In a now well-known ANC newsletter, President Mbeki succinctly portrayed South Africa’s development challenge:

... Our country is characterised by two parallel economies, the First and the Second. The First Economy is modern, produces the bulk of our country’s wealth, and is integrated within the global economy. The Second Economy (or the Marginalised Economy) is characterised by underdevelopment, contributes little to the GDP, contains a big percentage of our population, incorporates the poorest of our rural and urban poor, is structurally disconnected from both the First and the global economy, and is incapable of self-generated growth and development.¹

The theme of the two parallel economies is an elaboration of the two nations thesis the president developed in 1998, when he argued in a debate on the report of the Truth and Reconciliation Commission that:

the material conditions ... have divided our nation into two nations, the one black, the other white ... [the latter] is relatively prosperous and has ready access to a developed economy, physical, educational, communication and other infrastructure. ... The second, and larger, nation of South Africa is black and poor, [and] lives under conditions of a grossly underdeveloped infrastructure ... ²

The theme of the two parallel economies (or two nations) captured the imagination of policy thinkers in many different sectors. In agriculture, it spoke to the huge gulf between commercial farming — as it effectively positioned itself for a new era in international trade — and the marginal subsistence peasantry, barely eking out an existence on barren lands, unable to make inroads into commercial production. It made sense of the housing and the health sectors, where similar bifurcated ‘nations’ exist.

The two parallel economies/two nation’s image has conceptual purchase in the education sector. Following the logic of the metaphor — a decade after the end of apartheid — South Africa has not one, but two education ‘systems’. The

first 'system' is well resourced, consisting mainly of former white and Indian schools, and a small but growing independent sector. The first 'system' produces the majority of university entrants and graduates, the vast majority of students graduating with higher-grade mathematics and science. Enrolling the children of the elite, white-middle and new black middle-classes, the first system does a good job in ensuring that most children in its charge acquire literacy and mathematics competences that are comparable to those of middle-class children anywhere in the world. The second school 'system' enrolls the vast majority of working-class and poor children. Because they bring their health, family and community difficulties with them into the classroom, the second primary school 'system' struggles to ameliorate young people's deficits in institutions that are themselves less than adequate. In seven years of schooling, children in the second system do learn, but acquire a much more restricted set of knowledge and skills than children in the first system. They 'read', but mostly at very limited functional level; they 'write', but not with fluency or confidence. They can perform basic numeric operations but use inappropriately concrete techniques that limit application.

Unlike previous studies which indicate that South African learners are reading and doing mathematics well below comparable international norms and substantially below curriculum expectation, this book shows that when learners' average scores are disaggregated, the picture tells a devastating story of unequal learning. This chapter systematically documents the achievement gap between the 'first' and 'second' education systems. While each of the various cross-national studies, baseline project evaluations and national systemic assessments in turn provides fragments of the puzzle of primary school achievement — with their flaws and limitations — when assembled together, the contours of the national portrait are unmistakable. Whether the results emerge from small-scale in-depth studies of children's reading and writing in remote rural schools in KwaZulu-Natal, the Western Cape's Grade Learner Six Assessment Studies, or the raw scores of the Southern African Consortium for Monitoring Educational Quality (SACMEQ), the pieces all begin to fit together. Without ambiguity or the possibility of misinterpretation, the pieces together reveal the predicament of South African primary education.

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The studies show a consistent statistical pattern in primary school achievement — a pattern that often appears as a bimodal distribution.¹ In simple terms, if all the achievements of average primary school learners were plotted on a frequency distribution, two ‘humps’ or hills would be apparent. The vast majority of children’s performance would be reflected in the first big ‘hump’ — close to the y-axis — and a small minority of children would be reflected in the second (much smaller) ‘hump’ on the right of the graph, in the upper performance range. With the exception of a small number of talented youngsters who attend disadvantaged schools, the second ‘hump’ is likely to reflect the performance of children who attend former white, Indian and independent schools. The graph suggests that children, both black and white, in the first ‘system’ have achievement levels comparable to those of Germany or the United States. The larger ‘hump’ reflects the learning achievement of that majority of children in the second system. This ‘hump’ tells the story of the pervasive under-achievement amongst the vast majority of South Africa’s primary schoolchildren. As an indicator it shows the scale of under-achievement in disadvantaged schools. While a talented few who attend these schools outperform their peers and may even compete on equal terms with children in the privileged ‘system’, the evidence shows that the majority of children in the ‘second’ system cannot read for meaning in any language and are not numerically competent.

The chapter follows the contours of both large- and small-scale studies that track primary school achievement in South Africa in the past decade. Data has been generated by national and provincial government departments in their efforts to develop a baseline which will assess progress for its curriculum reform and from cross-national studies of quality which are part of the realisation of the goals of the ‘Education for All’ movement. Huge quantities of data have been generated by recent nationwide school improvement initiatives that have attempted to document achievement gains for their particular models. While not intended to provide information about achievement for the country as a whole, they provide unique insights into actual achievement in the ‘second’ system. Finally, through nuanced qualitative studies of learning, individual researchers and teams of researchers, concerned with the quality of primary

¹ The notion of a bimodal distribution of learning achievement in South Africa can be likened to the use that the UK Labour Party has given to the problem of the ‘long tail of under-achievement’. Based on some cross-national studies of quality (but not the most recent PISA study) English children have a wide range of achievement scores, with a high proportion of low-achieving children. While statistics that measure central tendency are important, and while in South Africa we put considerable store by the ‘pass rate’, in the context with substantial inequality the central tendency can be misleading and of little use. In a society defined by gross inequality, it is critical to track statistical spread or variance. In macro-economics this would be best measured by the Gini-coefficient.
education, have added real depth to our understanding of achievement in primary schools. In this chapter I review the findings of these studies and — in the case of the SACMEQ II data — do some original analysis. While the majority of the studies focus on learning achievement in Grades Three and Six, one small-scale study provides interesting insights about the reading ability of Grade Ones. We have also included achievement studies of children in Grades Eight and Nine, as they provide a fuller picture of learning gains for the full primary school experience.

GOVERNMENT INITIATIVES

Systemic evaluation

The much-anticipated and long-delayed first official report on primary school learner achievement in the post-apartheid era was released in June 2003. The Systemic Evaluation of the Foundation Phase was triumphantly described by the then Minister of Education, Professor Kader Asmal, as ‘a historic milestone in the transformation of the [South African] system’. The study was designed to gather baseline information on learners, schools and, ultimately, learning in the first three years of formal schooling. The study reported on the results of a series of questionnaires for principals, teachers and learners. What was historic, however, was the inclusion of three achievement tasks, or tests, linked to the new curriculum in the learning areas of literacy, numeracy and life-skills. At the time of the release of the report there were no comprehensive studies in South Africa that measured the levels of learning achieved of primary school children.

At the end of 2001, some 51 000 randomly selected Grade Three learners, (comprising about five per cent of the total Grade Three enrolment), completed the three ‘assessment tasks’. All three ‘tasks’ included both multiple-choice and free-response questions.\(^5\) The results of the nation’s educational temperature-taking (as it was referred to by the minister) showed that the Grade Threes appeared to have a very poor grasp of elementary mathematics — as reflected in an average score of only 30 per cent on the numeracy task. In the literacy task, the children’s average score was 54 per cent. But when the literacy task was broken down into the oral domain and the reading and writing domain, the average score on the reading and writing domain was much lower (39 per cent).

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\(^5\) The report notes an interesting phenomenon for a country that did not have a history of national standardised testing. It noted that pupils scored significantly higher on the multiple-choice question format than on the free response question format. Department of Education (2003) Systemic Evaluation Foundation Phase Mainstream National Report Pretoria: DoE.
<table>
<thead>
<tr>
<th>Assessment</th>
<th>Agency</th>
<th>Year of last test</th>
<th>Grade of test</th>
<th>Number of schools</th>
<th>Number of learners</th>
<th>Objective of test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systemic Evaluation in Grade Three</td>
<td>DoE</td>
<td>2001</td>
<td>Grade Three</td>
<td>14 000</td>
<td>51 307</td>
<td>Numeracy, literacy and life skills</td>
</tr>
<tr>
<td>Grade 6 Intermediate Phase Systemic Evaluation</td>
<td>DoE</td>
<td>2004</td>
<td>Grade Six</td>
<td>1 000</td>
<td>34 015</td>
<td>Mathematics, language, and natural science</td>
</tr>
<tr>
<td>Western Cape Education Department Grade Three Learner Assessment Study</td>
<td>WCED</td>
<td>2004</td>
<td>Grade Three</td>
<td>1 093</td>
<td>34 877</td>
<td>Literacy and numeracy</td>
</tr>
<tr>
<td>Western Cape Education Department Grade Three Learner Assessment Study</td>
<td>WCED</td>
<td>2006</td>
<td>Grade Three</td>
<td>1 086</td>
<td>82 879</td>
<td>Literacy and numeracy</td>
</tr>
<tr>
<td>Western Cape Education Department Grade Six Learner Assessment Study</td>
<td>WCED</td>
<td>2003</td>
<td>Grade Six</td>
<td>1 079</td>
<td>34 596</td>
<td>Literacy and numeracy</td>
</tr>
<tr>
<td>Western Cape Education Department Grade Three Learner Assessment Study</td>
<td>WCED</td>
<td>2005</td>
<td>Grade Six</td>
<td>1 040</td>
<td>31 726</td>
<td>Literacy and numeracy</td>
</tr>
<tr>
<td>Third International Mathematics and Science Study (TIMSS) 1999</td>
<td>HSRC</td>
<td>1999</td>
<td>Grade Eight</td>
<td></td>
<td></td>
<td>Mathematics and science</td>
</tr>
<tr>
<td>Trends in International Mathematics and Science Study TIMSS 2003</td>
<td>HSRC</td>
<td>2003</td>
<td>Grade Eight</td>
<td>254</td>
<td>9 000</td>
<td>Mathematics and science</td>
</tr>
<tr>
<td>Southern and East African Consortium for Monitoring Education Quality (SAC-MEQ) II</td>
<td>RIEP</td>
<td>2001</td>
<td>Grade Six</td>
<td>168</td>
<td>3 163</td>
<td>Reading and mathematics</td>
</tr>
<tr>
<td>Progress in International Reading Study (PIRLS)</td>
<td>University of Pretoria</td>
<td>2006</td>
<td>Grade Four and Five</td>
<td>441</td>
<td>16 288 14 711 Grade Four</td>
<td>Reading</td>
</tr>
</tbody>
</table>
Table 1.1 (continued)

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Agency</th>
<th>Year of last test</th>
<th>Grade of test</th>
<th>Number of schools</th>
<th>Number of learners</th>
<th>Objective of test</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Improvement Baseline Studies and Evaluations</td>
<td>District Development Support Programme (DDSP)</td>
<td>2001</td>
<td>Grade Three</td>
<td>453</td>
<td>14 700</td>
<td>Literacy and mathematics</td>
</tr>
<tr>
<td>Quality Learning Project (QLP)</td>
<td>Joint Education Trust</td>
<td>2001</td>
<td>Grade Nine and Grade Eleven</td>
<td>102</td>
<td>8 453</td>
<td>Literacy and mathematics</td>
</tr>
<tr>
<td>Small Scale</td>
<td>Family Literacy Project</td>
<td>UNISA</td>
<td>Grade One</td>
<td>5</td>
<td>40</td>
<td>Literacy</td>
</tr>
<tr>
<td>Eric Schollar and Associates</td>
<td>Eric Schollar</td>
<td>1994-2003</td>
<td>Grade Five &amp; Seven</td>
<td>20</td>
<td>845</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Early Reading Workshop</td>
<td>HSRC</td>
<td>1998</td>
<td>Grade Three</td>
<td>20</td>
<td>845</td>
<td>Literacy</td>
</tr>
</tbody>
</table>
The minister acknowledged the weakness in learning with the comment:

... This bears out the concern I raised when I became Minister of Education in 1999. I was then concerned that the curriculum did not explicitly mention the need for students to know how to read and write.6

Given our national concerns about equality, many questions were asked about the achievement gap between the advantaged and disadvantaged schools, between black and white children. Within the report itself, the authors conceded that, as low as the mean numeracy score was, it did not fully capture the actual performance of the vast majority of learners in disadvantaged schools. The mean score on the literacy task was inflated by a stronger performance on the listening and comprehension questions. But the majority of children tested scored below 40 per cent on the reading and writing questions.

These results, while limited, provided important evidence about learning achievement. The Grade Three Systemic Evaluation showed that while there was a high concentration of children scoring below 20 per cent on the assessment task, there was also a small — but not insignificant — percentage of children scoring above 60 per cent. As a first national measurement of primary education achievement, the Grade Three Systemic Evaluation study revealed that the average Foundation Phase schoolchild was really struggling with numeracy and barely coping with the demands of learning to read and write.

In 2005, the Department of Education released the results of the Grade Six Systemic Evaluation.7 Based on the results of an analysis of the academic performance of a sample of 34 015 learners tested in 2003 in three learning areas: language, mathematics and natural sciences, the results confirmed the trends evident in the Grade Three Evaluation study. The Grade Six evaluation found that learners obtained mean scores of 35 per cent for language, 27 per cent for mathematics and 41 per cent for natural sciences.

When these scores were reported for each learning area according to four achievement levels, ie outstanding, achieved, partly achieved and not achieved, the Department could determine the average levels at which South African learners function. In language, only 28 per cent of Grade Six schoolchildren were at 'achieved' or above the standard required by the curriculum. Put another way, the evaluation found that more than two-thirds

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6 Speech by the then Minister of Education, Professor Kader Asmal, MP, at the Colloquium Marking the Launch of the Foundation Phase Systemic Evaluation Report, Eastern Boulevard Holiday Inn Garden Court, Cape Town, 10 June 2003.

of South African Grade Six learners performed below the level expected of them. In mathematics, the picture painted by the statistics is even more horrifying. Only 12 per cent of all learners sampled scored at ‘achieved’ or ‘outstanding’ levels, with 81 per cent scoring at the ‘not achieved’ level. In other words, only one learner in ten was at the standard required by the National Curriculum Statement.

**Western Cape results**

The full extent of the huge achievement gap between Intermediate Phase learners in advantaged and disadvantaged schools became evident in 2004 with the release of the results of the first Western Cape Grade Six Learner Assessment Study. In this study, every primary school in the Western Cape with five or more Grade Six learners was included (34 596 children). One of the main purposes of this assessment exercise was to determine the proportion of learners who have attained official curriculum grade-level competence in literacy and numeracy.

The results of the study showed that, of the 34 596 learners who wrote the literacy task, only 12 104 (35.0 per cent) were performing at Grade Six level.\(^8\) While the Grade Three Systemic Evaluation reported only a single mean score, with no reference to the proportion of learners who ‘made the grade’, the Western Cape not only reported on the achievement level based on the curriculum requirements, but disaggregated the results by former department and by school poverty quintile.

**Table 1.2. Literacy pass rates by grade and ex-department (percentage)**

<table>
<thead>
<tr>
<th>Ex-Dept</th>
<th>Grade Three</th>
<th>Grade Four</th>
<th>Grade Five</th>
<th>Grade Six</th>
<th>% of Prov Learners</th>
</tr>
</thead>
<tbody>
<tr>
<td>CED</td>
<td>97.8</td>
<td>96.8</td>
<td>98.0</td>
<td>82.9</td>
<td>20</td>
</tr>
<tr>
<td>DET</td>
<td>66.5</td>
<td>37.9</td>
<td>49.3</td>
<td>3.7</td>
<td>65</td>
</tr>
<tr>
<td>HOR</td>
<td>81.5</td>
<td>64.3</td>
<td>78.1</td>
<td>26.6</td>
<td>14</td>
</tr>
</tbody>
</table>

*Source: WCED, 2004*

*Note: Report acknowledges problems with the standard of the Grade Four test questions*

The results powerfully illustrated the scale of the achievement gap. While almost four out of five children in former white schools were at a Grade Six level, the figure was one child in four in former coloured schools. In former DET schools, only four children in a hundred were reading at grade level. Worse

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\(^8\) Western Cape Education Department (2004) *Grade Six Learner Assessment Study 2003: Final Report Cape Town.*
TWO NATIONS AND THE BIMODAL DISTRIBUTION OF ACHIEVEMENT

still, a full third of children in these schools could not read at a level set for Grade Three children.

On the numeracy test, the researchers found that, overall, only 15.6 per cent of learners were performing at grade level. Forty per cent of the children in the sample could only operate at Grade Three level. Less than one per cent of children (the talented few) in the poorest schools were able to handle the Grade Six questions, compared to 62 per cent in wealthiest schools.

Table 1.3. Numeracy pass rates by grade and ex-department (percentage)

<table>
<thead>
<tr>
<th>Ex-Dept</th>
<th>Grade Three</th>
<th>Grade Six</th>
</tr>
</thead>
<tbody>
<tr>
<td>CED</td>
<td>90.5</td>
<td>62.4</td>
</tr>
<tr>
<td>DET</td>
<td>12.0</td>
<td>0.1</td>
</tr>
<tr>
<td>HOR</td>
<td>30.5</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Source: WCED, 2004

The report concluded:

The schools continue to exhibit performance profiles that would have been expected during the apartheid era, their learners profiles are significantly different to raise questions about causes, issues and factors involved in the learner achievement in the province.

By disaggregating achievement by former department and by poverty quintile, the Western Cape study suggested the scale of South Africa’s primary education achievement gap. But still more importantly, the study suggested that the achievement levels of the majority of children — youngsters attending former House of Representatives and former DET schools — were extraordinarily low. Not only were few ‘making the grade’; the evidence indicated that the majority of children in Grade Six had not mastered the basics of reading and mathematics.

Many hoped that the various strategies put in place in the Western Cape would begin to close the achievement gap. But while there was important improvement in the literacy rate between 2003 and 2005 with the average pass rate improving from 35 per cent to over 42 per cent, the literacy pass rate improved by only one percentage point from 3.7 per cent to 4.7 per cent in former DET schools.

Table 1.4 Western Cape literacy pass rates for Grade Six by ex-Department, 2003 and 2005

<table>
<thead>
<tr>
<th>Ex-Dept</th>
<th>Grade Six</th>
<th>% Distribution of Learners by ex-Dept</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003</td>
<td>2005</td>
</tr>
<tr>
<td>CED</td>
<td>82,9</td>
<td>86,9</td>
</tr>
<tr>
<td>DET</td>
<td>3,7</td>
<td>4,7</td>
</tr>
<tr>
<td>HOR</td>
<td>26,6</td>
<td>35,5</td>
</tr>
<tr>
<td>Total Province</td>
<td>35,0</td>
<td>42,1</td>
</tr>
</tbody>
</table>


The 2005 report notes that the major challenge remains with the former DET schools where performance at Grade Four levels had actually fallen. On the numeracy test, between 2003 and 2005, the pass rate increased in former House of Representative schools and Cape Education Department schools, but was little changed for the former DET schools.

Table 1.5 Western Cape mathematics pass rates by grade and ex-Department, 2003 and 2005

<table>
<thead>
<tr>
<th>Ex-Dept</th>
<th>Grade Six</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003</td>
</tr>
<tr>
<td>CED</td>
<td>62,4</td>
</tr>
<tr>
<td>DET</td>
<td>0,1</td>
</tr>
<tr>
<td>HOR</td>
<td>3,8</td>
</tr>
<tr>
<td>Total Province</td>
<td>15,6</td>
</tr>
</tbody>
</table>


INTERNATIONAL INITIATIVES

Monitoring Learning Achievement

Monitoring Learning Achievement (MLA) was one of the first large cross-national studies of quality in which South Africa participated. As part of the UNESCO/UNICEF ‘Education for All’ campaign, the study was designed to track and monitor the quality of education in primary schools in participating countries. The study involved national samples of Grade Four learners in
literacy, numeracy and life skills. South Africa participated alongside a number of other African countries.

Table 1.6 Scores for numeracy, literacy and life skills, MLA 1999

<table>
<thead>
<tr>
<th>Country</th>
<th>Numeracy</th>
<th>Literacy</th>
<th>Life skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tunisia</td>
<td>60,4</td>
<td>77,9</td>
<td>74,7</td>
</tr>
<tr>
<td>Mauritius</td>
<td>58,5</td>
<td>61,0</td>
<td>58,0</td>
</tr>
<tr>
<td>Morocco</td>
<td>56,4</td>
<td>67,6</td>
<td>62,3</td>
</tr>
<tr>
<td>Botswana</td>
<td>51,0</td>
<td>48,0</td>
<td>56,0</td>
</tr>
<tr>
<td>Uganda</td>
<td>49,3</td>
<td>58,7</td>
<td>66,8</td>
</tr>
<tr>
<td>Madagascar</td>
<td>43,7</td>
<td>54,7</td>
<td>72,1</td>
</tr>
<tr>
<td>Mali</td>
<td>43,6</td>
<td>51,8</td>
<td>56,9</td>
</tr>
<tr>
<td>Malawi</td>
<td>43,0</td>
<td>35,0</td>
<td>77,0</td>
</tr>
<tr>
<td>Senegal</td>
<td>39,7</td>
<td>48,9</td>
<td>45,7</td>
</tr>
<tr>
<td>Niger</td>
<td>37,3</td>
<td>41,1</td>
<td>44,7</td>
</tr>
<tr>
<td>Zambia</td>
<td>36,0</td>
<td>43,0</td>
<td>51,0</td>
</tr>
<tr>
<td>South Africa</td>
<td>30,2</td>
<td>48,1</td>
<td>47,1</td>
</tr>
</tbody>
</table>

Source: Chinapah et al, 2000

Note: Sorted by numeracy

The Grade Four numeracy, literacy and life skills test took place in 400 schools in all nine provinces. More than 10 400 learners participated. The literacy task consisted of 30 items focusing on word recognition; understanding of detail content; writing skills; spelling; grammar; retrieving information, and providing information. The mathematics task focused on four domains: numeracy and numeration; measurement; geometry of shape, and everyday statistics. In the numeracy and numeration domain, specifically, learners were tested on knowledge and skills counting; writing numbers in words; the four operations; word problems; fractions and decimals.¹⁰

While Strauss and Berger reported the average scores for the three tasks (30,2 for numeracy, 48,1 for literacy and 47,1 for life skills), little emerged about the underlying distribution of the scores. In the literacy area they note that almost 44 per cent scored below 25 per cent. A small but not insignificant group of

learners (12 per cent) obtained scores of 75 per cent or higher. The initial report pointed to a trend that would continue in later studies: consistently higher scores in Gauteng and the Western Cape. On the literacy tasks, children performed best on items requiring word recognition.

**Trends in International Mathematics and Science Study**

The first round of results from what was originally called the Third International Mathematics and Science study were cause for considerable national anxiety.\(^{11}\) While concerns were correctly raised about the meaningfulness of cross-national comparisons and South African schools’ unfamiliarity with standardised testing, the fact that South Africa came at the bottom of the TIMSS country mean scores was taken as a sign of weakness in secondary school mathematics and science teaching rather than as a symptom of the crisis in primary education. More recently, Vijay Reddy has raised similar concerns on the most recent round of TIMSS results, but has also engaged with the wider processes associated with international assessment.\(^{12}\)

When the results of the most recent TIMSS tests were released, the media took note of what continued to be an extraordinarily poor national performance. According to the press release from the agency responsible for conducting the test, the Human Sciences Research Council, the poor performance can be accounted for by the unfortunate timing of the administration of the tests (in the midst of curriculum change). A linked curriculum concern is the lack of content specification and the low overlap with the international curriculum. But Reddy ascribes poverty, resources and infrastructure, low teacher qualifications, poor learning cultures and poor language proficiency as factors contributing to low scores.\(^{13}\)

In November 2002, the Human Sciences Research Council administered the TIMSS 2003 to 9 000 Grade Eight learners (15-year-olds). The results reflected little change from the 1999 assessment with East Asian countries scoring highest and South Africa appearing at the bottom of the list with the lowest average score in both mathematics and science. The average South African


score for mathematics was 264 (SE 5.5) compared to an international average of 467 and the science mean score was 244 (SE 6.7) compared to international average of 474. The low average score conceals the huge spread in achievement within the 9 000 learners who took the test. South Africa has the widest distribution of scores in mathematics and science of all the participating countries. Children who attended former black schools had average mathematics scores of 227 compared to the average scores of learners who attended former white schools whose mean score was 456, which is close to the international average.\(^\text{14}\)

The Grade Eight TIMSS Mathematics Test was divided into two dimensions: a contents dimension and a cognitive dimension. The contents dimension assessed the following domains: number (approximately 40 per cent of the test); algebra (15 per cent) measurement (20 per cent); geometry (15 per cent) and data (10 per cent). Mirroring the overall mathematics score, the average South African score on the number dimension was 274, with a standard deviation of 5.4 compared to Botswana, which had a national average of 384 (with a much lower standard deviation of 2.2).\(^\text{15}\)

Only when we get to the level of the individual questions do we really get a sense of how South African pupils are learning. In a question (below) that asked pupils to solve a one-step problem involving division of a whole number by a unit fraction, only 7 out of every 100 South African Grade Eight learners got full credit compared to 78 in Singapore, 50 in England, and 11 in Botswana.

Figure 1.1

A scoop holds \(\frac{1}{5}\) kg of flour. How many scoops of flour are needed to fill a bag with 6 kg of flour?

\[
\begin{align*}
\text{Answer:} & \quad 6 \div \frac{1}{5} \\
& \quad 6 \times 5 \\
& \quad 30 \text{ scoops}
\end{align*}
\]

Source: Reddy, 2006


The diagram above shows a community consisting of mice, snakes and wheat plants. What would happen to this community if people killed the snakes?

*Because there are no snakes, we would get more mice. This would cause less wheat plants.*

*Source: Reddy, 2006*

A similar response trend is evident in the life science domain of the science assessment. On the question that required reading skills and a basic understanding of ecology, 57 of 100 learners in England got full credit, but only 6 out of every 100 South Africans got it right.$^{16}$

**SACMEQ II**

In 1991 the International Institute for Educational Planning (IIEP), working with Ministries of Education in Southern and East Africa, established an integrated research and training project designed to provide training in technical skills for monitoring and evaluating the quality of basic education. The project was referred to as the Southern and East Africa Consortium for Monitoring Educational Quality (SACMEQ). It currently has 15 membership Ministries of Education: Botswana, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania (Mainland), Tanzania (Zanzibar), Uganda, Zambia and Zimbabwe.

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$^{16}$ On this question, the international average was 33 per cent and Botswana’s average was 7 per cent.
The first two educational policy research projects undertaken by SACMEQ — commonly referred to as the ‘SACMEQ I Project’ (covering 1 000 schools, 20 000 learners and 7 countries) and the ‘SACMEQ II Project’ (covering 2 300 schools, 42 000 learners and 14 countries) — were designed to provide assessments of the conditions of schooling and the quality of education provided by primary education systems. The data archive for SACMEQ II has more than 1 000 variables, including comprehensive information on family and community context; school infrastructure; classroom resources; and teachers and teaching.

Two assessment tasks are at the core of the SACMEQ studies. These cover the learning areas of reading and mathematics, which are administered to a representative sample of Grade Six learners in each country. The entire data set, with background variables and detailed breakdown on learners’ response to each test item, is available to the research community.\(^{17}\) In addition to presenting comparative achievement results, the SACMEQ team adopted an approach that linked performance on the test to levels of academic mastery.\(^{18}\)

Most other quantitative studies report national or provincial means, the meaning of which is often limited. The SACMEQ approach provides a very clear picture of achievement by linking scores to levels of academic mastery. The SACMEQ data also provide useful insights into the patterns, profiles and prevalence of particular levels of academic mastery.

There are a number of valid criticisms of the tests, as well as of testing in general, and the results and epistemological and political assumption around the testing. Even if we use cross-country comparison with caution, which I believe is necessary, we need to be mindful of possible problems. These include the fact that many of the most disadvantaged learners would be unfamiliar with the test-taking processes, and the standard error would be larger than ideal. This would mean that valid inferences to the total population of Grade Six learners would be problematic since each study provides a piece of the picture puzzle, which together begins to reveal the scope and severity of the crisis in primary education.

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\(^{18}\) Byamugisha, A (2003) Reading Literacy and Mathematics Literacy Assessments — SACMEQ Approach to the Test Construction and Competency Level Analysis Lyon: International Scientific Colloquium on Assessment of Low Levels of Literacy. For example, in order to move from Level 2 (Emergent reading level) to Level 3 (Basic reading level) in reading, learners are required to be able to not only read forward but also to read backward, and interpret the meaning of a short text instead of merely a phrase, using a cueing system.
Table 1.7 Distribution of South African scores in reading in the SACMEQ II study

<table>
<thead>
<tr>
<th>Levels</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Pre-reading</td>
<td>385</td>
<td>12.2</td>
</tr>
<tr>
<td>2 Emergent reading</td>
<td>596</td>
<td>18.1</td>
</tr>
<tr>
<td>3 Basic reading</td>
<td>604</td>
<td>19.1</td>
</tr>
<tr>
<td>4 Reading for meaning</td>
<td>506</td>
<td>16.0</td>
</tr>
<tr>
<td>5 Interpretive reading</td>
<td>298</td>
<td>9.4</td>
</tr>
<tr>
<td>6 Inferential reading</td>
<td>223</td>
<td>7.0</td>
</tr>
<tr>
<td>7 Analytic reading</td>
<td>344</td>
<td>10.9</td>
</tr>
<tr>
<td>8 Critical reading</td>
<td>208</td>
<td>6.6</td>
</tr>
<tr>
<td>Total</td>
<td>3163</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Mobi & Strauss, 2005

What does this table tell us? Of 3 163 randomly selected children in Grade Six classes in South Africa, just over half were not ‘reading for meaning’. Half the children in the sample were unable to demonstrate the ability to read and make meaning of a simple reading comprehension task. To illustrate what this means, I have included an exemplar item that is designed to test reading for meaning (level 4). Children are asked to read a short text and answer multiple-choice questions.

**Grandpa**

Once upon a time, there was an old man. His eyes had become weak. His ears were deaf, and his knees would shake. When he sat at the table, he was hardly able to hold a spoon. He spilled soup on the tablecloth, and he often slobbered.

He lived with his son and daughter-in-law. They also had a small boy who was four years old, so the old man was a grandfather.

His son and his sons wife found it disgusting to see him spilling food on the table. And so they finally ordered him to sit in a corner behind the stove. Here, they served him his food on a small earthenware plate. Now, Grandpa didn’t even get enough to satisfy his hunger. He sat there feeling sad. He looked at the table, where the others were eating, and his eyes filled with tears.

Then, one day his shaking hands could not even hold the plate. It fell to the floor, and was broken into many pieces. The young wife scolded him. But the old grandfather said nothing. He just sighed. Then the young wife bought him a very cheap wooden bowl. Now he had to eat from that.

One day, while they were having dinner, the grandchild sat on the floor, and was very busy with some small pieces of wood.
What are you doing? asked the father.
I am making a bowl, the boy answered.
What is it for?
It is for my father and mother to eat from when I grow up.
Then the man and wife looked at each other for a long time. Then, they started to cry. At once, they asked the old grandpa back to the table, and from then on he always ate with them. After that if he sometimes spill his food, they never said a word about it.

54. How did the grandfather feel when he sat by the stove?
A. □ Bored.
B. □ Tired.
C. □ Pleased.
D. □ Unhappy. (*)

Source: SACMEQ II Documentation: Part A: The Fourteen Main Phases of the SACMEQ II Project, Appendix H

This item requires children to be able to read through it and come to a judgment about the main or principal idea in the text. They must be able to read forward and backward. The reader cannot merely search for the correct word in the passage but must demonstrate an understanding of the core idea. The SACMEQ II reading scores suggest that half of all South African Grade Six learners are unable to do this.

Following on the trend in almost all other studies of achievement, the mathematics scores are consistently lower than those for reading or literacy.

Table 1.8 SACMEQ II mathematics cumulative percentage score, South Africa

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-numeracy</td>
<td>245</td>
<td>7,7</td>
</tr>
<tr>
<td>Emergent numeracy</td>
<td>1 385</td>
<td>43,8</td>
</tr>
<tr>
<td>Basic numeracy</td>
<td>742</td>
<td>23,4</td>
</tr>
<tr>
<td>Beginning numeracy</td>
<td>273</td>
<td>8,8</td>
</tr>
<tr>
<td>Competent numeracy</td>
<td>189</td>
<td>6,1</td>
</tr>
<tr>
<td>Mathematical skilled</td>
<td>180</td>
<td>5,8</td>
</tr>
<tr>
<td>Problem-solving</td>
<td>65</td>
<td>2,1</td>
</tr>
<tr>
<td>Abstract problem-solving</td>
<td>40</td>
<td>1,3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3 119</strong></td>
<td><strong>100,0</strong></td>
</tr>
</tbody>
</table>

Source: Mokoi & Strauss, 2005
Of the 3 119 randomly selected South African Grade Six learners tested on the mathematical level, more than half had not even reached the basic numeracy level. More than half of the children had only the level of mastery of a two-step addition or subtraction operation involving carrying, check (through very basic estimation).

4. Subtraction

\[
\begin{align*}
6000 \\
- 2369 \\
\end{align*}
\]

A. 3 531
B. 3 631 (*)
C. 3 742
D. 4 369

Source: SACMEQ II Documentation: Part A: The Fourteen Main Phases of the SACMEQ II Project, Appendix 1

This task required schoolchildren to perform a subtraction operation with carrying. For more than half of the Grade Six children tested, this type of question defined the outer limits of their mathematical knowledge and skills.

Moloi and Strauss have taken the analysis of what South African primary schoolchildren have achieved one step further by asking the question, 'What is the prevalence of children who have achieved minimum and desired levels of mastery in reading and mathematics?' In order to answer this question they convened a committee of South African educational experts who drew up a list of 'essential' test items, and indicated how many of these a learner should be expected to answer correctly in order (a) barely to survive during the next year of schooling and (b) to be guaranteed success during the next year of schooling. Those who could only answer the first set of questions were said to have reached the 'minimum level of mastery' and those who answered the second set of questions correctly were at the 'desirable level of mastery'.

19 For more details see Moloi & Strauss 170-1.
Table 1.9 Percentages and sampling errors of learners reaching minimum and desirable reading levels of mastery

<table>
<thead>
<tr>
<th></th>
<th>Learners reaching minimum level of mastery</th>
<th>Learners reaching desirable level of mastery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>SE</td>
</tr>
<tr>
<td>Eastern Cape</td>
<td>18.5</td>
<td>5.88</td>
</tr>
<tr>
<td>Free State</td>
<td>16.3</td>
<td>6.76</td>
</tr>
<tr>
<td>Gauteng</td>
<td>65.9</td>
<td>11.83</td>
</tr>
<tr>
<td>KwaZulu-Natal</td>
<td>43.9</td>
<td>8.34</td>
</tr>
<tr>
<td>Mpumalanga</td>
<td>12.9</td>
<td>7.06</td>
</tr>
<tr>
<td>Northern Cape</td>
<td>30.3</td>
<td>5.90</td>
</tr>
<tr>
<td>Limpopo</td>
<td>15.5</td>
<td>5.54</td>
</tr>
<tr>
<td>North West</td>
<td>10.4</td>
<td>3.19</td>
</tr>
<tr>
<td>Western Cape</td>
<td>84.2</td>
<td>4.44</td>
</tr>
<tr>
<td>South Africa</td>
<td>35.1</td>
<td>3.18</td>
</tr>
</tbody>
</table>

Source: Moloi and Strauss, 2005

If we assume that the sample was representative of the country as a whole, and that the test was a good gauge of children’s reading and mathematics achievement levels — given the standard error — they found that 40 per cent of children were reading at the minimum level of mastery and just over 20 per cent were reading at the desired level of mastery. From this, Moloi and Strauss draw the following conclusion:

... more than half of the children in South Africa’s primary schools are not even reading at a minimal level to allow them to survive. While the national situation is bad, [in] some provinces the picture gets bleaker. In the North West, only 10 per cent of learners read at the minimal level.

As Moloi and Strauss point out, when we begin to disaggregate the picture, the achievement deficit is even more acute for certain provinces and groups of children.

The figure below is a recalculation from Martin Gustafsson’s recent analysis of the SACMEQ II data, which graphically illustrates the dispersion of achievement. The figure shows a distinct bimodal distribution, with the vast majority of children clustered around raw reading scores of 29 out of 80, and a second,
much smaller, group around the 65 mark. The graph shows all learners, not differentiated by the type of the school.

Figure 1.3 Frequency distribution of reading in South Africa, SACMEQ II

Source: Recalculated from original, but formulation from Gustafsson, 2005

Underlying this distinct statistical pattern, Gustafsson envisages two schooling systems:

... [W]e are dealing with two schooling systems within one: a historically disadvantaged (HD) one and a historically advantaged (HA) one. Of note is the size of the HA segment... the HA segment comprises some 20 per cent of the whole in terms of weighted learners. Given that white learners make up some 6 per cent of Grade Six learners in 2000 (Annual Survey of Schools), the remaining 14 per cent would be learners from groups which had been discriminated against under apartheid. StatsSA data indicates that some two-thirds of this 14 per cent would be African learners, while one-third would be either coloured or Indian learners... The great majority of learners in the HD segment would be African.20

Taking Gustafsson's hypothesis one step further, by analysing the average school performance and differentiating schools on the basis of the socio-economic status of parents, a distinct pattern reappears. One sees in figure 1.4 that a small number of schools have a consistently high average on raw reading scores, and — with few exceptions — for the vast majority of schools the average raw reading scores are low.

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Figure 1.4 Distribution of average reading scores for wealthiest 20 per cent of schools

![Graph showing distribution of average reading scores.]

Source: Author's own calculations from the SACMEQ II dataset

Figure 1.5 Distribution of average reading score for poorest 80 per cent of schools

![Graph showing distribution of average reading scores.]

Source: Author's own calculations from the SACMEQ II dataset

What does this mean for specific schools? We take, for example, a school with the lowest socio-economic profile in the study, a school in the Vryberg district of the North West. Of the 20 Grade Six learners who were assessed, four were reading at a pre-reading level, ten were reading at an emergent reading level,
and seven children were reading at a basic level. At this particular school, none of the children who were assessed had begun ‘reading for meaning’. The situation in mathematics was even more serious as half of the learners tested were at the pre-numeracy level, the others achieving only one level up at the emergent stage. In contrast, in a school attended by the most affluent children in the provincial capital of Limpopo, the Grade Six learners all demonstrated that they could read and do mathematics extremely well. Thirteen of 18 children tested were reading at the highest levels possible, and 11 were at the highest mathematics level, i.e. abstract problem-solving.

**Progress in International Reading Literacy Study (PIRLS)**

While the study findings had yet to be published at the time this book went to press, the preliminary results from the Progress in International Reading Literacy Study (PIRLS) adds an important new facet to the picture of the bimodal distribution of achievement.21

As part of the large-scale study of reading in South African primary schools, the Progress in International Reading Literacy Study tested over 30 000 learners in Grades Four and Five. Sarah Howie and colleagues at the University of Pretoria found that on average the Grade Fours scored 13,2 per cent and the Grade Five learners only marginally better at 18,2 per cent.22 But unlike almost all previous cross-national studies, the 2006 PIRLS study offered learners the option of taking the test in any of the 11 official languages. When the raw scores were disaggregated by language, the results suggest that for schoolchildren for whom the language of instruction is not the same as their mother tongue, their reading levels differ very little whether they wrote the test in their mother tongue (mean 13,9 per cent at Grade Four and 18,7 at Grade Five) or in the (additional) language of instruction (12,0 per cent at Grade Four and 17,2 at Grade Five).

**SCHOOL IMPROVEMENT PROJECT EVALUATIONS**

**Eric Schollar**

After two decades of working as a project evaluator, Eric Schollar has become increasingly concerned about the levels of achievement he found in primary

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22 These are raw mean scores and as such should be interpreted with extreme caution. At the time of publication of this book the data was still to be scaled and weighted.
schools in peri-urban and rural areas. Using a small grant from the Shuttleworth Foundation, Schollar undertook a secondary analysis of the data he had gathered from three long-term evaluations of intervention projects at primary school level. While some university-based academics are sceptical of statistical inferences and have raised questions about the reliability of his instruments, Schollar’s data remains compelling.

As part of the project evaluations, Schollar administered standardised literacy and numeracy tests to Grade Five and Grade Seven children in the three intervention projects and parallel control schools. The evaluations tracked the schools’ progress from one year to the next. Over the years, Schollar collected data from 4 256 learners. Along with the answers to the test items, Schollar and his team also collected the learners’ rough workings.

Of the three projects he evaluated, two appeared to show little success in achieving an improvement in reading and mathematics. While these results must have been disappointing to the project planners and their backers, the really significant aspect of Schollar’s findings was not actually related to the projects per se, but rather provided insights into the validity of the achievement results, results that had consistently shown very low levels of mathematics achievement in the schools.

Schollar found that in simple arithmetical operations most children got the addition items correct, but were less confident with multiplication and division, particularly at Grade Five level.

<table>
<thead>
<tr>
<th></th>
<th>Addition</th>
<th>Subtraction</th>
<th>Multiplication</th>
<th>Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Five</td>
<td>84,5</td>
<td>61,2</td>
<td>50,3</td>
<td>40,8</td>
</tr>
<tr>
<td>Grade Seven</td>
<td>74,7</td>
<td>92,6</td>
<td>75,0</td>
<td>59,4</td>
</tr>
</tbody>
</table>

*Source: Schollar, 2004*

On higher-order mathematical skills, such as computation of length and word sums, the children in Schollar’s evaluations performed very poorly. Only 5,6 per cent of Grade Five learners got the correct answer for the items requiring understanding of conversions. On word sums, only 12 per cent of Grade Fives and 31 per cent of Grade Sevens got the items correct.

While the performance of these children on the higher-order mathematics skills is of great concern, it was Schollar’s analysis of the learners’ rough

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workings on basic operations that disturbed him most. The rough paper analysis showed a very definite pattern. On the simple arithmetic operations (i.e. addition, subtraction, multiplication and division), the children’s workings graphically showed that many were not in fact using abstract methods such as carrying, but rather using concrete procedures such as unit counting.

*Figure 1.6*

*Source: Schollar, 2004*

This, according to Schollar, is common for the Grade Five learner. Thirty-eight per cent of Grade Five scripts showed evidence of unit counting. In this manner, the mathematics problem is solved by reducing the number to simple unit markings and counting up. This is comparable to counting on fingers for numbers larger than 10.
Above is an example of how a Grade Seven learner responded to the problem of multiplying 17 by 6. The learner attempted to solve it by reducing it to a problem of repeated addition. Both attempts yielded the incorrect answer.

**Quality Learning Project**

As part of the trend towards large-scale school development projects in the first years of the new millennium, the Quality Learning Project (QLP) — a multi-level, integrated secondary school improvement project designed to improve performance in mathematics and languages — commissioned a baseline study to collect data on learner achievement in Grades Nine and Eleven. The baseline study collected data on school and classroom characteristics and children’s family circumstances. The survey sample included 102 secondary schools in 17 districts, with 8 453 learners in the two grades. Participating schools were located throughout the country — in districts of Lusikisiki and Flagstaff in the Eastern Cape, Libode and Bethlehem in the Free State, Soweto and Vanderbiltpark in Gauteng, Inanda, Ixopo in KwaZulu-Natal, Moretele and Mafikeng in the North West, Zeerust and De Aar in the Northern Cape, Bolobedu and Konekwena, and Zebeiala in Limpopo and Kuik River in the Western Cape. Ninety per cent of the learners surveyed were black and seven per cent identified themselves as coloured. On average, the children in the Grade Nine classes in the study were 17 years of age. As the intervention projects were designed for disadvantaged schools, it was not surprising that the overwhelming majority of learners’ parents education ended at secondary level, although 80 per cent of learners reported that they had access to calculators, dictionaries, radios and television sets.
While the Grade Nine test results undoubtedly measure aspects of secondary education, they simultaneously provide an opportunity to assess continuity and discontinuity with primary education achievement. A cursory analysis reveals a not surprising consistency in the patterns of achievement. On the language test, the average score for the Grade Nines was 41.9 per cent. Eight of the 17 districts reported average language scores of below 30 per cent. The test results showed that Grade Nines were better at reading and comprehension than writing, particularly creative writing. Apart from schools in Gauteng (and Afrikaans learners), the district averages for creative writing were all below 20 per cent, suggesting a very low level of competence. Within the reading and comprehension domain, these young people were given questions that required them to identify literal meaning correctly far more frequently than questions that demanded that they make inferences or interpret the text.

The mathematics test results further confirmed the continuing pattern of under-achievement in disadvantaged schools. Eighty per cent of Grade Nines who were tested got less than 15 per cent of the questions correct. In fact, only a small number of learners scored above 50 per cent. Anil Kanjee and colleagues noted that, while the overall levels of learning in mathematics in the QLP schools were extremely low, these youngsters were particularly weak in domains that required them to reproduce knowledge, answer theorems, and define certain concepts. They suggest that this may be because they had not been taught the theorems or that they did not understand the underlying basic theoretical principles which would allow them to handle mathematical algorithms and procedures.25

In a secondary analysis of the QLP data, Charles Simkins and Andrew Paterson observed that, 'The philosophy of the test was to make it appropriate to the grade, but pupils in QLP are so far behind that there was clustering at very low marks'.26 As an aside, Nick Taylor reported that there was no significant improvement in learners' achievement results on these tests which could be attributed to the intervention, with the exception of improvements on the Grade Eleven writing task.27

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**District Development Support Programme**

Preceding QLP by a few years, the District Development Support Programme (DDSP) used a comparable method in its approach to improving primary education. As part of the wider intervention, the DDSP undertook what was referred to as the National Assessment Systems Modeling Initiative, which was essentially a baseline study in which numeracy and literacy tests were administrated to 14 700 Grade Three learners in 453 project schools. What became known as the JET Mahlahle literacy and numeracy tests were translated into Afrikaans, SeSotho, isiZulu, isiXhosa, Tshivenda and Setswana.

While the tests were not designed to measure learner achievement levels, but rather to evaluate change over time and to provide ‘lessons-learned’, the baseline achievement result is a missing puzzle piece in the incomplete picture of primary education in South Africa.

The literacy test made use of a multiple-choice format for all questions assessing word recognition, sentence comprehension and comprehension of short passages. The numeracy test used an open-ended question format and focused on counting and ordering, addition, subtraction and multiplication. Parts of the literacy test were borrowed from the International Association for Education Achievement (IEA) survey which had been successfully conducted in 27 countries in the early 1990s.

In assessing the results of the study, Penny Vinjevold and Luis Crouch began with two telling observations related to the administration of the tests themselves. First, the children needed extended time to complete the front page of the test, which simply required them to write their own name and that of their school, and many seemed to have little idea of how to spell their school’s name. Second, the ‘learners also appeared to have little experience of test writing, as they did not turn the pages of the 20-page test and had to be continually reminded to do so by the test administrators’.

While the Grade Threes appeared to do better on literacy than numeracy, the test showed a very low level of proficiency in reading comprehension. The children were expected to read and answer questions on four short passages from the IEA test, which had been translated into their home languages. While the international average for the first passage was 78 per cent, the mean score for DDSP learners was 26 per cent.

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On the numeracy test, the Grade Threes had the greatest difficulty with the 30 questions which required them to demonstrate mastery of number concepts and ordering.

*Figure 1.8*

Write down the number to which the arrow is pointing.

![Number sequence with arrow pointing to 1360](image)

*Source: Vinjevold & Crouch, 2001*

But the learners were not proficient even on simple addition operations. While the overwhelming majority of children could correctly add two single-digit numbers (eg 7 + 5), they could not do problems that required addition of two double digit numbers with carrying (eg 55 + 67). This may suggest that ‘many learners use their fingers or ‘sticks’ on the page to solve addition problems’, an observation made by Eric Schollar. If these learners had limited proficiency with addition, their problems were compounded with other operations such as multiplication and division. More than half, for example, used continuous addition to solve multiplication problems.

Vinjevold and Crouch conclude that the children on the DDSP project were making predominant use of ‘concrete’, context-specific approaches that may be appropriate at the early stages of numeracy but become an impediment to more complex arithmetic problems. In their view, few Grade Threes had made the transition to using abstract methods which depend on a solid understanding of the structure of the base-10 number system. On literacy achievement, the test reveals that while most learners had begun to learn to read, many appeared unable to attach meaning to the sounds of written words.

*Family Literacy Project*

Located in a remote rural district in KwaZulu-Natal, the Family Literacy Project (FLP) was designed to assess the efficacy of a family literacy model. The aim of the model was to improve the attainment of four assessment standards as specified in the Revised National Curriculum Standard. In terms of this standard, Grade One learners are expected to:

+ use visual cues to make meaning (eg use pictures to interpret meaning);
+ role-play reading (eg hold book the right way);
+ make meaning using written texts (e.g., retell the main ideas in a story that is read to them), and
+ recognise letters and words (e.g., read simple materials).

To assess the effectiveness of the training of teachers in the family literacy project approach and the impact of the regular follow-up visits, the researchers conduct pre- and post-literacy tests in both intervention and control schools. The children in the project classrooms made substantially higher progress than the children in control classrooms. The project models appeared to improve book behaviour, story retelling, isiZulu word recognition, and isiZulu story comprehension. Of the children in the control classrooms who received regular teaching, Pretorius and Machet observed little evidence of progress in the acquisition of pre-literacy and emergent literacy skills. For example, they found that relatively few children could recognise simple high-frequency written isiZulu words such as vuka, sana, ikati and ikhaya\(^\text{29}\) by the end of Grade One.

**Early reading workshop**

When the education officials from the Benoni/Brakpan district in the Gauteng Department of Education visited schools after the initial Curriculum 2005 orientation in 1997, they noticed that many Grade One learners were having difficulty learning to read. This observation was the catalyst for a major district education improvement project on emergent reading. As a key component of the initiative, the district office commissioned a baseline assessment of reading attainment.

The Human Sciences Research Council, who were contracted to undertake the study, selected a representative sample of 20 primary schools, all of whom used English as a medium of instruction. Eleven of the sample schools were located in Daveyton, Tsakane and Wattville; the remainder were located in the suburbs of Benoni and Brakpan, in Actonville and Gelenkkel. The reading assessment instrument used in the study was jointly developed by the HSRC and staff in the district office. It was designed to assess oral language development, pre-literacy skills, phonological awareness, and reading comprehension. The oral component of the test was read aloud by the test administrators and learners responded in their test booklets. In the reading component, the Grade Three learners were expected to complete items that measured their phonological awareness, picture story sequencing, semantic knowledge and comprehension.

In discussion with the district office, in the post-collection period the HSRC identified minimum and desired mastery levels based on percentages answered correctly on the sub-tests. Minimum mastery level was set at 50 per cent. The results showed that most learners were familiar with the oral items, with 94 per cent of all children tested reaching the minimum level. On the reading component, however, the picture was very different. Only 38.2 per cent of Grade Three learners who were tested had reached a minimum mastery level.

When the reading sub-test results were disaggregated by the former department, the achievement gap in the bimodal distribution of achievement was evident. In the former DET schools, only 17.4 per cent of learners had reached a minimum level of mastery overall, and none had reached the desired level. Matthews Makgamatha noted that very few learners in ex-DET schools demonstrated mastery of phonological skills, decoding ability, and reading comprehension.\textsuperscript{30} In the former white schools, almost all first language English speakers reached the minimum level and 44.4 per cent reached the desired level. Eighty-three per cent of second language English speakers, most of whom were black learners, achieved the minimum level of mastery and 9 per cent were at the desired level.

CONCLUSION

The evidence points to inextricable conclusions. While the studies use different ‘standards’ or yardsticks to measure achievement, some deliberately avoiding judgements of ‘pass rates’ altogether, they all directly or indirectly point to the predicament of primary education achievement. This is the predicament of extremely low average primary education achievement levels. The descriptive statistics that summarise the central tendency, as shocking as they appear, obscure the underlying pattern of unequal achievement. While a small minority of primary schoolchildren attending privileged schools are achieving at curriculum benchmarked ‘grade level’, which is comparable to countries such as Germany and the United States, the vast majority of children attending disadvantaged schools do not acquire a basic level of mastery in reading, writing and mathematics. It is these South African children who struggle to read for meaning and to perform simple numerical operations — whose learning remains context-bound and non-generalisable. South Africa’s primary education achievement gap, with its distinct bimodal distribution, begins in the Foundation Phase, at the very earliest days of formal schooling, and continues unbroken to the end of primary education and beyond. The remaining chapters of this book take on the task of explaining why.

CHAPTER 2

Health and under-achievement

The appalling ravages of the two chief Bushveld diseases, malaria and bilharziasis, shocked me when I became aware of their incidence and gravity. . . . I recognized that no particular person or party was to blame from a state of affairs. . . . to detect malnutrition so glaringly apparent, feeble-mindedness so obvious, and physical deterioration so evident!
I try hard in my humble way to teach my children something, Doctor. But it is hard. You find them all miserably underfed. They are unable to concentrate; always listless and tired. It is heartbreaking work to have to teach them, and some of them are so eager.1

Louis Leipoldt, poet and writer and the first medical inspector of schools in the new Union, travelled thousands of kilometres between 1914 and 1924 visiting ‘native’ and white, urban and rural schools throughout South Africa. From observing and examining thousands of schoolchildren, he concluded that the ‘disappointingly low averages’ he found in poor communities were largely the consequence of the poor health brought on by malaria, malnutrition, diarrhoea and bilharziasis.

The link that Leipoldt observed 80 years ago between poor health and under-achievement is the theme of this chapter. It is not sufficient, however, to point to the causal connection between poor health problems and learning failure. In South Africa in particular, poor health in children is a marker of poverty. In other words poverty impacts on learning through chronic and acute ill-health — prior to schooling as manifest in neurological damage during pregnancy and in early childhood, during the normal cycle of the school year, in both life-threatening diseases and common health problems that go untreated. Given the sheer magnitude of the problem — an average of six out of ten children in South Africa live in poverty (with the highest rates in Limpopo at 72 per cent living on less than R800 per month)2 — it follows that the poverty–health complex is a critical determinant of learning under-achievement.

The evidence examined in this chapter has been published in international peer-reviewed journals and to a lesser extent official government publications.

1 Leipoldt, C (1937) Bushveld Doctor London: Jonathan Cape Ltd.
To provide a textured ‘feel’ of the impact of the specific health problems on children’s learning, vignettes from sources such as the Human Rights Watch and the Nelson Mandela Children’s Fund have been included. The peer-reviewed studies range from secondary analyses of national representative surveys such as the South African Food Consumption Survey and the National HIV Prevalence and Risk Survey of South African Children to small-scale randomised experiments that report on evaluations of a particular medical intervention. Individual studies have been undertaken in various locations throughout South Africa, although a disproportionate number report on research conducted in KwaZulu-Natal. Detailed attention has been devoted to specific health problems such as malnutrition, parasite infection, hearing loss, asthma, fetal alcohol syndrome, HIV/AIDS and malaria. Other health-related problems such as mental health maladies, violence and related physical trauma, respiratory infections and diarrhoea are clearly important and studies that deal with them have been cited. The choice of health problems analysed in this chapter has been guided by the opinion of experts in field of child health.³ Most of the research is of a high standard, although a number of studies do contain flaws that limit their usefulness.⁴

MALNUTRITION

In South Africa, the main nutritional problems facing schoolchildren include stunting, micronutrient deficiencies and short-term hunger. Along with the problem of inadequate calorie intake and the absence of key micronutrients, South Africa — which is in the middle of a nutrition transition — is also beginning to confront the added problem of obesity in children.⁵

Stunting

While South African studies have found low rates of wasting (the early stages of starvation), the high prevalence of stunting (weight : height ratio) is associated with a lack of protein energy in the diet. This particular form of

⁵ Important research on nutrition and children is currently underway as part of the Birth-to-Twenty Project. See, for example, Richter, L, Norris, S & De Wet, T (2004) ‘Transition from Birth to Ten to Birth to Twenty: The South African cohort reaches 13 years of age’ Paediatric and Perinatal Epidemiology 18(4) 290–301.
malnutrition may partly explain the relationship between poverty and poor performance. International research has consistently shown that severe stunting in the first two years of life is strongly associated with low test scores in school-aged children (ages 8–11).\textsuperscript{6}

One of the most comprehensive studies of childhood malnutrition in South Africa, undertaken in 1993, found that 24.5 per cent of children under five were stunted. This figure has been confirmed by other studies.\textsuperscript{7} But like the average achievement level, the aggregate statistic masks the real underlying health inequality. The study found that the poorest 10 per cent of households have rates of stunting eight times as high as the richest 10 per cent.

Figure 2.1 Child malnutrition by per capita expenditure decile

![Graph showing rates of stunting, underweight, and wasting by per capita expenditure decile.](image)

Source: Zere, 2003

More than four in every 10 young children in the poorest decile were stunted, compared to one in 20 in the richest decile. As one moves up the income ladder (one being poorest, 10 being richest), a remarkable drop in the rate of stunting is observed. The problem of stunting is not merely a problem associated with very young children. The 1999 South African National Food Consumption Survey, which targeted children aged 1–9 years of age, reported that 12 per cent of children aged 7–9 years were stunted, and 30–50 per cent had


insufficient food intake for their energy requirements. The rates of stunting were worst in the Northern Cape and the Free State with levels of 31 per cent and 30 per cent respectively.\(^8\) Other published studies, however, place the stunting rate at a more modest rate of 7.3 per cent for a cohort of schoolchildren between 8 and 10 years of age randomly selected from 11 primary schools in the rural district of southern KwaZulu-Natal.\(^9\)

Some insight into the dietary habits of South African schoolchildren has recently been published. In a study of children aged 10 and 11 years living in a poor community north-west of Durban it was found that children generally consume a very limited number of food items: bread, rice, phutu, dried beans and Niknaks. Despite the presence of food gardens, fruit and vegetable consumption is low, resulting in a poor intake of key micronutrients. Children seldom eat protein such as meat, fish, chicken and diary products and have only limited access to eggs.\(^10\)

And what of the educational consequences of stunting? The researchers note that while the school nutrition programme may have some ‘palliative’ effects, they suggest that the scale and severity of early childhood malnutrition is ‘likely to result in irreversible damage to children’s intellectual development’.\(^11\) A Limpopo study involving 1 033 schoolchildren aged 7–14 randomly sampled from 11 primary schools and one secondary school found a statistically positive relationship between stunting and poor mathematics performance.\(^12\) Other studies have shown the link between food intake and school performance, specifically showing how under-nutrition is associated with poor cognitive function, late enrolment and frequent illness.\(^13\) In other words, one in every eight children in the Foundation Phase is likely to be stunted, with a much higher prevalence in poorer communities. This phenomenon has been shown to be associated with delayed cognitive development and ultimately school achievement.

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\(^12\) Themane, M, Moneke, K, Nthangeni, M, Kemper, H & Twisk, J (2003) ‘The relationship between health (malnutrition) and educational achievement (Maths and English) in the rural children of South Africa’ International Journal of Educational Development (23) 637–43.

\(^13\) Kloka, op cit 15.
Micronutrient deficiencies

Along with long-term physiological effects of low protein energy diets, insufficient micronutrients in the diet is estimated to affect half of all South African schoolchildren and is likely to have an equally dramatic impact on learning.\textsuperscript{14} While it is well known that food insufficiency is a serious problem affecting children’s ability to learn, evidence has shown that a deficiency in micronutrients such as iron deficiency can result in slower child development in the domains of language learning and motor skills.\textsuperscript{15} The problem is that iron deficiency develops slowly in children and seldom produces acute symptoms, though as the problem becomes worse, children do become pale and weak, eat less and tire easily. These children are more susceptible to respiratory illnesses and intestinal infections.

Much of our understanding of the impact of micronutrient deficiencies on learning achievement has come from randomised controlled trials in which children were provided with fortified biscuits as part of the school feeding scheme. The studies have shown that providing children with a fortified biscuit and special juice which supplements their iron, vitamin A and iodine intake improves children’s short-term memory, reduces the number of days children miss school as a result of fewer respiratory and diarrhoea-related illnesses.\textsuperscript{16} In a follow-up evaluation of the effectiveness of using fortified biscuits, the group of researchers found that the effects of the additional micronutrients were not carried over the summer holidays. In other words, children’s previous micronutrient deficits would re-emerge after their being away from the school for the six-week December/January holidays.\textsuperscript{17}


A problem with this research is that it is difficult to show that iron deficiencies or other micronutrient deficiencies are solely responsible for delays in child development. As with similar poverty-related factors, iron deficiency is associated with low birth weight, malnutrition, poor education of mothers and a lack of stimulation in the home, all of which affect child development.\(^{18}\)

**The hidden hunger**

The Nelson Mandela Children’s Fund’s study on rural education found that 14 per cent of all children they surveyed reported having either tea or nothing for breakfast, and 75 per cent reported having tea with bread or porridge. Children that are not fed are likely to have difficulty concentrating and performing complex tasks, even if they are otherwise well nourished. In the United States and Mexico, studies have shown that the effects on children that skip breakfast include poorer learning.\(^{19}\)

Teachers’ testimony from these rural schools provides powerful evidence that links poverty to under-achievement. One teacher perceptively describes the experience of her children:

> They come without food and they eat here at school… Sometimes they come inadequately dressed, without a jersey or shoes and it’s cold and it’s a learner who does not have a home. When a child is shivering, he doesn’t learn well. That’s the reason he has a difficulty. He won’t listen to you or concentrate on what you do because of hunger and cold that he’s feeling.\(^{20}\)

The irony is that while large numbers of children in South Africa are not getting enough of the right food to eat, which is directly affecting their academic achievement, the society as a whole is currently in the middle of a nutrition transition, with increasing numbers of children eating higher than required levels of fats and carbohydrates as the pace of urbanisation accelerates.\(^{21}\)

The South African research into nutrition and learning consistently shows that approximately 25 per cent of pre-school children are stunted, with the prevalence rates going down as children get older. Stunting, however, is best understood as a marker for a range of nutritional deficits, not only protein energy deficits. And while school feeding programmes and the recent national food fortification legislation will address both micronutrient deficits and the

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\(^{18}\) ibid.

\(^{19}\) Sibanda-Mulder op cit 11.


short-term hunger of schoolchildren which would in turn have positive effects on attendance and concentration, the fundamental problem of the long-term consequence of children in poverty who experience inadequate nutrition during early years has and will continue to be associated with developmental delays and other related negative consequences for primary education.\textsuperscript{22}

With regard to the school feeding programme, even though the school meal per se does not have a direct impact on nutrition, the evidence from various studies suggests that alleviating hunger in schoolchildren does contribute to improved enrolment and attendance, and ultimately school performance. There are, however, a number of problems associated with such schemes including their high cost, unsustainable benefits (children’s nutritional status declines during holidays), administrative complexities and little direct positive impact on micronutrient deficiencies.\textsuperscript{23}

**PARASITE INFECTIONS**

**Malaria**

On the African continent as a whole, malaria accounts for one in five childhood deaths. In addition to high mortality levels, the high prevalence of malaria transmission in children means that a significant portion of schoolgoers suffer from long-term damage of malaria in the form of epilepsy, neurological damage, and health problems that compromise children’s normal development and inevitably this affects achievement. The malaria symptoms typically begin with fever, vomiting and headache, and if untreated can rapidly progress into convulsions, coma and death. Repeated episodes of malaria can lead to severe anaemia, which has been consistently linked to delayed intellectual development.\textsuperscript{24} With this profile it would appear that malaria might have a significant effect on learning achievement.

After almost a century of research, it is now clear that malaria and poverty are interlinked. Poor communities, with lower levels of education and limited access to health care, are least able to take the necessary precautions against malaria and are even less able to receive treatment. At the same time, communities with a high incidence of malaria transmission are likely to get poorer. Death and disability associated with malaria reduces family resilience

\textsuperscript{22} Personal correspondence with Dr Haroon Saloojee, 11 November 2005.

\textsuperscript{23} Kloka op cit.

\textsuperscript{24} http://www.rbm.who.int/cmc_upload/0/000/015/367/RBMInfosheet_6.htm (accessed 21 November 2005).
to economic shocks. In the long term, children that get malaria will miss school more frequently and ultimately under-achieve, thus reproducing the cycle of poverty.

Does this pattern hold for South Africa? Between the 1940s and the 1980s, the number of reported malaria cases in South Africa typically did not exceed 600 per rainy season. However, the number of reported cases increased exponentially from lows of 600 in 1991/1992 to over 30,000 in the 1999/2000 season.25 Given these figures, and the impact that malaria transmission has on learning, it appears as a likely contributor to low achievement in areas prone to malaria.

On closer interrogation, however, there are reasons to doubt its wider impact. First, even at the peak of the recent ‘epidemic’, malaria was confined to three provinces, KwaZulu-Natal, Mpumalanga and Limpopo. In KwaZulu-Natal, which has about half of all cases nationally, over 90 per cent of cases are reported in two northernmost districts, Ingwavuma and Umbo.26 Second, within three years of the re-introduction of DDT household spraying, along with new antimalaria treatment, malaria cases in KwaZulu-Natal declined by more than 99 per cent.27

Other parasite infections

Given the high mortality rates associated with malaria in children in Africa as a whole, its eradication has been prioritised both by national governments and international agencies. However, other parasite infections may have a much more severe impact on schooling in South Africa. Poor children, particularly those from rural parts of some provinces, are particularly susceptible to helminthes (worm) infestations that impact negatively on their learning achievement. Bilharziasis, in particular, while seldom life-threatening in the way that malaria and HIV/AIDS are, has a profound impact on poorer communities.

Parasite infections are caused by helminthes, disease-causing organisms that live in humans and deprive their host of nourishment. Helminthes’ eggs contaminate food, water, air, faeces, pets and wild animals, and objects such as toilet seats, and enter the human body via the mouth, nose or anus, and


26 Op cit 1247–57.

usually lodge in the intestines, where they hatch, grow and multiply, sometimes infecting other body sites.

There are four main parasites that affect South African schoolchildren: *T. trichiura* (whipworm), *A. lumbricoides* (roundworm), *S. haematobium* (bilharzias) and hookworm (*N. americanus*). In a study undertaken in the late 1990s in a southern KwaZulu-Natal health district that had underdeveloped social services and low socio-economic status communities, research found very high parasite infection rates. Of the 268 Grade Three children tested, 50 per cent were found to be infected with whipworm, 29 per cent were infected with roundworm, three per cent with hookworm, and 22 per cent had bilharzias.\(^\text{28}\)

The intensity of infection varied, but the infestation was extensive.

In a study of the effects of fortified biscuits on primary schoolchildren in Ndunakazi Primary School in a mountainous area about 60 kilometres from Durban, the researchers found that 34.3 per cent of the study population were infected with one or more parasite, mostly *T. trichiura* or whipworm. Although infection with this parasite in many cases went unnoticed, ie they were asymptomatic, long-term infection and reinfection caused chronic diarrhoea, dysentery, and anaemia; and heavy infection has been linked to permanent mental and physical developmental delays.\(^\text{29}\)

In another study of bilharziasis in particular, conducted in the tropical region of Maputaland in northern KwaZulu-Natal, researchers found that 68 per cent of the Grade Three children in their study showed the presence of bilharzias eggs and 38 per cent of children had egg counts of 50, which the World Health Organisation regards as the threshold for heavy-intensity infections.\(^\text{30}\) In other words, one in every three primary schoolchildren in this particular region had severe bilharziasis. Heavy-intensity infection at this level would result in slower growth, frequent school absence, and ultimately under-achievement.

Worm parasites are not confined to tropical and subtropical areas — or even rural areas, for that matter. A recent study of helminth infections in Cape


Town found that 50.6 per cent of children tested in a low-income but well-serviced community were infected with *Trichuris* (whipworm).31

Given high prevalence rates, proven relatively cost-effective treatment, and policy that appears to support it, why has there been no nationwide rollout? Apparently this is not happening because existing South African legislation regulating the procurement of and use of anthelmintic medicines makes it unimplementable. It is not permitted to purchase unregistered anti-parasite medication from international procurement agencies.32

The brief history of an anti-parasite programme was described by the Nelson Mandela Children's Foundation as follows:

In 1998 the KZN Department of Health initiated a school-based treatment and control programme intended to benefit one-and-half million children in areas where clean water and sanitation were inadequate . . . it was sustainable as it did not place large additional demands on budgets and the drug costs were relatively low. It readily linked with other programmes such as health promotion in schools, nutrition, etc . . . An evaluation conducted in 40 schools found that treated children experienced freedom from pain and blood-loss. They were less often absent from school and less likely to repeat grades. They were more likely to perform better on scholastic tasks. In addition, after some initial misgivings, parents/caregivers expressed a willingness to become involved in the programme . . . The impact has been fairly rapid. There was a dramatic decline in parasite prevalence in the schoolchildren between 1998 and 1999, but very little improvement between 1999 and 2000. Although the programme had been launched and implemented with some enthusiasm, difficulties appeared in interdepartmental co-ordination and insufficient commitment from the 'lead' department. There was a drop-off in drugs being distributed to schools, and in the case of the parasite infections, the incidence was starting to rise to pre-treatment levels.33

**HEARING LOSS**

For generations, educators and researchers alike have recognised that moderate and even mild hearing loss, if chronic and undetected, may contribute to or amplify other difficulties, leading to poor achievement and

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academic failure, negative behaviours such as inattention, interruption of others, and inappropriate responses to oral directions. Practitioners’ experiences have been confirmed in a comprehensive review of the literature, which confirms the links between hearing impairment and under-achievement.34

Typically the underlying causes of hearing disorders included impacted wax and otitis media or middle-ear infections. While ear infection is often considered the second most common diagnosed childhood illness, with most children suffering periodic bouts particularly in the first four years of life, the evidence shows that children from disadvantaged families disproportionately suffer persistent acute otitis media (middle-ear infections), which often goes untreated, leading to hearing difficulties and speech delays. These hearing difficulties are often exacerbated by adverse conditions such as large, noisy classrooms.35

A study conducted in the early 1990s in central Durban found that pre-school African children (4–5 years of age) had hearing disorder rates of 13 per cent and Indian children a slightly higher prevalence of 14,3 per cent.36 A slightly lower incidence rate was reported in a study of 400 Grade Two children living in a high poverty rural area of the Western Cape. In this study, the researchers found that 9 per cent of schoolchildren had ‘significant’ hearing impairment.37 A few years earlier a group of doctors from the Madadeni Hospital in Newcastle screened more than 2 000 children who repeated Grade One in 25 junior primary schools in two local townships and found that 9,2 per cent of those children had hearing or ear problems.38 In studies of middle-ear infections in particular, Swart found that 6 per cent of a random sample of Grade One children in the industrial areas of Witbank/KwaGuqa had evidence of otitis media.39

One of the most rigorous epidemiological studies of ear and hearing disorders was conducted on a sample of Grade One schoolchildren in Swaziland in the

mid-1990s. The study found that 16.8 per cent of children had an ear disorder and that more than 80 per cent had normal hearing. The most common disorder was impacted wax, followed by active middle-ear infections. It is generally accepted that the Swaziland rates are likely to be similar to those found in South Africa as the socio-economic conditions in which children live are quite similar.

While audiometric measures of hearing impairment are not consistent across the studies, and there is no automatic link between hearing disorders and learning difficulties, the overall trend is unmistakable. The prevalence studies consistently show higher rates of hearing disorders that would affect learning than typically observed in developed countries and by extension middle-class children in South Africa. This fact notwithstanding, prevalence rates, even for poor children, do vary from region to region, between boys and girls, and fluctuate from season to season. As children get older, the incidence of mild and moderate hearing dysfunction appears to decline.

One of the critical issues, however, is that even with basic hearing screening, which focuses on deafness, many children with hearing difficulties associated with impacted wax and acute chronic middle-ear infections are not diagnosed. These children will in all likelihood be perceived as slow or disruptive learners as they struggle to hear, make sense, and articulate.

ASTHMA

In the United States, researchers have found a positive association between the prevalence of asthma and poverty. In a research study undertaken in the early 1990s, researchers studying the prevalence of asthma symptoms in primary schoolchildren in Cape Town concluded that the prevalence of wheezing in schoolchildren was higher than in the population as a whole, and frequently went under-diagnosed and under-treated. Another study conducted in the Garankuwa Hospital, which is situated on the border between Gauteng and North West Province serving the urban and peri-urban population, found that the number of children admitted with asthma increased by a factor of 2.5 between 1986 and 1996.

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More nuanced findings emerged in a more recent Cape Town study. Because of the unreliability reported in earlier studies, researchers administered a written and video questionnaire in three languages to a representative sample of over 5 000 13- and 14-year-olds and tracked their level of socio-economic deprivation by linking their response to home addresses. What the researchers found when they looked at the relationship between the prevalence of asthma in schoolchildren and their levels of poverty is that richer children reported higher levels of night-time wheezing, wheezing at rest, exercise wheezing and night coughs. They conclude that children with higher standards of living tend to have higher incidences of asthma. They offer a possible explanation for this. First, poor children may not be as prone because they tend to have higher exposure to certain childhood infections which subsequently may inhibit allergen sensitisation. Second, there may be underreporting of mild symptoms by poorer children. In contrast, a study undertaken in south-central Durban, one of the most heavily polluted areas of South Africa, found that 10 per cent of children reported doctor-diagnosed asthma. The study also found a strong correlation between asthma prevalence and children missing school.

The evidence regarding the impact of asthma on children’s schooling is contradictory. While a number of studies point to the growing incidence of childhood asthma amongst disadvantaged children (Garankuwa and south-central Durban), a recent Cape Town study seems to suggest that poorer children may not suffer higher levels than middle-class children. The prevalence rates are difficult to determine, but some indications are that in highly polluted areas as much as 10 per cent of children have been diagnosed by doctors. Poverty is likely to mean that children that are chronic asthma sufferers are less likely to have access to and continue to use asthma medication to relieve the symptoms. As a result, children in disadvantaged communities that have higher prevalence rates are likely to miss school.

FETAL ALCOHOL SYNDROME

Fetal alcohol syndrome is a birth defect that results from exposure of the fetus to alcohol during pregnancy. Typically, children born with fetal alcohol syndrome have small heads at birth and a number of identifiable facial

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features. In many instances, babies have abnormalities or deformities in limbs, hands and feet and may have specific heart, liver and kidney problems. The syndrome is also associated from birth with hearing and vision problems.

Children with fetal alcohol syndrome and fetal alcohol effects (prenatal alcohol exposure but no physical symptoms of fetal alcohol syndrome) often experience slow growth and difficulty with both gross and fine motor coordination. When children with fetal alcohol syndrome and fetal alcohol effects get to school, they often experience difficulty staying focused on academic tasks, have difficulty recognising and understanding patterns, and struggle to master mathematics and reading.45 Studies of the relationship between fetal alcohol syndrome and school learning have confirmed the findings of international studies. For example, a study of coloured Afrikaans-speaking Grade One children found that fetal alcohol syndrome affects higher-order cognitive motor competencies, particularly in speech performance, practical reasoning and eye and hand coordination.46

The prevalence rates in South Africa are extremely high, with an estimated 4 percent of children affected in the Western and Northern Cape and 2 per cent in Gauteng.47 The history of exploitation in the wine industry largely accounts for the high incidence in both the Western and the Northern Cape. A culture of payment in wine was outlawed in the 1960s but the practice continues in many communities. The prevalence figures have been confirmed in a recent study of six-year-olds in normal Grade One classes (4.6 per cent) in a farming community. This figure is 23 to 46 times greater than the birth prevalence in industrialised countries overall.48 While the severity of this particular health problem appears to be confined to two, possibly three provinces, the high incidence in these areas means that of a class of 25 children, teachers may anticipate at least one child with fetal alcohol syndrome with all the related cognitive and behavioural difficulties.

45 For more information see National Association for Fetal Alcohol Syndrome website (http://www.nofas.org/educator/).
HIV/AIDS

In a seminal paper published in 2000, a leading expert in Aids in education, Carol Coombe, characterised the impact of pandemic on the education system as ‘catastrophic’. Coombe noted that the pandemic will impact the system at various levels. Aids will result in declining and changing demand for schooling; it would reduce educator numbers and resultant effects on the quality of education; it would create trauma in the classroom and an increasingly embattled school leadership corps. On the first issue, she anticipated that the reduced number of parents between 20 to 40 years old and resultant increase in orphans living in deepening poverty will impact on school enrolment rates. Orphans, she argued, are likely to be living in high levels of poverty, which would result in illness, a lack of motivation and trauma. For schooling the consequences would be high levels of absenteeism due to the household demands and the need for child labour. At the same time, fewer births and more deaths of children under five will inevitably impact on enrolment rates. On the side of teachers, given the reported prevalence rate amongst teachers of 12 per cent and the slow rollout of drugs, the consequence would be that a substantial portion of the teaching force will get increasingly sick and ultimately die prematurely. The picture presented from both the side of the schoolchildren and that of the teachers suggests that the pandemic will have a traumatic impact on classrooms. Sick teachers will undoubtedly lose interest in professional development and have low morale as they wrestle with their own mortality. Other teachers will themselves be traumatised and demoralised by the presence of sick colleagues and orphaned children. School managers, already working in fragile institutions will increasingly have to cope with a range of new personnel and pastoral challenges.49

This scenario would suggest the pandemic may be having a dramatic impact on learner achievement, particularly as the disease disproportionately affects poorer South Africans. Evidence just emerging has found strong direct links between HIV infection and child development.50

In the seven years since the publication of Coombe’s seminal paper, research and practice has begun to temper this depressing portrait. While the

prevalence rate of children infected with the HI virus is clearly high and
growing, with the 2002 National Household HIV Prevalence and Risk Survey of
South African Children showing prevalence rates among children 2–18 years
to be 5.4 per cent, two developments are likely to alter the picture.\textsuperscript{51} First, even
if an increasing portion of women giving birth are likely to be HIV-positive, the
rollout of mother-to-child transmission prevention regimes is already showing
signs of decline in the percentage of children born with the HI virus. For
children that are not treated at birth, recent policy to provide treatment will go
some way towards mitigating the effects of the virus on early childhood
development and, by extension, school achievement.

The ways in which HIV/Aids affects learning achievement are complex. Even
before children are orphaned, the disease is likely to have an impact on school
learning in a number of ways. First, children in households affected by HIV/
Aids are very likely to have experienced extreme poverty. Brookes, Shisana
and Richter have shown that children living in poor households are most likely
to lose one or both parents to Aids. The pattern works both ways, ie poorer
families more likely to have parents die and parents that are dying are more
likely to increase poverty in the household. The combination of extreme
poverty and HIV infection creates the conditions of endemic chronic stress,
punitive and inconsistent parenting, and generalised emotional states of
helplessness, hopelessness, depression and anxiety. In other words, children in
HIV-affected households which would likely to be extremely poor are likely to
express high levels of emotional uncertainty. This emotional state can only be
worsened by parental death after months of uncertainty associated with
intermittent and progressive HIV illnesses. During this time, in addition to
suffering the stresses from within the home, children are increasingly being
subjected to community stigma that tend to isolate them further.

Uninfected children born to mothers with HIV manifest disturbances in their
development. Some studies have shown that these children display signifi-
cantly higher incidences of attention, social and behavioural problems. These
problematic childhood behaviors are caused by compromised parenting and
childcare practices. HIV-infected mothers are much more susceptible to
depression and loss of social support.\textsuperscript{52}

\textsuperscript{51} Brookes, H, Shisana, O & Richter, L (2004) \textit{The National Household HIV Prevalence and
Risk Survey of South African Children Pretoria: Human Sciences Research Council.}

\textsuperscript{52} Stein, A, Krebs, G, Richter, L, Tomk\text inspires, A, Rochat, T & Bennish, M (2005) 'Babies of a
pandemic' \textit{Archives of Diseases in Childhood} (90) 116–18.
While these are likely patterns, insufficient evidence has been collected to confirm them. And as Linda Richter reminds us, it does not take sufficient account of children and community resilience in the face of adversity.\(^\text{53}\)

Given the magnitude of the pandemic, with an estimated 2.3 million children under the age of 19 having lost one or both parents, representing 13.3 per cent of all South African children, we need to explore how the disease impacts on achievement directly and how it is mediated through family poverty.\(^\text{54}\) A study that has attempted to pinpoint the ways in which the pandemic impacts education achievement draws on a longitudinal study in uMkhanyakude district. Using data from the African Centre for Health and Population Studies, Case and Arlington found that schoolchildren that lose their mothers are less likely to be academically successful. Not only are orphans who have lost their mothers less likely to enrol in school; they have significantly less spent on them (R42) to pay for uniforms, school fees and transport than non-orphans even in the same household (R53). Orphaned children lag behind their contemporaries in the average number of years completed. The statistics suggest that losing a mother, in addition to the psychological damage, also means losing a champion. Other caregivers, grandmothers and relatives, often do not pay as much attention to the educational needs of orphans in their care, and do not invest as much money in schooling.\(^\text{55}\) Other studies have shown that extended families are overall willing to care for orphaned children, even if HIV-negative female orphans under six years of age and who are family members from the same cultural background have the best chance of being fostered or adopted.

A recent Human Rights Watch study points to the ways in which Aids orphans’ education is impacted negatively. Their interviewees consistently pointed to the ways in which Aids orphans were treated worse than biological children in their relatives’ homes, how they suffer emotional burdens, and experience abuse and discrimination within extended and foster families. Most profoundly affected are the children living in child-headed households.\(^\text{56}\)

On the basis of the available evidence on HIV/AIDS, the pandemic undoubtedly explains some of the achievement gap. As a factor that compounds the effects of poverty, living in a home with sick or dying parents

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can only have a negative influence on schooling. Children with Aids are likely to have physiological damage from the disease, but affected children are likely to face emotional and financial consequences that may impact on achievement. How significant a factor is this? Time sequence analysis and regional or even district disaggregation is critical. As the pandemic’s effects become more visible, studies are likely to show growing effect from the pandemic in the near future.

CONCLUSION

To what extent can health concerns explain the bimodal distribution of achievement? While a range of health-related issues such as pedestrian road traffic accidents, lead poisoning, mental-health problems, domestic violence and vision have not been explored, the evidence presented in this chapter provides a convincing case for the assertion that children from working-class and poor families are far more likely than their middle-class counterparts to have a range of health problems that will impact directly and/or indirectly on their school achievement.

The impact of health problems is, however, complex and varied. Prenatal and early childhood health problems such as fetal alcohol syndrome and acute, chronic micronutrient deficiencies will undoubtedly do long-term damage to children’s minds and bodies, damage that is not fixable. While the number of children living in poverty that are permanently handicapped by health problems may be relatively small, with prevalence rates for fetal alcohol syndrome and early childhood stunting reaching highs of 46 in 1 000 only in


isolated communities, the impact is likely to be significant in those communities. But only a small portion of the health problems that impact on school achievement will be permanently disabling. For most children, health concerns, even those that are chronic and acute, may recede with normal maturation or treatment. Children, for example, with otitis media, middle-ear infections and parasites can be treated or may grow out of the problem, but for the duration of the disease it may have very significant effects on learning. Children that cannot hear are likely to suffer language development delays or, at a much more basic level may fail to hear and comprehend the teacher's instruction. They may struggle to participate in peer group learning both in and outside the school. On parasite infection, the effects are likely to be debilitating for many children that suffer high levels of infestation. The impact of the parasite on learning, however, is likely to be experienced indirectly through anaemia. In this case, children are likely to be more frequently absent, listless and less able to concentrate. With the latter two health problems, the prevalence rate in poorer communities can be high, with some studies showing as high as 35 per cent of children with high levels of bilharzias. Not all common childhood health problems are tied to poverty, however. As the research shows, some illnesses tend to have higher prevalence rates among wealthier communities. Two examples come to mind immediately: asthma and obesity.

In addition to long-term physiological and neurological damage that would directly influence achievement, and less direct short-term side-effects of child health concerns that are strongly related to poverty, health problems may indirectly but profoundly influence achievement. The most profound example of this is the HIV/AIDS pandemic. In this particular instance, while a very small number of children with AIDS may have been tested in the various studies of achievement cited in the previous chapter, the number is unlikely to have influenced the particular pattern of achievement. The reason for this is that until recently the overwhelming majority, approximately 70 per cent, of children born HIV-positive die before the age of two, with very few surviving to the end of primary school. This situation, however, is likely to change as more HIV-positive women give birth to more children and an increasing number of children gain access to treatment. But if HIV-infected children are not a significant part of the explanation of under-achievement, the wider effects of the pandemic may be. In particular, we now know that children from households where parents are sick and dying are more likely to be profoundly impoverished, which is inevitably going to have affect on enrolment, attendance and ultimately on achievement. More specific than poverty associated with AIDS, we now know that the death of a mother has a significant effect on schooling outcomes. While the scale of the death of mothers of children in primary school is likely to become far worse in the next
decade, the problem has already had a marked impact on primary school achievement.

One of the critical insights that have emerged from the research on child health and achievement is the uneven or local nature of health concerns. For example, bilharziasis may have major impact on schooling in districts in northern KwaZulu-Natal, but may not be a factor at all in the Midlands or in any other part of South Africa. Similarly, fetal alcohol syndrome appears to be a profound problem in the Northern Cape and Western Cape, with other provinces recording very low prevalence rates. Health problems also vary considerably from season to season, between boys and girls, and change in intensity as children grow older.

Finally, at a policy level, some of the health problems are currently being addressed aggressively — such as short-term hunger through the national school feeding programme. Others such as parasitic infections and *otitis media*, could be addressed at relatively low cost but are not. Other health concerns require a much more complex and interdisciplinary response; these include micronutrient deficiencies, fetal alcohol syndrome and Aids.