

A MODEL FOR EVALUATING SOUTH AFRICA'S EDUCATION SYSTEM BASED ON SACMEQ II RESEARCH DATA

Jacob P Strauss, Research Institute for Education Planning, University of the Free State,
PO Box 339, Bloemfontein, 9300, South Africa
E-mail: strausjp.hum@mail.uovs.ac.za

Abstract

The aim of this paper is to develop a model to evaluate an education system. Indicators have in the past been developed worldwide, but developers have fallen short of creating a single index to evaluate an education system. According to the framework for an education system the different dimensions for each of the phases contribute to the outputs of the system.

Indicators, using data from the SACMEQ II survey, have been developed. These indicators have been categorized according to the three interrelated principles of the Education for All (EFA) project, namely quality, access and equity. To calculate the efficiency index, a three-dimensional system of three mutually perpendicular axes was chosen to present the three indicators. The length of the sides of the formed triangle and its area can be calculated. The square root of the area will be the efficiency index of the education system.

The ultimate purpose of this model is not merely to rank the education systems of countries, but also to ascertain whether progress has been made over a period of time. The efficiency indices of a country's provinces can be used to decide on intervention where necessary.

1. INTRODUCTION

Several efforts have been made to evaluate the effectiveness and efficiency of an education system. The majority of these efforts used different indicators to indicate the success of such a system or part of it. Education indicators are statistical values designed to provide information about the condition, stability, functioning or performance of an education system or any part thereof. Implicit in this definition is the notion that indicators deal with the

measurable features of an education system. Education indicators show the nature, functioning, efficiency or outcomes of the quantifiable facets of an education system at a national, provincial, regional, school or classroom level, and can thus give an indication of the quality and potential problems of the education system as measured against set standards.

However, these efforts have failed to produce ways in which to evaluate the system according to a single index. This paper is an attempt to construct a model in which a single index can be deduced from the results that were achieved from the SACMEQ II project. This index will be called the efficiency index. Once such a model is constructed it can be used to measure progress over a period of time.

2. EFFORTS TO EVALUATE THE EDUCATION SYSTEM OF A COUNTRY

Efforts to evaluate the education system of a country resulted in the development of indicators for the different aspects of the education system. Member countries of the Organisation for Economic Cooperation and Development (OECD) have decided to give priority to developing education indicators that are both policy relevant and useful in meaningfully comparing the performance of education systems among OECD countries (UNESCO, 1998). The results have been published in the OECD publication entitled: 'Education at a Glance'.

A project by the United States Agency for International Development (USAID) in some developing countries, entitled 'Improving the Efficiency of Educational Systems', concentrated on the efficiency and effectiveness of the education system. Their definition of educational efficiency implied the following: The concept of efficiency provides a broad perspective from which to analyze an education system – one in which the costs of educational inputs and processes can be related to benefits, such as improved effectiveness. This concept has meaning only if outputs and outcomes are correctly specified and measured. Quality of education, according to practitioners of this project, is probably more closely related to the content and processes of education than to the total extent of schooling (Burchfield, 1992).

According to the expanded vision and the renewed commitment of the Education for All project (EFA), the vision for basic education should be to provide quality education that is equitable and to which all learners have access (EFA, 2001).

The *White Paper on Education and Training* (DoE, 1995) defines the principles of access, equity, redress and quality as being interrelated. According to the *White Paper* the principle of *access* requires the system to increasingly promote access for all learners to high-quality education and training. According to the *White Paper*, the system must offer learners “an increasing range of learning possibilities, offering greater flexibility in choosing what, where, when, how and at what pace they learn”.

The *White Paper* defines *equity* in relation to the distribution of resources, human rights, equal opportunities and gender. In particular, the *White Paper* requires the system to allocate resources according to the principle of equity so that the same quality of learning opportunities is afforded to all.

3. EDUCATION FRAMEWORK

The education system of a country can be represented as a framework describing the different phases as indicated in *Figure 1* (Burchfield, 1992; Holmes & Williams [s.a.]). Each of these phases will have an influence on the final outcome of the education system. All frameworks show some broad commonalities that can be described as indicators of context, input, process and output. Different dimensions or aspects exist within the different phases.

(Place Figure 1 about here)

Context information describes the current conditions, issues, opportunities and constraints in the environment of the learners. The context in which education takes place is reflected in the socio-economic milieu and the demographic background in which the learners grow up and live during their school career (Burchfield, 1992).

Inputs into education can be seen as the provision that is made before education can take place. The government plays an important role in supplying human, financial and physical resources (Burchfield, 1992). In addition to resources the characteristics of learners will also be discussed.

The *process* in education attempts to describe the activities taking place in the teaching and learning situation. All the stakeholders in education, namely the parents, learners, teachers and principals, play an important role. For the purposes of this paper the item 'Equal opportunities' in Burchfield's (1992) original figure was replaced with 'Learner participation' from a similar framework by Holmes and Williams [s.a.].

The *output* phase of the education system describes the immediate effects of the education process and includes the achievements that were attained in the assessment (Burchfield, 1992). The *outcomes* phase describes the less-immediate and less-direct results. This aspect can only be measured over a period of time. Outcomes cover a wider range of individuals than just the school leavers (Burchfield, 1992).

4. CATEGORIZING INDICATORS

From the EFA goals for education three principles were clearly identified, namely access, quality and equity. The first step in building a model to evaluate an education system will be to identify indicators accordingly from the different dimensions of the education framework (i.e. the socio-economic and demographic background, teacher management, etc.) and to categorize them according to the principles of quality, access and equity.

In cases where more than one indicator for quality (or access or equity) can be identified in a dimension (e.g. management) the indicators will be aggregated so that only a unique indicator for a dimension can be used in the model. It must be stated that indicators for more than one of the principles of quality, access and equity might be identified from a single dimension in the education framework.

4.1 Equity indicators

In the SACMEQ II project, variations (inequities) were calculated using standard statistical formulas, as well as defined calculations. The two statistical measures of equity used in the SACMEQ II project were described as follows:

4.1.1 *Intra-class correlation*

Two statistical techniques have been used to explore variations in human and material resources in education. One technique used the ratio of standard deviations to compare the variation of resources among schools in a province with the variation among schools at the national level. The second technique used a coefficient of intra-class correlation called rho (ρ) to determine the percentage of variation in resource distribution among schools in a province that can be ascribed to variation among the provinces. The remaining variation (100 percent minus the calculated value of rho) can be ascribed to allocation variations among schools within the provinces. Knowing the location of variations (inequities) in the distribution of resources will be useful in indicating the level at which decisions to rectify the situation should be taken (SACMEQ II, 2005).

4.1.2 *Variations among schools within provinces*

A quantified measure (percentage) of a resource variation among schools within a province compared to the variation among schools at the national level was calculated as follows:

$$\text{Variation} = \frac{\text{Standard deviation of resource index in a province}}{\text{Standard deviation of the resource index in the nation}} \times 100$$

The standard deviation of a resource index in a province measures the variation of a particular resource among the schools in the province, whilst the standard deviation of the resource index in the nation measures the variation of the resource among schools at the national level. The ratio of the two standard deviations, expressed as a percentage, provides a measure of equity in the province compared to the national picture.

Ideally, the value of the standard deviation should be zero where there is no variation in the resource index. In general, the magnitude of the standard deviation is proportional to the amount of variation. The numerical value (percentage) of variation that can be calculated using the above formula can be equal to, less than or greater than 100 percent.

If the standard deviation of a resource index in a province is equal to the standard deviation of the resource index in the nation, the numerical value of the variation for the province will be 1×100 percent = 100 percent. A value of 100 percent in this case means that the variation in the distribution of the resource among schools within the province is the same as the variation in the distribution of the same resource among all schools at the national level.

If, however, the standard deviation of a resource index in a province is smaller than the standard deviation of the resource index in the nation, the numerical value of the variation for the province will be less than 100 percent. A value less than 100 percent in this case means that the variation in the distribution of the resource among schools within the province is less than the variation at the national level. In other words, there is a more equitable distribution of the resource among schools within the province than there is at the national level.

If, on the other hand, the standard deviation of a resource index in a province is greater than the standard deviation of the resource index in the nation, the numerical value of the variation for the province will be greater than 100 percent. A value greater than 100 percent in this case means that the variation in the distribution of the resource among schools within the province is greater than the variation at the national level. In other words, there is a more equitable distribution of the resource at the national level than there is among schools within the province (SACMEQ II, 2005).

4.1.3 Calculation of equity indicators

To be able to use equities in the model, a definition for the equity index must be given in terms of the calculated variation. The values for variation differ for the different groups, resources or services for which the variations were calculated. The two types of variations calculated in the SACMEQ II report are both linear. Therefore the equity index can be defined as: *variation plus equity equals a constant*. The value for the constant can be chosen so that the equity is never less than zero. Because the variations among schools within the province can be more than 100, a value of 200 will be taken for the constant to avoid working with negative numbers. However, the equity index for South Africa, will be the complement of 100 and the variety index.

4.2 Quality indicators

Quality indicators describe the standard of services, resources or conditions in education. To be able to describe the quality there must be a norm or ideal (a maximum value) to indicate the utmost value. An indicator for quality therefore must describe the current value in terms of the ideal. Not all descriptive indicators can be classified as quality indicators, because the desired ideal cannot be illustrated, e.g. age of teachers.

4.3 Access indicators

Access indicators describe the openness of the education system to all learners. Access indicators should therefore describe the measure to which learners and teachers have the opportunity to gain entrance to education activities. Again there must be an ideal state against which the current situation can be measured.

5. DEVELOPMENT OF INDICATORS

Using the framework according to *Figure 1*, it is possible to accentuate the aspects of the education system for which data were collected in the SACMEQ II survey and which can be used to calculate an indicator. As pointed out, the indicators must be quantifiable. Once the indicators are quantified under the headings of the education framework, they will be categorized as either a quality, access or equity indicator.

6. INDICATORS FOR CONTEXTUAL BACKGROUND

In the environment in which the learners grew up, data were collected to calculate indicators for the level of the parents' education, learners' meals, reading materials and electronic media in learners' homes, the general quality of learners' homes, and the socio-economic status of learners' parents.

6.1 Access indicator for contextual background

6.1.1 Access to reading materials and electronic media at learners' homes

On a given list of items, such as reading materials (weekly or monthly magazines, daily newspapers, etc.) and electronic media (cassette players, videocassette recorders, telephones, etc.) learners had to indicate those items to which they had access at home. An index of the items was calculated and it ranged from a minimum of one for no item ticked to a maximum of 13 if all the items were ticked. The mean indices have been summarized as “Possessions at home” in the first data column of Table 1 for the provinces and for South Africa. (SACMEQ II, 2005).

(Place Table 1 about here)

6.2 Quality indicator for the contextual background

6.2.1 General quality of learners' homes

The index for the general quality of the Grade 6 learners' homes was constructed as a sum of the indices for lighting, condition of floors, condition of walls and condition of roofs. For each of the four aspects the minimum value of the index was one for absolutely basic or poor conditions, and the maximum was 4 if the conditions were perfect. Therefore, the minimum value of the index for general quality was 4 if all the aspects were absolutely basic or poor and the maximum was 16 if all the aspects were perfect (SACMEQ II, 2005). The results of the survey relating to the general quality of learners' homes, as well as the converted percentages, have been given in Table 2.

(Place Table 2 about here)

6.2.2 Learners' meals

Learners were asked to indicate how often they ate each of breakfast, lunch and supper in a typical school week. A score of three was assigned where a learner indicated that he/she did

not eat at all, six for one meal, nine for two meals and 12 where it was indicated that all three main meals were eaten every day of the week. The mean meal indices for the Grade 6 learners, as well as the converted percentages, have been presented in Table 2 as part of a quality indicator (SACMEQ II, 2005).

6.2.3 Level of parents' education

The parents' level of education will determine to a large extent the quantity and quality of support that they can give their children in Reading and Mathematics. The index for the level of education was calculated by assigning a score of 1 for a parent who "Did not go to school and had no adult education", 2 for some primary education, 3 for completed primary education, 4 for some secondary education, 5 for completed secondary education and 6 for completed post-secondary or university education. Where there were two parents the average level of the parents' education was calculated – so that the minimum average score was 1 and the maximum was 6 (SACMEQ II, 2005). The results from the survey, as well as the converted percentages, have been given in Table 2.

6.2.4 Unique quality indicator for the contextual background

To find a unique quality indicator for the contextual background dimension of the education framework, the mean for the values of the parents' education, meals eaten, and the general quality of learners' homes was calculated. The indicators, in percentages, for all the indicators in this dimension as well as the mean indicators, have been displayed in Table 2.

7. CALCULATING INPUT INDICATORS

Inputs into the education system were categorized under human and material resource management, as well as learners' characteristics. Although local community support and financial management form part of the education framework, it will not be used as an indicator, because no relevant information as an input was available.

7.1 Quality indicators for teacher management

The dimension of teacher management from the education framework can also be seen as human resource management. Data concerning teachers for this purpose were collected on the socio-economic status of teachers.

7.1.2 Socio-economic status of teachers

The indicator for possessions of teachers was constructed from a given list of items such as a daily newspaper, weekly or monthly magazine, radio, television set, VCR, cassette player, telephone, refrigerator, car, motorcycle, bicycle, electricity and a table at which to write on, and teachers were instructed to tick off those items they owned. The index of the items was calculated and it ranged from a minimum of zero for no item ticked to a maximum of 13 if all the items were ticked. The summary of the indices for the possessions of Grade 6 teachers has been presented as “Possessions at home” in Table 3.

(Place Table 3 about here)

7.2 Equity indicator for teacher management

7.2.1 Qualifications and experience of teachers

As discussed previously, there are two types of variation that can be calculated. In Table 4 the variations on human resource allocation among provinces are described in the last column, while the variations among schools within provinces are described in the other columns. The variations among the provinces cannot be higher than 100 percent, while the variation among schools can be more than 100 percent. The second-last row of Table 4 contains the 'mean variations' among the provinces and among schools within provinces. The last row of this table contains the 'equity indicators'. The equity indicator at national level (among provinces) is the difference of 100 percent and the variation, while the equity indicator for the provinces (among schools within provinces) is the difference of 200 percent and the corresponding variation. (Two hundred percent is used to avoid a negative number.) The unique equity indicators for teacher management have been displayed in the last row of Table 4.

(Place Table 4 about here)

7.3 Access indicator for teacher management

7.3.1 In-service training of teachers

The mean duration in days that the Reading and the Mathematics teachers of Grade 6 learners had access to in-service training in the three years preceding the survey has been shown in Table 5. According to the norms and standards set by the Department of Education, a teacher is expected to receive 80 hours (ten eight-hour working days) of in-service training in a year. This would translate to 30 days in three years (SACMEQ II, 2005). In the last column of Table 5 the mean number of days is given as a percentage of 30 days, the norm determined by the Department of Education.

(Place Table 5 about here)

7.4 Indicators for learners' characteristics

The age and gender distribution of learners is given by the net enrolment ratio (NER), the gross enrolment ratio (GER) and the gender parity index (GPI). Another characteristic of the learners is the percentage of learners who did not repeat a grade in their school career.

7.4.1 Access indicators for learners' characteristics

Access of learners into the system is given by the net enrolment ratio and the gross enrolment. At primary school level, learners are admitted to school at the age of 7 years and their ideal age in Grade 7 (the final grade in the primary school) should thus be 13 years. UNESCO (1998) gives the following definition for the net enrolment ratio (NER) for the age group 7 to 13 years:

$$NER = \frac{\text{Number of learners aged 7 to 13 years in school}}{\text{Number of 7 to 13 year - olds in population}} \times 100$$

(Place Table 6 about here)

The theoretical maximum of this index will be 100 percent, because there will not be more 7 to 13 year-old children in school than there are in the population. A ratio of less than 100 percent indicates that there are learners from the age group 7 to 13 years who are not participating in education. The NER can thus be seen as an indicator of access to primary schools by learners of the ideal age.

The following definition of the gross enrolment ratio (GER) at primary school level is given by UNESCO (1998):

$$GER = \frac{\text{Number of learners enrolled in school}}{\text{Number of 7 to 13 year - olds in population}} \times 100$$

(Place Table 7 about here)

Percentages lower than 100 percent for the gross enrolment ratio indicated that there were learners of school-going age who were not attending school, while percentages greater than 100 percent indicate that there are learners younger than seven years or older than 13 years in primary schools. The ideal for the gross enrolment ratio would be 100 percent. Percentages higher than 100 percent indicate a deviation from the ideal access ratio of learners into schools. For the sake of the calculation of the indicator, any percentage higher than 100 will be converted to an index lower than 100 by the percentage the gross enrolment ratio is greater than 100. In general mathematical terms the converted index equals $[100 - \text{absolute}(100 - \text{GER})]$. The last column of Table 8 displays the converted GER indicator.

(Place Table 8 about here)

Table 9 displays the unique indicators for learners' access to primary schools. The unique indicator is calculated as the mean of the NER and GER indicators.

(Place Table 9 about here)

7.4.2 *Equity indicator for learner characteristics*

The gender parity index can be regarded as an equity indicator. The following definition of the gender parity index (GPI) is given by the Department of Education (2002):

$$\text{GPI} = \frac{\text{GER for females}}{\text{GER for males}}$$

(Place Table 10 about here)

In Table 10 the GPI is expressed as a percentage. This index indicates the level of participation of girls in education, compared to that of boys. An index higher than 100 percent indicates that, in proportion to the appropriate school-age population, there are more girls than boys in the school system.

7.4.3 *Quality indicator for learners' characteristics*

The Department's norm for repetition is one year per school phase. Effectively, this means that a learner may not repeat more than one grade in a 3-year phase. The challenge is to provide appropriate special support to learners who may be lagging behind their age cohort in terms of performance.

The percentages of learners who did not repeat a grade from the time of their admittance to school until Grade 5 have been presented in Table 11.

(Place Table 11 about here)

7.5 Indicators for resource management (material)

The availability of adequate classroom furniture and equipment leads to conditions conducive for teaching and learning. Equitable distribution or allocation of these resources is therefore an important input that might impact considerably on teachers' ability to perform their task and on learners' ability to perform at their level best (SACMEQ II, 2005).

7.5.1 *Quality indicator for resource management*

Data on the following were used to calculate indicators for resource management:

- adequate sitting and writing places, furniture and equipment;
- equipment and general facilities of schools;
- general condition of school buildings;
- basic classroom supplies for writing;

Between 90 percent and 100 percent of all Grade 6 learners in all the provinces were accommodated in classrooms with adequate sitting and writing space within their classrooms (Table 12). The mean availability of sitting and writing space in Reading and Mathematics classes has been reflected in the last column of Table 12.

(Place Table 12 about here)

In order to gain further insight into the distribution of the classroom material resources an index of the resources was constructed by assigning a unit value to each of the following: a usable writing board, chalk, a wall chart of any kind, a cupboard, one or more bookshelves, a classroom library or book corner, and a teacher's desk. The minimum value of the index was 0 for no resources and the maximum was 8 if all the resources were available (SACMEQ II, 2005). The results have been calculated as percentages and summarized in the two sets of figures and the mean in Table 13.

(Place Table 13 about here)

The percentages of school buildings that were in need of repairs have been given in the first set of figures in Table 14. The percentages of schools that did not need any repairs have been given in the last column.

(Place Table 14 about here)

The percentages of the Grade 6 teachers who had been provided with the given teaching aids in their schools have been shown in Table 15. Information on the provision of the basic writing materials such as exercise books, pencils, pens and rulers has been given in Table 15. These materials can be regarded as the minimum required for class and homework. The mean indicators for writing materials have been given in the last column of Table 15.

(Place Table 15 about here)

To find a unique quality indicator for material management, the indicators for sitting and writing space, classroom resources, condition of buildings and writing materials were aggregated. This indicator (as a percentage) has been displayed in the last column of Table 16.

(Place Table 16 about here)

7.5.2 Equity indicator for material resource management

The percentages indicating variations of material resource allocations among schools within provinces and variations among provinces at the national level for Grade 6 learners in South Africa have been given in Table 17 (SACMEQ II, 2005).

(Place Table 17 about here)

In the second-last row of Table 17 the mean variations of the different materials have been given, while in the last row the complement of 200 and the mean variation for provinces and the complement of 100 and the mean variation for South Africa as a whole have been given. These mean equities can be regarded as the unique equity indicator for material resource management.

7.5.3 Access indicator for material resource

Data on the following were used to calculate the access indicator for resource management

- access to teaching aids
- access to textbooks
- access to resource centers

The percentages of Grade 6 learners and their teachers that had access to each of the given teaching aids in their schools have been shown in Table 18. The first three data columns in Table 18 refer to teaching aids for teaching Reading and the next two to teaching Mathematics (SACMEQ II, 2005). The last column of Table 18 reflects the mean indicator for teachers' and learners' access to teaching aids.

(Place Table 18 about here)

Learning is a process whereby learners derive meaning from the learning content by interacting partly with peers and teachers but mainly with resources and materials in the learning environment. Learners who have access to adequate learning support materials are likely to perform better than those who do not. To examine this general policy concern, two specific research questions were asked regarding the percentage of Grade 6 learners who had access to Reading and Mathematics textbooks and other basic classroom materials to aid learning (SACMEQ II, 2005). This information on learners' access to Reading and Mathematics textbooks has been reported in Table 19.

(Place Table 19 about here)

In addition to regular in-service training, teachers need a sound professional support system for development and sustained resourcefulness. To this end, the provision of resource centers has always been seen as an indispensable necessity (SACMEQ II, 2005). The information on teachers' access to resource centers has been reflected in Table 20. The indicators in Table 20 can be seen as the measure of teachers' access to resource centers.

(Place Table 20 about here)

To calculate a unique indicator for access to material resources the indicators for teaching aids, textbooks and resource centers have been aggregated and given (as a percentage) in the last column of Table 21.

(Place Table 21 about here)

8. PROCESS INDICATORS

To develop process indicators, the following aspects of the framework for an education system – namely teaching quality, learner participation and school management – have been taken into consideration. Curriculum quality has not been taken into account as no relevant data was available.

8.1 Quality indicator for teaching

In order to calculate indicators for teaching quality, data for the following aspects were used:

- school principals advise teachers on their teaching;
- written tests in Reading and Mathematics;
- monitoring and assisting with learners' homework;
- homework assigned and corrected.

The majority of Reading teachers and Mathematics teachers responded that they “sometimes” or “often” received advice from their principals (Table 22). Although at the national level the difference between the Grade 6 Reading teachers and Mathematics teachers who received advice from the principals was not high, the provincial differences in this regard were fairly high (SACMEQ II, 2005). The last column of Table 22 displays the mean indicator for the advice from principals to teachers.

(Place Table 22 about here)

Information on the frequency with which Grade 6 teachers gave written tests was gathered for Reading and Mathematics respectively and is presented in Table 23. This information has

been given in different frequencies. In order to find a common frequency the information was converted to the equivalent percentage of teachers giving at least one test per week by using the following formula:

$$\text{Equivalent percentage} = \left\{ \begin{array}{l} \text{Percentage for 'once per week' } + \\ \frac{5}{8} \text{ of percentage of 'two/threetimes per month' } + \\ \frac{1}{4} \text{ of percentage of 'less often' } \end{array} \right.$$

The equivalent percentages in columns 4 and 8 of Table 23 can be interpreted as the percentage of teachers giving at least one test per week.

(Place Table 23 about here)

The mean of the equivalent percentage of teachers giving at least one Reading test and one Mathematics test per week is the index for writing tests and will contribute to the indicator for teaching quality. This mean has been given in the last column of Table 24.

(Place Table 24 about here)

The value of homework is twofold. Firstly it enables learners to consolidate their understanding of what they have learnt in class. Secondly, learners get an important opportunity to interact with family members around their schoolwork. Because they receive a wider spectrum of perspectives, learners' knowledge base may be enriched significantly by these interactions. The apparent neglect of Reading homework in the schools may deprive learners of valuable opportunities to learn and may thus impact negatively on learners' scholastic achievements (SACMEQ II, 2005).

Information on the frequency with which learners received Reading and Mathematics homework has been summarized in Table 25. The mean percentage for Reading and Mathematics homework assigned and corrected has been displayed in the last column of Table 25.

(Place Table 25 about here)

To calculate the unique indicator for teaching quality, the mean of the percentages of advice given to teachers, tests given, homework given and homework corrected was calculated and the information has been presented in the last column of Table 26.

(Place Table 26 about here)

8.2 Indicators for learner participation

8.2.1 Quality indicator for learner participation

To find an indicator for learner participation in education the following aspects were taken into consideration: absence of learners, school days lost in the last school year, and the parents' assistance with homework. These three aspects gave the learners the opportunity to receive instruction and support at home.

According to data available from the SACMEQ II survey, learners had to indicate how many days they were absent during the previous month. These data were converted to the percentage of days that learners were attending school, and the information has been presented in Table 27 (SACMEQ II, 2005). The percentages for school attendance can be regarded as a quality indicator for learner participation in education.

(Place Table 27 about here)

The assistance that learners received from their parents was investigated through a number of questions. Learners were asked whether their parents ensured that homework was done, helped them with the homework, looked at schoolwork done, asked the learners to read, asked questions on school Reading work, asked the learners to do mathematical calculations, asked questions on school Mathematics work, and signed Reading and Mathematics homework.

The information gathered in this regard has been presented in Table 28. These questions and answers can be regarded as an indication of how learners participated in education. The mean assistance calculated in the last column of Table 28 can be regarded as another quality indicator for learner participation.

(Place Table 28 about here)

The average number of official school days that had been lost in the previous school year due to events such as the late start of term, scheduling of examinations, school festivals, national celebrations, storms, etc. for South Africa overall on average was 3,3. The responses were converted to the percentage of days on which the schools were functioning and this information is presented in Table 29. In addition to the days on which learners were absent from school and did not receive instruction, learners were also deprived of instruction on days when the school was not functioning. The percentages in the last column represent the percentage of days on which the school was functioning. This can be seen as a quality indicator as in the case where learners were attending school.

(Place Table 29 about here)

To calculate the unique indicator for learner participation the mean of the percentages for school attendance, home assistance and school functioning was calculated and the information is presented in the last column of Table 30.

(Place Table 30 about here)

8.3 Indicators for school management

8.3.1 Quality indicator for school management

Two issues, namely teachers meeting with parents and vice versa, as well as behavioral problems of learners and teachers, were considered when a quality indicator for school management was developed.

In terms of the South African Schools Act (1996) it is one of the duties and responsibilities of teachers to meet with parents and discuss with them the conduct and progress of their children. The frequency of teacher-parent and parent-teacher meetings has been presented in Table 31. The mean for parent-teacher and teacher-parent meetings has been presented in the last column of Table 31 and is considered to be a quality indicator.

(Place Table 31 about here)

Principals were given a list of common learner behavioral problems in schools and were asked to indicate the frequency of occurrence of these in their schools. The percentages of principals who indicated that the given behavioral problems ‘never’ occurred in their schools have been shown in Table 32.

(Place Table 32 about here)

Information on behavioral problems of teachers in the schools has been presented in Table 33. The figures in the table refer to the percentage of principals who indicated that the respective teacher behavioral problems ‘never’ occurred in their schools.

(Place Table 33 about here)

To find the unique quality indicator for school management the mean percentages of parent-teacher meetings, learner behavioral problems and teacher behavioral problems were calculated and have been presented in Table 34.

(Place Table 34 about here)

8.3.2 *Access indicator for school management*

Grade 6 learners and school principals were asked whether learners were allowed to take library books home to read. The two sets of responses – the first from the principal and the second from the learners – have been summarized in Table 35. The mean indicator can be seen as an access indicator, as learners responded on the one hand to the question of whether they had access to library books, and on the other hand to the question of whether they were permitted by the school to have access to library books.

(Place Table 35 about here)

9. OUTPUT INDICATORS

9.1 Quality output indicators

The performance of learners in Reading and Mathematics can be considered as one of the most important aspects of evaluating an education system. Data on the Grade 6 learners' scores were analyzed using computer software that applied the Rasch model of measurement. The basic feature of the Rasch model is that the program performs a linear transformation of the test scores into a scale on which the predetermined mean score is 500 and the standard deviation is 100. Due to the importance of the performance of learners, the indicator for the performance will only be the mean for Reading and Mathematics

(Place Table 36 about here)

9.2 Equity indicator for output

Apart from the performance of the learners it is also important to look at the variation among provinces and among schools in respect of performance. The first two rows of data give the variance, while the next two rows give the equity index for Reading and Mathematics and the last row the mean equity index for both subjects.

(Place Table 37 about here)

10. CONSTRUCTING THE MODEL

The first stage in developing the model was to calculate the different indicators according to the education framework, followed by a process of categorizing them as quality, access and equity indicators. The results from the categorizing have been given in Table 38.

(Place Table 38 about here)

To enable all three principles to contribute to the final efficiency of the education system, a three-dimensional model is proposed. The values for the three principles, namely quality, access and equity, can be presented along three mutually perpendicular axes (Figure 2).

(Place Figure 2 about here)

When the values on each of the axes are connected a triangle is constructed (the colored part). The length of the sides of the triangle, as well as the area of the triangle, has been calculated and given in the fourth data column of Table 39. The area of a triangle (a two-dimensional value) is equal to a square with sides of a specific length (a one-dimensional quantity). The following definition is therefore given: *The efficiency index of the education system can be defined as the length of a square with an equal area as the triangle formed by the indicators quality, equity and access.* This efficiency index can thus be calculated as the square root of the area of the triangle. These indices for the provinces and South Africa have been given in the final column of Table 39.

(Place Table 39 about here)

11. INTERPRETATION OF THE EFFICIENCY INDICES

The efficiency index for South Africa is 522.9 (Table 38). Note that the final efficiency index for South Africa is not the mean of the indices for the provinces, since the equity indicator for

South Africa is calculated in a different way to those for the provinces. This index can serve as a baseline for comparison with the results of a subsequent SACMEQ survey.

The indices for the provinces indicate a point difference of more than 100 between them. The Western Cape had the highest index and Limpopo the lowest, but not all the indicators of this province were the lowest, as reflected in Table 39. Rather than merely comparing the performance of provinces, areas of concern can be identified for possible interventions.

Another application of this model lies in the fact that the strong and weak points of an education system can be identified for interventions if necessary. For this purpose, other descriptive data that were not used to calculate the indicators can be used to find out more about the conditions in schools.

12. FURTHER INVESTIGATION

To increase the number of indicators or the components of indicators for a more effective model, it is essential that the data are refined and that more statistical analysis on the basic data should be done. Mainly published data have been used for this model. Further investigations can also be undertaken to include more questions in the questionnaires or to rephrase some questions to gather more information. A real shortcoming in this paper is that the performance of teachers could not form part of the outputs, as the teachers' assessment was not available.

13. CONCLUSION

The calculation of the efficiency index must not be seen as the only measure to evaluate an education system. This model can rather be used to evaluate an education system over a period of time and not merely to compare the education systems of countries, since not all conditions in all countries are the same. These different conditions might not be captured in the collected data. Within a country the results for the different provinces can be compared for purposes of intervention by the authorities where needed and to track the progress of education over a period of time.

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Figure 1: Framework for an education system

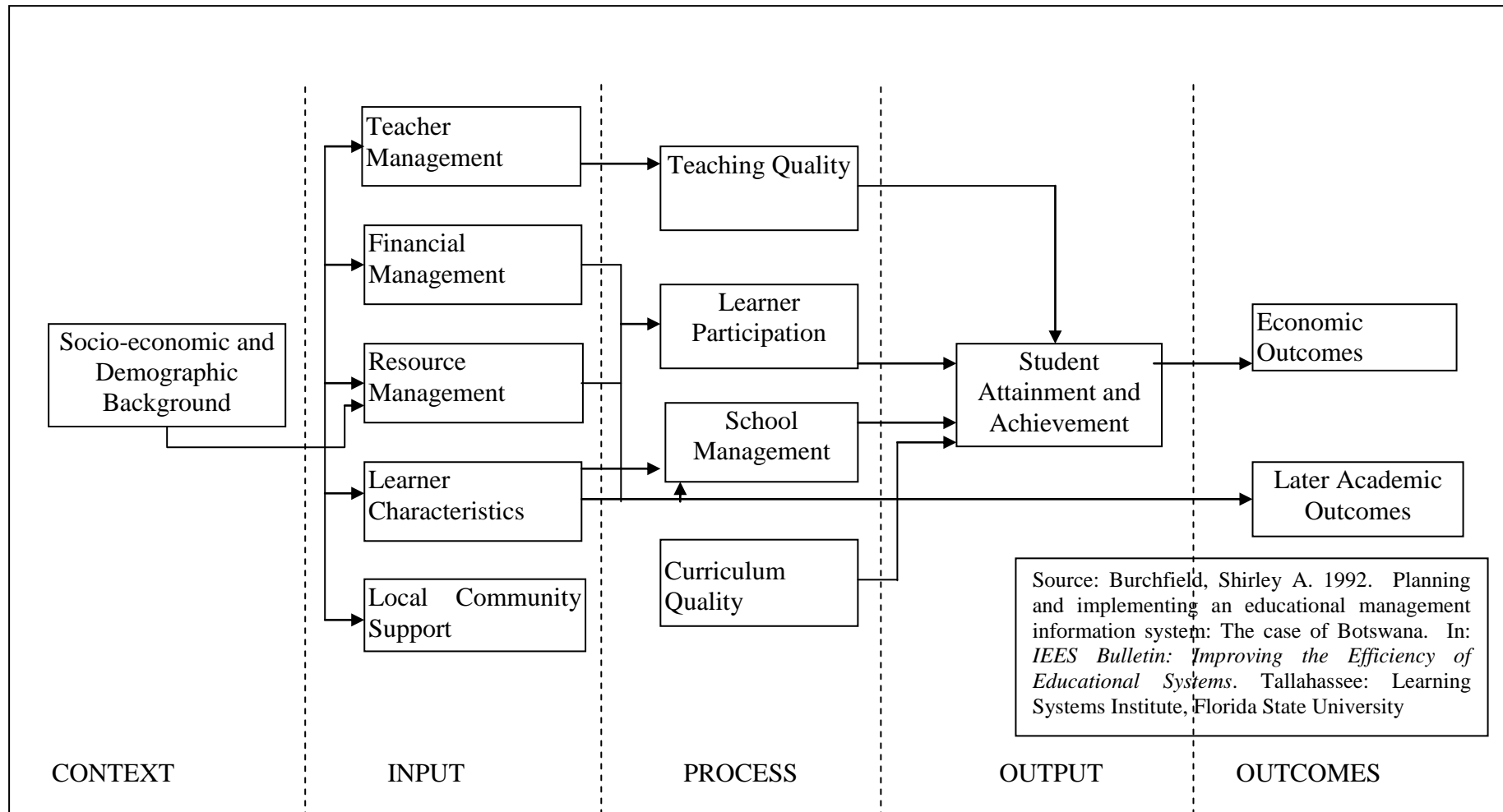


Figure 2: Quality, equity and access indicators of South Africa

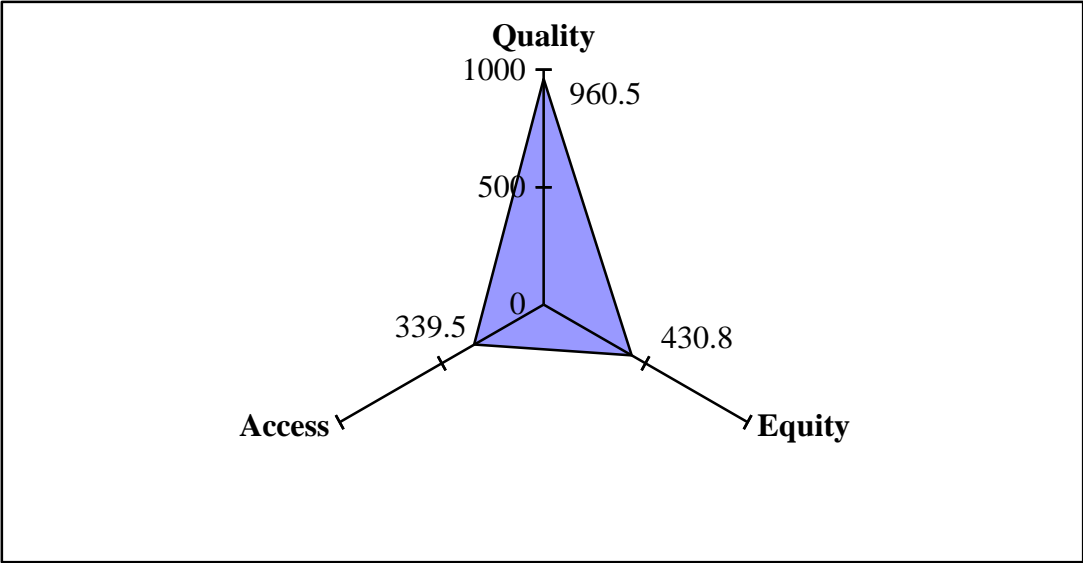


Table 1: Means for the learners' possessions at home

Province	Possessions at home	
	Mean index (Max = 13)	Index as %
Eastern Cape	5.4	41.5
Free State	6.6	50.8
Gauteng	8.5	65.4
KwaZulu-Natal	6.5	50.0
Mpumalanga	5.3	40.8
Northern Cape	6.7	51.5
Limpopo	5.2	40.0
North West	5.9	45.4
Western Cape	9.6	73.8
South Africa	6.6	50.8

Table 2: Means and percentages for learners' personal and home-related characteristics

Province	General quality of parents' homes		Meals		Parents' education		Mean index
	Mean index (Max = 13)	Index as %	Mean index (Max = 16)	Index as %	Mean index (Max = 6)	Index as %	%
Eastern Cape	10.6	66.3	10.1	63.1	3.5	58.3	62.6
Free State	11.4	71.3	10.9	68.1	3.3	55.0	64.8
Gauteng	13.8	86.3	10.6	66.3	4.6	76.7	76.4
KwaZulu-Natal	12.1	75.6	10.8	67.5	3.9	65.0	69.4
Mpumalanga	11.4	71.3	10.0	62.5	3.5	58.3	64.0
Northern Cape	11.0	68.8	10.8	67.5	3.6	60.0	65.4
Limpopo	10.6	66.3	10.2	63.8	3.5	58.3	62.8
North West	11.8	73.8	10.3	64.4	3.5	58.3	65.5
Western Cape	14	87.5	11.1	69.4	4.8	80.0	79.0
South Africa	11.9	74.4	10.5	65.6	3.8	63.3	67.8

Table 3: Indicators for the socio-economic background of Reading and Mathematics teachers

Province	Possessions at home (index)			
	Reading teachers Max = 13	Mathematics teachers Max = 13	Mathematics and Reading teachers Max = 13	Mathematics and Reading teachers %
Eastern Cape	8.3	8.5	8.4	64.6
Free State	8.9	9.3	9.1	70.0
Gauteng	10.1	10.6	10.4	79.6
KwaZulu-Natal	9.6	9.2	9.4	72.3
Mpumalanga	9.4	9.4	9.4	72.3
Northern Cape	8.9	10.4	9.7	74.2
Limpopo	7.8	7.1	7.5	57.3
North West	9.1	8.7	8.9	68.5
Western Cape	10.9	10.9	10.9	83.8
South Africa	9.2	9.1	9.2	70.4

Table 4: Human resource allocation as assessed by variation among schools within provinces, and variation among provinces

Province	Variation among schools within provinces (%)									
	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Mpumalanga	Northern Cape	Limpopo	North West	Western Cape	Variation among provinces (rho x 100)
Reading teachers: professional qualification	88.1	117.9	75.9	101.7	97.6	91.0	93.3	88.1	16.3	19.0
Reading teachers: experience	133.4	111.0	97.9	87.6	86.9	103.6	70.3	111.5	80.8	0.0
Mathematics teachers: professional qualification	97.6	105.0	87.7	89.7	120.7	57.9	87.4	99.5	16.9	19.4
Mathematics teachers: experience	133.3	112.5	82.6	105.9	80.1	94.0	83.4	75.7	95.1	0.0
Principals: professional qualification	118.0	97.9	98.8	100.9	93.7	59.1	96.0	82.5	33.7	12.7
Principals: experience	106.3	91.7	119.1	105.5	112.6	74.4	95.0	116.3	69.4	0.0
Inspectors/advisors: visits to Reading teachers	102.6	137.4	59.1	102.9	101.6	94.9	83.6	93.5	118.8	0.0
Inspectors/advisors: visits to Mathematics teachers	76.2	130.8	84.5	90.6	89.7	87.5	126.9	108.9	108.9	0.0
Learner/teacher ratio	143.9	60.1	75.2	115.3	88.7	40.0	74.5	94.8	86.4	5.3
<i>Mean variation</i>	111.0	107.1	86.8	100.0	96.8	78.0	90.0	96.8	69.6	6.3
<i>Mean equity</i>	89.0	92.9	113.2	100	103.2	122	110	103.2	130.4	93.7

Table 5: Mean for in-service training days attended by teachers in the last three years

Province	Reading teachers	Mathematics teachers	Mean	Indicator
	Days	Days	Days	%
Eastern Cape	30.4	30.8	30.6	100.0*
Free State	18.7	11.2	15.0	50.0
Gauteng	21.0	14.0	17.5	58.3
KwaZulu-Natal	26.4	12.2	19.3	64.3
Mpumalanga	17.6	14.7	16.2	54.0
Northern Cape	20.3	10.7	15.5	51.7
Limpopo	8.8	16.8	12.8	42.7
North West	15.3	8.4	11.9	39.5
Western Cape	17.9	12.5	15.2	50.7
South Africa	20.8	16.2	18.5	61.7

*100% is the maximum

Table 6: The net enrolment ratio (NER) for primary schools in South Africa, 2000

Province	%
Eastern Cape	94.4
Free State	94.5
Gauteng	99.1
KwaZulu-Natal	96.0
Limpopo	94.6
Mpumalanga	96.1
Northern Cape	97.5
North West	97.9
Western Cape	99.7
South Africa	96.3

Source. Department of Education (2002) and Statistics South Africa (2003)

Table 7: The gross enrolment ratio (GER) for primary schools in South Africa, 2000

Province	GER (%)
Eastern Cape	106
Free State	95
Gauteng	100
KwaZulu-Natal	100
Limpopo	93
Mpumalanga	101
Northern Cape	86
North West	94
Western Cape	96
South Africa	99

Source: Department of Education (2002)

Table 8: The gross enrolment ratio (GER) and converted GER indicator for primary schools in South Africa, 2000

Province	GER (%)	GER indicator (%) (converted)
Eastern Cape	106	94
Free State	95	95
Gauteng	100	100
KwaZulu-Natal	100	100
Limpopo	93	93
Mpumalanga	101	99
Northern Cape	86	86
North West	94	94
Western Cape	96	96
South Africa	99	99

Table 9: The unique learner access indicator for primary schools in South Africa, 2000

Province	NER indicator (%)	GER indicator (converted) (%)	Learner access indicator (%)
Eastern Cape	94.4	94.0	94.2
Free State	94.5	95.0	94.8
Gauteng	99.1	100.0	99.6
KwaZulu-Natal	96.0	100.0	98.0
Limpopo	94.6	93.0	93.8
Mpumalanga	96.1	99.0	97.6
Northern Cape	97.5	86.0	91.8
North West	97.9	94.0	96.0
Western Cape	99.7	96.0	97.9
South Africa	96.3	99.0	97.7

Table 10: The gender parity index (GPI) for primary schools in South Africa, 2000

Province	GPI (%)*
Eastern Cape	100
Free State	96
Gauteng	97
KwaZulu-Natal	95
Limpopo	95
Mpumalanga	95
Northern Cape	100
North West	96
Western Cape	99
South Africa	97

Source: Department of Education (2002)

Table 11: Percentage of non-repeaters according to province

Province	% non-repeaters
Eastern Cape	52.7
Free State	51.5
Gauteng	74.4
KwaZulu-Natal	61.0
Mpumalanga	46.0
Northern Cape	49.8
Limpopo	42.8
North West	51.5
Western Cape	77.6
South Africa	57.7

Table 12: Availability of sitting and writing space in classrooms

Province	Learners having		Mean
	sitting places	writing places	
	%	%	%
Eastern Cape	93.9	91.1	92.5
Free State	99.0	97.6	98.3
Gauteng	100.0	100.0	100.0
KwaZulu-Natal	98.2	96.1	97.2
Mpumalanga	98.5	98.7	98.6
Northern Cape	99.6	99.2	99.4
Limpopo	98.4	95.3	96.9
North West	99.2	97.8	98.5
Western Cape	100.0	97.9	99.0
South Africa	98.1	96.4	97.3

Table 13: Means for the classroom resources index

	Classroom resources index			
	Reading teachers	Mathematics teachers	Reading and Maths teachers	Reading and Maths teachers
	Mean (8)	Mean (8)	Mean (8)	Mean (%)
Eastern Cape	6.1	5.7	5.9	73.8
Free State	5.9	5.6	5.7	71.9
Gauteng	6.8	7.1	6.9	86.9
KwaZulu-Natal	6.7	6.7	6.7	83.8
Mpumalanga	5.2	4.8	5	62.5
Northern Cape	5.1	5.7	5.4	67.5
Limpopo	5.3	5.2	5.2	65.6
North West	6.3	5.9	6.1	76.3
Western Cape	7.5	6.7	7.1	88.8
South Africa	6.3	6.1	6.2	77.5

Table 14: General condition of buildings and toilet facilities

Province	Repairs needed	No repairs needed
	%	%
Eastern Cape	55.9	44.1
Free State	56.9	43.1
Gauteng	25.1	74.9
KwaZulu-Natal	34.2	65.8
Mpumalanga	48.2	51.8
Northern Cape	15.8	84.2
Limpopo	80.2	19.8
North West	61.3	38.7
Western Cape	0.0	100.0
South Africa	44.5	55.5

Table 15: Percentages for availability of basic classroom writing materials: Exercise books, pencils, pens and rulers

Province	Exercise books %	Pencils %	Pens %	Rulers %	Mean %
Eastern Cape	76.8	73.3	73.9	77.3	75.3
Free State	87.0	66.3	76.3	75.7	76.3
Gauteng	85.9	89.8	86.4	91.5	88.4
KwaZulu-Natal	87.6	83.8	81.1	81.5	83.5
Mpumalanga	58.6	54.3	55.0	56.9	56.2
Northern Cape	79.2	86.6	71.7	78.0	78.9
Limpopo	59.9	56.5	53.5	57.5	56.9
North West	88.6	86.4	83.1	81.4	84.9
Western Cape	85.7	91.2	92.9	82.0	88.0
South Africa	78.9	76.3	75.3	76.4	76.7

Table 16: Mean quality indicator for resource management (material)

Province	Sitting and writing space %	Classroom resources %	Condition of buildings %	Writing materials %	Mean indicator %
Eastern Cape	92.5	73.8	44.1	75.3	71.4
Free State	98.3	71.9	43.1	76.3	72.4
Gauteng	100	86.9	74.9	88.4	87.6
KwaZulu-Natal	97.2	83.8	65.8	83.5	82.6
Mpumalanga	98.6	62.5	51.8	56.2	67.3
Northern Cape	99.4	67.5	84.2	78.9	82.5
Limpopo	96.9	65.6	19.8	56.9	59.8
North West	98.5	76.3	38.7	84.9	74.6
Western Cape	99	88.8	100	88	94.0
South Africa	97.3	77.5	55.5	76.7	76.8

Table 17: Equity of material resource allocation as assessed by variation among schools within provinces and variation among provinces (SACMEQ II, 2005)

	Variation among schools within provinces									Variation among provinces (rho x 100)
	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Mpumalanga	Northern Cape	Limpopo	North West	Western Cape	
Classroom furniture index by Reading teacher	86,1	86,7	81,9	82,0	70,8	143,7	109,4	105,2	30,5	15,8
Classroom furniture index by Mathematics teacher	78,5	107,6	75,1	80,6	96,1	94,8	104,3	78,5	106,9	19,7
Toilets per learner	66,0	21,2	31,5	83,0	47,7	14,5	226,8	40,8	12,1	12,0
Classroom library by Reading teacher	104,6	106,6	93,6	88,0	100,2	101,3	101,1	102,7	76,7	5,1
Classroom library by Mathematics teacher	102,1	102,1	97,8	99,2	102,3	85,3	103,0	102,3	95,2	1,1
Classroom space per learner	75,2	38,0	30,6	45,9	285,8	49,1	56,4	5,9	30,8	2,1
Reading teacher housing quality	112,2	102,6	58,2	108,7	0,0	26,6	111,9	105,0	0,0	21,6
Mathematics teacher housing quality	110,2	111,8	53,1	101,8	76,2	0,0	110,6	111,8	0,0	17,7
School resources index	72,5	62,0	77,5	109,2	77,5	29,7	61,9	65,3	41,9	48,3
<i>Mean variation</i>	89,7	82,1	66,6	88,7	95,2	60,6	109,5	79,7	43,8	15,9
<i>Mean equity</i>	110,3	117,9	133,4	111,3	104,8	139,4	90,5	120,3	156,2	84,1

Table 18: Percentages of teachers and learners having access to teaching aids at school

Province	Map	English dictionary	Reading teacher's guide	Geometrical instruments	Mathematics teacher's guide	Mean
	%	%	%	%	%	%
Eastern Cape	69.6	66.1	68.8	53.3	66.8	64.9
Free State	45.8	61.1	78.3	67.3	59.8	62.5
Gauteng	87.8	92.7	81.3	84.3	90.5	87.3
KwaZulu-Natal	74.5	76.5	85.8	68.5	66.0	74.3
Mpumalanga	60.5	35.5	61.0	57.1	58.0	54.4
Northern Cape	76.7	84.2	47.8	57.8	78.2	68.9
Limpopo	48.0	50.2	61.3	56.9	50.6	53.4
North West	51.4	65.5	55.4	56.2	54.0	56.5
Western Cape	96.6	100	84.7	68.6	84.7	86.9
South Africa	68.8	70.3	73.1	64.4	67.4	68.8

Table 19: Percentages of learners having access to their own Reading and Mathematics textbooks

Province	Own Reading	Own Mathematics	Mean
	textbook	textbook	
	%	%	%
Eastern Cape	42.1	42.3	42.2
Free State	60.9	49.1	55.0
Gauteng	55.8	51.1	53.5
KwaZulu-Natal	40.3	39.9	40.1
Mpumalanga	44.8	34.6	39.7
Northern Cape	29.9	28.4	29.2
Limpopo	44.2	43.1	43.7
North West	35.4	24.7	30.1
Western Cape	49.1	36.9	43.0
South Africa	45.6	41.1	43.4

Table 20: Access to resource centres by teachers

Province	Available (%)
Eastern Cape	46.7
Free State	8.8
Gauteng	65.8
KwaZulu-Natal	43.8
Mpumalanga	45.8
Northern Cape	57.8
Limpopo	29.9
North West	15.6
Western Cape	83.7
South Africa	44.7

Table 21: Unique access indicator for material resources

Province	Teaching aids	Textbooks	Resource centres	Mean indicator
	%	%	%	%
Eastern Cape	64.9	42.2	46.7	51.3
Free State	62.5	55.0	8.8	42.1
Gauteng	87.3	53.5	65.8	68.9
KwaZulu-Natal	74.3	40.1	43.8	52.7
Mpumalanga	54.4	39.7	45.8	46.6
Northern Cape	68.9	29.2	57.8	52.0
Limpopo	53.4	43.7	29.9	42.3
North West	56.5	30.1	15.6	34.1
Western Cape	86.9	43.0	83.7	71.2
South Africa	68.8	43.4	44.7	52.3

Table 22: Mean indicator for advice to teacher from principal

Percentage of teachers receiving advice 'sometimes' or 'often'			
Province	Reading teachers	Mathematics teachers	Mean
	%	%	%
Eastern Cape	89.7	89.7	89.7
Free State	87.0	72.4	79.7
Gauteng	85.8	96.1	90.9
KwaZulu-Natal	89.8	86.5	88.1
Mpumalanga	88.0	82.2	85.1
Northern Cape	75.4	59.0	67.2
Limpopo	83.6	89.2	86.4
North West	100.0	85.3	92.6
Western Cape	92.9	84.3	88.6
South Africa	88.7	87.1	87.9

Table 23: Percentages for the frequency of Reading and Mathematics tests

Province	Reading tests				Mathematics tests			
	1 + per week	2/3 per month	Less often	Equivalent as 1 test per week	1 + per week	2/3 per month	Less often	Equivalent as 1 test per week
	%	%	%	%	%	%	%	%
Eastern Cape	18.6	52.5	29.0	60.9	30.1	41.8	28.1	63.3
Free State	5.1	35.7	59.1	43.7	46.9	6.5	46.6	62.6
Gauteng	12.8	18.6	68.6	42.4	53.7	36.6	9.7	79.0
KwaZulu-Natal	23.7	46.2	30.1	62.0	27.4	60.6	12.1	68.3
Mpumalanga	0	53.2	46.8	47.2	22.0	37.8	40.1	55.7
Northern Cape	7.5	68.1	24.5	59.0	8.3	53.2	38.5	51.2
Limpopo	15.1	55.6	29.2	59.5	40.1	54.9	5.1	75.7
North West	33.7	34.5	31.8	64.7	64.2	3.8	32.0	74.6
Western Cape	37.4	58.0	4.6	77.2	14.5	45.2	40.3	52.8
South Africa	18.1	44.5	37.3	57.1	36.1	41.4	22.5	67.6

Table 24: Percentages of teachers giving at least one test per week

Province	Writing at least one test per week		
	Reading	Mathematics	Mean
Eastern Cape	60.9	63.3	62.1
Free State	43.7	62.6	53.2
Gauteng	42.4	79.0	60.7
KwaZulu-Natal	62.0	68.3	65.2
Mpumalanga	47.2	55.7	51.5
Northern Cape	59.0	51.2	55.1
Limpopo	59.5	75.7	67.6
North West	64.7	74.6	69.7
Western Cape	77.2	52.8	65.0
South Africa	57.1	67.6	62.4

Table 25: Mean frequency of homework given on most days

Province	Homework assigned		Homework mostly/always corrected		Homework assigned and corrected
	Reading	Mathematics	Reading	Mathematics	Mean
	%	%	%	%	%
Eastern Cape	40.5	48.7	52.6	66.5	52.1
Free State	34.4	54.8	63.3	79.3	58.0
Gauteng	50.8	58.5	62.7	60.5	58.1
KwaZulu-Natal	30.5	46.2	50.2	67.1	48.5
Mpumalanga	41.2	50.2	57.5	66.7	53.9
Northern Cape	28.3	43.4	42.6	50.9	41.3
Limpopo	44.8	62.8	52.1	63.3	55.8
North West	46.3	43.3	53.4	71.7	53.7
Western Cape	25.7	70.6	35.8	65.0	49.3
South Africa	39.2	53.8	53.1	66.2	53.1

Table 26: Mean indicator for teaching quality

Province	Means for			
	Advice given to teachers	Tests given	Homework	Teaching quality
	%	%	%	%
Eastern Cape	89.7	62.1	52.1	68.0
Free State	79.7	53.2	58.0	63.6
Gauteng	90.9	60.7	58.1	69.9
KwaZulu-Natal	88.1	65.2	48.5	67.3
Mpumalanga	85.1	51.5	53.9	63.5
Northern Cape	67.2	55.1	41.3	54.5
Limpopo	86.4	67.6	55.8	69.9
North West	92.7	69.7	53.7	72.0
Western Cape	88.6	65.0	49.3	67.6
South Africa	87.9	62.4	53.1	67.8

Table 27: Percentages of learners attending school regularly

Province	%
Eastern Cape	93.6
Free State	93.6
Gauteng	95.5
KwaZulu-Natal	90.0
Mpumalanga	91.4
Northern Cape	93.2
Limpopo	90.0
North West	97.3
Western Cape	92.7
South Africa	92.7

Table 28: Home assistance 'most of the time' with Reading and Mathematics schoolwork

Province	Ensure homework is done %	Help with homework %	Look at schoolwork done %	Ask to read %	Questions on school Reading work %	Ask to do mathematical calculations %	Questions on school Mathematics work %	Sign Reading homework %	Sign Mathematics homework %	Mean
Eastern Cape	37.6	29.5	36.2	29.5	30.9	30.5	28.9	46.9	54.8	36.1
Free State	58.2	37.4	32.3	43.0	44.9	26.1	29.6	61.6	84.8	46.4
Gauteng	55.0	31.6	46.3	21.0	30.8	24.6	27.5	67.8	88.3	43.7
KwaZulu-Natal	53.6	40.6	37.0	24.7	34.0	29.3	34.9	64.7	63.8	42.5
Mpumalanga	46.6	36.7	42.7	31.5	39.8	38.9	37.7	53.1	44.0	41.2
Northern Cape	38.2	29.9	32.4	25.8	30.0	27.4	26.5	20.4	32.0	29.2
Limpopo	40.8	30.5	37.8	26.1	31.7	25.4	33.6	45.2	28.3	33.3
North West	44.4	40.8	43.2	34.7	35.5	33.8	32.3	68.8	50.4	42.7
Western Cape	56.8	33.2	37.9	18.6	24.3	30.9	27.6	69.4	71.5	41.1
South Africa	48.4	34.5	39.0	27.2	33.1	29.2	31.4	58.1	59.7	40.1

Table 29: Percentage of official school days on which schools were functioning

Province	Mean (%)
Eastern Cape	97.1
Free State	99.0
Gauteng	99.2
KwaZulu-Natal	98.0
Mpumalanga	98.6
Northern Cape	98.3
Limpopo	98.3
North West	98.0
Western Cape	99.6
South Africa	98.3

Table 30: Mean quality indicator for learner participation

Province	School attendance by learners	Home assistance	School functioning days	Mean indicator for learner participation
	Mean %	Mean %	Mean %	%
Eastern Cape	93.6	36.1	97.1	75.6
Free State	93.6	46.4	99.0	79.7
Gauteng	95.5	43.7	99.2	79.5
KwaZulu-Natal	90.0	42.5	98.0	76.8
Mpumalanga	91.4	41.2	98.6	77.1
Northern Cape	93.2	29.2	98.3	73.6
Limpopo	90.0	33.3	98.3	73.9
North West	97.3	42.7	98.0	79.3
Western Cape	92.7	41.1	99.6	77.8
South Africa	92.7	40.1	98.3	77.0

Table 31: Percentages for the frequency of teacher-parent and parent-teacher meetings

Province	Teachers frequently meeting with parents		Parents frequently meeting with		Mean %
	Reading teachers	Mathematics teachers	Reading teachers	Mathematics teachers	
	%	%	%	%	
Eastern Cape	82.0	87.0	39.6	35.9	61.1
Free State	77.6	89.3	44.5	43.1	63.6
Gauteng	97.7	93	47.6	48.2	71.6
KwaZulu-Natal	87.7	85.9	41.0	43.4	64.5
Mpumalanga	59.8	75.1	25.2	30.5	47.7
Northern Cape	68.0	46.8	27.6	32.6	43.8
Limpopo	52.6	59.1	34.1	30.2	44.0
North West	89.6	86.4	39	38.1	63.3
Western Cape	100.0	91.6	54.9	51.3	74.5
South Africa	81.1	82.4	40.6	39.8	61.0

Table 32: Percentage of learner behavioural problems 'having never occurred'

Province	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Mpumalanga	Northern Cape	Limpopo	North West	Western Cape	South Africa
Arriving late for school	0.0	7.9	0.0	0.0	0.0	0.0	0.0	0.0	5.5	1.0
Absenteeism	0.0	0.0	4.5	4.7	0.0	0.0	0.0	0.0	7.8	2.4
Skipping classes	48.8	61.1	39.7	35.1	34.2	19.6	49.7	63.2	59.7	45.9
Dropping out of school	0.0	8.2	20.9	11.0	25.7	0.0	7.0	12.9	52.2	14.8
Classroom disturbance	41.2	48.0	23.5	40.3	34.0	35.8	65.3	62.1	18.0	41.3
Cheating	17.6	14.0	12.1	8.3	6.4	45.3	24.8	31.5	30.5	17.6
Use of abusive language	17.8	0.0	0.0	3.6	12.6	0.0	25.7	30.3	13.0	12.2
Vandalism	44.0	35.6	10.6	13.3	40.9	29.0	41.5	38.6	49.4	31.3
Theft	29.2	8.1	14.6	3.6	35.0	0.0	25.4	17.4	18.1	17.9
Intimidation of learners	10.0	0.0	0.0	2.1	10.8	15.2	20.3	23.7	13.0	9.3
Intimidation of teachers/staff	87.3	27.1	45.4	61.9	75.9	58.9	83.2	65.4	70.4	67.0
Physical injury to staff	96.8	92.4	75.1	91.1	100.0	100.0	97.2	87.0	100.0	92.0
Sexual harassment of learners	75.4	84.3	60.4	68.4	75.5	59.1	80.3	87.7	85.6	74.5
Sexual harassment of teachers	96.8	100.0	75.1	95.5	100.0	92.6	97.2	94.8	100.0	93.8
Drug abuse	64.3	74.7	61.4	49.7	71.4	71.5	84.1	82.8	85.6	68.6
Alcohol abuse	73.5	59.1	58.8	63.3	77.7	38.2	93.6	82.8	85.6	72.9
Fights	11.8	0.0	0.0	0.0	6.4	0.0	8.9	25.9	0.0	5.9
Health problems	5.5	0.0	5.4	0.0	0.0	0.0	4.2	9.4	5.5	3.6
Mean	40.0	34.5	28.2	30.7	39.3	31.4	44.9	45.3	44.4	37.3

Table 33: Percentage of teacher behavioural problems ‘having never occurred’

Province	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Mpumalanga	Northern Cape	Limpopo	North West	Western Cape	South Africa
Arriving late for school	3.5	16.2	46.2	15.3	0.0	14.7	4.2	0.0	31.8	15.5
Absenteeism	21.0	16.2	70.1	28.6	28.2	63.3	42.1	16.1	59.5	37.4
Skipping classes	62.0	55.2	70.3	67.5	54.5	56.5	42.1	63.9	92.5	63.2
Intimidation or bullying of learners	80.6	60.2	62.3	64.7	81.1	67.6	64.5	52.6	64.0	67.0
Sexual harassment of teachers	100.0	100.0	96.3	91.1	100.0	92.6	97.2	90.6	100.0	96.3
Sexual harassment of learners	95.0	100.0	96.3	91.1	100.0	92.6	97.2	94.8	100.0	95.8
Use of abusive language	74.6	44.7	66.0	58.3	83.4	29.5	72.3	77.1	82.2	68.6
Drug abuse	93.6	92.8	96.3	78.0	90.2	92.6	85.7	91.2	100.0	89.7
Alcohol abuse	86.4	58.7	96.3	78.6	70.2	76.7	79.9	87.0	85.6	82.2
Health problems	13.1	0.0	11.7	1.8	23.8	31.4	21.3	6.6	15.8	12.0
Mean	63.0	54.4	71.2	57.5	63.1	61.8	60.7	58.0	73.1	62.8

Table 34: Mean quality indicator (percentages) for school management

	Meetings	Learner problems	Teacher problems	School management
	%	%	%	%
Eastern Cape	61.1	40.0	63.0	54.7
Free State	63.6	34.5	54.4	50.8
Gauteng	71.6	28.2	71.2	57.0
KwaZulu-Natal	64.5	30.7	57.5	50.9
Mpumalanga	47.7	39.3	63.1	50.0
Northern Cape	43.8	31.4	61.8	45.7
Limpopo	44.0	44.9	60.7	49.9
North West	63.3	45.3	58.0	55.5
Western Cape	74.5	44.4	73.1	64.0
South Africa	61.0	37.3	62.8	53.7

Table 35: Percentages for learner and principal responses to whether learners were permitted to borrow books from a classroom or a school library

Province	Learners	Principals	Mean
	%	%	%
Eastern Cape	60.4	100.0	80.2
Free State	61.3	79.1	70.2
Gauteng	82.5	94.3	88.4
KwaZulu-Natal	59.8	100.0	79.9
Mpumalanga	57.5	100.0	78.8
Northern Cape	47.4	66.6	57.0
Limpopo	58.2	100.0	79.1
North West	39.7	100.0	69.9
Western Cape	45.8	89.0	67.4
South Africa	60.2	93.8	77.0

Table 36: Means for the Reading and Mathematics test scores of learners on all test items

Province	Learner performance on all test items		Reading and
	Reading	Mathematics	Mathematics
	Mean	Mean	Mean
Eastern Cape	444.3	449.5	446.9
Free State	446.4	447.7	447.1
Gauteng	576.3	552.3	564.3
KwaZulu-Natal	517.5	510.3	513.9
Mpumalanga	428.4	433.6	431.0
Northern Cape	470.5	461.1	465.8
Limpopo	437.0	446.2	441.6
North West	428.0	419.8	423.9
Western Cape	629.1	591.0	610.1
South Africa	492.4	486.2	489.3

Table 37: Variation and equity among schools within provinces and among provinces associated with the Rasch scores of learners in Reading and Mathematics

Province	Variation among schools within provinces									Variation among provinces (rho x 100)
	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Mpumalanga	Northern Cape	Limpopo	North West	Western Cape	
Reading test variance	67.3	49.9	83.8	102.3	55.7	53.8	96.8	35.3	72.3	44.9
Mathematics test variance	60.5	26.3	111.5	92.0	42.8	34.2	103.7	38.9	103.9	41.0
Reading test equity index	132.7	150.1	116.2	97.7	144.3	146.2	103.2	164.7	127.7	55.1
Mathematics test equity index	139.5	173.7	88.5	108.0	157.2	165.8	96.3	161.1	96.1	58.9
<i>Mean equity index for Reading and Maths tests</i>	136.1	161.9	102.4	102.9	150.8	156.0	99.8	162.9	111.9	57.0

Table 38: Final indicators for provinces and South Africa

Province	Quality indicator	Equity indicator	Access indicator
Eastern Cape	896.5	529.4	367.2
Free State	899.8	563.7	307.9
Gauteng	1088.7	546.0	380.6
KwaZulu-Natal	994.2	509.2	344.9
Mpumalanga	871.2	546.8	317.8
Northern Cape	911.5	616.4	304.0
Limpopo	858.0	481.3	297.9
North West	890.8	576.4	284.9
Western Cape	1153.8	593.5	361.0
South Africa	960.5	430.8	339.5

Table 39: Final indicators and efficiency index for provinces and South Africa

Province	Quality indicator	Equity indicator	Access indicator	Area of triangle	Efficiency index
Eastern Cape	896.5	529.4	367.2	304717.4	552.0
Free State	899.8	563.7	307.9	301739.3	549.3
Gauteng	1088.7	546.0	380.6	376903.4	613.9
KwaZulu-Natal	994.2	509.2	344.9	318083.8	564.0
Mpumalanga	871.2	546.8	317.8	288869.8	537.5
Northern Cape	911.5	616.4	304.0	326944.0	571.8
Limpopo	858.0	481.3	297.9	253189.8	503.2
North West	890.8	576.4	284.9	297915.3	545.8
Western Cape	1153.8	593.5	361.0	414841.8	644.1
South Africa	960.5	430.8	339.5	273378.0	522.9