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How effective are poor schools? Poverty and educational outcomes in South Africa☆

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ABSTRACT

Given South Africa's divided past, it is imperative to improve educational outcomes to overcome labour market inequalities. Historically white and Indian schools still outperform black and coloured schools in examinations, and intraclass correlation coefficients (rho) reflect far greater between-school variance than for other countries.

SACMEQ's rich data sets provide new possibilities for investigating relationships between educational outcomes, socio-economic status (SES), pupil and teacher characteristics, and school resources and processes. As a different data generating process applied in affluent historically white schools (test scores showed bimodal distributions), part of the analysis excluded such schools, sharply reducing rho. Test scores were regressed on various SES measures and school inputs for the full and reduced sample, using survey regression and hierarchical (multilevel or HLM) models. This shows that poor schools were least able to systematically overcome inherited socio-economic disadvantage. Schools diverged in their ability to convert inputs into outcomes, with large random effects in the HLM models. Outside of the richest schools, SES had only a mild impact on test scores, which were quite low in SACMEQ context.

Introduction

Massive differentials on achievement tests and examinations reflect South Africa's divided past. International tests demonstrate that South African educational quality lags far behind even much poorer countries. Educational quality in historically black schools – constituting 80% of enrolment – has not improved since political transition, despite large resource transfers to such schools. Drawing on a wide range of research, Taylor (2007: 537) concludes that *"(i) nterventions in poorly performing schools, which probably constitute around 80% of the total, have realised some impact, but proved to be highly inefficient. . ."* This study concerns itself with this problem: to determine what factors inhibit performance in poorer (mainly black or coloured) schools. In particular, the purpose is to understand the role of school effectiveness, socio-economic status (SES) and resources in determining educational performance at Grade 6 level in South Africa.

SACMEQ II's rich data set provides new possibilities for investigating a research question that could hitherto not be systematically answered with South African data, viz. how effectively schools convert resources into educational outcomes, and specifically, how effective *poor* schools are in overcoming socio-economic disadvantage. Studies have shown high variability in school performance (large residuals) even *after controlling for SES and teacher inputs* that may be indicative of varying efficiency, hinting at managerial problems in many schools (Crouch & Mabogoane, 1998).

As quite different processes may determine learning outcomes in affluent schools (bimodal distributions of test scores provide evidence of separate data generating processes) and the focus here lies on performance of the resource-scarce poorer schools, part of the analysis excludes affluent schools. Test scores are regressed on SES, pupil characteristics, school inputs, school processes and location for the full and reduced samples, using survey regression and hierarchical linear models (HLMs) to deal with sample design and nested data. This should advance understanding of the conditions required for resources to have an optimal impact, as earlier work indicated that resources mattered only conditionally on school efficiency (the ability to convert resources into educational performance, whilst controlling for SES), which varied widely amongst schools.

The paper proceeds as follows: First, educational inequality between South African schools is placed in perspective to show that it is indeed a major educational challenge. After a brief discussion

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of the SACMEQ II data, school and pupil performance is analysed using ordinary least-square (OLS) regressions but allowing for clustering effects in sample design. The next step is an analysis of performance of a reduced sample of less affluent schools, so as to capture relationships in schools that were not formerly advantaged. Thus coefficients can better be interpreted as applying amongst such schools rather than largely capturing differences between historically white and black schools. Next, quantile regression is used for a similar purpose, viz. to model differences in performance in well and weakly performing schools. School performance is briefly modelled next as a prelude to two-level HLM modelling that incorporates the effects of both individual and school characteristics, focusing particularly on SES. The paper closes with an overall conclusion.

Background

The Coleman report gave rise to many studies and an ongoing debate about the ability of schools to systematically overcome socio-economic disadvantage. In developing countries, the multivariate analysis needed to isolate the influence of school effects on education after controlling for home background, particularly SES, and school resources, is often constrained by the absence of rich data sets. Two sets of South African studies are directly relevant to this study. The first are those dealing with results from educational evaluations; the second are educational production functions.

An "established trend" (Chisholm, 2004: 12) from the South African literature based on the country's participation in international evaluation studies since the political transition (Trends in International Mathematics and Science Study, 1999 and 2003 (TIMSS), Monitoring Learning Achievement, 1999 (MLA), and Southern African Consortium on Monitoring Education Quality, 2001 (SACMEQ II)) is that South African educational performance is extremely weak, and that systematic differences between schools serving different parts of the population remain exceedingly large. Taylor, Muller and Vinjevold (2003: 41) note that these studies "*. . .suggest that learners' scores are far below what is expected at all levels of the schooling system, both in relation to other countries (including other developing countries) and in relation to the expectations of the South African curriculum*". Similarly, the political analyst and commentator Aubrey Matshiqi holds that "*. . .the failure to provide decent education, especially to the disadvantaged, is one of the most spectacular failures of the past 13 years*" (Matshiqi, 2007).

In the 1999 MLA study, South African Grade 4 pupils scored the lowest of 12 participating African countries in numeracy and outperformed only 3 countries in literacy. In the 2003 Grade 8 TIMSS, South Africa scored the lowest of 46 participating countries in both Mathematics (264 compared to an international mean of 467) and Science (244 vs. 474). Whilst formerly white schools performed at the international mean level, formerly black schools achieved less than half that level (Reddy, 2006: 50). The South African scores showed no improvement on the 1999 position, and the country maintained its bottom rank even against other African countries that are generally much poorer (Egypt, Tunisia, Morocco, Botswana and Ghana) (Human Sciences Research Council, 2005; Reddy, 2006; Taylor et al., 2003). In SACMEQ II, South Africa placed in the bottom half on both reading and mathematics. This was despite much higher expenditure per pupil than almost all 13 other participating countries, as a government report noted (South Africa, Department of Education, 2003a: 102).

Studies based on literacy and numeracy modules included in the 1993 Statistics for Living Standards and Development household survey had also shown severe quality problems in large parts of the education system (Case & Deaton, 1999; Van der Berg, Wood, and L Roux (2002)). Black teenagers had literacy scores less than two-thirds and numeracy scores less than half of white levels, despite a smaller gap in attainment levels.

More recent internal evaluations also give grave cause for concern. The 2003 Systemic Evaluation of 54 000 Grade 3 pupils indicated serious shortcomings in education quality. Against expected learning outcomes scores of 50% in each area, average scores were 54% and 69% for life skills and listening comprehension, but only 38% for reading comprehension and 30% for numeracy (South Africa, Department of Education, 2003b: viii–ix). In the 2005 Systemic Evaluation, fewer than half of Grade 6 pupils were achieving expected learning outcomes in Natural Sciences, 40% in the language of learning (mainly English) and 20% in Mathematics. Average percentage scores were 41%, 38% and 27%, respectively for these three learning areas (Pandor, 2005). Kanjee et al. (2001), analysing baseline data for a school improvement project (Quality Learning Project), also commented on the low levels of achievement in these schools; improvements attained were modest measured against these needs (Kanjee & Prinsloo, 2005).

The production function approach deals with some of the issues raised by the Coleman report, viz. identifying factors that contribute to educational performance. Such an approach to measuring school efficiency is similar to using a production function to model the production process (cf. Hanushek, 2002; Filmer and Pritchett, 1999). It measures statistically the relationship between school inputs and outputs, controlling for other explanatory factors such as home background, to determine what factors influence school performance. Interest focuses in particular on whether education can systematically overcome home background, on the role of school resources, and on the efficiency of schools as deduced from their ability to convert resources into outcomes. The few such studies thus far carried out in South Africa (Crouch & Mabogoane, 1998, 2001; Gustafsson, 2005a,b; Van der Berg, 2001, 2007; Van der Berg and Burger, 2002; Van Wyk, 2006) all found school effectiveness to be a major problem. However, until SACMEQ II, such studies largely analysed matriculation results and could not control for many potentially important variables.

Inequality between schools

South Africa's high intraclass correlation coefficient rho (ρ) – variance in performance between schools as a proportion of overall variance – of 0.70 for reading scores and 0.64 for mathematics scores in SACMEQ II confirmed that there was exceedingly high inequality between schools. Differentials between rich and poor schools and those in large cities and isolated rural areas also far exceeded those in other SACMEQ countries (SACMEC Indicators, 2005).

Lowess (locally weighted) regressions of the relationship between SES and test scores for both individuals scores and for school averages (Figs. 1a and b, 2a and b) were quite flat over most of their range. Apparently, below a certain SES threshold, individual reading or mathematics score did not improve much with higher SES—most schools were not able to turn higher SES into educational advantage. Thus even some middle class children performed poorly. Table 1 confirms that mean performance per school quintile – arranged according to mean SES – largely remained unchanged between the poorest and the third, and indeed even the fourth, quintile. However, in the richest quintile performance leaps up by one quarter in both reading and mathematics. This quintile also far outperformed the rest in proportions with marks above 500 (the SACMEQ mean), or below 400 (one standard deviation below this mean).