sampling method. Given that North West has fewer schools, 9 percent of public primary schools were selected to allow for a slightly larger sample. These percentages conform to similar education studies, as discussed later in the chapter and were selected to fit within the resources available to undertake the survey. The sampling procedure did not take school size into account and therefore in the random selection, some schools would have more pupils than others. This does not bias the study the unit of analysis is at the school level and not pupil level.

An SPSS software was used to select schools at random. Each school in a particular district/region had an equal chance of being selected. Simple random sampling is also referred to as "epsem sampling" (equal probability of selection method). It is widely used in applied educational research because it usually leads to self-weighting in which the simple arithmetic mean obtained from the sample data is an unbiased estimate of the population mean (Ross, 2005).

Table 5.1 Sample Allocation over Strata, Gauteng Province

Districts	**Total Number of Schools (N)**	**Sample size (n)**
Erkurhuleni North	103	8
Erkurhuleni South	117	9
Gauteng East	109	9
Gauteng North	33	3
Gauteng West	83	7
Johannesburg Central	157	13
Johannesburg East	78	6
Johannesburg North	102	8
Johannesburg South	64	5
Johannesburg West	92	7
Sedibeng East	53	4
Sedibeng West	98	8
Tshwane North	59	5
Tshwane South	125	10
Tshwane West	45	4
TOTAL	**1318**	**106**

For Gauteng province, the study would target a sample size of 106 schools.

Table 5.2 Sample Allocation over Strata, North West Province

Districts (Regions)	**Total Number of Schools (N)**	**Sample size (n)**
Bophirima	172	16
Southern	218	20
Central	348	31
Bojanala	376	34
TOTAL	**1114**	**101**

Similarly, 101 schools would be administered in North West. In total, the study aimed for to survey 207 schools in the two provinces.

Sampling and Stratification Techniques Used in Other Education Surveys

As mentioned in Chapter 1, PETS-QSDS has been conducted in several countries. The sampling approach used in some of these countries is briefly highlighted here to show conformity of this study's approach to similar studies. In the Uganda PETS, 250 primary schools out of 8500 public primary schools (3 percent) were surveyed in 19 of Uganda's 39 districts (Ablo & Reinnika, 1998). The schools surveyed were fixed within the range of 10 – 20 due to budget constraints. The 250 schools were derived by selecting 10 schools from districts with less than 100 public primary schools; 15 schools with districts that had 100-200 primary schools and 20 within districts that had more than 200 schools. A 3 stage stratification method was used: regional stratification, followed by districts, then schools. In Rwanda, 390 schools were surveyed out of 2142 public primary schools (18 percent) in all of Rwanda's 151 districts. The schools were selected through a random sampling method, following a two-stage stratification technique by rural/urban location and then schools (Fofack, Obidegwu & Ngong, 2003). In Zambia, a sample of 200 schools out of 3933 schools (5 percent) was surveyed. It was first stratified by urban and rural location before schools were selected. In the case of South Africa, the Systemic Evaluation of Grade 6 learners targeted 7 percent of the defined population and in the end surveyed 3 percent. The sampling was also done at a pupil level and not a school level: 34, 015 learners out of 1,107,635 learners (DOE, 2005).

From the above illustrations, it is clear that sample sizes in these kinds of studies tend to be arbitrarily selected and range between 3 and 18 percent of the population. So, clearly there is no standard or optimal size. Nonetheless, all studies stratify the sample and place

more emphasis on minimising non-sampling errors. By aiming for 207 schools (8.5 percent of total school population) and including a stratification technique, this study falls within the sampling norms.

5.4 Process of Data Collection and Field Work

Pilot Test Phase

Pretesting – the final stage of questionnaire development – involves the use of the questionnaire in a small pilot study to ascertain how well the questionnaire works. According to Hunt, Sparkman and Wilcox (1982), pretesting is highly critical and attention should be placed in five areas: what specific items should be pretested? What method should be used to conduct the pretest? Who should do the pretesting? Who should be the subjects in the pre-test? And how large a sample is needed for the pretest?

Taking these as important guidelines, the Primary School PETS-QSDS was piloted in 4 schools and in 3 districts: Tshwane South, Tshwane West and Gauteng East. The four schools were in Capital Park Primary, Brooklyn Primary, Bonwelong Primary and Arcadia Primary. The 3 districts were specifically selected due to their accessibility to the researcher but the 4 schools were randomly selected from those districts. The selection of 4 schools falls short of the various recommended pretest sample sizes. For instance, Ferber and Vendoorn (1962) recommend 12; Boyd, Westfall and Stasch (1977) recommend 20 and Backstrom and Hursch (1963) indicate 30 to be adequate. Clearly, according to the literature, there are no fixed sizes for pretest samples. A minimalist sample was selected as the timing of the pretest (mid March) coincided with the final

days for the end of the first term. Because the questionnaire was also not lengthy, contained mostly close-ended questions and was designed for an informed respondent, a larger sample for the pretest was deemed unnecessary. Furthermore, the smooth running of the interview at the fourth school was an indication that the questionnaire was ready for full implementation. The pretest was not limited to specific questions in the questionnaire. The entire questionnaire was pretested and the average the time taken to complete the questions was 20 minutes.

Because the questionnaire was designed to be face to face, the piloting was conducted in that manner, with the exception of one school, where due to scheduling conflicts, the interview was conducted telephonically. The experience showed no difference in the quality of the data obtained from the face-to-face interviews and telephone interviews. Therefore, phone interviews emerged as an alternative method if the preferred method of face-to-face was not possible for certain schools. The only potential problem is where respondents may conceal the truth about certain facilities in the school, knowing that there was no one there to verify. Because of this, interviews by phone would be the exception and not the norm.

In most cases, the principal was the main respondent, although some principals invited their deputies to participate in the interview. The pilot test also showed that the questionnaires were administered more efficiently when the respondent also had a copy of the questionnaire in front of them for reference.

Lessons Learned from the Pilot Test

The pilot experience gave the researcher the assurance that the availability of data was not likely to be a problem as in all schools visited, the schools confirmed that they submit a report to their districts authorities every year on academic information and financial reports. The pilot also resulted in the deletion of certain questions that seemed to have no relevance in the South African context (for example, the payment of teacher bonuses is only done by the districts, not the schools) and the inclusion of new or follow up questions such as asking the reason why a school does not have a PTA or why some classrooms do not have a desk and a table for the teacher. The explanations for the classroom questions were not always obvious and could be misinterpreted. For instance, one school had 3 classrooms without a desk and a table because those classrooms were newly built and were yet to be furnished. The absence of furniture was not to be interpreted as an indication of poor facilities.

Administration of Questionnaire

A total of 10 research assistants were recruited to implement the primary school questionnaire, whereby 5 of them were assigned to schools in Gauteng and the other 5 assigned to schools in the North West province. All the research assistants were university students or graduates and were paid a stipend to conduct the fieldwork in a time frame of three months. The fieldwork, being more challenging than anticipated turned out to be a six-month exercise (April – September 2008). Each researcher was allocated 2 or 3 adjacent districts to review all the selected schools. They were responsible for making the appointments with the schools, using their own or public

transportation to get to the schools and completing the questionnaires. All were trained on the use of the questionnaire, in particular how to ask the questions and to record the data.

For the most part, the primary schools questionnaire was administered in a face-to-face interview in order to allow for a higher response rate. Follow-up on certain parts of the questionnaire that could not be completed at the time of the interview was done either by telephone, fax or a follow up visit. Schools that were hard to reach due to distance were surveyed by phone and fax. A signed approval letter from the provincial departments of education in Gauteng and North West, granting permission to conduct research in its institutions facilitated the administration of the questionnaire both at schools and at the districts. A number of schools requested that both letter and questionnaire be faxed to them in advance before the interview and this was done.

The district questionnaire was administered in a face-to-face interview by the PhD candidate. In a few instances, the regional director or deputy director requested that the questionnaire be left with the office to allow for consultations and for various departments to make the relevant inputs. In all cases, the questionnaire could not be completed by an individual.[17] Input was therefore sought from other officials such as the financial/budget officer, human resources specialists and district inspectors.

Challenges

There were two key challenges encountered in the administration of the questionnaire: the reluctance of some schools and government officials to participate and the difficulty

[17] It was originally envisaged that the district director would be able to answer all questions.

in sourcing data, especially financial data from both schools and department of education. In the case of the schools, some principals felt that the questions were too invasive even when they were presented with an approval letter for the Department of Education. This occurrence was particularly frequent in the North West, whereby field assistants would travel as far as 200km to a school for an interview only to find the principal absent after agreeing to an interview. In some cases, the principals did not show up at the school for the entire day. Specific to financial reports, the impression given was that the reports were available, but the principals were not comfortable releasing what they felt was confidential information.

Within the Department of Education, the intention was to sample the national office, two provincial offices and 19 district and regional offices in Gauteng and North West. Due to lack of cooperation, the fieldwork was limited to the district and regional education offices in Gauteng North West provinces. Provincial and national offices were not included. As mentioned, data were sought from various units at the education offices (for example, budget planning, policy and research, human resources and transport) rather than relying solely on the district director's office. Despite these efforts, there were some gaps in the district questionnaires as record keeping (particularly financial) was inconsistent in some districts and regions.

Some district officials also viewed the exercise with suspicion and wanted some assurances that this exercise was not a "trick" from the opposition party to undermine the

current administration.[18] This was in spite of two letters from the Department of Education (Gauteng and North West province) authorising the research in both schools and district offices, after reviewing all the survey instruments two months prior to the commencement of the fieldwork. Furthermore, one region in the North West did not positively respond to repeated requests for meetings or information. This region (Bojanala) is therefore the only regional office in North West that was not surveyed. In Gauteng, 10 out of 15 district education offices were surveyed. The remaining five did not participate in the survey in spite of repeated requests.

Data Triangulation

In order to obtain reliable data, the research relied on more than one source especially on information relevant to the public expenditure tracking survey. For instance, the amount of funds that are allocated to schools was sought from both districts and schools. Therefore, there were intentional overlaps in the questionnaire.

Response Rate and Data Limitations

Of the 207 questionnaires administered, the cumulative response rate was 62 percent. The response rate was higher in Gauteng (72 percent). In North West however, the response was 51 percent. The breakdown of responses is shown in Table 5.3 below.

[18] This suspicion is not altogether unreasonable as some previous PETS exercises have exposed extensive inefficiencies and corruption in the sector (see literature review). In the case of Tanzania, the government banned the publishing of the findings. In Peru, researchers were banned from asking certain kinds of questions. It should however be recalled that the researcher followed due process by applying for authorization from the two provincial authorities two months before the commencement of the fieldwork. To South Africa's credit, none of the questions were found to be problematic at the time when the Department was reviewing the survey instruments. Nonetheless, districts and schools simply chose not to answer questions that they were not comfortable with.

Table 5.3 Response Rate by District/Region

Gauteng Districts	Response Rate (%)	NW Regions	Response Rate (%)
Erkurhuleni North	50 (4/8)	Bophirima	38 (6/16)
Erkurhuleni South	89 (8/9)	Southern	40 (5/20)
Gauteng East	100 (9/9)	Central	84 (26/31)
Gauteng North	0 (0/3)	Bojanala	26 (9/34)
Gauteng West	71 (5/7)		
Johannesburg Central	77 (10/13)		
Johannesburg East	66 (4/6)		
Johannesburg North	88 (7/8)		
Johannesburg South	100 (5/5)		
Johannesburg West	71 (5/7)		
Sedibeng East	100 (4/4)		
Sedibeng West	75 (6/8)		
Tshwane North	40 (2/5)		
Tshwane South	80 (8/10)		
Tshwane West	75 (3/4)		
AV TOTAL	**72 %**		**51%**

Brackets: (number of completed questionnaires/number of questionnaires administered)

In total, 80 and 46 questionnaires were received from Gauteng and North West respectively, totalling 126 schools and hence falling short by 81 schools (26 schools in Gauteng and 55 schools in North West). The feedback from the researchers is that the schools that did not participate were simply not interested in the study. The lack of participation by these schools however, presents a potential bias in the study. For example, if some schools decided not to participate because of high rates of repetition and dropouts, the final sample could suffer from a self selection bias. In this case, the lack of

participation, particularly from North West schools in Bophirima, Southern and Bojanala districts may present a downward bias in the estimates because these schools are more likely to be underperforming. As the study tries to assess the impact of PEM on poor education outcomes, the less than optimal number of underperforming schools would weaken the results. This means that a lack of significant results in the coefficient estimates may be due to sampling errors. It is a concern for this study, but still one that is better than a sampling error that would overestimate the results.

In order to reach the targeted sample of schools, a second "random" sample only from the suburbs where for one reason or the other, the schools did not participate in the survey was drawn. Successful schools were first removed from the list before the second sample was drawn. An additional 81 schools were surveyed in attempt to strive for the desired sample size. It is acknowledged however, that this method of replacement is tantamount to purposive sampling and may compromise the randomness of the data - a quality that is sacrosanct in statistical analysis. It may cause a bias in the sample if schools are not equally balanced or objectively represented (Ross, 2005). A potential consequence in this approach would be erroneously attributing a result on education outcomes to an aspect of PEM rather than a sampling bias.

The second round of sampling was however undertaken in order to expand the sample of schools with the understanding that missing values tend to be fairly common in survey work and rather than working with a substantially smaller dataset, which is also a source of bias, it was better to work with a larger dataset. It is worth repeating that serious efforts were made to minimise sampling errors by randomly selecting schools within the same

locality (suburb) as the original school that did not participate. A similar technique was used in the PETS for Papua New Guinea, where schools were replaced by randomly selecting from the same district (World Bank, 2004c).

As a result of the second sampling, the study ended up with a total of 175 schools.[19] Of these, there were a total of 96 schools from Gauteng and 79 from the North West province. The same problems were encountered during the second fieldwork phase, which mainly utilised telephonic and faxing methods and therefore, the targets of 106 and 101 schools in Gauteng and North West respectively, were not reached. Nonetheless, given the experience of other PETS studies, a sample of 175 schools (7 percent of the population) is still considered adequate for statistical analysis.

5.5 Data Analysis

Introduction

The study uses both quantitative and qualitative analyses. The qualitative analysis focuses on the functioning of institutions at the district level, their levels of efficiency and accountability. The aim of the assessment is to shed light on the formal and informal rules of the game and the implications on learning outcomes at the school level. It relies on interviews, the PETS-QSDS surveys, observations in the field and secondary data. The quantitative analysis relies on bivariate and cross-section regression analyses to assess the relationship between PEM and education outcomes. A discussion of the distribution of the data, rationale for model selection and a specification of the model follows in the next section.

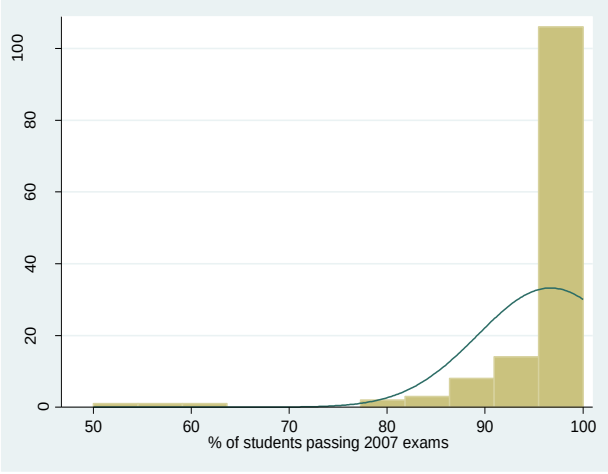
[19] From the second drawing, 49 of the 81 schools participated in the survey.

Considerations for Model Selection

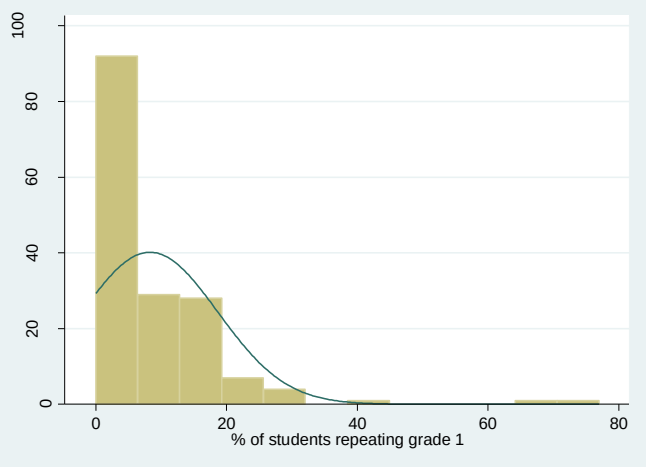
Various models used in estimating education outcomes, such as OLS models, multi-level analysis, randomised experiments and value-added models were discussed in Chapter 4. A model should be selected based on its effectiveness in addressing the research questions that the study seeks to answer, but also one that is most appropriate for the distribution of the data. The prevalence of parametric techniques, particularly OLS regressions in education production function studies provides a compelling rationale to use OLS regressions in the analysis. OLS techniques typically need to satisfy assumptions of normal distribution and linearity. These assumptions are assessed in the histograms below which show the distributions for all the education outcome variables to be non-Gaussian.

Figure 5.1: Histogram of Education Outcome Variables

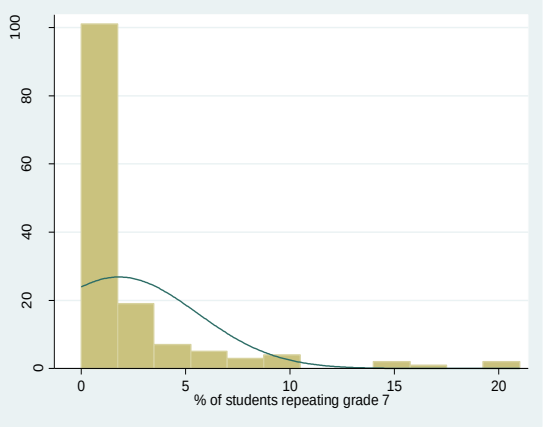
5.1(a) Pass Rates



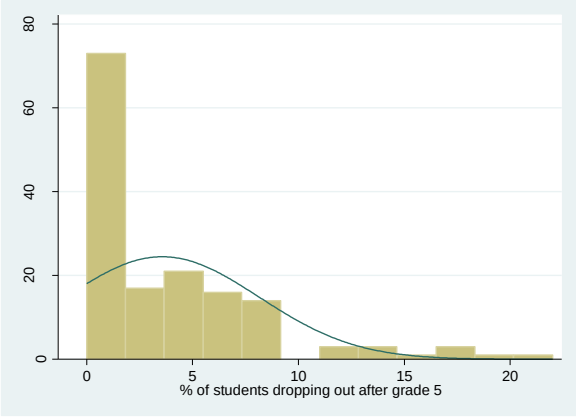
5.1(b) Grade 1 repetition rates



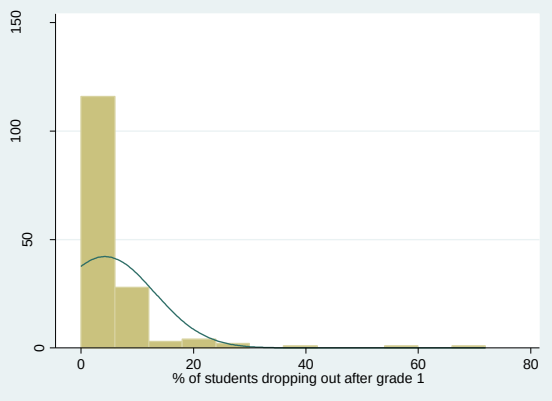
5.1 (c) Grade 7 repetition rates



5.1 (d) Grade 5 dropout rates



5.1 (e) Grade 1 dropout rates



The graphs show that there is a large concentration of schools at the extreme end of the spectrum. A great majority of schools have 100 percent pass rates and similarly, a vast majority have zero rates of repetition and dropout. The graphs show clearly that the dependent variables are non-normal and skewed. Normality tests were conducted to confirm whether the distributions indeed lacked normality. The results are presented in Table 5.4 below.

Table 5.4 Results of Normality Tests

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
% of students passing 2007 exams	.318	122	.000	.521	122	.000
% of students repeating Grade 1	.173	122	.000	.850	122	.000
% of students repeating Grade 7	.310	122	.000	.579	122	.000
% of students not returning after Grade 1	.325	122	.000	.475	122	.000
% of students not returning after Grade 5	.237	122	.000	.764	122	.000
a. Lilliefors Significance Correction						

The KS and SW statistics quantify the discrepancy between the distribution of the data and the ideal Gaussian distribution (Motulsky, 1999). A significant test means that the fit is poor. It is evident, therefore, from the p values (all close to 0) that the data fails the normality test and that the population is unlikely to Gaussian. The general recommendation is that failing normality tests, skewed distributions can be mitigated by transforming variables into logarithms in order to convert non-Gaussian data to a Gaussian distribution (Wooldridge, 2000). Taking the logs usually narrows the range of the variable and makes estimates less sensitive to outlying observations. A major limitation of this transformation is that logs cannot be used if a variable takes on zero or negative values (Wooldridge, 2000). Transforming the variables into logs would reduce the sample size significantly as most schools have zero values. Leaving them out of the

analysis would completely bias the estimates.[20] Taking these considerations into account, a more suitable model would be one that allows for not only a non-normal distribution but one that allows for limited dependent variables. These are discussed below.

Limited Dependent Variable Models

The limited dependent variable (LDV) is defined as a dependent variable whose range of values is substantively restricted (Wooldridge, 2000). In some cases, these variables take on a binary response (values of one or zero) in which case Logit and Probit models can be applied. The dependent variables for this study as shown in Figure 5.1 are roughly continuous but limited between 0 and 100. In this instance, there are two other econometric models that may be considered. The first is the Tobit model, which is explicitly designed to model "corner solution" dependent variables – cases whereby optimising behaviour of a sizeable fraction of the population results in zero quantity as the optimal solution (Wooldridge, 2000). Examples include the number of married women in the labour force or the number of families that would make a charitable contribution in a given year.

While the Tobit model appears to be appropriate for data (positive integers) with a huge pile up of zeros, which is the case in this study for four of the five dependent variables, it is also unsuitable because it is also designed for a broad range of positive values and crucially relies on normality and homoskedasticity in the underlying latent variable as shown below.

[20] According to Wooldridge (2000), where a variable takes on the value of zero, log (1+y) can be used. It is acceptable to interpret it is as log (y) if the data on y is not dominated by zeros. In light of the dominance of zeros on the data, this approach is not taken.

$y^* = \beta_0 + x\beta + \mu$, $\mu|x \sim \text{Normal}(0,\sigma^2)$ [5.1]

Even though the Tobit model is more interested in explaining $y = \max(0,y^*)$ – the observed variable – if the assumptions of the homoskedasticity and normality in the latent variable is incorrect, then it is difficult to know what the Tobit model is estimating (Wooldridge, 2000).

For positive integer distributions such as repetition and dropout rates that take on relatively few values, including zeros and are non-normal with heteroskedastic distributions, there are two appropriate models: the negative binomial regression model (NBRM) and the Poisson regression model (PRM) (Wooldridge, 2002; Long and Freese 2006). These models have been applied to distributions such as the number of children ever born to a woman, number of times someone is arrested per year or the number of patents applied for by a firm in a year (Wooldridge, 2000). The PRM is critiqued for being much too restrictive. All the probabilities and higher moments of the Poisson distribution are determined entirely by the mean and in particular, the model requires that the variance be equal to the mean – a restriction that is violated in many applications (Cameron and Trivedi, 2009). The negative binomial regression model has the same mean structure as the Poisson model but is a good alternative to the PRM and more efficient in cases of overdispersed data where the variance is much larger than the mean. A review of the summary statistics for the sample data for this study (see Table 6.2) shows clearly that the sample variances are larger than the sample means in all the outcomes variables, except pass rates which in any case is not a Poisson distribution

given the absence of zeros. If the assumptions for PRM are incorrect, the expected outcomes will not be biased but the standard errors in the PRM will be biased downwards and generate small p values and therefore present inappropriate conclusions about significance (Long and Freese, 2006).

The Negative Binomial Regression Model

The NBRM, similar to the PRM, models information on count variables. It differs from the PRM through the additional parameter in the equation to address overdispersion of count data, which is when the conditional variance exceeds the conditional mean. To illustrate, the probability for observing a count of an outcome Y in the univariate Poisson distribution is given by the formula:

$$\Pr(Y = y) = \frac{e^{-\mu}\mu^{y}}{y!} \quad [5.2]$$

The key assumption is that $E(Y) = \mu$ and $Var(y) = \mu$, meaning that the mean and the variance are equal. In practice, the equidispersion property is often violated. Additional dispersion can be accounted for in several ways. Most common is the presence of unobserved heterogeneity, which generates additional variability in y (Cameron and Trivedi, 2009). Researchers are often unable to collect all of the explanatory variables relevant to explaining the variation in the underlying rates of outcomes among the study subjects. In the NBRM, an additional parameter is added. For example, if μ were replaced with μv, where v is a random variable and specified such that $E(v) = 1$ and $var(v) = \sigma^2$, then it would be easier to show that v preserves the mean but increases dispersion

(Cameron and Trivedi, 2009). If σ^2 is zero, then we would obtain Poisson variance and if σ^2 were greater than zero, then the variance would be larger than the mean.

Essentially, the mean structure of the PRM and the NBRM will remain the same but the standard errors in the PRM will be biased downwards. It is the incorporation of both observed and unobserved heterogeneity into the conditional mean, through the addition of a parameter that distinguishes the NBRM from the ordinary Poission count model and makes it more suitable for overdispersed data. This is an important consideration in this study because the education outcomes data used in this study are prone to overdispersion. Preliminary diagnostics of the sample data as shown in Table 6.2 show that the variances of repetition and dropout rates are consistently larger than the means.

Taking these considerations into account, various studies concerned with overdispersion of their outcomes data, have applied the NBRM Model. A few notable examples include: the explained inverse relationship between education and fertility in Columbia and Peru (Tuman, Ayoub and Roth-Johnson, 2007); regional variation in under 5 mortality rates in Kenya (Rutaremwa, 2000) and the relationship between place (schools, churches, alcohol-related establishments) and crime (Willits, Broidy, Gonzales and Denman, 2011). In these three studies, the outcome variables: crime, fertility and child mortality rates had overdispersed count data and were more suitably analysed with the NBRM.

Given the considerations above, the negative binomial regression model is used in this study. OLS estimates are also reported even though they may not be the best fit for the data and likely to predict conservative values. They are nonetheless included because it

always useful to start with a linear model, which are renowned for being robust. It has also been argued that a violation of the normality assumption only does minimal damage to OLS estimates of β_0 and β_k as even small sample properties of OLS estimators still retain their BLUE (best linear unbiased estimator) characteristics (Hubbard, 1978).

Regression Model Applied

The regression model applied in this study is presented below. The relationship between PEM and education outcomes is expressed as:

$$Educ = \beta_0 + \beta_1 PEM + \beta_2 schinp + \beta_3 nonschinp + \mu \quad [5.3]$$

Whereby, Educ represents education outcomes (pass rates, Grades 1 and 7 repetition rates and Grades 1 and 5 dropout rates). PEM refers to the independent variables (leakage, delays, public expenditure, total resource wealth and LTSM expenditure). The model also controls for non-school inputs (nonschinp) such as the district socio-economic status. This is captured by quintiles, which as index between 1 and 5, reflecting rates of unemployment, income and illiteracy within a school catchment area. School inputs (schinp) with theoretical and empirical importance such as classroom size are controlled for. μ represents the error term (that is, the unmeasured factors that influence education outcomes).

The model has to address issues of endogeneity in order to minimise doubt as to whether the relationship between two variables is being driven by another unobservable variable.

Two sources of endogeneity: selective migration and purposive programme placement are addressed below because they are common problems affecting EPF studies. The former is a problem of self-selection and refers to instances where parents choose the schools their children attend on the basis of its resources and therefore schools with more resources end up having pupils with more favourable family backgrounds. Similarly, better qualified teachers may to work in more affluent schools. In this instance, self-selection can overestimate the effect of resources on outcomes. The first problem is minimised to a large extent in the context of South Africa because in the public school system, schools are obliged to give admission preference to children living within a "school feeder zone".[21] Other children outside of this area are taken on a first come, first serve basis or placed on a waiting list. Self-selection is therefore, unlikely to occur on a large scale in the case of parental selection of schools. The preference of affluent schools by better qualified teachers however, remains an endogenous problem that will have to be addressed in the model. This is done by controlling for teacher qualification.

The second source of endogeneity pertains to the targeting of educational resources to weaker/disadvantaged schools from a policy standpoint. This is true in the case of South Africa, whereby the government provides more resources per capita to poorer schools as defined by the quintile ranking. The model addresses this problem by controlling for socio-economic status (SES), which would be the factor determining how resources are allocated. The SES, an index based on poverty quintiles, is computed nationally at the

[21] School Feeder Zones are set by the Department of Education in consultation with School Governing Bodies. Preference is given to learners whose parents live in the feeder zone in their own domicile or employer's domicile. The second order of preference would be children whose parents work address is in the feeder zone. Third would be other learners on a first come, first serve basis (Department of Education, 1998).

level of a school catchment area. It includes three variables: unemployment rates, literacy levels and income levels. There are other sources of endogeneity that may also affect the explanatory variables. They are addressed in Chapter 8.

The count and OLS regressions do not address aggregate biases and nesting of data, which are more appropriately addressed by HLM models (see Chapter 4). This is not a concern for this study because the research collects and analyses data at the school level and also makes conclusions at the school level, not the pupil level. This is an important caveat to bear in mind when interpreting the results. For example, if public expenditure is found to be important for an education outcome, such as Grade 1 repetition, the interpretation would be that increased public expenditure (by a specific rand amount), all things being equal, results in a reduction of Grade 1 repetition at the school level.

In light of the considerations above, the regression model is used to address the following research questions: (i) is there a significant relationship between leakage of funds and education outcomes? (ii) is there a significant relationship between delays in the disbursement of funds and education outcomes? (iii) is there a significant relationship between public expenditure (government subsidies) per capita and education outcomes? (iv) is there a significant relationship between the total resource wealth of a school per capita and education outcomes? and (v) is there a significant relationship between LTSM (learning and teaching support materials) per capita expenditure and education outcomes?

5.6 Conclusion

This chapter has explained in detail, the preparations made to ensure technical rigour in the research methodology, while exposing all shortcomings and their implications for the study. The Chapter has also discussed how the research was undertaken during the field work period and indications of how data would be analysed. The following information provided the basis for analysis: a micro-level survey of 175 schools in North West and Gauteng provinces and 13 local education offices and secondary data. The research methodology took into consideration the theoretical discussions around the various explanatory variables for education and education outcome variables discussed in Chapter 2. It also built on the theoretical framework presented in Chapter 4 and presented a regression model that would be used in the analysis. In the three chapters that follow, the results of the survey are presented beginning with a descriptive analysis in Chapter 6, a qualitative analysis of technical efficiency at sub-national level in Chapter 7 and correlation and regression analyses in Chapter 8.

CHAPTER SIX

DESCRIPTIVE ANALYSIS OF PRIMARY SCHOOLS SURVEY

6.1 Introduction

Earlier chapters established the importance of primary education for growth and development and showed that good outcomes are not necessarily generated by increased spending. Chapters 1 and 3, in particular, brought the case of South Africa to the fore, where primary education in South Africa was shown to absorb the most funding in the social services category since the democratic regime, while improvements in education have been limited. South African pupils have been placed in the bottom category in international reading and mathematics tests. This chapter builds on this discussion by presenting a detailed descriptive analysis of the state of education, using public primary schools in Gauteng and North West provinces as case-studies.

The analysis is based on a comprehensive survey (covering 100 variables on the school system) in 175 public primary schools in Gauteng and North West provinces. The chapter begins with a general description of the schools with a focus on geographic location and socio-economic status. The results of the outcome variables (pass, repetition and drop-out rates) are subsequently presented. This is followed by a discussion of the findings of the quality of educators in terms of their qualifications, salaries, experience and degree of absenteeism. The next sections focus on the quality of school facilities such as classrooms, libraries and playgrounds; the proximity of schools to public transportation

and health facilities; the organisation and structure of school governance; the level of supervision by district inspectors; accountability of schools to the districts in terms of annual reporting, and finally, a discussion of school income and expenditure patterns.

With regards to the school sample, 96 of the 175 schools (out of a total 1,318) were selected from the Gauteng province and the remaining 79 schools (out of a total 1,114) were selected from the North West province. This represents 7.3 percent and 7.1 percent of the school population respectively.

6.2 General Description of Schools: Geographic and Socio-economic Data

In terms of geographic location, the majority of schools (60 percent) were located in urban areas. Thirty five percent were located in the rural areas and 5 percent were located in peri urban areas. All the schools were mixed gender schools. The student population ranged from 33 to 1644 students with a median school population of 562 and an average of 633 students. The pupil-to-teacher (PT) ratios ranged from as little as 13 pupils per teacher to as high as 112 pupils per teacher. The average PT ratio for the sample was 39 pupils per teacher. The schools with a PT ratio higher than the average were schools with very high student populations and were mainly located in Gauteng Province (75 percent).

As discussed in Chapter 3, the socio-economic status of schools (quintiles) ranges from 1 (most poor) to 5 (least poor). The table below shows the distribution of quintiles of the sampled schools.

Table 6.1 Schools' Quintile Ranking

	Quintiles	Frequency	Percent	Cumulative Percent
Gauteng	Q1	6	6.2	6.6
	Q2	10	10.3	17.6
	Q3	35	36.1	56.1
	Q4	23	23.7	81.4
	Q5	17	17.5	100
	Total	91	93.8	
Missing	System	6	6.2	
Total		97	100.0	
North West	Q1	26	33.3	36.6
	Q2	15	19.2	57.7
	Q3	23	29.5	90.1
	Q4	4	5.1	95.7
	Q5	3	3.8	99.9
	Total	71	91.0	100
Missing	System	7	9.0	
Total			100.0	
Gauteng and North West	Q1	32	18.3	19.8
	Q2	25	14.3	35.2
	Q3	58	33.1	71.0
	Q4	27	15.4	87.7
	Q5	20	11.4	100.0
	Total	162	92.6	
Missing	System	13	7.4	
Total		175	100.0	

The table clearly shows that the majority of the wealthy schools (quintiles 4 and 5) are located in the Gauteng province and the majority of the poorer schools (quintiles 1 and 2) are located in North West. The regional disparity is quite striking. On the aggregate level, the majority (about 36 percent) were quintile 3 schools – medium in the poverty spectrum. This was followed by approximately 20 percent in quintile 1, which shows that a large concentration of schools was in the poorer to middle spectrum. As previously mentioned in Chapter 3, schools in the lower quintiles (particularly 1 and 2) are normally given *no-fee* status. The survey found this to be true as all the schools in quintiles 1 and 2 were categorised as *no-fee* schools. Furthermore, 7 out of the 58 schools in quintile 3

were also declared as *no-fee* schools. In total, there were 68 *no-fee* schools[22] (40 percent of the total sample), which means that as a result of their socio-economic status, they were not allowed to charge tuition fees. There were 102 schools (61 percent) ranking between quintiles 3 and 5, charged schools fees.

Tuition Fees

This section only concerns schools with fee-charging status. Tuition fees ranged from as little as R25 per annum to R9,800 per annum with a mean of approximately R1,405 per annum. In terms of policy, tuition fees in public schools are set annually by the school governing bodies, not the Department of Education. Parents who cannot afford the school fees can either seek (through the SGBs) to obtain a full or a partial exemption depending on their financial status. The survey found that the majority of schools (73 percent) were awarding full exemptions to qualified students. Of these, 55 percent also awarded partial exemptions in addition to the full exemptions. Therefore, more schools tended to offer full exemptions rather than partial exemptions. On the receiving end, qualifying students for full exemptions were, on average, 10 percent of all students in the fee-charging schools and 8 percent average for partial exemptions.

The schools that did not award any full tuition exemptions were relatively inexpensive. On average, the tuition fees were R289 (or R79 average if two schools were to be excluded) per annum, which compares favourably with the sample average of R1,405. The same applied to schools that that did not offer any partial exemptions. The average

[22] This includes 32 from Quintile 1; 25 from Quintile 2; 7 from Quintile 3 and 4 others that did not specify their quintiles.

tuition per annum was R471 (or R115, excluding 4 schools that charged over R1,000). Therefore, there was substantive evidence that schools were complying with the exemption policy.

6.3 Findings on Education Outcomes: Repetition, Dropout and Pass Rates

Five indicators of education outcomes were collected in the survey: pass rates; Grade 1 repetition rates; Grade 7 repetition rates; Grade 1 dropout rates and Grade 5 dropout rates. These variables were selected partly because nationally comparable test scores were not available for the sample of schools used this study but also because, despite their limitations, they were deemed appropriate and relevant for this study and for the South African context (see Chapters 1 and 2). A summary of statistics for the other outcome variables are presented below.

Table 6.2 Summary of Statistics for Repetition and Dropout Rates

	Variable	Obs	Mean	Std. Dev.	Min	Max
Gauteng Province	Pass	83	97.3	7.3	50	100
	Gr_1_rep	91	5.4	5.8	0	24
	Gr_7_rep	84	1.0	1.8	0	9
	Gr_1_dropout	85	4.1	8.3	0	54
	Gr_5_dropout	85	3.3	4.3	0	18
North West Province	Pass	53	95.6	7.6	58	100
	Gr_1_rep	72	12.0	13.4	0	77
	Gr_7_rep	60	3.0	5.2	0	21
	Gr_1_dropout	71	4.4	9.5	0	72
	Gr_5_dropout	68	3.9	4.9	0	22
GP and NW	Pass	136	96.7	7.4	50	100
	Gr_1_rep	163	8.3	10.4	0	77
	Gr_7_rep	144	1.8	3.7	0	21
	Gr_1_dropout	156	4.2	8.7	0	72
	Gr_5_dropout	153	3.6	4.6	0	22

The table shows that the average pass rates in the two provinces were nearly 97 percent, with very little variation between the two provinces. The average repetition rates for

Grade 1and Grade 7 pupils were 8.3 and 1.8 percent, respectively, for the two provinces.[23] Dropout rates were 4.2 percent for Grade 1 and 3.6 percent for Grade 5.[24] Interestingly, the outcomes indicators are similar for both North West and Gauteng, with the exception of Grade 1 repetition, which reveals a large discrepancy. The average Grade 1 repetition rate is as high as 12 percent in North West, compared with 5 percent in Gauteng. Detailed discussions on each of the outcome variables follow below.

Findings on Pass Rates

In the case of pass rates, the majority of schools (59 percent) reported a pass rate of 100 percent; 35 percent reported relatively high pass rates between 90 and 99 percent and the remaining 7 percent reported between 50 and 89 percent pass rates. Therefore, pass rates on the whole were very high. This finding must be interpreted cautiously for reasons explained in Chapter 5, whereby primary school-leaving exams are set internally by schools making comparability impossible.

Finding on Repetition Rates

In the case of Grade 1 repetition, the rates ranged from 0 percent to 77 percent. Although not shown in the table, of the 163 schools that provided data on repetition rates, 23 percent reported that none of their learners repeated Grade 1. The majority of schools, 45 percent, reported Grade 1 repetition rates as between 1 and 10 percent. There was also a sizeable proportion (32 percent) that had Grade 1 repetition rates of over 10 percent, that is, between 11 and 77 percent. Of this group of high repeaters, it is important to

[23] As a rough comparison, national statistics provided by the Department of Education (2009) shows Grade 1 repetitions at 10 percent and Grade 7 repetitions at 5 percent in 2003.
[24] Department of Education (2009) indicates 10 percent and 2.6 percent dropout rates for Grades 1 and 5 respectively at the national level in 2003.

emphasise that they did not emerge specifically from any of the socio-economic categories. That is, 49 percent of them were from fee-charging schools and 47 percent were within the range of quintiles 3 and 5. They were also fairly evenly distributed between rural and urban locations (46 and 50 percent respectively). The vast majority, 69 percent of these schools, were located in the North West province.

In the case of Grade 7 repetition rates, the vast majority, 65 percent, did not have any repeaters; 32 percent had between 1 and 10 percent repeaters and 3 percent experienced a high repetition rate falling between 14 and 21 percent. Of the last group of high repeaters, they were all schools in the North West, with 80 percent of them in Bophirima region. Furthermore, 60 percent were fee-paying schools and had quintile 3 status. They were all rural schools, with the exception of one school in a peri-urban geographic location.

It should be noted that repetition rates in Grade 7 tend to be conservative because students who do not successfully meet the academic requirements to move forward to secondary school, may not be held back because they may be over the age limit set for primary schools in South Africa and, therefore, may choose to continue their education in an adult institution or they may have already repeated once before in the phase and cannot by policy, repeat twice in the same phase.

Findings on Dropout Rates

Data on dropout rates were collected for Grades 1 and 5. In Grade 1, almost half of the schools surveyed (48 percent) did not have any dropouts. A sizeable group (45 percent), however, reported dropout rates of between 1 and 10 percent. Very few schools (6

percent) experienced very high dropout rates between 12 and 17 percent. It was a similar case for Grade 5, although the dropout rates were slightly more extensive. Forty three percent did not have any dropouts in 2007 but, almost half of the schools surveyed (49 percent), experienced between 1 and 10 percent of dropouts. Eight percent had between 11 and 22 percent of students dropping out.

The group of schools that had relatively high Grade 1 dropout rates were fairly evenly distributed across the two provinces and in socio-economic groupings. In the case of Grade 5 dropouts, the schools were mostly in urban areas (75 percent); mostly fee-charging schools (83 percent) and all, with the exception of one, between quintiles 3 and 4. Therefore, Grade 5 dropout rates appeared more prominently in schools with a relatively high socio-economic status. The reasons for this are not clear. It is possible that weaker students were not capable of the academic demands given that these were predominantly in the medium quintiles. In examining the general reasons for dropping out of the school system (the question was not grade specific), it emerged that most students did not return because they transferred to another school (see Table 6.3 below).

Table 6.3 Main reason for dropping out this year

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	working to support family	6	3.4	5.1	5.1
	transferred to other school	80	45.7	67.8	72.9
	lack of food or malnutrition	3	1.7	2.5	75.4
	Other	29	16.6	24.6	100.0
	Total	118	67.4	100.0	
Missing	System	57	32.6		
Total		175	100.0		

As indicated in the table above, 68 percent of the schools that responded indicated that "transferring to another school" was the main reason for dropout. The truthfulness of this could be questioned as schools may not wish to admit some form of failure on their part. Furthermore, in sparsely populated areas such as those in the North West, it is unlikely that parents would have several choices of schools in the communities in which they live. Though unlikely, it is still possible that school transfer was a reason for leaving a school. Interpretation of findings using dropout rates would therefore require some caution.

6.4 Findings on Principal and Teacher Experience and Qualification

Principals were asked to indicate their number of years as an educator, number of years as a principal in any school and number of years as a principal in their current school. The findings showed that principals were generally well experienced. The years of experience as an educator ranged from a minimum of 10 years to 43 years, with an average of 25 years work experience. Experience as a principal in any school ranged from 6 months to 34 years, with an average of 11 years. As a principal of their current schools, experience ranged from 4 months to 31 years, with an average of 10 years.

Moreover, additional information was sought on their educational backgrounds by explicitly asking about their highest level of education. There was data missing for 25 principals. These were cases where a Head of Department or other senior administrator answered the questionnaire. Only 1 percent had a secondary school certificate as the maximum qualification; 27 percent possessed a diploma; 7 percent had undertaken some university training; the majority, 37 percent, were however, university graduates and an additional 27 percent had post-graduate training.

Concerning teachers, the survey found that in 72 percent of the schools, there were no teaching gaps and all allocated positions had been filled. The remaining 28 percent reported vacant positions ranging from 1 post to 14. It should be clarified that the teacher allocations for each public school are determined by the Department of Education. The teaching gap could be the result of the Department being unable to provide the full complement of teachers on time or it may be that the schools determine their own staff ratio which may be different to the Department's formula. Therefore, schools have to either increase the work burden of available teachers or recruit teachers from the school's own revenue to fill the teaching gap. Schools that do not have the financial means would simply have to operate with a larger than planned student-teacher ratio. Many fee-charging schools are able to fill this gap and even recruit more teachers than the minimum prescribed by the Department in an effort to have smaller teacher-student ratios.[25]

In terms of teacher qualifications, all the schools, with the exception of 10, confirmed that the teachers had the requisite teaching certificate and were therefore qualified to teach in schools. Therefore, about 95 percent of teachers are qualified. The schools with unqualified teachers did not have any unique characteristics. They were fairly evenly distributed between the two provinces, fee-paying status and quintiles.

As teacher absenteeism is often reported to be a recurring problem in the South African media, the survey asked whether all teachers were present and teaching in the school on

[25] The study was unable to collect information on extra teachers hired at the expense of the schools.

the day of the survey. Sixty nine percent of schools reported that all their teachers were present and teaching on that day and 32 percent reported incidences of teacher absenteeism, signifying that on the day of the survey, at least one-third of all teachers were not present and teaching. Further on teacher conduct, the survey showed that only 2 percent of schools had had teachers laid off in the past 12 months. Reasons given included: absenteeism and redundancy. Interpreting low levels of dismissals to be cases of misconduct is misleading because the study found that laying off teachers in public schools is ultimately decided by the Department of Education, who may be reluctant to do so as it means that a school would be without a teacher until one is recruited. It is also important to note that South Africa has a long history of teacher unionism and these bodies have enjoyed a close relationship with government since 1994 and as such, they are powerful organisations (Govender, 2004).

Teacher salaries are set by the Department of Education, based on their qualifications (academic training and professional experience). The findings showed that monthly gross salaries ranged from a minimum of R3, 000 to a maximum of R20, 000. The average salary was R8, 807. There were 30 schools (20 percent) whose teachers on average, earned more than R10,000 a month. These teachers tended to work in medium sized schools (average size 635). Poorly remunerated teachers (earning less than R10,000 a month) worked in slightly larger schools (648 average). As shown in the table below, the difference in average salary between the two provinces is quite small. This was an unexpected finding given that one would have expected better qualified teachers to be concentrated in Gauteng, the wealthier province.

Table 6.4 Teacher Monthly Gross Salaries by Province

Province where school is located		N	Minimum	Maximum	Mean	Std. Deviation
GP	Teacher gross salary (monthly)	79	5,000	15,000	8,751.06	2,233.7
NW	Teacher gross salary (monthly)	70	3,000	20,000	8,869.43	3,219.1

Therefore, there was a fairly even distribution of qualified teachers across the two provinces. The data did provide evidence that better qualified teachers tend to work in higher quintile schools. Therefore, although this trend did not come across at the provincial level, it came across very clearly at the quintile level as shown below.

Table 6.5 Teacher Monthly Gross Salaries by Quintile

Quintile where school is located		N	Minimum	Maximum	Mean	Std. Deviation
Q1	Teacher gross salary (monthly)	30	3,000	15,000	8,163.4	2,759.9
Q2	Teacher gross salary (monthly)	20	3,957	20,000	8,372.8	3,448.3
Q3	Teacher gross salary (monthly)	47	3273	16,599	8,282.7	2,648.8
Q4	Teacher gross salary (monthly)	22	7,000	15,000	9,789.7	2,213.7
Q5	Teacher gross salary (monthly)	17	8,000	13,479	10,072.2	1659.3

The mean statistics show a trend in teacher salaries whereby better paid teachers, who are also better qualified teachers tend to be concentrated in the high quintile schools and vice versa. The distinction between the lowest three quintiles and the top two quintiles is

substantial. Therefore disadvantaged schools are deprived of highly qualified teachers. The standard deviation also shows that there is a lot of variation in teacher salary in the quintile 2 schools.

6.5 Findings on School Facilities

The availability and quality of facilities were mixed. Whereas, most schools had decent infrastructure with respect to furniture, water and toilet facilities, many lacked adequate roofs, playgrounds, libraries and science laboratories. On the positive side, the majority of schools had tables and chairs for teachers in the classrooms. Only 18 percent complained of classrooms that did not have a chair and a table for the teacher's use. Furthermore, 70 percent of schools had toilet facilities in good working order and 86 percent had piped water as the main source of drinking water. When asked whether the water facilities were in working condition and whether students were able to drink from that source on the day of the interview, 96 percent answered "yes". Therefore, only 4 percent reported problems with the water facilities, citing reasons of recent burglaries in the schools whereby the taps were stolen.

In terms of security, 90 percent of the survey schools were surrounded by a fence that was in good condition, indicating that most schools were properly secured although very few actually had a security guard at the gate as observed by field researchers on the day of the interview. In terms of meals, 57 percent of schools were benefiting from the school feeding schemes, whereby the majority of their students enjoyed free lunches at the school. Only 7 percent of students paid for lunches at the school and 29 percent of

schools had students who brought their own lunches. The remaining 6 percent had other arrangements, such as going home to eat lunch.

The survey found that nearly half of the schools surveyed (46 percent) complained of roofs that leaked when it rained. Furthermore, less than half of the schools (48 percent) had libraries, only 21 percent had science laboratories and 31 percent of schools did not have a playground or sports area for the students. Though a very small percentage (4 percent), it was worrying that some schools did not have separate toilet facilities for girls and moreover 2 percent did not have a source of drinking water at the school or relied on rain.

6.6 Findings on Location and Distance

Proximity of schools to amenities such as public transportation and health facilities are good indications of a school's socio-economic status. Schools that are remotely located from public amenities and are largely inaccessible tend to be in the rural areas and have the disadvantage of potentially receiving less attention (visitations) from the district authorities. Furthermore, in cases of emergencies, these schools would have a longer waiting period to reach or receive assistance. The survey found that a sizeable percentage were fairly close to public amenities: 33 percent of schools were located within just 100 metres from the nearest public transport; 21 percent were located between 100 and 500 metres and another 21 percent were located between 500 metres and 1 kilometre of public transport. Almost a quarter of the sample (24 percent), however, were located more than 1 kilometre from the nearest public transport, which means that children would have to walk a considerable distance to reach the schools.

In terms of proximity to clinics, not many schools had easy access: only 9 percent were within 100 metres to the nearest clinic; 21 percent were located between 100 and 500 metres; another 21 percent were located between 500 metres and 1 kilometre but the majority, 49 percent, were located more than 1 kilometre from the nearest health facilities.

Most schools (81 percent) stated that they were not the only schools in the area, meaning that there were other options available to parents. For these schools, the principals were asked why parents had chosen that particular school. In response, 38 percent of principals indicated that it was the academic reputation of the school; 29 percent believed proximity was the reason; 17 percent attributed the school selection to the environment/culture; 6 percent said ethnicity or religion and only 2 percent said cost. The remaining 7 percent could not specify the reason or attributed it to other reasons other than those listed above.

6.7 Findings on Organisation and Governance

Public schools in South Africa are required to have a school governing body (SGB), as discussed in Chapter 3. The SGBs for the most part, have replaced the old system of parent teacher association (PTAs), although, some schools maintain PTAs for fundraising and other purposes. With the exception of one school which did not provide a response, all schools had an SGB. The membership of SGBs ranged from a minimum of 4 to a maximum of 16 members. From the sample, 73 percent of schools had an SGB membership of 8 and 11 members; 15 percent had members between 4 and 7 and 12 percent of SGBs had between 12 and 16 members. The average size of SGBs for the

entire sample was about 9 members. In most SGBs, parents comprised the majority of the membership.

The number of times the SGB met in 2007 ranged from only two meetings to a maximum of 22 meetings. Nearly one third of SGBs would meet once a term, which means they met 4 times in the course of 2007. On average, SGBs met 7 times in a year. The most discussed issue by SGBs (56 percent) pertained to budgetary and financial issues. The second most discussed issue (11 percent of schools) was on facilities and maintenance; for 10 percent of schools, "discipline" was the most discussed issue during SGB meetings. Seven percent discussed curriculum and student performance issues; 6 percent discussed mainly staff issues; 4 percent mostly discussed fees, while the remaining 5 percent discussed other issues other than those mentioned above.

Regarding PTAs, only 36 schools (21 percent) had these bodies. Fifteen of these schools (about 47 percent) were either in quintile 4 or 5 schools, which is a finding that becomes important later in the analysis. Of the schools that did not have PTAs, 70 percent attributed it to redundancy; in light of the mandatory establishment of SGB structure and 22 percent stated that PTAs did not exist because of lack of interest and participation on the side of the parents. The remaining 8 percent attributed the absence of PTAs to a lack of interest by the school and various reasons other than the ones specified. From the schools that had PTAs, participation of parents was mixed. About 48 percent of those schools said the participation of parents fell somewhere between "very few" and "less than half" and 52 percent had between "about half" and "most" parents participating in PTAs.

All schools (with exception of 7 that did not respond) held an Annual General Meeting (AGM) involving parents in 2007. Furthermore, 96 percent of schools presented the school budgets at the AGM meeting. It is not clear why the remaining 4 percent (7 schools) did not submit their budgets. All were schools in Gauteng Province and with the exception of one, were fee-charging schools between quintiles 3 and 4. Therefore, it is unlikely that capacity constraint was the issue.

6.8 Findings on Supervision

Supervision of schools is a core function of district education offices. They may take the form of scheduled or unscheduled visits. District inspectors may visit schools to attend to a problem reported by the school principal or undertake periodic assessments of the quality of education including areas such as curriculum, learning materials, school infrastructure, performance of teachers and management issues. In 2007, the frequency of inspections to the surveyed schools varied from nil to a maximum of 50. On the extreme ends, 3 percent of schools (5 schools) had no visits at all from the district in 2007 and 4 percent (7 schools) had at least 20 in the year.

During the interviews with district authorities, it was clarified that needy schools may receive more frequent visits due to the several constraints that they face. The survey found the opposite. The 7 schools that numerous visits from the district were mostly in Gauteng (5 schools) and with the exception of one, were urban schools. Furthermore, only 2 of the 7 were *no-fee* schools and none of the schools were in quintile 1 (all ranged between 2 and 4). Conversely, the 5 schools that received no visitations in 2007 tended to

fit the profile of needy schools. All were located in North West; 4 out of 5 were in rural areas and 3 out 5 were *no-fee* schools in quintile 1. Surprisingly, they received no assistance from the district in terms of school visits. Therefore, this trend is an anomaly that requires attention by the department.

On the whole, the majority of schools (41 percent) had between 3 and 5 visits in the year, indicating that district inspectors would on average visit a school once a term, thus 4 times a year. It was a similar trend in 2006, with about 40 percent of schools receiving between 2 and 4 visits from the district inspector.

From the information gathered from the survey (see Table 6.6), general inspections form the bulk of visitations (about 44 percent) from the district inspectorate, followed by advisory visits (18 percent). The former involved among others, assessments of the school premises and teaching staff and the latter involved some form of technical assistance to the schools. The other visits focused on a variety of issues, including facilities and general school quality (11 percent) and assessing teachers (8 percent).

Table 6.6 Main purpose of official's last visit

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	general inspection	74	42.3	43.5	43.5
	advisory visit	31	17.7	18.2	61.8
	assessment of teachers	14	8.0	8.2	70.0
	assessment of students	3	1.7	1.8	71.8
	assessment of facilities and general quality	19	10.9	11.2	82.9
	Other	28	16.0	16.5	99.4
	Total	170	97.1	100.0	
Missing	System	5	2.9		
Total		175	100.0		

Following each visit, it is expected that district inspectors provide some form of feedback to the schools. This was not done for about 13 percent of schools, as shown in Table 6.7 below. Written reports were presented in only about 5 percent of schools. A verbal report to teachers was the most common type of feedback (43 percent).

Table 6.7 Type of feedback from Inspector

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	22	12.6	12.9	12.9
	verbal report at staff meeting	24	13.7	14.1	27.1
	verbal report to head teacher only	43	24.6	25.3	52.4
	verbal report to individual teachers	74	42.3	43.5	95.9
	written report to head teacher	6	3.4	3.5	99.4
	written report to individual teachers	1	.6	.6	100.0
	Total	170	97.1	100.0	
Missing	System	5	2.9		
Total		175	100.0		

6.9 Findings on Accountability

Public schools are required to adhere to certain measures of accountability, such as the submission of an audited report to district authorities every year. Interviews with some district directors further indicated that the submission of these reports is a prerequisite to receiving funds for the following year. In addition to the audited reports, schools are

required to submit their annual budgets and academic reports to the district authorities. As shown in the three tables below, with few exceptions, schools tend to adhere to the accountability measures.

Table 6.8: Indicators of School Accountability (Academic Report)

Did school provide academic report to district in 2007?						
Province where school is located			Frequency	Percent	Valid Percent	Cumulative Percent
GP	Valid	yes	95	99.0	99.0	99.0
		No	1	1.0	1.0	100.0
		Total	96	100.0	100.0	
NW	Valid	yes	75	94.9	98.7	98.7
		No	1	1.3	1.3	100.0
		Total	76	96.2	100.0	
	Missing	System	3	3.8		
	Total		79	100.0		

Only two schools did not provide their academic reports. Similarly, a high percentage (97 percent) submitted their budgets to the district authorities (see table 6.9 below).

Table 6.9 Indicators of School Accountability (Budget Report)

Did school provide budget to district in 2007?						
Province where school is located			Frequency	Percent	Valid Percent	Cumulative Percent
GP	Valid	Yes	93	96.9	96.9	96.9
		No	3	3.1	3.1	100.0
		Total	96	100.0	100.0	
NW	Valid	Yes	73	92.4	96.1	96.1
		No	3	3.8	3.9	100.0
		Total	76	96.2	100.0	
	Missing	System	3	3.8		
	Total		79	100.0		

Only 6 schools failed to submit a budget. Moreover, 97 percent presented their latest audited financial report to the district authorities (as shown in table 6.10 below). Five schools did not submit their audited reports.

Table 6.10 Indicators of School Accountability (Audited Financial Report)

Did school provide financial report to district in 2007?						
Province where school is located			Frequency	Percent	Valid Percent	Cumulative Percent
GP	Valid	Yes	94	97.9	97.9	97.9
		No	2	2.1	2.1	100.0
		Total	96	100.0	100.0	
NW	Valid	Yes	73	92.4	96.1	96.1
		No	3	3.8	3.9	100.0
		Total	76	96.2	100.0	
	Missing	System	3	3.8		
	Total		79	100.0		

This shows that by and large, there is a high degree of accountability from schools to district authorities. The reason for the high levels of compliance to district education regulations is that schools are mandated to submit these reports as a condition for receiving government funding for the next academic year. From the table, it is evident that a small number of schools failed to submit these documents and still received their funding for the following academic year.

6.10 Findings on School Income and Expenditures

Public ordinary schools in South Africa have three main sources of income: government funds (subsidies), school fees and funds from donors or from fund-raising activities. Table 6.11 below summarises the income data per capita for 2007 for the surveyed schools. The data excludes teacher salaries, which constitute the largest share of education funding and only presents the amounts that goes directly to the schools. The table shows that Gauteng public primary schools on average receive the bulk of their funding from school fees and not government subsidies. In fact, the money received from households in the form of fees is more than 6 times the money received from government. The North West, being the relatively poorer province, receives more funding

per capita from government than Gauteng (see mean column in Table 6.10). Both provinces, however, rely more on household funds in the form of fees than any other means of income.

Table 6.11 Summary of School Income (Rands) per capita per Province

Descriptive Statistics							
Province where school is located		N	Minimum	Maximum		Mean	Std. Deviation
GP	Government subsidies	93	27.52	1,685.28		397.0900	255.45640
	Tuition Fees	91	.00	10,374.44		852.3839	1786.55242
	Donor Funding	85	.00	6,015.04		163.0035	725.68491
NW	Government subsidies	72	23.57	1,750.00		425.2923	240.19575
	Tuition Fees	70	.00	3,598.74		216.0845	631.21935
	Donor Funding	63	.00	505.12		35.4620	89.28338

Table 6.11 also reveals that Gauteng schools are more effective in generating income from other sources. On average, schools in Gauteng earned about 163 Rands per student in 2007 from sources other than government and school fees, compared to 35 Rands per student in North West. It is also noteworthy that the highest amount made by a Gauteng school in raising other funds is 6, 015 per student (8 million in total, though not shown in table), compared to 505 Rands per student (2.4 million) in the North West.

Regarding school expenditure, data was sought on five key expenditure items: maintenance, LTSM, utilities, teacher training and administrative costs. The results are shown in Table 6.12 below.

Table 6.12 Summary of School Expenditure (Rands) per capita

Descriptive Statistics							
Province where school is located		N	Minimum	Maximum	Sum	Mean	Std. Deviation
GP	Amount spent on school maintenance	86	.00	7,981.10	19,588.92	227.7781	865.70807
	Amount spent on utilities	84	.00	820.93	9,711.05	115.6078	121.57912
	Amount spent on scholastic materials	84	34.40	3,822.72	24,312.46	289.4340	432.19486
	Amount spent on teacher training, bonuses etc	82	.00	3,645.45	9,677.38	118.0168	498.68950
	Amount spent on administrative costs	76	.00	1,003.31	13,190.52	173.5595	226.33464
NW	Amount spent on school maintenance	65	.00	1214.29	9,242.69	142.1953	178.26359
	Amount spent on utilities	63	.00	1,569.94	5,322.69	84.4871	230.18274
	Amount spent on scholastic materials	63	.00	954.55	6742.37	107.0217	127.95266
	Amount spent on teacher training, bonuses etc	63	.00	1,075.07	2,909.89	46.1887	172.37802
	Amount spent on administrative costs	64	.00	562.29	6,067.95	94.8117	130.50039

The data shows that schools in Gauteng spend most of their resources on scholastic materials (LTSM) than any other category, which is in line with the expectations of the Department of Education. This is not the case in the North West province, where poor infrastructure and other challenges have resulted in a higher expenditure on school maintenance than scholastic materials. Furthermore, the data show that the minimum spent by a Gauteng school on scholastic materials per student is R 34, while in North West; one school reported not to have any spending on scholastic materials.

6.11 Findings on Leakage

Leakage, as defined in Chapter 5, is the allocated spending that does not reach intended beneficiaries and is either used by local government officials for purposes unrelated to education or captured for private gain. The study relied on data from the schools by asking the principals how much they expected to receive from government and how much they *actually* received. In an effort to triangulate data collection, district officials were also asked to provide information on the amount that schools were supposed to receive. These two sources of information were consolidated to derive the amount schools were meant to receive (intended amount). Actual receipts obtained from school records were captured as amounts actually received. To derive leakage, the original amount earmarked by the central government is compared with the amounts actually reaching the schools. The formula below is used to derive the extent of leakage (modified from Reinikka and Svennson, 2001).

$$Leakage = 1 - \{\frac{amount\ received\ by\ schools}{actual\ amount\ earmarked\ for\ schools}\} * 100$$

Of the 164 schools for which financial data was obtained, there were cases of leakage in 21 schools. Of the 21 leakage schools, 13 were located in Gauteng and the remaining 8 were located in the North West province. The mean poverty quintile of these schools was 3.6 but, the modal value was 5. The emergence of a large proportion of wealthy schools experiencing leakage is a surprising finding with important implications and will be discussed later in the chapter and in Chapter 8. The descriptive data is shown below.

Table 6.13: Descriptive Data of Leaked Funds

Descriptive data of Leaked funds	Leaked funds (Rands)
Minimum	1,000
Maximum	197,845
Mean	38,920
Total amount – Gauteng (Average per school)	612,446 (47,111)
Total amount - North West (Average per school)	204,833 (25,604)
Grand Total (GP and NW)	817,329

On the whole, a cumulative amount of over R 800,000 or nearly R 40,000 per school was leaked or unaccounted for in 21 schools. The extent of leakage per school in Gauteng was nearly twice the levels in the North West province. One may argue that this occurrence may be due to higher resource allocation in Gauteng schools. On the contrary, the North West has a higher allocation per school as shown in Table 6.11. The high levels of leakage in Gauteng are related to the earlier finding of high incidences of leakage among relatively wealthy schools. These schools rely mainly on tuition fees and other non-state funding and therefore are less likely to pay attention to their subsidy allocations and ensuring that they receive the amounts that they are entitled to. Corrupt officials within sub-national levels may target these schools for this purpose. One would expect that the poorer schools that do not charge fees and rely solely on subsidies would monitor government subsidies more closely.

Leaked funds (according to Reinikka and Svennson's 2001 definition) may be the result of misappropriation. It could also be that these funds cannot be accounted for simply due to poor accounting (by schools or government). Both of these are governance concerns. It is important to recall the provisions made by government for underprivileged schools (no fee and non-section 21 schools) as discussed in Chapter 3. For these schools, the

Department of Education manages their finances and as indicated by District officials during the interviews, the department at times makes payments for certain categories of spending such as utilities and maintenance on behalf of the school. One may argue that this explains the discrepancies in funding. Therefore, one would have to examine whether the district offices made some payments on utilities and maintenance for these schools that would be equivalent to the leaked amount. In examining the expenditure statements of the 21 schools, it was observed that only five of these schools did not make utility payments in 2007 and one could infer that payments were made on their behalf by the district authorities. In the end, questions remain about the funding gap for the remaining 11 school funds that made utility and maintenance payments.

For Gauteng Province, 13 percent of funds earmarked for public schools in Gauteng province were leaked as shown below. Therefore, only 87 percent of the allocated funds reached the schools.

$$GP_LeakageI = 1 - \{\frac{1{,}971{,}976}{2{,}257{,}222}\} * 100 = 13\%$$

In the North West Province, a considerably higher proportion, 28 percent of funds were leaked meaning that only 68 percent of funds reached the schools.

$$NW_LeakageI = 1 - \{\frac{530{,}637}{735{,}520}\} * 100 = 28\%$$

Even though in terms of a Rand amount, the leakage problem is more endemic in Gauteng, the pervasiveness of leakage in the North West cannot be overlooked. The fact that over a quarter of education funds are leaked in that province warrants a serious

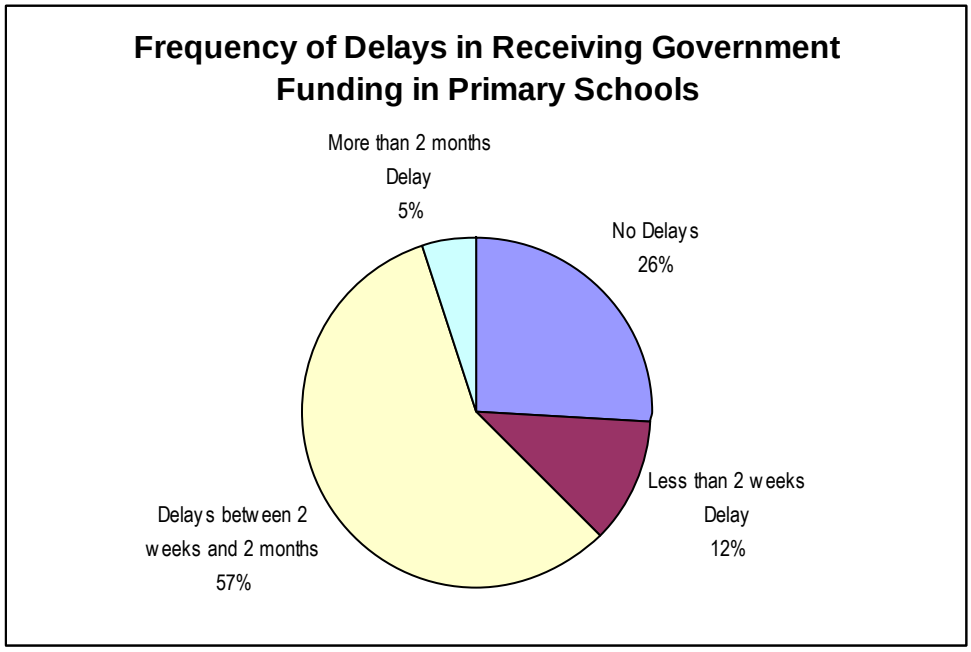
concern, especially if public funds are found to be highly correlated with outcomes. This is examined in Chapter 8.

In comparison with Table 1.1, where leakages in other African countries were as high as 78 percent in one country, leakage in the South African school system is relatively modest. It is also important to recall that personnel funds are excluded since teacher salaries are paid directly to the teachers by the Department of Education. These funds, as mentioned in Chapter 3, constitute the largest share of education funding. Therefore, the leakage calculations are relatively minimal. When examined from the perspective that any given school could be losing nearly R40,000 a year of funds that could upgrade facilities and supplement learning materials,, the leakage amount warrants some concern.

6.12 Findings on Release of Funds (Delays)

For schools that primarily depend on state resources (subsidies), one could argue that significant delays would adversely impact education outcomes. In this light, this section analyses the relationship between the timing of the release of public funds and education outcomes. To begin with, schools were asked to indicate the schedule upon which funds are disbursed. Four options were presented: (i) no delays (ii) less than 2 weeks delay (iii) between 2 weeks and 2 months and (iv) more than 2 months. The findings are captured in the pie chart below.

Figure 6.1 Frequency of Delays in Receiving Government Funding in Primary Schools



As shown in the chart, the majority of schools experienced between 2 weeks and 2 months delay in receiving their funding from government. Rarely do schools receive funding after 2 months and a sizeable number experience no delays or less than 2 weeks delay.

6.13 Conclusion

The descriptive analysis of the survey data revealed some important findings. Firstly, education outcomes are encouraging across schools in terms of high pass rates and relatively low dropout and repetition rates. As explained in Chapters 1 and 2, these outcome indicators do have limitations. Principals and teachers meet qualification thresholds but, teacher absenteeism occurred in about a third of the schools. The prevalent student teacher ratio was about 40 to 1 for the most part, but a high concentration of schools, particularly, in Gauteng, had overcrowded classrooms.

Concerning facilities, most schools have adequate furniture, water and toilet facilities, but a great number suffer from leaking roofs, and a lack of playgrounds, libraries and science laboratories, all of which are important for basic education. Additionally, although most schools are accessible by public transport, almost half of the schools (49 percent) are far from hospitals or clinics.

In terms of organisation and governance, all schools have SGBs and parents are adequately represented on the SGBs, although, the survey could not ascertain how effective the parents are in terms of meaningful participation and decision-making. Budgetary and financial issues dominate most SGB meetings, followed by facilities and maintenance. Most SGBs meet at least once a term – 4 times a year. Schools also consistently have annual general meetings, where the vast majority present the annual budgets to parents.

District supervision of schools was found to be the most problematic area. There were some schools that did not receive a single visit from the district in an entire year. Others received over 20 visits. The survey revealed that contrary to the indications by district authorities that needy schools require more visits, it was the needy schools that tended to be neglected. On the positive side, the district inspectors tended to give feedback to the schools after the inspections, although they were mostly verbal and not written.

In terms of income and expenditure, Gauteng schools were better resourced and relied more on private funds than schools in North West, which tended to rely more heavily on

government subsidies. Gauteng schools also tended to spend more of their income on learner materials than the North West, which spent the bulk of their allocations on maintenance. Delays in remitting funds were not very rampant as most schools receive the funds within a timeframe of two weeks to two months. Leakages only occurred in 13 percent of the schools but, the amounts were substantial (R 800,000), which is 16 percent of the total education funding allocated to the schools, excluding personnel costs.

CHAPTER SEVEN

ANALYSIS OF TECHNICAL EFFICIENCY AT THE SUB-NATIONAL LEVEL

7.1 Introduction

Technical efficiency, as explained in the introductory chapter, refers to the capacity of line agencies to use allocated resources in a manner that ensures efficient and effective delivery of public goods and services. A key value in technical efficiency is the systemic orientation that encourages government officials to focus on performance and strategic objectives. Among other requirements, technical efficiency relies on a well-functioning accounting and financial management system; and attention to the links between budgeting and financial management systems and other service-wide systems and processes. This chapter therefore qualitatively examines the extent to which sub-national structures in Gauteng and North West provinces succeed in being technically efficient and the extent to which deficiencies therein affect the provisioning of quality education services.

The chapter delves into questions such as: are the current decentralised education structures optimally designed to promote sound education outcomes? Is there adequate financial management capacity at the local government level? Are district offices properly equipped to enable officials to fully perform their functions? Are local education authorities provided with an enabling environment that incentivises optimal delivery of social services? The findings reported are based on interviews with 10 of the 15 District

Education Offices (DEOs) in the Gauteng Province that participated in the survey and 3 out of the 4 Regional Education Offices (REOs) in the North West Province. The chapter begins with an analysis of the decentralised education structure in the two provinces and how the structural design hinders or promotes effective service delivery. The next sections focus on financial management and an analysis of human resource capacity.

7.2 Decentralisation and Effective Service Delivery

Overview of Decentralised Education Structures in Gauteng and North West Provinces

The administration of education in South Africa is decentralised, with the highest-decision making authority being the National Department of Education, followed by the Provincial Education Departments (PEDs). The PEDs are headed by Members of the Executive Council (MECs) for Education. The next hierarchal position at the provincial level is the Superintendent General, who essentially ensures that the department is efficiently and effectively managed in terms of administration. A Deputy Director General (DDG) or Head of Department (HOD) oversees the operation of the executive managers in charge of the district/regional levels.

Beyond the provincial level, the structure varies by province. In Gauteng, there are District Education Offices (DEOs) in all districts, but in North West, clusters of districts are governed by a regional education office (REO) – four in total. The decentralised structure at the provincial level is a devolution of power, whereby PEDs have full authority and discretion over most of their affairs. Beyond that level, it becomes a

deconcentration of power, whereby the districts and regions remain under the hierarchal authority of the provinces.

At the time of the survey, there were 15 DEOs governing a total of 1,880 public ordinary schools, 1,617,124 learners and 47,990 educators in Gauteng province (National Treasury, 2007). In the North West province, there are 4 REOs supported by 21 Area Project Offices (APOs) that governed 2,115 public ordinary schools, 894,249 learners and 30,388 educators in 2007 (National Treasury, 2007). Due to resource constraints, the APOs are not fully established offices like the DEOs. They are smaller offices headed by a Chief Education Specialist (who serves at the level of a Deputy Director) and supported by managers and subject specialists offering direct support to schools. APOs generally provide support to a cluster of schools within a demarcated area (comprising of several districts).

Effectiveness of Sub-National Education Structures in providing Support to Primary Schools

In light of the efforts to enhance accessibility of education services and to facilitate efficiency in the delivery of these services, it is important to examine whether these decentralised education structures are effective in providing optimal services to schools. The starting point in this analysis pertains to accessibility: Are DEOs and REOs conveniently located to allow for optimal scheduled and unscheduled visits to schools? Table 7.1 below shows the location of these offices in relation to the schools within the region/district.

Table 7.1 Location of District/Regional Education Offices

Descriptive Statistics						
		N	Minimum	Maximum	Mean	Std. Deviation
GP	How many minutes it takes to reach closest school from office	9	1	35	10.22	11.311
	How many minutes it takes to reach the farthest school from office	9	25	90	49.78	19.633
	How many minutes it takes to reach a school on average school from office	9	15	60	31.22	16.200
NW	How many minutes it takes to reach closest school from office	3	1	5	3.00	2.000
	How many minutes it takes to reach the farthest school from office	3	90	180	150.00	51.962
	How many minutes it takes to reach a school on average school from office	3	30	60	43.33	15.275

The table shows that the REOs in the North West have a greater distance to cover to reach the average school and the farthest school, compared to the DEOs in Gauteng. Indeed, due to the large size of the province, it can take up to 2 hours to get to a school within a single region in the North West.[26]

Decentralising the administration of schools should ideally allow for regular monitoring and supervision of schools through regular on-site visits, for instance, and offering schools, technical support as needed, in order to meet pre-established educational goals. The study was able to examine whether district officials consistently pay on-site visits to schools. The study was also able to address questions such as, how do schools with more

[26] The study does not take APOs into account as they do not provide the full range of services provided by the REOs.

supervision fare in terms of education outcomes and how do schools with less supervision fare in terms of education outcomes?

Supervision of Schools by District/Regional Education Inspectors

The main purpose of district education offices is to support the delivery of the curriculum and to ensure that all learners are afforded good educational learning opportunities (Roberts, 2001). As part of their set functions, district officials periodically visit schools for a number of reasons. They include among others, periodic inspection of the premises; assessments of students/teachers; evaluation of the quality of education; attending to specific problems that have been reported by the school principal; training of teachers on new curricular; school governance and resolving management/conflict issues. The particular staff responsible for these supervisions at district/regional levels are: Institutional Development Support Officials (IDSOs) – in Gauteng Province and Area Project Officers (APOs) – in the North West Province.

While there is no theory on an acceptable quantity of on-site visits to schools in a term or in a year, one can assume that at least a single visit within a term to each public school would be expected and it would appear irregular if some schools did not receive a single visit from a district official within a school term for a quality assessment or any other reason. Therefore, for the sake of making some assessment in the absence of specific guidelines on the adequacy of the number of school visits, zero visits to any schools (whether performing or underperforming) will constitute a problem on the part of the district/regional offices. It may indicate that district offices are understaffed or lacking capacity to conduct the required inspections. It may also suggest that certain schools are

not easily accessible and therefore, district inspectors do not make the effort to go there. The implication could be highly detrimental to education outcomes.

At the same time, some schools may receive numerous visits in a year. According to district officials, this happens in the context of underperforming schools as they demand more attention. Therefore, one would observe a higher frequency of visits in such schools. Although, excessive visits could theoretically overwhelm the principal, who already has competing demands on his/her time, the rationale offered by IDSOs during interviews means that a high volume of visits may be a necessary occurrence that generates positive results in education outcomes.

Table 7.2 below shows the average number of visits by districts inspectors in 2006 and 2007 in Gauteng and North West provinces. For both provinces, it is clear that some schools did not have a single visit from the district in a term. As there are four terms in a year, one would expect at least 4 visits in a year. In Gauteng, however, there are instances of only one visit in a year. In the case of North West, some schools did not see a district inspector at all during the year.

Table 7.2 Frequency of Visits by District Inspectors

Descriptive Statistics						
Province where school is located		N	Minimum	Maximum	Mean	Std. Deviation
GP	# of visits by district inspector in 2007	90	1.00	32.00	7.5222	5.56116
	# of visits by district inspector in 2006	86	1.00	30.00	7.1395	5.55012
NW	# of visits by district inspector in 2007	73	.00	50.00	6.2055	6.97607
	# of visits by district inspector in 2006	65	.00	50.00	6.4308	7.31430
GP & NW	# of visits by district inspector in 2007	163	.00	50.00	6.9325	6.24908
	# of visits by district inspector in 2006	151	.00	50.00	6.8344	6.35655

Given that some schools in both provinces scarcely interact with the district officials at the school premises, it is important to examine those schools. As previously mentioned, one would expect these schools to fall within the top quintiles - which is also a signal of well performing schools and hence needing less visits.

Of the 175 schools surveyed, 44 schools (25 percent) emerged with less than 4 visits in the entire school year, as reported by the school principals. The majority of these (64 percent) were from the North West province, most especially from the Central Region. One would expect this trend to be more prevalent in the North West given the sparsely populated characteristic of the province and considerable distance of schools from the REO. However, it is worrying that up to five schools in the North West did not receive a single visit from a district official in the entire academic year.

The study was further interested in knowing the types of schools that were receiving considerable or very limited supervisory visits in terms of their socio-economic status. From the group that received less than 4 visits in a year, 44 percent fell between quintiles 1 and 2 and 78 percent fell between quintiles 1 and 3. This finding shows that contrary to expectations, a sizeable number of disadvantaged schools that would require more technical assistance from the districts (be it proactive or reactive visits), did not receive this support unless these schools were generally perceived by the districts to be efficient even if disadvantaged. It may also be that these schools were remotely located which presents a constraint to the district supervisors. The major concern here is that the criteria for supervision is not clear.

7.3 Environmental Constraints of Sub-National Education Structures in Delivering Services to Schools and Communities

The effectiveness of districts and regions in delivering education services can be compromised by environmental constraints at the district/regional offices such as poor infrastructure and inadequate facilities. In that regard, significant variation was observed in terms of office infrastructure at the district/regional levels. DEOs, such as those in Ekurhuleni North, Gauteng East, Johannesburg East and Johannesburg North had better-quality infrastructure such as a well-maintained building, compared to other districts such as Gauteng North, Gauteng West and Tshwane South where the offices were fragmented or visibly run-down, crowded and had furniture in dire condition. In the latter offices, there also appeared to be a lack of organisation and the working environment seemed disorganized. On the contrary, the three REO buildings surveyed in North West were all in fairly good condition.

All of the offices surveyed in the two provinces had government-issued vehicles, ranging from 18 cars in one district to 50 cars in another district. While 99 percent of vehicles were said to be in working condition in 9 DEOs in Gauteng, only 78 percent of vehicles were in working order in North West, which is seen as problematic given the larger distance they have to cover in the region.[27]

7.4 Financial Management at the Sub-National Level

To a large extent, the management of education funds is tasked to provincial authorities. Some of this burden has been shifted to the districts/regions and schools whereby, DEOs and REOs manage the funds for non-section 21 schools (for example, paying their utility bills) while, School Governing Bodies (SGBs) of section 21 schools, manage the funds received from government. Given the fiscal responsibilities given to sub-national structures, it is important that local education offices adhere to budgetary controls and other fiscal mechanisms observed at the national level.

The study found that all the DEOs and REOs surveyed had an accounting unit that handles all the financial and procurement matters for the office. In spite of this, it was observed that record-keeping in the finance offices was highly problematic in most districts. These challenges were more pronounced in the North West, where the regional offices frequently deferred questions on expenditures and finance issues to the provinces.

[27] This pertains to only Central and Southern Regions. Bophirima was unable to provide data on vehicles and Bojanala did not participate in the survey.

When asked whether there was regular auditing of the district/regional accounts, 8 districts/regions said yes and 3 district/regions said no. Upon further investigation on these inconsistencies, it was clarified that auditors may visit the district/regional offices as part of the audit exercise of the provincial audit. Therefore, in a strict sense, the lower levels of the sub-national offices are not audited. The lack of auditing of the district and regional offices may be rationalised by the fact that these decentralised structures are simply deconcentrated structures with no distinct powers. As these offices are not only managing their own accounts, but that of non-section 21 schools, one could query the practice of not auditing district/region accounts.

The study further found that district and regional education offices are not mandated to publish their financial accounts. Nevertheless, all 13 offices indicated that they operate within the regulations of the PFMA, which provides punitive actions for overspending or under-spending. Regardless, some of the districts and regions did admit that overspending and under-spending had occurred in the past under certain budgetary items, but since the accounts are balanced at the provincial level, these anomalies are corrected at that level. This indicates that any mismanagement of funds at the district and regional level would only be known by provincial authorities and not the public at large.

District and Regional Office Procurement Arrangements

District education offices in Gauteng province procure goods and services through a centralised system known as the Gauteng Shared Services Centre (GSSC). The rationale for the GSSC is to harness the GPG's collective buying power by reducing the cost of buying goods and services. Consolidating and outsourcing office support functions would

enable the decentralised education offices to focus and excel in service delivery. Therefore, there is a strong justification for this system of procurement. There are also drawbacks according to some district officials. The predominant concern is that of delays. As the GSSC has to service 11 departments in the province, delays are unavoidable. Some districts also feel that due to local knowledge, it would be more efficient and cost-effective for districts to procure their own goods and services. It should be noted however, that not all districts share this view. Some were supportive of the status quo despite its drawbacks. They noted that an agreement exists for procurement turnaround time. It was, however, clear that the GSSC does not always adhere strictly to the agreement and it is not clear what alternatives exist if they fail to procure services in the stipulated timeframe.

In North West, regional education offices procure directly from the service providers. As explained by one Chief Director, REOs have to source three quotations before procuring goods/services and the turnaround time is usually a month. Evidently, the two provinces have different procurement systems. Given that both provinces experience constraints in areas like infrastructure and maintenance, it is difficult to say which system is more effective and efficient. The feedback from the interviews on the success of requests for items like supplies and maintenance can offer some answers.

Of the four DEOs in Gauteng, who reported shortages in supplies, two noted that the request was not fully resolved. In North West however, only one REO (out of three) reported some shortage in supplies, but also reported that the request was fully resolved. Therefore, the shortage of supplies was only a concern for the Gauteng province and not

the North West province. In terms of building infrastructure, six out of ten DEOs in Gauteng reported problems. Of the six, only two DEOs reported that their requests were fully attended to. In the North West, there was only one REO that complained of building problems, but also reported that requests in this regard were fully resolved. From these results, one could conclude that the procurement system is more effective and efficient in North West province. It is important to recognise that these accounts are self-reports and may be subjective. They do however, align with the observation by the researcher made earlier that DEOs in Gauteng varied significantly in terms of the quality of infrastructure while the North West REO buildings were in good condition.

7.5 District/Regional Education Office Human Resource Capacity

In terms of human resource capacity, none of the surveyed district and regional offices in Gauteng and North West were fully staffed. The education sector tends to experience substantive horizontal and vertical movement of staff. It is common for teachers to leave schools and take up employment at the district/regional education offices and for education officials to move from one district to the other or from district to province. Among the 13 education offices surveyed, 7 provided complete information on the staff complement. The results are presented in Table 7.3.

Table 7.3 District and Regional Education Office Staff Vacancy Rate

PROVINCE	DISTRICT/REGION	VACANCY RATE (%)
GAUTENG	Johannesburg Central	37.04
	Johannesburg East	30.93
	Johannesburg West	43.59
	Tshwane North	13.30
NORTH WEST	Central	27.31
	Bophirima	43.0
	Southern	20.00

As the table shows, the vacancy rate ranges from 13 to 43 percent with significant variation within provinces though it is not clear why there is so much intra-provincial variation. With the exception of Gauteng North and Gauteng West, the remaining 11 districts and regions surveyed admitted to experiencing staff shortage in 2007 and had subsequently notified the Department. Of the 10 DEOs/REOs that provided further information as to whether requests made on staff shortages were successful or not, only 2 DEOs indicated that the request was fully successful. For the others, the requests were either partially successful (3); not successful (2) or pending (3).

These responses show some level of dissatisfaction with the manner in which the Department is responding to the human resource needs at the district and regional levels. One North West Regional Office indicated that shortage of staff continues to be a problem because (i) advertisement of staff is centralized and (ii) advertisements are not budgeted for at the regional level, which explains why vacancies were not advertised for three years. It is not clear why the regions would neglect to budget for advertisements.

Furthermore, six out of the thirteen DEOs and REOs surveyed indicated that they had experienced a problem of late payment of staff in 2007. Although this problem was resolved in four of those cases, one district indicated that it was only partially resolved and in the case of another district, the issue of staff payment was still pending. District officials did however, mention that late payment of staff may be a result of late submission of paperwork by the staff concerned and delays in opening bank accounts. Therefore, the issue may not be related to technical inefficiency at the district offices. While, the study was unable to verify this as interviewing staff was beyond the scope of

this study, observations during the fieldwork showed that inefficiencies are likely to be dominant in the district offices.[28]

Findings on Dismissals and Turnovers of District Directors and Senior Staff

High turnovers and dismissals in any institution are signs of technical inefficiencies and may stem from weak recruitment or appointment policies and practices and lack of solid management/leadership. These in turn, affect the stability of the working environment and can affect output. Table 7.4 below shows (i) the numbers of district or regional directors that have headed the education office in the past 5 years and (ii) accounts of dismissals of senior staff based on non-performance or irregularities.

Table 7.4 Incidences of Dismissals and District Director Turnover

PROVINCE	DISTRICT/REGION	Number of District Directors in Past 5 Years	Account of Dismissal of Senior Staff
GAUTENG	Gauteng North	2	No
	Gauteng West	7	Yes
	Johannesburg Central	2	No
	Johannesburg East	1	No
	Johannesburg North	1	No
	Johannesburg West	n/a	No
	Sedibeng East	3	No
	Sedibeng West	2	No
	Tshwane North	2	No
	Tshwane South	3	No
NORTH WEST	Bophirima	1	No
	Central	1	No
	Southern	2	No

[28]It was observed in one district in Gauteng Province that there are problems of either overlapping duties or lack of clarity in certain responsibilities. For instance, in the process of conducting an interview with the Finance Director in one DEO, a teacher came in to complain that her salary had been paid to a closed bank account. She recalled that she had previously informed the district of her new banking details in writing. The Finance Director referred her to the Human Resource office but moments later, the teacher came back stating that the human resource office had indicated that it was the finance office's responsibility. The finance director was adamant that the matter was outside his jurisdiction. In the end, it was not clear if and how the matter was resolved, but the incidence revealed a serious level of technical inefficiency – one which was having a distressing effect on a teacher(s) and could indirectly affect the quality of teaching.

As shown in the table, the district of Gauteng West stands out in terms of having seven district directors in five years. Tshwane South and Sedibeng East have had three district directors, while the rest have had either one or two. Gauteng West is also the only district that has had the experience of dismissing senior staff based on irregularities or lack of performance. This shows that the district may have some fundamental problems in the area of technical efficiency – a finding that could compound the problems of educational quality in that district. One could argue that the finding for Gauteng West is attributed to the rigour that is applied to service delivery and therefore, high turnovers are a reflection of low tolerance for non-performance. The fact remains that high turnovers in any organisation is perceived negatively and often symptomatic of internal organisational/efficiency problems.

For this reason, it is useful to examine the indicators of education outcomes in the Gauteng West district in comparison with other schools in the province. A compendium of the four education outcomes in all the fifteen Gauteng districts is presented in Table 7.5 in the appendix. A similar table is presented below but compares the education outcomes in Gauteng West with the averaged education statistics in the other 14 districts in the province.

Table 7.6 A Comparison of Education Outcomes between Gauteng West District and All Other Districts in Gauteng Province.

Districts in Gauteng Province	Indicators of Education Outcomes	N	Mean	Std. Deviation
All Gauteng Districts Except Gauteng West				
	% of students repeating Grade 1	86	5.20	5.72
	% of students repeating Grade 7	79	.85	1.53
	% of students dropping out after Grade 1	81	3.53	6.38
	% of students dropping out after Grade 5	81	3.34	4.35
Gauteng West	% of students repeating Grade 1	5	8.40	7.54
	% of students repeating Grade 7	5	2.80	4.09
	% of students dropping out after Grade 1	4	15.75	25.67
	% of students dropping out after Grade 5	4	2.50	3.79

The results show that with the exception of one indicator: Grade 5 dropout, schools in the Gauteng West district performed comparatively worse than other schools in the province. Gauteng West schools had higher repetition rates for Grades 1 and 7 and significantly higher Grade 1 dropout rates. The data for Grade 1 dropout is particularly alarming as Gauteng West schools experience on average nearly 16 percent dropout rates, compared to about a 4 percent average in other districts. There may be several reasons why schools in Gauteng West appear to be underperforming. This is a potential area for future research but, one of those reasons could be the lack of technical efficiency at the district office, as evidenced by high turnovers and accounts of dismissals.

7.6 Conclusion

This chapter focused on a qualitative analysis of efficiency and effectiveness of sub-national governments. On a positive note, all had accounting offices although record keeping was fairly poor, especially in the North West. It raises questions about how certain DEOs and REOs manage the accounts of section 21 schools, given their own lack financial management capacities. Human resource capacities are also a major challenge as none of the district/regional education offices were fully staffed. In fact some of the vacancy rates were significantly high. Gauteng West was singled out for unusually high turnover rates. It was also the only province with a record of recent dismissals of senior staff for irregularities. It was therefore no surprise that schools in Gauteng West performed worse than schools in other districts. The study also found problems in school supervision, where poorer and underachieving schools were receiving less supervisory visits than better off schools.

In conclusion, the study revealed problems in the operational management at the district levels. In terms of policy implications, it is clear that human resource capacity needs beefing up. District offices require adequate staff capacity, support in record-keeping, enough vehicles to allow for optimal supervisory visits and adequate infrastructure that is conducive for productivity.

CHAPTER EIGHT

RELATIONSHIP BETWEEN PEM AND EDUCATION OUTCOMES

8.1 Introduction

The overarching aim of this study is to examine whether PEM is a significant factor in explaining education outcomes. So far, the study has established that despite increased resources, outcomes in education are substandard in Africa. This is also true for South Africa (Chapters 1, 2 and 3). The study also established that poor practices in public expenditure management (PEM) have resulted in extensive leakages of education funds in several African countries and that 13 and 28 percent of education subsidies in Gauteng and North West provinces respectively were leaked in 2007 as evidenced by the sample surveyed for this study (Chapter 6). In Chapter 7, it was evident that technical inefficiencies which prevail in some districts may also be related to poor education outcomes.

This chapter empirically examines whether the variations in technical efficiency and allocative efficiency trends independently influence variations in education outcomes. This is done through correlation and regression analyses and robustness checks to verify the validity of the results.

8.2 PEM and Education Outcomes: Results of Correlation Analysis

The first step in establishing whether a significant relationship exists between PEM and education outcomes is to establish a correlation. A correlation analysis would indicate both the sign and the strength of the relationship between two variables. This is done through bivariate correlations where statistically significant results are reported at 0.05 and 0.1 levels. The findings on the strengths of PEM in education outcomes are presented below. This is followed by preliminary regressions between the education outcome variables and other explanatory variables in order to establish the important school and non-school inputs that should be incorporated in the regression model.

Results on Technical Efficiency: Leakage and Delays

In Chapter 6, leakage of funds was found to occur in only 13 percent of the schools sample, although the amounts were substantive. Delays in the channelling of funds from the government to schools were frequent occurrences but not severe as most schools received their subsidies within two weeks to two months. Nonetheless, it is important to assess whether leakages and delays, regardless of severity, were an important factor in education outcomes. The results of the correlations are shown in Table 8.1 below.[29]

[29] The results for leakage are derived from parametric bivariate correlations (pearson r). Given that the delay variable is categorical in nature, cross-tabulations were computed to assess the correlation between delays and education outcomes. The chi square results are presented in the table.

Table 8.1 Correlation between Leakage, Delays and Education Outcomes

Correlations						
		% of students passing 2007 exams	% of students repeating Grade 1	% of students repeating Grade 7	% of students dropping out after Grade 1	% of students dropping out after Grade 5
Leakage	Pearson Correlation	-.033	-.049	.045	-.020	.000
	Sig.	.710	.550	.602	.812	.993
	N	127	152	134	145	143
Delays	Pearson Chi-Square	17.43	15.68	15.34	**27.70***	**25.58***
	Sig	.425	.943	.355	.117	.142
	N	128	154	136	147	145
*. Correlation is significant at the 0.1 level						

According to the results, there are no statistically significant results for leakage but delays are significantly associated with dropout rates. The positive signs are the expected signs indicating that increased delays – an indicator of technical inefficiencies in the management of education funds – is associated with students not returning to the school. In the case of leakage, as was explained in Chapter 6, leakages were more frequent in relatively wealthy schools (the majority being quintile 5 schools). The two possible explanations are that the wealthier schools do not rely strongly on government subsidies and therefore, do not pay attention to leakages. It may also be that these schools report leakages more accurately than poorer schools. In either scenario, a significant correlation between leakage and performance would only be evident in poor schools. The results of leakage disaggregated by low and high poverty quintiles are shown in Table 8.2 below.

Table 8.2 Correlation between Leakage and Education Outcomes by Quintile

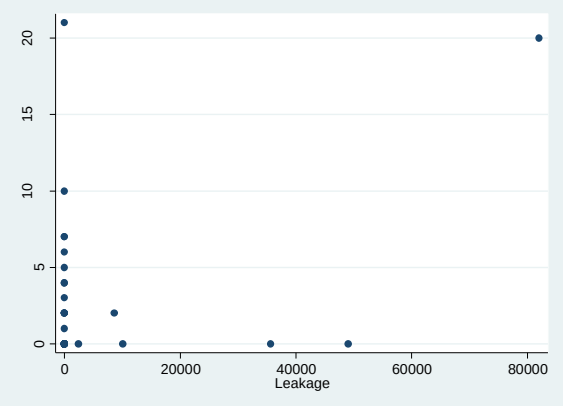
Correlations						
		% of students passing 2007 exams	% of students repeating Grade 1	% of students repeating Grade 7	% of students dropping out after Grade 1	% of students dropping out after Grade 5
Leakage (Q1, Q2)	Pearson Correlation	**-.396****	.044	**.402****	.070	-.145
	Sig.	.01	.75	.00	.62	.31
	N	39	52	42	50	50
Leakage (Q4, Q5)	Pearson Chi-Square	.072	-.078	-.116	-.074	.087
	Sig	.65	.61	.45	.64	.58
	N	41	43	43	41	42
**. Correlation is significant at the 0.05 level						

Note: Quintile 3 schools are excluded because they fall within the middle spectrum of the poverty scale. Their exclusion also allows us to see clearly the difference in outcomes between the schools at the opposite ends of the poverty quintile scale. The remaining schools are grouped into two in order to compare wealthy versus poor schools.

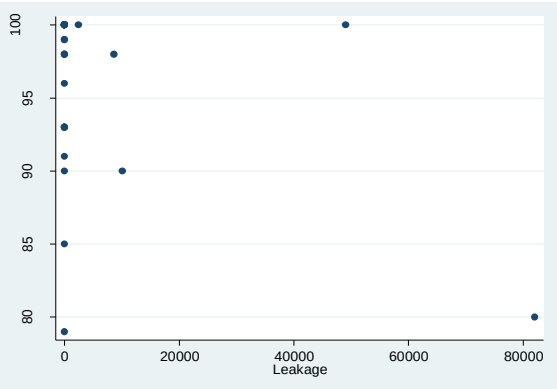
As shown in the table above, in high quintile schools, there are no significant results showing leakages to be associated with education outcomes but in low quintile schools, two significant results emerge for two of the outcome variables (pass rates and Grade 7 repetition rates). The significant correlations are further analysed in a scatter diagram to assess whether the relationship may be driven by outliers.

Figure 8.1: Scatter Plots of Leakage in Low Quintile Schools and Education Outcomes

8.1(a) Leakage and Grade 7 repetition



8.1(b) Leakage and Pass Rates



The diagrams, mapping out the relationship between leakage and Grade 7 repetition in the first chart and pass rates in the second chart, show a clear outlier of R 82,000 in leakage in the case of one school. When this single outlier is removed, the bivariate correlations lose all significance as shown in Table 8.3 below.

Table 8.3 Correlation between Leakage and Education Outcomes for Low Quintile Schools

Correlations						
		% of students passing 2007 exams	% of students repeating Grade 1	% of students repeating Grade 7	% of students dropping out after Grade 1	% of students dropping out after Grade 5
Leakage (Q1, Q2)	Pearson Correlation	.054	.003	-.127	.035	-.074
	Sig.	.74	.98	.42	.80	.61
	N	38	51	41	49	49

Note: The table excludes the outlier shown in figure 8.1

Therefore, leakage is not likely to be correlated with outcomes. The lack of significance could be also attributed to data limitations and more research drawing from a more representative dataset would be required to draw meaningful conclusions on the impact of leakage.

Results on Allocative Efficiency: Public Expenditure, Total resource wealth and LTSM Expenditure

This section explores the relationship between the three variables of education expenditure and education outcomes. Public spending refers only to government subsidies. Total resource wealth of a school includes subsidies, tuition fees and donor contributions. LTSM spending refers to the amount a school spends on learning, teaching and support materials. The results of the bivariate correlations are presented below.

Table 8.4 Correlation between Education Expenditure per Capita and Education Outcomes

Correlations						
		% of students passing 2007 exams	% of students repeating Grade 1	% of students repeating Grade 7	% of students dropping out after Grade 1	% of students dropping out after Grade 5
Per capita government funding	Pearson Correlation	-.097	.066	.075	.089	.063
	Sig.	.27	.41	.38	.27	.45
	N	129	156	137	149	146
per capita amount received from govt, fees and donor contributions	Pearson Correlation	**.175***	**-.145***	**-.152***	-.097	.024
	Sig.	.06	.09	.09	.27	.78
	N	115	137	121	131	130
Per capita LTSM spending	Pearson Correlation	.119	**-.214****	**-.153***	**-.006***	-.077
	Sig.	.21	.01	.09	.94	.38
	N	112	137	120	132	129
**. Correlation is significant at the 0.05 level						
*. Correlation is significant at the 0.1 level						

As the bivariate correlations show, total resource wealth per capita and LTSM spending per capita is significantly associated with education outcomes. The coefficients are not only statistically significant but also have the expected negative signs, showing that increased total and LTSM spending is strongly associated with reduced repetition rates. The lack of correlation for public spending however, may be explained by the redistributive component in terms of how resources are allocated to schools. In other words, a correlation may not be apparent in a situation where government allocates more funds to more disadvantaged schools as is done in South Africa whereby funding is weighted against a schools poverty quintile. In this context, there is a need to control for poverty quintiles. This is done in a partial correlation, shown below.

Table 8.5 Partial Correlations between Public Expenditure and Education Outcomes

Partial Correlations						
		% of students passing 2007 exams	% of students repeating Grade 1	% of students repeating Grade 7	% of students dropping out after Grade 1	% of students dropping out after Grade 5
Per capita government funding for Quintile 1	Pearson Correlation	-.000	.003	.001	.005	-.000
	Sig.	.79	.412	.44	.12	.91
	N	121	147	129	140	137
Per capita government funding for Quintile 2	Pearson Correlation	.000	.004	-.000	**-.008****	-.000
	Sig.	.79	.27	.69	.023	.72
	N	121	147	129	140	137
Per capita government funding for Quintile 3	Pearson Correlation	-.000	.004	.001	**.006***	-.000
	Sig.	.83	.20	.49	.08	.75
	N	121	147	129	140	137
Per capita government funding for Quintile 4	Pearson Correlation	-.000	.003	.000	**.007****	.000
	Sig.	.85	.36	.67	.02	.98
	N	121	147	129	140	137
Per capita government funding for Quintile 5	Pearson Correlation	.002	.001	-.000	.004	-.003
	Sig.	.42	.74	.92	.29	.13
	N	121	147	129	140	137
**. Correlation is significant at the 0.05 level						
*. Correlation is significant at the 0.1 level						

The correlations show that when SES is controlled for in the partial correlations, public spending still lacks significance in four of the outcome variables. Grade 1 dropout emerges as significant when the middle quintiles (two, three and four) are controlled for. Only one of them (quintile 2) emerges with the expected negative sign. Possibly, there may have been significant correlations with more robust indicators of SES. The quintile index is narrow in its categorical spread. While it reveals a clear difference between the top and bottom ranks, the significance of the variations in the middle quintiles could be marginal. It may also be the case that public spending is tenuously associated with education outcomes, which, as previously mentioned is heavily supported in the literature.

Results on School and Non School Inputs

In this section, a series of exploratory OLS regressions are undertaken using subgroups of school and class size, facilities, socio-economic characteristics, school-based governance and teaching characteristics – all of which have theoretical importance. The aim is to establish which of these variables are significantly associated with changes in education outcomes and should be included in subsequent stages of the analysis. The results are presented in Table 8.6 below.

Table 8.6 OLS Correlations of School and Non-school Inputs

Variable	Pass rates	Grade 1 repetition	Grade 7 repetition	Grade 1 dropout	Grade 5 dropout
School/Class size					
Student population	-.000 (.001)	.001 (.002)	.001 (.001)	-.003 (.002)	-.001 (.001)
Pupil-to-teacher ratio	.020 (.036)	-.054 (.059)	-.041 (.038)	-.052 (.073)	.018 (.036)
Pupil-to-classroom ratio	53.92** (28.10)	-88.46** (41.86)	-53.06** (23.44)	119.7** (49.90)	61.50** (24.77)
Obs	128	155	136	148	145
R-squared	.046	.058	.079	.117	.094
Facilities					
Leaking roofs	-.176* (.114)	.052 (.195)	.201** (.095)	.473** (.238)	.255** (.114)
Library dummy	.492 (.926)	-3.381** (1.446)	.424 (.758)	.081 (1.783)	1.881** (.921)
Science lab dummy	1.899* (1.034)	.517 (1.681)	-1.702** (.860)	-1.149 (2.099)	-1.562* (1.043)
Working toilets dummy	-.961 (.874)	-1.800 (1.368)	.436 (.706)	-.029 (1.666)	.501 (.831)
Playground dummy	.413 (.869)	2.897** (1.350)	-.487 (.708)	-1.396 (1.657)	-1.027 (.836)
Obs	131	157	139	150	148
R-squared	.081	.076	.073	.044	.072
Socio-economic Characteristics					
Poverty Quintile 1	-2.703* (1.486)	8.707** (2.312)	-.173 (1.247)	5.813* (3.330)	.812 (1.622)
Poverty Quintile 2	-3.600** (1.330)	6.828** (2.167)	1.876* (1.111)	2.553 (3.076)	1.593 (1.485)
Poverty Quintile 3	-2.001* (1.087)	3.754** (1.785)	1.071 (.897)	2.672 (2.561)	1.939* (1.242)
Poverty Quintile 4	-1.820*	1.407	.903	7.202**	3.924**

	(1.192)	(2.00)	(.984)	(2.886)	(1.365)
Urban dummy	.310 (1.044)	6.080** (1.636)	-.686 (.877)	-.067 (2.345)	.-.320 (1.122)
District population	-.000 (.000)	-.000 (.000)	.000 (.000)	-.000 (.000)	.000 (.000)
District Av Household size	6.196** (1.276)	-2.921* (1.969)	-3.985** (1.030)	-1.287 (2.821)	-.195 (1.359)
District access to electricity	.245** (.067)	-.116 (.110)	-.223** (.057)	.023 (.160)	-.033 (.075)
District access to piped water	-.019 (.052)	-.076 (.081)	-.005 (.042)	.027 (.117)	-.009 (.075)
Obs	124	149	132	142	140
R-squared	.028	.245	.281	.062	.066
School Based Governance					
PTA Dummy	1.787** (.918)	-.357 (1.400)	-1.147* (.728)	-2.925* (1.808)	.581 (.912)
SGB Meetings in 2007	.049 (.114)	.110 (.173)	-.043 (.094)	-.191 (.219)	-.048 (.114)
Number of SGB Members	-.300 (.279)	-1.013** (.410)	.248 (.226)	-.475 (.540)	-.299 (.271)
Number of SGB Parents	.277 (.454)	1.804** (.691)	-.358 (.376)	-.807 (.883)	.165 (.457)
Obs	126	152	134	145	143
R-squared	.004	.004	.002	.007	.001
Educator Characteristics					
Principal experience	-.056 (.055)	.110 (.097)	.067 (.048)	.026 (.124)	-.145** (.065)
Principal University Degree Dummy	1.204 (.931)	-1.917 (1.473)	-.741 (.769)	.611 (1.848)	-1.546* (.997)
Teacher absenteeism Dummy	.597 (.896)	-2.533* (1.528)	-.225 (.789)	-.1474 (1.907)	-1.529* (1.033)
Teacher salary	.000 (.000)	.000 (.000)	-.000 (.000)	.000 (.000)	.000 (.000)
Obs	97	116	102	108	105
R-squared	.034	.051	.037	.009	.084

Notes:
Standard errors are provided in the brackets after coefficients.
* denotes significance at 0.1 significance level.
** denotes significance at 0.05 significance level.
District population, household size, access to water and electricity were sourced from Statistics South Africa, 2007a, 2007b. All other data is obtained from PETS-QSDS survey collected for this study.

In the first category of school and class size, only one variable, pupil-to-classroom ratio, matters significantly for all five of the outcome variables but interestingly, the signs are mixed. For pass rates and repetition rates, the signs are not the expected ones. A high pupil-to-classroom ratio (more crowding) is associated with higher pass rates and lower repetition rates, which is counter intuitive. One would expect that smaller classes foster

interactive learning and cater better to the needs of students. There is evidence supporting this in the literature as discussed in Chapter 2. The results for dropout rates show the expected results whereby, larger classes are associated with higher dropout rates.

In terms of the other variables, school facilities, particularly the quality of the roofs and the existence of science labs appeared to matter for certain learning outcomes. Socio-economic characteristics mattered for pass rates but were particularly strongly associated with repetition rates and even explained about a quarter of the variation in repetition rates. Conversely, socio-economic characteristics had minimal association with dropout rates as evidenced by the low R squares – a finding that will be revisited at the end of this section. The PTA dummy was significant for three outcome variables, which is very interesting given that only 21 percent of the sample had PTAs. This is indicative that the additional functions served by PTAs, for instance fund raising and additional parental involvement do contribute to learning outcomes. It may also be an indicator that picks up the SES factor given the finding in Chapter 6 that most schools with PTAs fall within Quintiles 4 and 5.[30] On the contrary, SGBs were only important for Grade 1 repetition. The principal's education and experience mattered only for Grade 5 dropout rates and schools that did not have all teachers present and teaching on the day of the survey (captured as a dummy variable) emerged to be correlated with two of the outcome variables. Teacher salaries were insignificant in all the outcome variables.

The preliminary regressions provide an indication of the broad categories that are important for various indicators of outcomes. With the exception of pupil-to-classroom

[30] It should be noted here that SES is not conditioned for in this stage of preliminary regressions.

ratio (which had mixed signs), no single indicator emerged to be significant for all five indicators of outcomes. What is particularly striking in Table 8.6 is the revelation that *external* factors (mainly socio-economic conditions) strongly influenced repetition rates while *internal* factors within the school system influenced dropout rates. As was already mentioned, SES, which explains about a quarter of variations in repetition rates had virtually no correlation with dropout rates, be it Grade 1 or 5. The overcrowding of a classroom and a leaking roof alone explained about 16 percent of the variation in Grade 1 dropout. For Grade 5 dropout rates, a combination of overcrowding in classrooms, teacher characteristics and the absence or deficiencies in various facilities explained about 24 percent of the variation. The result showed that dropping out was a strong reflection of school inefficiencies and one that should be easier to address from a policy standpoint as compared with repetition rates. In what follows below, these preliminary results are tested more rigorously to isolate the key factors that determine education outcomes.

8.3 PEM and Education Outcomes: Regression Analysis

Given the established importance of delays, total resource wealth and LTSM expenditure per student through the bivariate correlations, the strengths of these associations with education outcomes are further examined in a regression analysis. While holding constant the relevant school and non-school inputs that emerged as significant in the preliminary regressions and assuming that variation between pupils is fixed, the model tries to predict the percentage change in education outcomes given a unit change in educational spending and delays.

The relationship between delays in disbursement of funds, total resource wealth and LTSM expenditure and education outcomes can be expressed as:

$$Educ = \beta_0 + \beta_1 Delay + \beta_2 LTSM + \beta_3 Totalres + \beta_4 schinp + \beta_5 nonschinp + \mu \quad (8.1)$$

Whereby, Educ is represented by five education outcome variables (exam pass, Grades 1 and 7 repetition rates and Grades 1 and 5 dropout rates); Delay represents a dummy variable for none/minimal delay or extensive delay in the disbursement of subsidies to schools; LTSM representing spending on learning and teaching materials per student and Totalres represents a sum of government subsidies, household contributions in terms of tuition fees and donor contributions per student. The model controls for school inputs (schinp) non-school inputs (nonschinp), which essentially incorporate only the variables in Table 8.6 which emerged as significant. These will vary according to outcome variable. Therefore, each model only includes variables that have been determined as important. μ represents the error term (that is, the unmeasured factors that influence education outcomes for example, innate abilities).

Given the prominence of OLS in cross-section regression analysis, the least squares model is used but, given its substantive limitations for count data and heteroskedasticity as discussed in Chapter 5, negative binomial regression estimates are also reported for all the outcome variables with the exception of pass rates, whose distribution is not Poisson (no zeros). The models also check for multi-collinearilty and indicate in the notes under

the regression tables where a variable is dropped due to high collinearity. The regression results are presented in Table 8.7.

Table 8.7 OLS and Negative Binomial Regressions of PEM and Education Outcomes

	Pass Rates	Grade 1 repetition		Grade 7 repetition		Grade 1 dropout		Grade 5 dropout	
Variable	**OLS**	**OLS**	**NBRM**	**OLS**	**NBRM**	**OLS**	**NBRM**	**OLS**	**NBRM**
LTSM expenditure	0.004	-0.010*	-0.001	0.001	0.001	-0.003	0.001	-0.000	0.000
	(0.003)	(0.006)	(0.001)	(0.002)	(0.001)	(0.007)	(0.001)	(0.003)	(0.001)
Total resource wealth	-0.000	-0.000	0.000	0.000	-0.000	-0.000	-0.001	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Delay Dummy	-0.093	-0.632	-0.132	-1.054*	-0.001	2.711*	0.316	-2.282**	-0.541*
	(0.909)	(1.468)	(0.256)	(0.703)	(0.471)	(1.833)	(0.412)	(0.961)	(0.339)
Class size	20.65	-40.34	-6.294	-38.61**	-35.89**	202.8**	26.52**	67.08	11.48
	(26.05)	(46.16)	(9.149)	(19.52)	(16.75)	(49.24)	(9.758)	(23.08)	(8.095)
Leaking roof	-0.172			0.252**	0.066	0.570**	0.173**	0.364**	0.077*
	(0.128)			(0.101)	(0.055)	(0.277)	(0.067)	(0.153)	(0.050)
Library		-1.242	-0.167					3.017**	0.689*
		(1.606)	(0.264)					(1.134)	(0.391)
Science lab	0.410			-0.601	-0.087			-4.218*	-1.194**
	(1.350)			(0.884)	(0.558)			(1.323)	(0.439)
Playground		2.009	0.249						
		(1.706)	(0.297)						
PTA Dummy	1.059			-0.448	0.480	-3.879*	-0.830*		
	(1.125)			(0.840)	(0.559)	(2.221)	(0.543)		
SGB members		-1.406*	-0.268**						
		(0.555)	(0.107)						
SGB parents		2.206**	0.356**						
		(0.799)	(0.148)						
Principal experience								-0.128*	-0.400*
								(0.069)	(0.026)
Principal degree								-1.588*	-0.189
								(0.950)	(0.315)
Teacher absenteeism		0.970	-0.006					-1.038	-0.209
		(1.464)	(0.255)					(0.967)	(0.354)
Quintile 1	-2.198	8.990	0.917						
	(2.413)	(4.015)	(0,640)						

Quintile 2	-3.679* (2.021)	7.185 (3.553)	0.957 (0.592)						
Quintile 3	-1.535 (1.994)	1.546 (3.352)	0.157 (0.537)						
Quintile 4	-1.329 (1.876)	-1.368 (3.300)	-0.144 (0.525)						
Urban Dummy		4.934** (2.183)	0.831** (0.411)						
District Av household size	5.780** (1.497)	-3.327 (2.625)	-0.209 (0.375)	-3.685** (0.071)	-2.482** (0.669)				
District access to electricity	0.196** (0.054)			-0.174** (0.041)	-0.115** (0.029)				
Observations	91	107	107	105	105	113	113	99	99
R squared/ Pseudo R squared	0.346	0.286	0.029	0.332	0.119	0.207	0.046	0.349	0.042

Notes:
standard errors are provided in the brackets after regression estimates.
* denotes significance at 0.1 significance level.
** denotes significance at 0.05 significance level.
Control variables that are excluded in certain models, for example, district variables in Grades 1 and 5 Dropout, are excluded because they do not alter the results and are insignificant in explaining those outcomes variables.
Quintile 5 is omitted due to collinearity with other quintiles.

Results of Regressions

The regression results produced in Table 8.7 showed that in the majority of cases, both the OLS and NBRM models were in agreement on the sign of the coefficient and agreed on the variables that were are significant or insignificant. For the PEM variables, both OLS and NBRM models produced insignificant results for total resource wealth in all the outcome variables. This finding aligns with many empirical studies that argue that resources do not matter or only matter conditionally (see Chapter 2). For LTSM spending, only one model yielded a significant result, suggesting that an increase of R 1 per student in LTSM spending is associated with a 0.01 percent decrease in Grade 1 repetition rates. Put differently, an increase of R100 per child is related with a one percent decrease in Grade 1 repetition rates.

While several significant results emerged for the delay variable, only one model produced the expected positive sign, indicating that extensive delays in disbursing funds is associated with a 2.7 percent increase in dropout rates at Grade 1 level. On the whole, the models did not produce very strong results for the PEM variables across the spectrum of the education outcome variables. A possible reason for this is that PEM variables interact with other variables such as poverty quintiles or class size and it is through this interaction that an impact is made on education outcomes. Interactions are tested later in the chapter.

In terms of the control variables, significant results were produced for several variables such as class size, the various indicators of school facilities, indicators of school

governance, geographic location and district effects. The poverty quintiles were only tested in the pass and repetition rate models and largely emerged to lack significance in both OLS and NBRM models. The lack of importance may due to the narrow categorical spread as mentioned earlier because the significance of the district effects showed that socio-economic status did matter.

Notwithstanding a few cases of divergences between the OLS and NBRM models, the OLS and NBRM models produced similar results showing that the OLS, despite its shortcomings for non-normal data produces robust results. A key difference worthy of note between the two models is the size of the coefficients. This is not obvious in the Table 8.8 because the coefficients have to be interpreted differently. For example, the OLS model, which is easier to interpret, suggests that an increase in an additional member to the SGB results in a 1.4 percent decrease in Grade 1 repetition rates. In the NBRM model, if a school were to increase its SGB membership by one person, the difference in the logs of expected rates of Grade 1 repetition would decrease by 0.268. This is equivalent to a decrease in 0.764 percent.[31] The OLS models therefore yield larger coefficients than the NBRM.

As was previously mentioned, the general lack of significance for the PEM variables, specifically, the expenditure variables could be linked to the absence of an interaction effect. Possibly, the relationship between education spending and learning outcomes could be driven by poverty, such that schools in disadvantaged areas struggle to convert resources into outcomes. Teacher quality may also be of interest if providing learning

[31] This is calculated by taking the exponential of -0.268.

materials improves outcomes because of the qualifications and experience of the teacher. The preliminary regressions in Table 8.6 showed teacher qualification (measured by salary) to be unimportant in all five outcomes. Another variable of interest as far as interactions are concerned is the size of the class, whereby increased spending in textbooks may only make an impact in a small classroom setting. In previous analyses, pupil-to-classroom ratio emerged as important and therefore could be a driving factor in the relationship between PEM variables and education outcomes. A series of interactions are therefore tested and the results are presented in Table 8.8 below.

Table 8.8 OLS and Negative Binomial Regressions of PEM with Interaction Effects and Education Outcomes

	Pass Rates	Grade 1 repetition		Grade 7 repetition		Grade 1 dropout		Grade 5 dropout	
Variable	**OLS**	**OLS**	**NBRM**	**OLS**	**NBRM**	**OLS**	**NBRM**	**OLS**	**NBRM**
LTSM expenditure	0.024 (0.080)	-0.091 (0.089)	-0.018 (0.015)	-0.071 (0.064)	-0.000 (0.040)	0.020 (0.016)	0.001 (0.003)	0.005 (0.008)	0.001 (0.002)
LTSMxQ1	-0.034* (0.020)	0.010 (0.032)	0.001 (0.005)	0.022 (0.015)	0.003 (0.007)				
LTSMxQ2	0.013 (0.011)	-0.016 (0.022)	-0.002 (0.003)	-0.007 (0.005)	0.002 (0.006)				
LTSMxQ3	-0.024** (0.010)	-0.017 (0.017)	-0.002 (0.003)	0.009 (0.007)	0.008* (0.004)				
LTSMxQ4	0.021 (0.015)	-0.044* (0.024)	-0.009** (0.004)	-0.010 (0.009)	-0.012* (0.007)				
LTSMxAvHH	0.012 (0.018)	0.015 (0.028)	0.003 (0..004)	-0.006 (0.014)	-0.008 (0.009)				
LTSMxElec	-0.000* (0.000)			0.001** (0.000)	0.000 (0.002)				
LTSMxClass size	-0.010 (0.289)	1.163* (0.677)	0.202* (0.117)	-0.032 (0.203)	0.165 (0.169)	-0.498 (0.390)	0.005 (0.098)	-0.177 (0.178)	-0.035 (0.056)
Total resource wealth	-0.015 (0.013)	-0.008 (0.003)	-0.001 (0.003)	-0.017* (0.010)	-0.008 (0.008)	0.000 (0.002)	0.000 (0.000)	-0.001* (0.001)	-0.000* (0.000)
TotalxQ1	-0.001 (0.013)	0.011 (0.014)	0.000 (0.002)	-0.006* (0.003)	-.000 (0.002)				
TotalxQ2	0.000 (0.003)	-0.007 (0.006)	-0.001 (0.001)	0.001 (0.002)	-0.007 (0.001)				

TotalxQ3	0.003* (0.001)	0.005 (0.003)	0.000* (0.000)	- 0.003** (0.001)	- 0.004** (0.001)				
TotalxQ4	-0.002 (0.015)	0.008** (0.003)	0.001** (0.000)	0.001 (0.001)	0.001** (0.001)				
TotalxAvHH	-0.004 (.003)	0.002 (0.005)	0.000 (0.001)	0.004* (0.002)	0.002 (0.002)				
TotalxElec	-0.000 (0.000)			0.000 (0.000)	-0.000 (0.000)				
TotalxClass size	0.003 (0.039)	-0.033 (0.045)	-0.002 (0.008)	-0.021 (0.022)	-0.023 (0.027)	-.023 (0.055)	-0.004 (0.016)	0.052** (0.024)	0.012* (0.007)
Obs	91	107	107	98	98	113	113	99	99
R square	0.529	0.435	0.060	0.481	0.178	0.233	0.046	0.382	0.029

Notes:
All regressions include the full set of controls as in Table 8.8
standard errors are provided in the brackets after regression estimates.
* denotes significance at 0.1 significance level.
** denotes significance at 0.05 significance level.
Quintile 5 is omitted due to collinearity with other quintiles.
Control variables that are excluded in certain models, for example, district variables in Grades 1 and 5 Dropout, are excluded because they do not alter the results and are insignificant in explaining those outcomes variables.

The regression results produced very strong evidence that interacting total resource wealth and LTSM expenditure with poverty quintiles matters when it is a high quintile school (quintile 4). That is, wealthier schools are better able to convert these resources into outcomes – a finding that aligns strongly with Van der Berg (2008). In poorer schools, there is no substantial evidence that increasing resources will curb repetition rates. The importance of LTSM spending was also shown in the interaction between LTSM and class size where Grade 1 repetition was concerned. Nonetheless, as was previously discussed, it remains unclear how class size impacts repetition rates given the unexpected sign in the correlation analyses. Therefore, quintiles remain the most important interaction effect in as far as LTSM spending is concerned.

In earlier regressions, total resource wealth did not show any significance in all the models. Interacting it with Quintile 4 and class size revealed that the volume of resources mattered, but did so conditionally – a theme that recurs in Fleisch (2008). Here again, it is the privileged schools that are better able to convert resources into outcomes. Furthermore, the significance of dropout rates when total resource wealth is interacted with class size reveals that smaller classes are important channels that drive the relationship between resources and dropout rates.

Robustness Checks

Thus far, the analyses have shown that only LTSM spending and delays matter on their own (Table 8.7). Total resource wealth only matters when driven by other variables. This section therefore tests the robustness of the LTSM results to assess whether LTSM spending contributes to improved education outcomes or whether schools with good outcomes tend to spend more on LTSM. Reverse causality does not apply to delays because delays are largely exogenous – it is very unlikely that underperformance by schools would cause delays. As explained in Chapter 6, as long as schools submit their financial reports and budgets on time, which is largely the case in this sample, they should receive their disbursements. Therefore, the endogeneity tests focus on LTSM spending.

In order for OLS to give consistent estimators, the error term should be unrelated to the regressors. When this assumption is violated, a common approach is to use instrumental variables (also discussed in Chapter 4). The instrumental variable is a substitute variable to eliminate endogenous variables from the model but also estimates causal impact.

Parental approval of the budget is selected as the instrumental variable because it is statistically correlated with LTSM spending as shown below in Table 8.9. Therefore, it can be argued that parents have an interest in ensuring that schools spend adequately on learning and teaching materials. Interestingly, there is no significant correlation between LTSM spending and SGB approval. Therefore, the parental approval satisfies two requirements of IVs: it is logically related to LTSM spending and also statistically correlated with LTSM spending.

Table 8.9 Correlation between LTSM Spending Parental Approval of the Budget

PerCap_LTSM	Coef.	Std. Err.	T	P>t	[95% Conf.	Interval]
Budget_Appr	49.34072	21.94705	2.25	0.026	5.933285	92.74816
_cons	150.0856	15.6326	9.6	0	119.167	181.0041

The IV regression is conducted only for Grade 1 repetition which was the only model that showed LTSM expenditure to be significant. Only the control variables that had importance in the earlier regressions are included. The results are presented in Table 8.10 below.

Table 8.10 Instrumental Variable (2SLS) Regression

Variable	Grade 1 repetition
LTSM expenditure	-.046 (.051)
Class size	-58.48 (52.90)
SGB members	-1.518** (.559)
SGB parents	2.469** (.928)
Urban Dummy	3.129 (3.156)
District Av household size	-2.652 (3.598)
Observations	128
R squared/ Pseudo R squared	.
Post-estimation tests:	
Durban Test	.826 (p=.363)
Wu-Hausman Test	.780 (p=.378)

Notes:
standard errors are provided in the brackets after regression estimates.
* denotes significance at 0.1 significance level;
** denotes significance at 0.05 significance level.
Instrumented: LTSM Expenditure

Results of Instrumental Variable Regression

Significant results would confirm that LTSM spending, while endogenous is still a determining factor of repetition rates. As Table 8.9 indicates, LTSM loses significance in the IV model. These results may be reflective of a weak instrument or may suggest LTSM spending is in fact not significantly related to repetition rates. It must be recalled that the IV approach assumes that the LTSM is endogenous. A post estimation test, the Durban-Wu-Hausman test (Cameron and Trivedi, 2009) is able to test whether LTSM is indeed endogenous. The null hypothesis for the test is that the variables are exogenous. The p values turn out not to be significant and therefore, the hypothesis cannot be rejected signifying that we cannot reject the exogeneity of the LTSM variable. If the

LTSM variable is indeed exogenous, the OLS outputs should be efficient. Therefore, the OLS results showing LTSM spending to be significantly associated with outcomes, specifically Grade 1 repetition remains a valid finding.

8.4 PEM and Alternative Education outcomes: Regression Analysis

In Chapter two, the limitations of the dependent variables were discussed in detail. In particular, dropout rates were noted to be limited in the sense that they capture students who do not return to that particular school in the following year. This does not mean they are lost to the education system. Repetition rates are also limited in the sense that they are not directly comparable across schools. For example, repetition rates may be underestimated in weaker schools and vice versa. Therefore, in the absence of test scores, alternative variables that measure "school efficiency" or "school quality" can be considered. The PETS-QSDS survey provides data such as the existence of a play ground, science laboratories and libraries. This section aims to explore the relationship between PEM and alternative education outcome variables that describe school quality and the efficiency of the school in converting inputs into outputs. Descriptive data on the three output variables are shown in Table 8.11 below.

Table 8.11 Descriptive Data on School Facilities

Variables	Frequency	Percent
Does the school have a science laboratory?		
Yes	37	22.22
No	131	77.98
Does school have a playground or sports area?		
Yes	115	68.05
No	54	31.95
Does school have a library?		
Yes	82	48.52
No	87	51.48

The null hypothesis being tested here is that: there is no significant relationship between PEM and the three school facilities specified above. LTSM spending is excluded for lack of a theoretical basis or intuitiveness linking spending on learning materials to the provision of school infrastructure. The other two expenditure variables (total resource wealth and public education spending) as well as leakages and delays are examined in a binary regression analysis. For each of the dependent variables, explanatory variables that have no significant correlations with the dependent variables at 0.05 percent level are excluded from the model. The three regression equations are therefore estimated as:

$$Sciencelab = \beta_0 + \beta_1 totalres + \beta_2 publicsp + \beta_3 totalxSES + \beta_4 publicspxSES + \beta_5 delays + \beta_6 Q1 + \beta_7 Q2 + \beta_8 Q3 + \beta_9 Q4 + \beta_{10} schoolsize + \beta_{11} districtpop + \beta_{12} districtwater + \beta_{13} districtelec + \mu \quad (8.2)$$

$$Playground = \beta_0 + \beta_1 totalres + \beta_2 totalxSES + \beta_3 Q1 + \beta_4 Q2 + \beta_5 Q3 + \beta_6 Q4 + \beta_7 schoolsize + \beta_8 districtpop + \beta_9 districtwater + \beta_{10} districtelec + \mu \quad (8.3)$$

$$Library = \beta_0 + \beta_1 totalres + \beta_2 publicsp + \beta_3 totalxSES + \beta_4 publicspxSES + \beta_5 leakage + \beta_6 Q1 + \beta_7 Q2 + \beta_8 Q3 + \beta_9 Q4 + \beta_{10} schoolsize + \beta_{11} districtpop + \beta_{12} districtwater + \beta_{13} districtelec + \mu \quad (8.4)$$

Whereby, totalres represents total resource wealth per student (includes subsidies, tuition fees and donor contributions); publicsp represents public spending (subsidies) per student, publicspxSES is an interaction between public spending per pupil and poverty quintiles; totalxSES is the interaction between total spending per pupil and poverty quintiles; leakage is the gap between what schools expected and what they actually received in terms of subsidies and the delay is a dummy variable with a value of 0,

signifying extensive delays as opposed to none or minimal delay. The model also includes dummy variables for each poverty quintile (quintile 5 is excluded due to collinearity with quintile 1) as control variables. Additional control variables include the size of the school in terms of its student population and district fixed effects, specifically, district population, percentage with access to electricity in the district and percentage with access to piped water in the homes. μ represents the error term. The regression results are presented in Table 8.12 below.

Table 8.12 Binary Outcome Regressions of PEM and Alternative Education Outcomes Variables

Variable	Science Lab			Playground			Library		
	LPM OLS	Logit MLE	Probit MLE	LPM OLS	Logit MLE	Probit MLE	LPM OLS	Logit MLE	Probit MLE
Total resource wealth/pupil	.000** (.000)	.008** (.004)	.004.** (.002)	.000* (.000)	.001 (.002)	.001 (.001)	.001** (.000)	.013 (.009)	.008* (.005)
Total x SES	-.000** (.000)	-.001* (.000)	-.000** (.000)	-.000 (.000)	-.001 (.000)	-.000 (.000)	-.000** (.000)	-.003 (.002)	-.002 (.001)
Public Expenditure/pupil	-.000 (.000)	-.028 (.014)	-.014 (.007)				-.001 (.000)	-.013 (.010)	-.008 (.006)
Public x SES	.000** (.000)	.005** (.004)	.002** (.002)				.000* (.000)	.002 (.002)	.001 (.001)
Leakage							.000* (.000)	.000** (.000)	.001* (.001)
Delays	-.038 (.472)	-.309 (.980)	-.087 (.535)						
School size	.000** (.000)	.000 (.001)	.000 (.000)	.000* (.000)	.001 (.000)	.000* (.000)	-.000 (.000)	-.000 (.000)	-.000 (.000)
Quintile 1	-.848** (.200)	-.169 (4.845)	-.220 (2.659)	-.464** (.272)	-.968 (2.279)	-.582 (1.381)	-.674** (.340)	-37.53 (1163)	-21.88 (459.6)
Quintile 2	-.757** (.150)	1.271 (4.031)	.479 (2.192)	-.187* (.248)	.215 (2.074)	.163 (1.255)	-.624** (.257)	-37.14 (1163)	-21.57 (459.5)
Quintile 3	-.908** (.126)	-7.591** (3.246)	-3.684** (1.576)	-.246** (.221)	-.157 (1.826)	-.046 (1.103)	-.624** (.218)	-37.19 (1163)	-21.59 (459.6)
Quintile 4	-.751 (.128)	-5.401** (2.408)	-2.989** (1.291)	-.099* (.210)	.455 (1.687)	.340 (1.009)	-.533** (.222)	-36.30 (1163)	-21.00 (459.6)
Quintile 5	-	-	-	-	-	-	-	-	-
District population	-.000** (.000)	-.000** (.000)	-.000* (.000)	-.000 (.000)	-.000 (.000)	-.000 (000)	.000 (.000)	-.000 (.000)	-.000 (.000)
District access to electricity	.013 (.004)	.390** (.154)	.195** (.076)	-.005 (.007)	-.032 (.040)	-.022 (.024)	-.007 (.007)	-.048 (.045)	-.029 (.026)
District access to water	-.003 (.003)	-.130* (.081)	-.067* (.043)	.003 (.005)	.032 (.040)	.016 (.020)	.012** (.005)	.085** (.039)	-.052* (.023)
Observations	120	130	130	131	131	131	128	128	128
R squared/ Pseudo R squared	.686	.707	.702	.145	.148	.151	.361	.350	.351
Log likelihood ratio		-20.15	-20.56		-67.16	-66.92		-57.62	-57.49

Results of Binary Outcomes Regression

According the results, total resource wealth per student matters significantly for school quality when science laboratories are used as indicators for school quality. This is consistent across the three models. Two models also revealed a significant relationship between total resources and school libraries as an indicator of quality. For the existence of playgrounds, only the linear probability model produced significant results. The positive signs on the coefficients indicate that schools with more resources, regardless of their poverty status, were associated with key educational facilities such as science laboratories, playgrounds and libraries in the school. Therefore, while resources may not translate into outcomes such as repetition and dropout rates, it is linked with improvements in school quality.

The importance of public expenditure was tested in the science laboratory and library models. On its own, public spending was not significant in any of the models but when interacted with SES to correct for the redistributive component, whereby the government disproportionally allocates more funding to poorer schools, public spending emerged as statistically significant in the science lab models but in the libraries model, only the LPM model was significant. The significance of quintiles across the various models and the interaction terms suggest that wealthier schools are better able to convert resources into "outputs". This contrasts with the earlier finding whereby interacting expenditure with quintiles had no significant effect on "outcomes".

Leakage was tested only in the libraries model. In all three models, it emerged as significant. Interestingly, the coefficients were positive linking higher leakages with more

facilities, which is counter-intuitive. It does, however, align with the finding that was made earlier in the chapter and also in Chapter 6 that leakages occur in wealthier schools. In the end, the coefficients are very close to zero so variation in leakages has a negligible impact on facilities. Delays were also found to be unimportant in the regressions possibly due to the coping mechanism that schools have adopted as was earlier discussed.

8.5 Conclusion

The analyses of PEM and education outcomes presented mixed evidence. Technical efficiency in terms of leakages was found not to be correlated with education outcomes but, delays were significantly correlated with one of the outcome variables. In terms of allocative efficiency, resources in terms of public spending and total spending were not associated with outcomes. Total resources only mattered through SES and class size. Spending on LTSM emerged as important and remained so after robustness checks. Alternative dependent variables (measures of school quality) were used to further assess the significance of PEM. The results showed that technical efficiency in terms of delays and leakages did not have a tangible effect on school quality. The expenditure variables were however, significant in the provision of certain facilities such as science labs and libraries, but not others such as playgrounds. Further research would be required to understand the variation of the expenditure results depending on the indicator of school quality.

CHAPTER NINE

SUMMARY OF FINDINGS, POLICY IMPLICATIONS AND CONCLUSION

9.1 Introduction

The objective of this study was to examine whether sound public expenditure management (PEM) contributes to improved education outcomes. PEM was defined as good fiscal discipline, allocative efficiency and technical efficiency. The latter two aspects of PEM formed the central aspects of the analysis. In analysing allocative efficiency – that is, the allocation of adequate funds to high impact activities – the study focused on the impacts of public education expenditure (government subsidies to schools); total resource wealth (inclusive of government and private contributions through tuition fees and donor support) and LTSM expenditure (allocations towards learning and teaching support materials) on education outcomes. The analysis of technical efficiency – defined as adoption of measures that ensure efficient allocation of resources and effective delivery of services – focused on the analysis of leakage (misappropriated funds); delays in the remittance of funds from government to schools and other characteristics of the district education offices and whether or not these variables impact education outcomes.

The search for explanations and solutions necessitated the incorporation of other non-PEM factors that may affect education outcomes, such as school-based governance, socio-economic status and school facilities. Therefore, the collection of a comprehensive

cross-section of data on school systems and other external agents that interact with the schools was required. Two micro-level surveys, applied at 175 public primary schools and 13 district education offices (DEOs) in two provinces in South Africa, allowed for this wealth of data and analysis. The results have been presented in Chapters 6 to 8. This chapter summarises these results, presents the limitations of the study, suggests areas for further research and concludes with some policy recommendations.

9.2 Restatement of the Problem

The study was motivated by the need to deepen the understanding of the factors that yield sound education outcomes. Conflicting empirical results and speculations have often led to policy prescriptions that do not result in improved education outcomes. It has often been assumed that the problems in education were due to lack of adequate resources. There is evidence showing that increasing government allocations have not always corresponded with school improvements. Therefore, resource availability cannot possibly be the sole explanation of the persistent high repetition and drop-out rates, low pass rates, sub-standard scores and low levels of absorptions into the labour force in developing countries, including South Africa.

The undertaking of public expenditure tracking (PET) exercises by the World Bank was ground-breaking in confronting this paradox of poor social outcomes despite available resources. It revealed massive bureaucratic inefficiencies within the various education departments/ministries in several countries, which manifested in poor service delivery in the education sector. The PET studies showed that the notion that public spending alone will improve services is misleading. Certainly, under-spending and high unit costs of

schooling could play a part in poor education outcomes, however, the paradox is clearly more complex and other factors, such as the management of education resources, which have largely been neglected in the economics of education literature, needed to be looked at. Therefore, this study sought to bridge this gap by empirically analysing the relationship between sound public expenditure management (PEM) and primary education outcomes.

9.3 Summary of Findings

This section presents the key findings of the research. That is, the significance of technical efficiency and allocative efficiency respectively in explaining education outcomes. It also presents the findings of other factors such as school inputs, socio-economic status and school-based governance and their respective significance in explaining education outcomes.

Technical Efficiency and Education Outcomes

Qualitative assessment of district education offices revealed that the districts have significant human resource constraints. Capacity is lacking and record-keeping, particularly on financial information is very poor. Lack of technical efficiency or bad operational management could result in among others, misappropriation of funds (leakage) and extensive delays in remitting funds to schools, which in turn could lead to poor education outcomes.

The study found evidence of leakage. The leaked funds did not necessarily imply that public funds were being siphoned by public officials for private gain. The weaknesses in

public financial management and poor record-keeping are possible explanations, which in itself constitutes a concern. The study found that leakage in education funds occurred in 13 percent of the sampled schools in Gauteng province and 28 percent of schools in the North West province. Cumulatively, the leaked funds, excluding personnel costs, amounted to over R 800,000, equivalent to nearly R 40,000 of annual funding for one school. For some schools, this can be a significant amount that could impede educational progress. Even though schools in the North West cumulatively have more leakage, the study found that leakages occur more frequently in Gauteng schools and in higher quintile schools (the majority being quintile 5 schools). This indicates that leakages occur in schools that do not rely heavily on government subsidies but are able to operate efficiently through the substantive resources received from households and donor funds. The study also found that information asymmetry allows space for leakages because through the data triangulation, it emerged that not all schools were knowledgeable on the amounts they were supposed to receive.

Empirical analysis was conducted to assess whether there is a strong relationship between leakage of funds and education outcomes. There was no significant relationship between the two variables. The explanation offered was that leakage tended to occur in high quintile schools that did not rely much on subsidies and therefore did not pay attention to leaked funds. In that scenario, leakage would not be associated with poor outcomes. The essential finding is that there is evidence of leakage of education funds and although it does not happen on a large scale, the amounts are significant enough to warrant policy measures to tighten resource management practices.

The study also found evidence of delays in the remittance of funds from government to schools. The delays were not too extensive, however. The vast majority of schools received their allocations between two weeks and two months after the start of the school year. Nonetheless, the study found evidence that delays in remitting funds were negatively associated with education outcomes, specifically in terms of Grade 1 dropout rates.

The study also examined the importance of technical efficiency in education outputs. The intent was to further explore the importance of technical efficiency using alternative dependent variables. The analysis corroborated the earlier findings on leakages in that leakages had no association with indicators of school quality in schools. Delays were also found to be unimportant in the provision of key educational infrastructure.

Allocative Efficiency and Education Outcomes

The Government of South Africa has shown that it values education by the weight it gives to education in the equitable share formula and the systematic real increases in education expenditure at the national level. In particular, primary schools receive most of the education expenditure. At the provincial level, the study showed that Gauteng province allocates more than double what North West province allocates to primary education at an aggregate level. Interestingly, North West not only spends more *per learner* than Gauteng, its per learner spending is higher than the national average. This section of the study sought to investigate whether education expenditure was significantly associated with education outcomes.

The results showed that public spending and total resource wealth had no relationship with education outcomes. The study acknowledged that the finding on public spending could be explained by the redistributive component in how resources are allocated to schools. In other words, a correlation may be positive or not apparent in a situation where government allocates more funds to historically disadvantaged or underperforming schools. When socio-economic status (SES) was controlled for, public spending was still insignificant. The interaction of SES and public spending proved to be important in the provision of science laboratories and libraries indicating that public resources are useful in improving school quality in higher quintile schools that are better able to convert resources into quality improvements. At the same time, improvements in school quality do not necessarily lead to improvements in school outcomes. This is an important limitation of public spending.

In terms of LTSM expenditure, there was strong evidence that schools that spend more on LTSM tend to have lower rates of Grade 1 repetition. This finding remained robust after further tests. The impact of LTSM on Grade 1 repetition was amplified when interacted with high quintile (privileged schools) showing again that wealthier schools are better able to convert learning resources into outcomes. It is acknowledged that other factors such as style of teaching or level of content preparation may also be an underlying factor explaining the correlation between LTSM spending and outcomes. The study could not control for this. At the same time, LTSM did not matter in the other outcome variables. Grade 7 repetitions were strongly driven by district characteristics while dropout rates were largely driven by school inputs and delays.

Total resource wealth, which includes government subsidies, tuition fees and other donor contributions, on its own did not appear to matter for any of the education outcome variables. It mattered when interacted with high quintile schools and class sizes, indicating that total resources matter for education outcomes in as far as they are schools with pupils from wealthier socio-economic backgrounds and smaller pupil-to-classroom ratios.

Other Key Considerations in Education Outcomes

The study found that school inputs such as pupil-to-teacher ratios, teacher salary and teacher experience had no relationship with education outcomes for the sample study. Other non-PEM factors were however, found to be correlated with education outcomes. Key among these were pupil-to-classroom ratio (an alternative measure of class size), membership of school governing bodies, principals experience and qualification, school facilities and socio-economic characteristics, particularly at the district level.

The importance of district effects which were captured by average household size and access to electricity showed that an improvement in poverty at the community level goes a long way in improving education outcomes. Improved socio-economic development manifests in the ability of parents to provide additional learning support, a stable home environment, excellent healthcare, nutrition and basically all the extra comforts that children need to excel in school. Children from poverty stricken homes lack these privileges and this could affect their performance in school. This finding is also heavily supported in the literature as discussed in Chapter 2.

9.4 Policy Implications

The findings discussed above have a number of policy implications for primary education. First among these is the need for better management of resources and technical efficiency at the sub-national level. The study found evidence of leakage in the amount of R 800 000, which is substantive enough for government to undertake serious corrective measures. The leakage amount could be greatly understated as a result of data limitations. District education offices need to have the requisite human resource capacity and training in financial management and also require good oversight. The government of South Africa may wish to consider regularising auditing of the accounts at district levels, which is currently not the case.

Secondly, the study showed that spending on learning and teaching support materials is very important in Grade 1. Therefore, it would be a wise policy decision to ensure that learners in Grade 1 (as well Grade 1 teachers) receive adequate levels of learning and teaching materials. The early stages of learning are critical. The qualitative analysis showed that not all schools spend most of their funds on LTSM as required by the government. In the North West province, the average school spends most of their allocations on maintenance. Therefore, education authorities need to ensure that adequate resources are earmarked for LTSM.

The study revealed that the underlying factors associated with repetition and dropout rates are entirely different. While repetition rates are strongly rooted in poverty levels at the district level, dropout rates are more linked to disbursement delays and school characteristics and less to poverty quintiles. This was a very important finding. It showed

that lack of facilities, poor school management and lack of service delivery at the schools may drive pupils to leave the schools. From a policy standpoint, schools and districts authorities can make quick wins in reducing dropouts by improving efficiency and the quality of the services. This contrasts with repetition rates that require a more systemic change at the district level – one that takes considerable time to yield the expected results.

The final policy implication refers to teachers. In South Africa, it is often speculated that shortcomings in teacher characteristics explain the poor education outcomes. This study did find considerable evidence of teacher absenteeism to the tune of 32 percent of the schools sampled. In the regression models, however, absenteeism did not have any strong correlations with the outcome variables when other factors were controlled for. Furthermore, 95 percent of teachers had the requisite qualifications. Notwithstanding that there are other measures of teacher characteristics, such as content preparation that were not included in this study, the study found that teacher attributes (including absenteeism, salary and qualifications) were not correlated with education outcomes. The study did show that better qualified teachers, as determined by their salary, tended to work in wealthy schools while less qualified teachers (but qualified nonetheless) tended to work in poorer schools. The study found that very good teachers were not largely present in disadvantaged communities. Policymakers have to find other incentives to attract highly skilled teachers in poor communities or raise the skills of teachers already based in these communities.

9.5 Limitations and Areas for Further Research

This study has a number of limitations. For one, it does not seek to explain all key factors that determine education outcomes as done in education production function studies. It focuses mainly on PEM-related variables. The OLS regression models explained about a third of the factors that determine education outcomes. Future research needs to look beyond these factors. Student characteristics were held constant. The reality is that children with different backgrounds respond to school environments in different ways. Innate ability has often been speculated as important but, understandably under-researched because of its complexity and even controversy. Other factors that need to be explored may include: migration trends, nutrition, language barriers and the age at which pupils start school, to name a few.

There were a number of methodological limitations. The sampling errors occurred in the form on non-responses from some schools and districts offices. The cross-sectional natures of the data meant that causality could not be assigned. The inclusion of poverty quintiles brought out important insights. At the same time, quintiles are narrow in categorical spread and this potentially limited the power of the analysis. The most important limitation can be attributed to the selected dependent variables: pass, repetition and dropout rates which are very revealing of school inefficiencies but have limitations as proxies of learning abilities.

On the limited findings in technical efficiency, it must be emphasised that the analysis of leakage was significantly limited by lack of information/data from the district officials

which was needed to triangulate information from the schools. The study would have benefited tremendously from financial information from the district officials. This information was not forthcoming and therefore information on leakage from district sources was obtained for only 26 schools. This was a limitation because the study found that schools were not always aware of the total amount they were supposed to receive that year. This means that the leakage amount presented is possibly understated. It would be useful for future research to conduct a more comprehensive PETS on a large sample of schools in order to better assess the extent of leakage.

9.6 Conclusion

This study provided a cross-section analysis of the relationship between sound public expenditure management (PEM) and education outcomes concerning 175 schools in North West and Gauteng provinces. The empirical analysis showed that there are areas of PEM to be concerned about, specifically leakages of funds and some delays in the disbursement of funds to schools. The study found that leakages were by and large not fundamental factors in explaining education outcomes. The more important contributors to education outcomes, in terms of PEM were the delays in disbursing funds and spending on learning and teaching support materials. Total resource wealth only mattered in high quintile schools and small class sizes. In the end, non-PEM factors particularly, socio-economic characteristics remained strong predictors of education outcomes.

Periodic tracking of public expenditure is fundamental in revealing governance blockages in social service delivery and should be institutionalised in the public service. By undertaking a tracking survey, the study was able to identify some of these governance

blockages and concludes with a strong recommendation for policymakers to address certain issues of public expenditure management, namely improved financial management at sub-national levels. Increased spending in learning and teaching support materials at Grade 1 level is vital to stem repetition rates. Improvements in school management and the quality of services are also important in the retention of pupils. On the whole, socio-economic development matters very strongly for education outcomes and should feature prominently in government efforts to improve education outcomes.

APPENDIX 1

(Public Expenditure Tracking and Service Delivery Survey for Public Primary Schools)

Section I: Identification

Question	Unit	Value
1. Name of School	Name	
2. Province	Name	
3. District	Name	
4. Rural, Urban, or Peri Urban	1 = rural, 2 = urban	
5. Boys, Girls or Mixed	1=boys, 2=girls, 3=mixed	
6. Number of students in primary school (Grades 1 - 7)	Number	
7. Is this a no fee school?	1 = yes 2 = no	
8. National Quintile Ranking	Number (1-5) or "99" for don't know	
9. Respondent	1 = Principal 2 = Deputy Principal 3 = Other Teacher	

Section II: Students: Repetition, Dropout and Completion

Question	Unit	Value
10. How many students were **enrolled** in Grade 1 in 2007?	No. of students	
11. How many students were **enrolled** in Grade 5 in 2007?	No. of students	
12. How many students were **enrolled** in Grade 7 in 2007?	No. of students	
13. How many of students received a **passing mark** on the primary leaving exam (Grade 7) in 2007?	No. of students	
14. Of these, how many were girls?	No. of girl students	
15. How many students are **repeating** Grade 1 this year?	No. of students	
16. Of these, how many were girls?	No. of girl students	
17. How many students are **repeating** Grade 7 this year?	No. of students	
18. Of these, how many were girls?	No. of girl students	
19. How many students **did not return** after completing Grade 1 last year?	No. of students	
20. Of these, how many were girls?	No. of girl students	
21. How many students **did not return** after completing Grade 5 last year?	No. of students	
22. Of these, how many were girls?	No. of girl students	

23. What is often the main reason given for students **dropping out** of school?	1= non payment of fees 2 = needed for work to support family 3 = transferred to other school 4 = lack of food/ malnutrition 5 = health-related problems 6 = other (specify)	

Section III: Information on Tuition and Low Income Students (No Fee Schools should skip to section IV)

24. What is the school fee (tuition) amount **per student**, per year?	Amount (Rands)	
25. How many students right now are **completely** exempted from paying schools fees?	Number	
26. How many students right now are **partially** exempted from paying schools fees?	Number	
27. For the students who are **partially** exempt, what percentage of the normal school fees do they pay? ***(Give average estimate)***	Percentage	

Section IV: Principal and Teachers

Question	Unit	Value
Questions here refer to Principal Only (if respondent is not principal, skip to Qu.32)		
28. Number of years as an Educator?	Years	
29. Number of years as Principal?	Years	
30. Number of years as Principal **in this school**?	Years	
31. Highest level of education	1=secondary school 2= Diploma 3 = some university 4 = university degree 5 = post-graduate work	
Questions here refer to Teachers		
32. How many teaching positions are officially allocated to this school?	Number	
33. How many of the official positions are **actually filled** by permanent staff?	Number	

34. How many teachers have teaching certificate?	Number	
35. Are all teachers present and teaching in this school today?	1 = yes 2 = no 99 = don't know	
36. What is the average **gross salary** of teachers at this school?	Amount Rand (per month)	
37. Have any teachers been fired or laid off in the past twelve months?	Number fired	
38. If so, what has been the predominant reason for firing these teachers?	1= absenteeism 2 = abuse of children 3 = bad teaching 4 = services no longer needed/redundant 5 = conflicts with staff 6 = other	

Section V: Facilities

Question	Unit	Value
39. How many classrooms are there in this school?	Number	
40. How many classrooms have a roof that leaks when it rains?	Number	
41. How many classrooms (that are not newly built) do **NOT** have a chair and a table for the teacher?	Number	
42. Does this school have a library?	1=Yes 2 = No	
43. Does this school have a science laboratory?	1=Yes 2 = No	
44. Are there enough working toilets for the students to use?	1= Yes 2 = No	
45. Are there separate toilet facilities for girls?	1 = Yes 2 = No	
46. What is the main source of drinking water at this school?	0 = None 1 = Rain water tank 2 = Spring/lake/river 3 = Well /bore hole 4 = tap/piped 5 = other	
47. Are students able to drink water from that source today?	1=Yes 2 = No	
48. How do the majority of students eat lunch (NOTE: if the answer	1 = free school lunch at school cafeteria 2 = students pay for lunch at	

differs by Grade level, answer for students in Grade 5)	cafeteria 3 = Students bring their own lunch and eat at school 4 = students are sent home for lunch and then they come back 5 = school ends before lunch time 6 = other	
49. Does the school have a playground or sports area?	1=Yes 2 = No	
50. Is the school surrounded by a wall or fence?	1=Yes 2 = No	

Section VI: Location and Distance

Question	Unit	Value
How far from this school is the nearest of each of the following:		
51. Public transport	1 = Less than 100m 2 = Between 100m and 500m 3 = Between 500m and 1km 4 = More than 1km	
52. Hospital or Health clinic	1 = Less than 100m 2 = Between 100m and 500m 3 = Between 500m and 1km 4 = More than 1km	
53. Are there other schools that local children could go to instead of this one?	1 = Yes 2 = No	
54. If yes, what are the main reasons that parents or children choose this school?	1 = proximity 2 = academic reputation 3 = ethnicity or religion 4 = school environment/culture 5 = cost 6 = other (specify)	

Section VII: Organisation and Governance

Question	Unit	Value
55. Does the school have a School Governing Body?	1 = Yes 2 = No	
If no, skip to 61 …If yes,		
56. How many times did the SGB meet in 2007?	Number of meetings	
57. How many times did the SGB meet in 2006?	Number of meetings	
58. What were top 2 issues discussed at the most recent SGB meeting?	1 = discipline 2= school budget/finance issues 3 = fees 4 = staff issues 5 = curriculum matters 6 = student performance	# 1 Issue : # 2 Issue :

	7 = facilities/maintenance 8 = other school quality 9 = other	
59. How many people are on the SGB?	Total Number	
60. How many parents are on the SGB?	Number of Parents	
61. Does the school have a Parent Teacher Association (PTA)?	1 = Yes 2 = No	
If yes, skip to 63 …		
62. If no, what is the reason for no PTA	1 = Not required / necessary (explain) 2= Not enough participation by parents 3 = Not enough interest by school 4 = Other (specify)	
63. How many times did the PTA meet in 2007?	Number	
64. How many times did the PTA meet in 2006?	Number	
65. When was the last PTA meeting?	month, year (mm, yyyy)	
66. How many parents attended the last meeting?	0 = very few 1 = less than half 2 = about half 3 = more than half 4 = about all	
67. Does the school have an Annual General Meeting, involving parents?	1 = Yes 2 = No	
68. Was the school budget presented during the last AGM?	1 = Yes 2 = No	
School decision making Who has the most say in:		
69. Approving the budget	1 = Principal/School Executive 2 = other teacher 3 = other staff 4 = District/Province 5 = SGB 6 = PTA 7 = Parents 8 = Local politician 9 = community 10 = other (specify)	
70. General school quality	1 = Principal/School Executive 2 = other teacher 3 = other staff 4 = District/Province 5 = SGB 6 = PTA 7 = Parents	

	8 = Local politician 9 = community 10 = other (specify)	

Section VIII: Supervision and Accountability

Question	Unit	Value
71. How many visits were made to this school by a district official in 2007?	Number of visits	
72. How many visits were made to this school by the district official in 2006?	Number of visits	
73. What was the main purpose of the official's **last** visit?	1 = general inspection 2 = advisory visit 3 = assessment of teachers 4 = assessment of students 5 = assessment of facilities and quality in general 6 = other (specify)	
74. What kind of feedback was given at the end of the 2007 visit?	0 = none 1 = verbal report to all teaching staff 2 = verbal report to Principal only 3 = written report to Principal 4 = written reports to teachers	
75. Is the school compelled by law to give annual reports to district authorities?	1 = yes 2 = no	
76. Did school provide academic report to district authorities in 2007?	1 = yes 2 = no	
77. Did school provide its budget to district authorities in 2007?	1 = yes 2 = no	
78. Did school provide financial report to district authorities in 2007?	1 = yes 2 = no	

Section IX: School's Sources of Funding

Source	a. How much was the school entitled to receive from this source in 2007?	b. How much did the school actually receive from this source in 2007?	c. on what schedule were the funds from this source disbursed?	d. how much delay was there in receipt of these funds?	e. what procedure this the school go through to get these funds?	f. Did this funding come ear-marked for certain categories of spending?	g. If so, what category or categories of spending was this source of funding intended for? ***List all that are applicable***	c. How much is expected from this source in 2008?
	Amount	Amount	1 = all at once 2 = 2 to 3 installments 3 =monthly 4 = other	1 = None/ on time 2 = Few weeks delay 3 = Several months delay 4 = difficult to say	1 = automatic (mail or direct deposit) 2 = school responsible for pick-up 3 = significant paper work burden 4 = cash or check paid at the school 5 = other	1 = yes 2 = no	1= paying staff 2 = scholastic materials 3 = maintenance 4 = administration 5 = special programs 6 = construction or expansion of facilities 7 = other	Amount
79. National capitation grants								
80. PTA fees								
81. Tuition fees								
82. Fundraising and other fees								

Section X: What did the School spend its money on in 2007?

	a. How much was spent in the school budget on these items?	b. Did the school receive any of these items *in-kind* from outside sources?
	Amount	1 = yes 2 = no
83. School building maintenance and rehabilitation		
84. Utilities (water and electricity)		
85. Scholastic materials (textbooks, pens etc)		
86. Teacher training and bonuses		
87. Administrative Costs		

End of Interview

Request for copies of financial and budget reports for 2007 if available.

SUPPLEMENTARY QUESTIONNAIRE

(to be completed at the end of each school interview)

Question	Unit	Value
1. Did the Principal seem confident in providing the information on funding and expenditure?	1 = yes 2 = no 99 = don't know	
2. Does the school keep records of its income and expenditure?	1 = yes 2 = no 99 = don't know	
3. Is the school neat and tidy?	1 = yes 2 = no 99 = don't know	
4. Did you see any broken windows?	1 = yes 2 = no 99 = don't know	
5. Was the toilet clean and in working condition? ***Interviewer must ask to go to the toilet.***	1 = yes 2 = no 99 = don't know	
6. Was there a security guard at the gate?	1 = yes 2 = no 99 = don't know	
7. Is the school fence in good condition (for example, not broken to allow access to trespassers)	1 = yes 2 = no 99 = don't know	

APPENDIX 2

(Public Expenditure Tracking and Quantitative Service Delivery Survey for District/Regional Education Office)

Section I: Characteristics of District Office

Question	Unit	Value
88. How many staff members does this office have?	Number	
89. How many members of staff reported for duty today?	Number	
90. Does this office have an accounting unit?	1 = yes 2 = no	
91. How many cars/motorcycles does this office have at present?	Number	
92. How many of these cars/motorcycles are in working condition today?	Number	
93. How long does it take to reach the closest school to this office?	Minutes	
94. How long does it take to reach the furthest school to this office?	Minutes	
95. How long does it take to reach the average school to this office?	Minutes	

Section II: Decision-making

	96. Which of the following have to make a decision to:		97. Which of the following have to provide money for:	
	1= Department of Education 2=Province 3=Head-teacher/ School Executive 4=Teachers 5 =PTA / Parents 6=Churches/Donors 7= School Governing Body 8 =Community 9 =Other		1=Department of Education 2=Province 3=Head-teacher/ School Executive 4=Teachers 5=PTA Executive 6=Churches/Donors 7=School Governing Body 8 =Community 9=Other	
	Most Important	2nd most important	Most Important	2nd most important
1. Decide on School fees				
2. Exempt a child from school fees				
3. Provide financial support to a child who is particularly needy				
4. Provide additional classrooms for children in this school				
5. Repair something that has broken down in the school like a window.				
6. Provide textbooks that are in short supply after the allotment from the district				
7. Major rehabilitation of classrooms/ offices				
8. Hire an extra teacher to supplement shortage of teachers in a school				
9. Transfer/Suspend a teacher in a school				

Section III: Meetings with Province

Question	Unit	Value
98. How many meetings did you have with the Province (director level) in 2007?	Number	
99. When was the last time you had a meeting with the Province?	Month, Year	
100. What was the reason for this meeting?	1=Discuss national policy 2=Educational Event 3=Collect district allocation 4 = Financial 5=Other	

Section IV: Shortages and Requests

	101. Did you experience a shortage/problem in **2007** with _____? 1=Yes 2=No (*) *If NO fill in 2 & skip to next row*	102. Did you make a request? 1= Yes 2=No *If YES skip next column*	103. If not why not 1= Requests never successful 2=Problem was not serious 3=Other (Specify)	104. If yes to whom 1=DoE 2= Province 3=Other	105. Was your request successful? 1=Fully Successful 2=Partially Successful 3=Not Successful 4=Request is pending
1. Shortage of vehicles					
2. Shortage of office supplies					
3. Shortage of staff					
4. Late payment of Staff					
5. Problem with building maintenance					

Section V: Supervision and Accountability

(five randomly selected schools)

Question	106. How many visits were made to this school by the IDSO district official in 2007?	107. What about 2006?	108. What was the main purpose of the inspector's last visit? 1 = general inspection 2 = advisory visit 3 = assessment of teachers 4 = assessment of students 5 = assessment of facilities and quality in general 6 = other	109. What kind of feedback was given at the end of the 2007 visit? 0 = none 1 = verbal report at staff meeting 2 = verbal report to head teacher only 3 = verbal report to individual teachers 4 = written report to head teacher 5 = written reports to individual teachers	110. Did school provide academic report to district authorities in 2007? 1 = yes 2 = no	111. Did school provide financial report to district authorities in 2007? 1 = yes 2 = no
a)						
b)						
c)						
d)						
e)						

Section VI: Disbursement of Funds

Source	112. on what schedule were the funds from this source disbursed?	113. how much delay was there in receipt of these funds?	114. what procedure this the district go through to get these funds?	115. Did this funding come ear-marked for certain categories of spending?	116. If so, what category or categories of spending was this source of funding intended for?
	1 = all at once 2 = 2 or 3 instalments 3 = monthly 4 = other	1 = None/ on time 2 = less than 2 weeks 3 = between 2 weeks and 2 months 4 = more than 2 months	1 = automatic (mail or direct deposit) 2 = district responsible for pick-up 3 = significant paper work burden	1 = yes 2 = no	1= paying district admin expenditures 2 = scholastic materials for schools 3 = special programs 4 = curriculum support; 5 = other
a) National govt funding					
b) Subsidies to schools					
c) Donor Support					
d) Other sources					

Section VII: District Expenditures in 2007

Question	Amount
117. What was your total budget for 2007?	
118. How much was spent on office / admin expenditure?	
119. How much was spent on transport (including vehicle maintenance and fuel)?	
120. How much in total was disbursed to public primary schools?	
121. Of this amount, how much was allocated to quintile 5 schools?	
122. Of this amount, how much was allocated to quintile 4 schools?	
123. Of this amount, how much was allocated to quintile 3 schools?	
124. Of this amount, how much was allocated to quintile 2 schools?	
125. Of this amount, how much was allocated to quintile 1 schools?	
126. How much was spent on teachers salaries?	
127. How much was spent on teachers bonuses?	
128. How much was spent on telephone and electricity bills?	
129. How much was spent on other items (specify)?	

Section VIII: School Receipts

(same five randomly selected schools)

Schools	130. How much was given to this school in 2007?	131. On what schedule were the funds from this source disbursed?	132. How much delay was there in receipt of these funds?	133. What procedure this the school go through to get these funds?	134. Did this funding come ear-marked for certain categories of spending?	135. If so, what category or categories of spending was this source of funding intended for?	136. How much is the school to receive in 2008?
	Amount	1 = all at once 2 = 2/3 instalments 3 = more than monthly 4 = other	1 = None/ on time 2 = less than 2 weeks 3 = between 2 weeks and 2 months 4 = more than 2 months	1 = automatic (mail or direct deposit) 2 = school responsible for pick-up 3 = significant paper work burden 4 = cash or check paid at the school 5 = other	1 = yes 2 = no	1= paying staff 2 = scholastic materials 3 = maintenance 4 = administration 5 = special programs 6 = construction or expansion of facilities 7 = other	Amount
a)							
b)							
c)							
d)							
e)							

Additional Questions

Organisation and Management (technical efficiency)

Question	Answers
137. Are there formal constraints on district spending or is district legally allowed to spend beyond the budget?	
138. Are there punitive actions for overspending?	
139. Is the district office mandated to publish their financial accounts?	
140. How many district directors have there been in the past 5 years?	
141. Is promotion of senior managers linked to performance?	
142. Is there any account of dismissal of senior staff based on non-performance or irregularities in the past 5 years?	
143. Is there clear specification of output to be produced by district every year?	
144. Is there regular auditing of district accounts?	
145. Are district budgets done in consultation with community members?	

APPENDIX 3

List of Schools Sampled

	School	Province	District	Geog_Loc	Schl_Gender	Student_pop	No_Fee	Quintile
1.	Alberview	GP	ES	urban	mixed	1025	no fee	5
2.	Avante	GP	GW	urban	mixed	936	no fee	4
3.	Baisitse	NW	Bophirim	rural	mixed	580	fee	1
4.	Bakgatla	NW	Bojanala	rural	mixed	253	no fee	3
5.	Banabaka	NW	Central	rural	mixed	668	fee	1
6.	Bancho	NW	Bophirim	rural	mixed	48	fee	
7.	Barelwan	NW	Bojanala	rural	mixed	1168	no fee	3
8.	Biakaget	GP	GE	urban	mixed	640	no fee	3
9.	Bobuants	NW	Bojanala	rural	mixed	256	fee	2
10.	Boikanyo	GP	JW	urban	mixed	626	no fee	4
11.	Bonwelon	GP	JE	urban	mixed	1644	fee	
12.	Bopang	GP	ES	urban	mixed	1364	no fee	4
13.	Boshoek	NW	Bojanala	urban	mixed	745	no fee	3
14.	Bothibel	NW	Bojanala	urban	mixed	1013	fee	1
15.	Bulelani	GP	GW	urban	mixed	837	no fee	3
16.	Busisisw	GP	JC	urban	mixed	430	no fee	3
17.	Capital	GP	TW	urban	mixed	600		
18.	Carlison	NW	Central	rural	mixed	208	fee	1
19.	Central	NW	Bojanala	urban	mixed	546	no fee	4
20.	Collinda	NW	Bophirim	peri urban	mixed	1053	no fee	3
21.	Dan_Phar	GP	GE	urban	mixed	1139	fee	1
22.	De Beer	NW	Southern	rural	mixed	140	no fee	
23.	Die_Aren	GP	GE	urban	mixed	705	no fee	5
24.	Dikhukun	NW	Central	rural	mixed	33	fee	1
25.	Dimakats	GP	TW	urban	mixed	682	fee	2
26.	Dithakwa	NW	Central	rural	mixed	177	fee	1
27.	Doringkl	GP	TS	urban	mixed	956	no fee	5
28.	Dowlinga	GP	JN	urban	mixed	1148	no fee	4
29.	Dr_Knak	GP	JE	urban	mixed	1104	fee	2
30.	Driefont	NW	Southern	peri urban	mixed	370	no fee	3
31.	Dumehlez	GP	GE	urban	mixed	827	no fee	3
32.	EH_Mogas	NW	Central	rural	mixed	552	fee	1
33.	EW Hobbs	GP	JC	urban	mixed	1360	no fee	4
34.	Eastleig	GP	EN	urban	mixed	806	no fee	
35.	Edleen	GP	EN	urban	mixed	916	no fee	5
36.	Eendrach	GP	TW	urban	mixed	773	no fee	4
37.	Elethu_T	GP	JS	rural	mixed	603	fee	2
38.	Eligwa	GP	SW	urban	mixed	310	no fee	4
39.	Elspark	GP	ES	urban	mixed	790	no fee	5
40.	Emzimbvu	GP	JW	urban	mixed	410	no fee	3
41.	Fairland	GP	JN	urban	mixed	806	no fee	5
42.	Fairview	GP	JE	urban	mixed	478	no fee	3
43.	Fapha	NW	Bojanala	urban	mixed	1254	no fee	3
44.	Florida	GP	JW	urban	mixed	750	no fee	5
45.	Gaesegwe	NW	Central	rural	mixed	760	fee	1

46.	Garsfont	GP	TS	urban	mixed	1308	no fee	5
47.	Gedensko	NW	Southern	urban	mixed	702	no fee	3
48.	Germisto	GP	ES	urban	mixed	652	no fee	4
49.	Glen_Ali	NW	Central	rural	mixed	38	fee	1
50.	Glenstan	GP	TS	urban	mixed	1330	no fee	5
51.	Gontse	NW	Southern	rural	mixed	1462	no fee	
52.	Gustav	GP	JW	urban	mixed	451	no fee	5
53.	Hartsriv	NW	Bophirim	rural	mixed	487	fee	1
54.	Hendrik	NW	Bojanala	urban	mixed	665	no fee	5
55.	Hurlyval	GP	EN	urban	mixed	880	no fee	5
56.	IB_Damon	NW	Bojanala	urban	mixed	417	no fee	3
57.	Ikwezi	GP	JC	urban	mixed	320	no fee	3
58.	Ipoloken	GP	JN	urban	mixed	530	no fee	3
59.	Irene_Mi	GP	TS	urban	mixed	513	fee	2
60.	Isaac_M	NW	Bojanala	peri urban	mixed	625	no fee	4
61.	Isulihle	GP	JC	urban	mixed	1229	no fee	3
62.	Ithuthe	GP	JE	urban	mixed	1087	fee	2
63.	Itumelen	NW	Bojanala					
64.	Jatholim	NW	Central	rural	mixed	237	fee	1
65.	Kabelo	NW	Central	rural	mixed	557	fee	1
66.	Kagisano	NW	Central	rural	mixed	180	fee	1
67.	Karlien	NW	Bojanala	urban	mixed	548	fee	2
68.	Keleraya	NW	Central	rural	mixed	220	fee	1
69.	Kgatelob	GP	JC	urban	mixed	320	no fee	4
70.	Khandubu	GP	JN	urban	mixed	358	no fee	4
71.	Khayakhu	NW	Bojanala	rural	mixed	155	no fee	3
72.	Kloof	NW	Bojanala	urban	mixed	1027	no fee	4
73.	Koi_Koi	NW	Central	rural	mixed	195	fee	1
74.	Kolong	NW	Southern	peri urban	mixed		no fee	3
75.	Kwgakilw	NW	Bophirim	rural	mixed	1016	fee	2
76.	La_Hoff	NW	Southern	urban	mixed	594	no fee	5
77.	Lakeside	GP	ES	urban	mixed	1097	no fee	4
78.	Lekgophu	NW	Central	rural	mixed	223	fee	2
79.	Lelokwan	NW	Central	rural	mixed	142	fee	1
80.	Leresche	GP	JN	urban	mixed	427	no fee	3
81.	Lesedi	GP	SW	rural	mixed	1025	fee	1
82.	Lesego	NW	Southern	urban	mixed	1003	no fee	3
83.	Mabafeng	GP	TS	urban	mixed	660	no fee	3
84.	Maboelle	GP	SW	rural	mixed	450	fee	3
85.	Machadam	NW	Bojanala	rural	mixed	255	no fee	3
86.	Madibeng	NW	Southern	urban	mixed	830	fee	1
87.	Magaabue	NW	Bophirim	rural	mixed	59	fee	2
88.	Makwelen	NW	Bojanala	rural	mixed	161	fee	1
89.	Matsedis	GP	ES	urban	mixed	821	no fee	3
90.	Mboweni	GP	TS	urban	mixed	194	no fee	4
91.	Mbuyisa	GP	JW	urban	mixed	347	no fee	3
92.	Meyerton	GP	SE	urban	mixed	841	no fee	3
93.	Mmadiseb	NW	Central	rural	mixed	542	fee	2
94.	Mmuso	GP	GE	urban	mixed	640	fee	3
95.	Mochocho	GP	JC	urban	mixed	286	no fee	4
96.	Mohajane	NW	Bojanala	urban	mixed	393	no fee	3
97.	Mohato	GP	JC	urban	mixed	203	no fee	4
98.	Moitshok	NW	Bojanala	rural	mixed	1481	fee	
99.	Mokonyam	GP	TN	urban	mixed	1061	fee	1

100.	Monnapha	NW	Bophirim	rural	mixed	742	fee	2
101.	Morgenst	NW	Central	rural	mixed	98	fee	1
102.	Morokwen	NW	Bophirim	rural	mixed	562	fee	2
103.	Motlajoe	NW	Bojanala	rural	mixed	262	fee	1
104.	Motlhaba	NW	Central	rural	mixed	256	no fee	3
105.	Motlhako	NW	Central	rural	mixed	395	fee	2
106.	Motlhats	NW	Central	urban	mixed	529	fee	1
107.	Mshuluan	GP	GN	urban	mixed	872	no fee	3
108.	Mthimkhu	GP	ES	urban	mixed	896	no fee	4
109.	Naletsan	NW	Central	rural	mixed	357	fee	1
110.	Nka Thut	GP	JC	urban	mixed	405	no fee	4
111.	Nkholi	GP	JC	urban	mixed	510	no fee	4
112.	Nomnekan	GP	GE	urban	mixed	731	fee	2
113.	Olifants	GP	TS	urban	mixed	1238	no fee	5
114.	Olifants	GP	JS	rural	mixed	420	fee	1
115.	Onaleron	NW	Bophirim	rural	mixed	396	fee	2
116.	Opadiatl	NW	Central					
117.	Parkview	GP	JN	urban	mixed	261	no fee	5
118.	Pelonngw	NW	Bophirim	rural	mixed	192	fee	
119.	Peme	NW	Central	rural	mixed	183	no fee	2
120.	Pheasant	GP	ES	rural	mixed	841	fee	1
121.	Pheladi	GP	TS	urban	mixed	419	no fee	3
122.	Phemolon	GP	EN	urban	mixed	1050	fee	3
123.	Phera	NW	Central	rural	mixed	309	fee	1
124.	Phiri	GP	JC	urban	mixed	250	no fee	3
125.	Potchefs	NW	Southern	urban	mixed	540	no fee	3
126.	Protea	NW	Bojanala	urban	mixed	980	no fee	5
127.	Ramatla	NW	Bojanala	rural	mixed	509	fee	2
128.	Ratlou	NW	Central	rural	mixed	465	no fee	3
129.	Reaithut	NW	Central	rural	mixed	159	fee	1
130.	Reitsosi	NW	Central	rural	mixed	181	fee	1
131.	Rekopane	NW	Central	peri urban	mixed	805	fee	2
132.	Renonofi	NW	Central	rural	mixed	427	no fee	3
133.	Republie	GP	SE	urban	mixed	223	no fee	4
134.	Rethabis	GP	GN	peri urban	mixed	1398	fee	3
135.	Retshege	NW	Bophirim	rural	mixed	358	no fee	3
136.	Riviera	GP	TN	urban	mixed	350	no fee	
137.	Roodepoo	GP	JW	urban	mixed	1200	no fee	4
138.	Rynfield	GP	EN	urban	mixed	907	no fee	5
139.	Rynsoord	GP	EN	urban	mixed	800	no fee	5
140.	Saffola	GP	EN	rural	mixed	286	fee	1
141.	Sandile	GP	GW	urban	mixed	682	no fee	4
142.	Sazakhel	GP	EN	urban	mixed	485	fee	
143.	Sechaba	GP	GE	urban	mixed	401	fee	3
144.	Sedibeng	GP	SW	rural	mixed	269	fee	2
145.	Seeikile	NW	Bojanala	rural	mixed	625	no fee	3
146.	Seeiso	GP	SE	rural	mixed	1104	no fee	3
147.	Senkgwe	NW	Central	rural	mixed	824	no fee	3
148.	Shalom	GP	TW	urban	mixed	716	no fee	3
149.	Sindawon	GP	TS	urban	mixed	350	no fee	4
150.	Sivuse	GP	SW	urban	mixed	563	fee	3
151.	Spectrum	GP	JS	urban	mixed	1026	no fee	3
152.	Strathva	NW	Southern	urban	mixed	747	no fee	4
153.	Suidheuw	GP	JS	urban	mixed	498	no fee	4

154.	TC Este	GP	JN	urban	mixed	569	no fee	3
155.	Tamaho	GP	ES	peri urban	mixed	1350	fee	2
156.	Thembeli	GP	GE	urban	mixed	910	no fee	3
157.	Thipanya	NW	Central	rural	mixed	171	no fee	
158.	Thusanan	GP	JC	urban	mixed	458	no fee	3
159.	Tlatlogo	NW	Southern	rural	mixed	117	fee	1
160.	Tlhageng	NW	Bojanala	rural	mixed	155	no fee	3
161.	Tsakani	GP	GW	urban	mixed	954	no fee	3
162.	Tshepana	GP	JS	rural	mixed	980	fee	2
163.	Tshing	NW	Southern	urban	mixed	1107	no fee	3
164.	Tshirele	GP	JW	urban	mixed	410	no fee	3
165.	Tsimong	GP	GE	urban	mixed	362	no fee	4
166.	Tsoarana	GP	SE	urban	mixed	1135	fee	2
167.	Tumisang	NW	Central	urban	mixed	1158	fee	2
168.	United	NW	Southern	urban	mixed	407	no fee	3
169.	Valhalla	GP	TS	urban	mixed	589	no fee	5
170.	Wedela	NW	Southern	urban	mixed	774	fee	2
171.	Wendywoo	GP	JE	urban	mixed	954	no fee	5
172.	Western	GP	GW	peri urban	mixed	760	no fee	3
173.	Winnie	GP	JN	urban	mixed	796	no fee	3
174.	Zibambe	GP	JC	urban	mixed	572	no fee	3
175.	Zithulel	GP	SW	urban	mixed	486	fee	3

APPENDIX 4

[Statistical Output]

Chapter 2: Additional Robustness Tests for Repetition and Dropout Rates

One way to illustrate the appropriateness of these indicators was to conduct correlations between dropout and repetition against test scores using existing datasets that have all three variables. The SACMEQ dataset was used to conduct correlations between (i) dropout rates and test scores and (ii) repetition rates and test scores. The results of the crosstabulations are presented in Tables 2.1 and 2.2 below. Both results show a very significant correlation (p=0.00) indicating that there is a strong and statistically significant relationship between numeracy test scores and repetition and dropout rates. These results give additional credibility to repetition and dropout rates as credible outcome variables.

Table 2.1 Results of Cross Tabulation between Repetition and Test Scores

```
. tabulate zmalocp zprepeat, chi2
```

scr:/ pupil math-all 500 score [mean=500 & sd=100]	r:/ grade repetition never	repeated	Total
.4322608	0	1	1
147.718	1	2	3
189.1245	1	0	1
222.3172	2	7	9
250.1091	6	0	6
274.1879	5	9	14
295.5663	13	11	24
314.9193	11	17	28
332.4721	20	18	38
348.7872	23	36	59
363.9771	27	58	85
378.3794	56	86	142
391.8815	85	78	163
404.821	81	105	186
417.0854	84	99	183
429.0123	105	106	211
440.4891	92	117	209
451.5159	84	110	194
462.3176	89	84	173
472.7817	77	70	147
483.0208	78	64	142
493.0349	82	59	141
502.9365	64	53	117
512.613	53	26	79
522.177	34	24	58
531.6285	54	21	75
541.08	34	11	45
550.3065	29	18	47
559.6454	29	8	37
568.8719	38	11	49
578.0983	20	3	23
587.4373	34	8	42
596.6638	12	4	16
606.0027	26	5	31
615.4542	16	4	20
625.0182	31	4	35
634.5823	19	3	22
644.3713	21	4	25
654.2729	20	2	22
664.512	26	3	29
674.8636	20	2	22
685.5528	14	0	14
696.467	20	2	22
707.8313	15	1	16
719.6457	19	2	21
732.0226	16	1	17
744.9622	11	1	12
758.5768	9	0	9
773.2041	11	0	11
788.8441	12	1	13
805.8342	5	2	7
824.6247	8	0	8
845.6655	8	0	8
869.8569	5	0	5
898.5489	7	0	7
934.5546	7	0	7
983.7248	3	0	3
1065.3	2	0	2
Total	1,774	1,361	3,135

Pearson chi2(57) = 363.2741 Pr = 0.000

Table 2.2 Results of Cross Tabulation between Dropout and Test Scores

```
. tabulate zmalocp zspupp04, chi2
```

scr:/ pupil math-all 500 score [mean=500 & sd=100]	r:/ school problem-pupil dropout sometimes	never	Total
.4322608	1	0	1
147.718	3	0	3
189.1245	1	0	1
222.3172	8	1	9
250.1091	6	0	6
274.1879	14	0	14
295.5663	21	3	24
314.9193	23	5	28
332.4721	37	1	38
348.7872	56	3	59
363.9771	81	4	85
378.3794	123	18	141
391.8815	150	13	163
404.821	169	16	185
417.0854	174	6	180
429.0123	193	17	210
440.4891	193	16	209
451.5159	177	16	193
462.3176	160	12	172
472.7817	133	13	146
483.0208	127	13	140
493.0349	123	15	138
502.9365	105	11	116
512.613	67	10	77
522.177	54	3	57
531.6285	59	13	72
541.08	39	6	45
550.3065	44	3	47
559.6454	25	12	37
568.8719	37	12	49
578.0983	20	3	23
587.4373	32	9	41
596.6638	13	3	16
606.0027	20	11	31
615.4542	12	8	20
625.0182	20	15	35
634.5823	11	11	22
644.3713	14	11	25
654.2729	14	8	22
664.512	15	14	29
674.8636	12	10	22
685.5528	4	10	14
696.467	6	16	22
707.8313	3	13	16
719.6457	4	17	21
732.0226	3	14	17
744.9622	2	10	12
758.5768	3	6	9
773.2041	2	9	11
788.8441	2	11	13
805.8342	2	5	7
824.6247	3	5	8
845.6655	0	8	8
869.8569	0	5	5
898.5489	1	6	7
934.5546	1	6	7
983.7248	0	3	3
1065.3	0	2	2
Total	2,622	491	3,113

Pearson chi2(57) = 830.1526 Pr = 0.000

Table 8.5 Descriptive Statistics on Education Outcomes for Schools in Gauteng Province

Descriptive Statistics				
District where school is located		N	Mean	Std. Deviation
EN	% of students repeating Grade 1	8	.7500	2.12132
	% of students repeating Grade 7	8	1.8750	1.95941
	% of students dropping out after Grade 1	8	2.5000	6.30193
	% of students dropping out after Grade 5	8	.6250	1.40789
	Valid N (listwise)	8		
ES	% of students repeating Grade 1	9	4.0000	3.74166
	% of students repeating Grade 7	9	.8889	1.36423
	% of students dropping out after Grade 1	9	2.5556	3.39526
	% of students dropping out after Grade 5	9	2.7778	4.17665
	Valid N (listwise)	9		
GE	% of students repeating Grade 1	9	4.4444	4.77261
	% of students repeating Grade 7	9	2.8889	2.52212
	% of students dropping out after Grade 1	9	.1111	.33333
	% of students dropping out after Grade 5	9	2.2222	2.77389
	Valid N (listwise)	9		
GN	% of students repeating Grade 1	2	6.5000	4.94975
	% of students repeating Grade 7	2	.5000	.70711
	% of students dropping out after Grade 1	1	.0000	.
	% of students dropping out after Grade 5	1	1.0000	.
	Valid N (listwise)	1		
GW	% of students repeating Grade 1	5	8.4000	7.53658
	% of students repeating Grade 7	5	2.8000	4.08656
	% of students dropping out after Grade 1	4	15.7500	25.66937
	% of students dropping out after Grade 5	4	2.5000	3.78594
	Valid N (listwise)	4		
JC	% of students repeating Grade 1	10	2.2000	2.29976
	% of students repeating Grade 7	8	.3750	1.06066
	% of students dropping out after Grade 1	10	7.1000	7.35527
	% of students dropping out after Grade 5	8	4.6250	4.68851
	Valid N (listwise)	6		

JE	% of students repeating Grade 1	5	7.4000	8.53229
	% of students repeating Grade 7	4	.2500	.50000
	% of students dropping out after Grade 1	5	2.8000	2.16795
	% of students dropping out after Grade 5	4	4.2500	2.87228
	Valid N (listwise)	4		
JN				
	% of students repeating Grade 1	8	5.6250	7.72635
	% of students repeating Grade 7	7	.0000	.00000
	% of students dropping out after Grade 1	6	6.1667	10.08795
	% of students dropping out after Grade 5	7	2.8571	2.79455
	Valid N (listwise)	4		
JS				
	% of students repeating Grade 1	5	2.4000	1.51658
	% of students repeating Grade 7	5	.0000	.00000
	% of students dropping out after Grade 1	5	5.2000	6.37966
	% of students dropping out after Grade 5	5	3.6000	4.50555
	Valid N (listwise)	5		
JW				
	% of students repeating Grade 1	5	7.0000	6.89202
	% of students repeating Grade 7	6	.1667	.40825
	% of students dropping out after Grade 1	5	2.4000	2.88097
	% of students dropping out after Grade 5	6	2.3333	2.06559
	Valid N (listwise)	4		
SE				
	% of students repeating Grade 1	4	5.7500	4.92443
	% of students repeating Grade 7	4	.0000	.00000
	% of students dropping out after Grade 1	3	.6667	.57735
	% of students dropping out after Grade 5	4	2.2500	4.50000
	Valid N (listwise)	3		
SW				
	% of students repeating Grade 1	6	7.0000	5.44059
	% of students repeating Grade 7	4	.5000	1.00000
	% of students dropping out after Grade 1	6	3.5000	4.18330
	% of students dropping out after Grade 5	6	3.1667	3.60093
	Valid N (listwise)	4		
TN				
	% of students repeating Grade 1	2	15.5000	12.02082
	% of students repeating Grade 7	1	.0000	.
	% of students dropping out after Grade 1	1	.0000	.
	% of students dropping out after Grade 5	1	17.0000	.
	Valid N (listwise)	1		

TS				
	% of students repeating Grade 1	10	7.7600	6.08444
	% of students repeating Grade 7	10	.7000	.94868
	% of students dropping out after Grade 1	10	5.5000	11.33578
	% of students dropping out after Grade 5	10	5.9500	6.87366
	Valid N (listwise)	10		
TW				
	% of students repeating Grade 1	3	9.0000	6.55744
	% of students repeating Grade 7	2	1.5000	2.12132
	% of students dropping out after Grade 1	3	1.3333	2.30940
	% of students dropping out after Grade 5	3	3.0000	5.19615
	Valid N (listwise)	2		

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