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Implementing Education Quality in Low Income Countries

THE RANGE AND EXTENT OF SCHOOL EFFECTS IN SACMEQ II SCHOOL SYSTEMS

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ABSTRACT

This paper describes in detail the initial analyses of SACMEQ II data, using multilevel modelling techniques, to develop general models of school effectiveness for SACMEQ II member countries and specific models for Tanzania (including Zanzibar). Differences between schools in Grade 6 pupils' reading and mathematics achievements are explored and the percentage of variance in pupil outcomes attributable to school and country levels is estimated before and after adjusting for various pupil and school factors outside the control of the school. A wide range of key factors have been examined such as school location and resources, school leadership, school and community/parent relationships, school inspection, homework and extra tuition, teacher and pupil behaviour problems, grade repetition, and student and teacher absence, and a subset of these were found to be statistically significantly related to student academic achievement. The findings will be discussed in the light of previous research on school effects in sub-Saharan Africa.

CONTENTS

1. INTRODUCTION

The universalization of basic education is neither achievable nor sustainable without the continuous delivery of quality education by school systems. Demand for education quality is also increasing, as governments view the satisfactory performance of their basic education systems not only instrumentally but also strategically in relation to economic development and international competitiveness. The success and realisation of the African Renaissance for the 21st century is dependent on the success of the education systems in African countries, in particular, at the level of primary education, "For nowhere in the world has sustained development been attained without a well-functioning system of education, without universal and sound primary education, …" (President Thabo Mbeki, Opening Speech, Conference on Education for African Renaissance in the Twenty-first Century, Johannesburg, South Africa, 6 December 1999). The value of emphasizing and researching the quality of primary education and the effectiveness of the primary schools of the African countries, where only a small proportion of school-age children are reaching the minimum required competencies in numeracy and literacy, is acute, especially as other countries around the world are gradually realising their goals of *Education for All* (World Conference on Education for All 1990). The acquisitions of both the essential learning tools and the basic learning content required by human beings "to be able to survive, to develop their full capacities, to live and work in dignity, to participate fully in development, to improve the quality of their lives, to make informed decisions, and to continue learning" (World Declaration on Education for All 1990, Article 1, Paragraph 1) is hard to achieve without minimum competencies in numeracy and literacy of all citizens, in particular, the younger generation – the primary school age children near or at the end of their primary education – because it provides not only an exit point to monitor and evaluate the quality of the primary education but also a starting point to gauge the inputs of those students who enter the secondary education.

Arrangements to monitor the effectiveness of schooling and accountability of the school systems are in place for every government to improve education quality to meet the challenges of global economy. In the 1990s a successful strategy for capacity building in the area of monitoring and evaluating education quality was developed through the establishment of a consortium of fifteen Ministries of Education known as the *Southern and Eastern Africa Consortium for Monitoring Educational Quality* (www.sacmeq.org). In its second survey which took place in 2000-2002, SACMEQ collected data on the conditions of schooling and the quality of education in fourteen school systems of its members: Botswana, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania (Mainland), Tanzania (Zanzibar), Uganda, and Zambia. In particular, data included Grade 6 students' achievements in mathematics and reading comprehension and their personal and family characteristics, and school contexts and process factors. For further information about SACMEQ II, see Murimba (2005a; 2005b). At present, SACMEQ is conducting its third round of survey (SACMEQ III). Several important reports (e.g. *Education for All Global Monitoring Report* 2006, 2007 and UNESCO Institute for Statistics 2006 report on *Teachers and Educational Quality: Monitoring Global Needs for 2015*) have used some parts of SACMEQ II data from different perspectives. However, systematic analyses of SACMEQ II data to understand school effects and school effectiveness are only emerging, e.g., Lee, Zuze and Ross (2005) and Zhang (2006). The secondary analyses of the SACMEQ data provide a cost-effective and directly relevant investigation into the complexity of school effectiveness in these countries. However, it is important to note that the SACMEQ II data are cross-sectional and not longitudinal and therefore established methods of examining "value added" measures of school effectiveness in terms of relative pupil progress (see Scheerens *et al.* 2003; Thomas *et al.* 1997) will not be possible. Thus in the absence of longitudinal data, an alternative and more limited approach to estimating school effects can be used that adjusts student achievement data using proxy measures of socio-economic status and other relevant student and school background characteristics. The *School Effectiveness and Education Quality* (SeeQ) project, which uses SACMEQ data, is one of the five large-scale research projects, along with Curriculum Change, ICTs, Language and Literacy, Leadership and Change, within the DfID-funded Research Programme Consortium on *Implementing Education Quality in Low Income Countries* (www.edqual.org). Below we provide further details of the purposes and aims of the SeeQ project – *seek*ing for *quality* education.

2. THE SCOPE OF THE SEEQ PROJECT: AIMS AND PLANNED OUTCOMES

The SeeQ project aims to use multilevel modelling techniques to analyse SACMEQ data to develop quantitative models of school effectiveness and school quality indicators of the fourteen Sub-Sahara African school systems. It comprises two main research phases – (a) secondary analyses of SACMEQ II and III data[1] and (b) the implementation of case studies in more/less/mixed effective schools identified in the above (or alternative) analyses. Multilevel modelling techniques using MLwiN (www.mlwin.com) are employed in the secondary data analyses to explore and identify quantitative models to create school effectiveness indicators relevant in sub-Saharan context, and to identify the correlates and processes of effective schooling in those school systems. The analyses aim to understand the impact of in-school as well as out-of-school factors on student achievement in reading and mathematics (SACMEQ II) and where possible also the awareness of the risks and prevention of HIV/AIDS (SACMEQ III). In addition, the SeeQ project will carry out a number of case studies in schools identified as more/less/mixed effective from SACMEQ analyses or alternative methods[2] in South Africa and Tanzania mainland and Zanzibar (three school systems of EdQual partner institutions in Africa and also SACMEQ members). The case studies will focus on school, teacher and student characteristics, conditions and contexts of effective education (e.g. teacher effectiveness, teaching and evaluation strategies, community involvement and support) and the possibilities for enhancing school self-evaluation and improvement of remote and overcrowded schools. The qualitative case study component of the SeeQ project will analyse and build on previous research techniques and conceptual frameworks particularly relevant to Sub-Saharan contexts (e.g. Heneveld 1994; Heneveld and Craig 1996). This will involve placing schoolteachers, and communities as well as policy makers at the heart of the research activities and working with them to develop and evaluate school effectiveness indicators and school improvement and self-evaluation activities and strategies.

Therefore, in terms of research communication and engagement, the SeeQ project aims to develop the capacity of (a) the African partners to become regional centres of excellence in research, teaching and policy advocacy in school effectiveness and (b) policy makers and schoolteachers to understand the key features of school effectiveness in the African context via consultative workshops and seminars and the possibilities for enhancing school self-evaluation and improvement via use of comparative feedback data. The project findings will also inform the further development of SACMEQ and the design of additional longitudinal data that could be used to examine in more detail the size and extent of school effects, the correlates of effective schools and the approaches that could be used for school self-evaluation. The findings of the secondary data analyses will feed into the other four large-scale projects within EdQual to assist the development and implementation of their initiatives in curriculum change, language and literacy, and leadership management. Moreover, the dissemination of the new knowledge generated from the SeeQ project will target various stakeholders through a range of virtual and printed media in order to assist governments in sub-Sahara African countries, DfID and the international development community to improve the monitoring and the implementation of school effectiveness initiatives for academic achievement and to provide quality education for all school-age children to reduce poverty.

As discussed above, the main aim of the SeeQ project is to understand the school effectiveness indicators in SACMEQ countries to assist the policy makers and international development community to improve and ensure the delivery of quality education in low-income countries. The complexity of school effectiveness models according to the existing literature (see *Research Evidence of School Effectiveness in Sub-Saharan African Countries* prepared by the SeeQ team) and the richness of the SACMEQ data also place the SeeQ project in a prime position to play a central role within EdQual to provide the other four large-scale projects with findings of

[1] The limitations of the methodology and the quality, validity and reliability of the data will continuously be reviewed throughout the study. In some cases, it might be necessary to look at other equivalent datasets (e.g. TIMSS 2003, 2007 and PIRLS 2006) to make cross-datasets comparisons on the impacts of in- and out-of-school factors on students' academic achievements. In TIMSS (2003, 2007), two EdQual partner countries (Ghana and South Africa) participate; in PIRLS (2006), only South Africa participates.

[2] The specific approach to be used for school case study selection will depend on the results of the secondary SACMEQ (or alternative) data analyses. However, due to school anonymity in the SACMEQ datasets, it will not be possible to identify outlier schools without government/SACMEQ approval . The implementation of the case studies will also be subject to the consent of the school administrations and teaching staff.

direct relevance to inform and assist the development, implementation and mainstreaming of their initiatives. The SeeQ project will contribute to the other four large-scale projects through the development of school quality indicators that may be used in the evaluation of initiatives developed by them. The findings from the multilevel analysis of the large datasets will complement the qualitative action research approach of other large-scale projects to strengthen the integrity and persuasiveness of EdQual as a whole in the eyes of key national and international policymakers.

Besides the expected benefits at the national and international policy levels, the SeeQ project also aims to influence the local community of the schools via a number of case studies. It is well established that a school can never be effective without the sufficient support of the wider local community, of which it is an essential part, for example, the parents. It also holds true that schools can have significant impacts not only on the students but also on the wider local community, through the parents of the students and the students themselves as members of the wider local community. In particular this applies in the African context in relation to HIV/AIDS which is causing dramatic changes to the school systems and the delivery of basic education and its quality. HIV/AIDS is not only an issue for the schools but also for the wider local community. The analyses of SACMEQ III which will include data on students' awareness and knowledge of HIV/AIDS risks and prevention will help to illuminate the possible strategies that schools and the local communities can use to work in partnership to combat the HIV/AIDS problems. It also provides an interesting new research perspective for school effectiveness.

In summary, the SeeQ project aims to focus on the development of three areas: research, policy, and capacity building in school effectiveness and improvement. In particular, it aims to:

1) explore and identify quantitative models to create school effectiveness indicators relevant in low-income countries, in particular, sub-Sahara African contexts;
2) inform the further development of SACMEQ and the design of additional longitudinal datasets that could be used to examine in more detail the size and extent of school effects, the correlates of effective schools and the approaches that could be used for school self-evaluation;
3) feed into the other four large-scale projects in EdQual to assist them to develop, implement and mainstream their initiatives for improving educational quality;
4) inform and engage various stakeholders such as governments in sub-Saharan countries, DfID, international development community and schoolteachers to improve the monitoring and the implementation of school effectiveness initiatives for academic achievement and HIV/AIDS awareness so as to provide quality education for school age children to reduce poverty;
5) develop the capacity of (a) the research team members in project management and research into school effectiveness in low-income countries, (b) the African partners to become regional centres of excellence in research, teaching and policy advocacy in school effectiveness and (c) policy makers and schoolteachers and school communities (including parents) to understand the key features of school effectiveness in the African context and the possibilities for enhancing school self-evaluation and improvement via the use of comparative feedback data.

In correspondence with the research aims as listed above, the SeeQ project will have the following main outcomes:

- identification of quantitative models to estimate and create "proxy" school effectiveness indicators relevant in sub-Saharan countries, through the secondary analyses of SACMEQ II and III datasets;
- identification of detailed school characteristics, conditions and contexts (e.g. teaching and evaluation strategies, community and parent involvement) to explain the differences in school effectiveness, through the case studies at South African and Tanzanian primary schools;
- identification of the existing evidence and future opportunities for school evaluation and self-evaluation, through the case studies at South African and Tanzanian primary schools;
- provision of empirical quantitative evidence to the other four large-scale projects to support the development, implementation and mainstreaming of their new initiatives;
- recommendations to SACMEQ for its further development and management in data collection and dissemination to exert its greater policy influence on school effectiveness and quality primary education in its member countries;

- seminars for policy makers, researchers and schoolteachers to understand the key features of school effectiveness in the African context.

After the identification of the school effectiveness models and indicators, recommendations will be made by the SeeQ project in relation to new initiatives and strategies on how to improve data collection, school self evaluation and school effectiveness by addressing various in- and out-of-school context factors (e.g. location, absenteeism, grade repetition and home work, availability and accessibility of classroom and library materials, extra tuition, parent and community involvement, characteristics of teachers, teaching practice and teacher job satisfaction, and school management and leadership among other will be examined in the secondary data analyses and case studies). Recommendations will be disseminated via 1) a series of seminars for policy makers, researchers and schoolteachers to understand the key features of school effectiveness (including feeding into the dissemination workshops of the other four large-scale projects, where appropriate), 2) the other four large-scale projects, and 3) the policy advocacy of the African partners (incl. SACMEQ). In the longer term the SeeQ project aims to enhance the promotion of new initiatives through supporting the implementation and mainstreaming of the initiatives by African partners. Another key outcome will involve the development of a school self-evaluation checklist which schools can use to identify areas of strength and weakness in relation to enhancing student enrollment, outcomes and the quality of educational provision.

3. METHODOLOGY

3.1 Research Questions

The overall research question to be addressed at Phase I stage of secondary analyses of the SACMEQ II data is:

What are the relative impacts of different in- and out-of-school factors contributing to effective schooling for academic achievement (literacy and numeracy)

In particular, the secondary analyses of SACMEQ datasets will address the following key research questions:

- What statistical and modeling approaches are appropriate to create school effectiveness and improvement measures in the African context?
- What pupil assessment and other data is appropriate to measure educational progress?
- What current and new outcome and explanatory variables are appropriate to examine school effectiveness and improvement in the African context?

Further key research questions to be addressed at the Phase II stage of case studies are:

- What school characteristics, conditions and contexts (e.g. teaching and evaluation strategies, community involvement) can be identified to explain the differences in effectiveness (i.e. between more/less/mixed effective schools)?
- What evidence of school evaluation and self-evaluation can be identified in the African context? Can opportunities for school evaluation and self-evaluation be improved in the African context?

3.2 Methods and Strategies of Data Analysis

The SeeQ project applied multilevel modelling techniques using MLwiN to analyze SACMEQ II data in the first phase of the project. The case studies in the second phase of the research will use both qualitative and quantitative research methods. As mentioned previously, the limitations of the methodology and the quality, validity and reliability of the data will be continuously reviewed throughout the study. This paper reports the findings of the first phase.

Schooling systems usually group, nest or cluster students within classes and schools, which themselves may be clustered within education authorities and countries. This is exactly the case for the SACMEQ II datasets. The SACMEQ II consists of 14 member countries. Data was collected from different schools, areas and countries. The traditional regression analyses suffer from the lack of validity through failing to take account of the school level clustering of students. An analysis that explicitly models the manner in which students are grouped within schools has several advantages. First, it enables data analysts to obtain statistically efficient estimates of regression coefficients. Secondly, by using the clustering information it provides correct standard errors, confidence intervals and significance tests, and these generally will be more "conservative" than the traditional ones which are obtained simply by ignoring the presence of clustering. Thirdly, by allowing the use of covariates measured at any of the levels of a hierarchy, it enables us to explore the extent to which difference in average academic achievement test results (and HIV/AIDS knowledge tests where available) between schools are accountable for by factors such as school climate, teaching practice or possibly in terms of other characteristics of the student background characteristics (e.g. gender, age, socio-economic status), resource allocation and school management – interests of investigations for the SeeQ project. It also makes it possible to study the extent to which schools differ for different kinds of students, for example to see whether the variation between schools is greater for girls than for boys (e.g. Goldstein *et al.* 1993) and whether some factors are better at accounting for the variation for the former students than for the latter. Finally, it provides sophisticated quantitative evidence that can be used to inform the evaluation and screening of individual schools, using the performances of their students after adjusting for background and context factors. This can be done straightforwardly using a multilevel modelling approach. In some cases, some of the schools from the SACMEQ datasets may have very few students; fitting a separate model for each of these schools will not yield reliable estimates. The multilevel modelling approach can help us to obtain more precision by regarding the schools as a sample from a population and using the information available from the whole sample data when making estimates for any one school.

The multilevel analysis of SACMEQ II data of the fourteen school systems involved several steps:

1) Identifying possible SACMEQ pupil outcome variables to be used in analyses;
2) Identifying the extent of between/within school/country variability in pupil outcomes via means and standard deviations of the data of all the fourteen school systems;
3) Identifying variability (ICC) in pupil outcomes at three (pupil, school, country) and two (pupil, school) levels;
4) Deciding which modelling approach in the first instance (2 or 3 levels);
5) Using the following models for each pupil outcome measure: reading comprehension and mathematics:
    A. no explanatory variables
    B. pupil background characteristics (including only those that are statistically significant when tested individually and jointly)
    C. school context variables (e.g. %SES) (including only those that are statistically significant when tested individually and jointly)
    D. a) school process factors (Block A, including only those that are statistically significant when tested individually and jointly), b) school process factors (Block B, including only those that are statistically significant when tested individually and jointly), and c)…etc according to Heneveld's school effectiveness frameworks (Heneveld 1994; Heneveld and Craig 1996)
    E. pupil background characteristics and school context variables (i.e. Model B and C variables)
    F. a) pupil background characteristics, school context (e.g. % SES), school process factors (Block A), b) pupil background characteristics, school context (% SES), school process factors (Block B) etc
    G. Final model including all statistically significant pupil background, school context & school process variables. This tests all process and resource groups/blocks of statistically significant variables (tested individually and jointly using criteria for model F) against basic 'school effectiveness' model (Model E) to explore how well the key process and resource variables (assumed to be within control of school or education system) seem to explain any apparent differences estimated between schools (and countries) using 'school effectiveness' Model E.
6) Check and contrast model results for individual school systems (e.g. Tanzania mainland and Zanzibar and South Africa).

In order to facilitate the comparison between the model results a key aim of the analysis was to identify a consistent set of explanatory variables for both reading and mathematics outcomes for each model above, where appropriate.

The explanatory variables for models B and E were selected because:

1) they were clearly outside the control of the school and have a statistically significant impact on reading and mathematics scores.
2) they were found to be statistically significant when tested individually and in combination with similar variables (i.e. within identified 'blocks' of similar variables) - statistically significant in terms of the coefficient estimate being 1.96 times larger than the associated standard error.
3) when tested individually and in combination the subsequent model was found to have statistically significantly improved the fit of the model - tested by checking the percentage of total variance explained has increased and also tested using chi squared statistic.

At the same time, the relevance of the following issues were also reviewed or checked:

- Check that transformations of the same variable are not used in the same model at the same time (e.g. raw score and normalised raw scores; individual and composite variables; different types of dummy variables). In each case only one approach was used. This was decided on by the significance tests outlined above or information about data quality.
- Test all selected variables/blocks in combination to identify those variables that remain significant/become not significant.
- Decide whether or not to exclude non-significant variables (note that a variable should normally be included if it is statistically significant either reading, or mathematics or both)
- Consider whether school context (i.e. pupil aggregated variables) should also be included/tested (Note: school context variables are often treated differently and/or as proxies when student level data is missing)
- Check whether country context (i.e. pupil/school aggregated variables) should also be included/tested.
- Establish basic models for reading and mathematics and prepare descriptive statistics and plots showing range and extent of school effects across and within SACMEQ school systems.

All the analysis above used SACMEQ II data of all the fourteen school systems in order to identify some (if any) generic school factors that can promote school effectiveness across the fourteen systems.

4. FINDINGS

4.1 The Fourteen School Systems

Overall it was found that all models had quite poor "goodness of fit". The explanatory models were not particularly good at explaining differences in student achievement in reading or mathematics, although better data fit was noted for reading (38% maximum total variance explained) than mathematics (31% maximum total variance explained, as shown in Models G^+ (see Table 1 for reading comprehension and Table 2 for mathematics). Due to the fact that not all school systems in SACMEQ II collected data on teacher's knowledge and skills in reading and mathematics, we analysed the data in Models G and G^+ excluding and including data on teacher knowledge/skill respectively. Without including data on teacher knowledge/skill (i.e. Model G), the maximum total variance explained by the model was 30% for reading (see Table 1) and 22% for mathematics (Table 2). The performance of the models further demonstrated that:
Significant student characteristics (Model B) explain 35% of the differences between schools in reading comprehension, and this increases to 45% and 54% when school context (Model E) and process factors (Model G) respectively are also included. The equivalent figures for mathematics, as shown in Table 2, are 25% (Model B), 30% (Model E) and 41% (Model G).

In terms of raw achievement scores (Model A), 32% variance in student reading comprehension is attributable to difference between schools and 20% to differences between countries. The equivalent figures for student mathematics achievement are 28% (between-school difference) and 23% (between-country difference)
Having accounted for significant/key student personal and family characteristics (Model B), 27% remaining variance in student reading comprehension is attributable to difference between schools and 16% to differences between countries. The equivalent figures for mathematics achievement are 26% (between-school difference) and 19% (between-country difference).
Having also accounted for significant/key school context factors (Model E), 24% remaining variance in student reading comprehension is attributable to difference between schools and 19% to differences between countries. The equivalent figures for mathematics achievement are nearly the same as for student reading comprehension ability.
Having also accounted for significant/key school and teacher process factors (Model G), 21% remaining variance in student reading comprehension is attributable to difference between schools and 18% to differences between countries. The equivalent figures for mathematics achievement are 22% (between-school difference) and 20% (between-country difference).

Generally, in line with previous research, pupil background factors were found to have statistically significant impact on pupil achievement. In terms of negative impacts, it is found that pupil's age (in months), not staying with parents at night, number of days absent from school (particularly in relation to certain reasons for being absent such as being ill, having to work to support the household, and fees not paid) and grade repetition (though not necessarily for repeating Grade 6) all had statistically significant and negative effects on pupil's achievement in reading comprehension, and in mathematics too, across Models B-G^{+}. Older pupils achieved worse than younger ones, which may be due to their starting school later or/and repeating grades which itself seemed to have detrimental effects on pupils' academic achievements. The place where a pupil stayed at night also seemed to have played an important role in his/her academic achievements. (Being able to) staying with parents was more beneficial than staying with relatives, in a hostel or by his/her own, in a decreasing order. Although it is hard to tease out to what extent this has to do with family stability and parents' support and help, it is prudent to say that availability of parents, even if just physically, may lend a helping hand to the learning of their child(ren). However, the extent to which student's academic achievement is affected by their parents' engagement with reading and mathematics remains unclear, even puzzling (but see Booth 1995; Booth 1996; Booth 2003). In terms of positive effects, it is found that the frequency of speaking English at home, number of books available at home (both of which may well be important indicators of socio-economic status), and the socio-economic status of pupils had statistically significant and positive effects on achievements in reading comprehension and mathematics across the models. Furthermore, in terms of pupil gender, girls on average attained significantly higher scores than boys in reading comprehension, but lower scores in mathematics. Unsurprisingly, the higher a pupil's socio-economic status – a composite of data on parents' education levels, possessions at home except for books, and the quality of house in terms of its floor and wall materials and lights – the better his/her academic achievements in reading comprehension and mathematics.

As a school context factor, the average of the pupils' socio-economic status at school level also had statistically significant and positive effects on pupils' academic achievements in reading comprehension and mathematics. So did class size. It is noted that pupils in larger classes tended to have higher scores in both reading comprehension and mathematics, although overall pupils in larger schools performed worse than those in schools with smaller number of pupils. Furthermore, we noticed significant difference in achievements between schools in rural areas and in large cities (see also Zhang 2006 on the rural/urban discrepancies in resources). However, such effects attributable to school location and school average of socio-economic status dropped at a great extent when we took into account school process factors (i.e. in Model G and G^{+}). This holds true for both reading comprehension and mathematics.

Among the school process factors, lack of resources (e.g. exercise book, pencils, rulers, pens) had statistically significant and negative effects on pupils' academic achievements. A pupil in a school where s/he could have his/her own place to sit down and write on and where teachers could have access to English dictionaries was more likely to achieve higher scores in both reading comprehension and mathematics, although maybe less likely so in mathematics achievement. Overall, it is noted that pupils in a well-resourced school had higher scores in reading comprehension and mathematics. Various other school process factors were also found to

have exerted statistically significant impacts on pupils' academic achievements. For example, both as an indicator of teachers' professional commitments to teaching and the relationship with and involvement of parents, percentage of parents meeting the teacher had statistically significant and positive effects on pupils' reading comprehension and mathematics. As an indicator of school-community relationships, whether community contributed to the cost of textbooks was positively related to pupils' reading comprehension and mathematics. The effects of school head teacher's academic qualification on pupils' academic achievement seemed to be mixed: positive on reading comprehension but not significant on mathematics. In addition, when subject teachers' knowledge/skill data was included (i.e. Model G^+), school head teacher's academic qualification was no longer significant for reading, nor for mathematics. In terms of effects of subject teachers' academic qualification and professional teacher training on pupils' achievement, a more complex picture emerged. Generally speaking, the more the teachers were trained in terms of the average number of teacher training years of a school, the more likely the pupils of the school achieve higher scores in reading comprehension and mathematics. However, in terms of teachers' academic qualification (e.g. junior secondary, senior secondary, A-level, or tertiary), higher qualification of teachers did not always necessarily bear out higher achievements of their pupils, as demonstrated in Model G. Pupils whose teachers had only junior secondary education themselves had higher scores in reading comprehension and mathematics than those pupils whose teachers had tertiary education. Nevertheless, it should be pointed out that such effects phased out when teachers' subject knowledge/skill data was included in the analysis (i.e. Model G^+). One possible explanation for this may be that data on teachers' knowledge/skill was able to speak for their academic qualifications. Further school process factors were identified to have significant effects on pupils' academic achievements, in particular, the extent to which schools face pupils' and teachers' behaviour problems. Teachers' and pupils' absenteeism (see above in Model B where pupils absenteeism as a pupil-level variable) and pupils' dropout had detrimental effects on pupils' academic achievements in reading comprehension and mathematics in both Models G and G^+. Finally, pupils whose teachers assign homework were found to have statistically significant higher achievements in reading comprehension and mathematics than those who did not have assignments.

4.2 Tanzania Mainland and Zanzibar and South Africa

The findings of school effects reported above are based on data of all the fourteen school systems. In other words, it is a kind of averaged effects. It is important to test these models, using the same identified variables but at two levels (school and pupil), to see whether and to what extent the models were fit for each individual school system. In this section, we report such analyses on the data of Tanzania mainland (see Tables 3 and 4) and Zanzibar (see Tables 5 and 6) and South Africa (see Tables 7 and 8). As clearly demonstrated in Tables 3-8, many of the pupil and family characteristics as well as school context and process factors were no longer statistically significant when they were applied to the data of a particular school system. In addition, what was considered significant for one school system may not be so for another (see Lee *et al*. 2005). The over 60% school-level variance in South Africa (66% for reading comprehension and 63% for mathematics) presents a very difference case for analyses on the data of Tanzania mainland (32% for reading comprehension and 25% for mathematics) and Zanzibar (27% for reading comprehension and 34% for mathematics).

These raise not only the question about the fitness of the models but also the urgency of being context-sensitive when establishing and interpreting school effectiveness models and when implementing findings from models developed from one country or school to another. SACMEQ II countries may share many similarities in their economic, social and educational development, but they are by no means a single unit. As many researchers have argued (e.g. Creemers 1994; Fuller and Clarke 1994; Hannaway and Talbert 1993; Sammons *et al.* 1995; Wimpleberg *et al.* 1989), it is important to recognize that findings from school effectiveness studies do not provide a blueprint or recipe for the creation of more effective schools and should not be applied mechanically without reference to the particular contexts of a country or school. The complexity of local conditions should receive much more attention in interpreting and understanding school effectiveness indicators. Fertig (2000) posits a contextually-related view of school effectiveness and calls for incorporating the perceptions of different stakeholders into the examination of school effectiveness, rather than in simple relation to an "objective" checklist(s) derived from research in different cultural contexts and often done years earlier. As Fertig (2000) argues that "school effective research in developing countries needs to move towards a more contextual model, one which takes account of the internal processes within the school, the socio-economic, political and cultural

contexts in which the organisation operates, and the perspectives which different stakeholder groups bring to bear on the activities of the school" (p. 395), and "to move towards a more qualitative approach to research in the developing world, one which looks clearly at the perspectives and contexts in which different groups of actors in the process operate" (*ibid.*). Scheerens (2001a) envisages integration of school process indicators as the most "responsible" way to improve school effectiveness. In a broader context, Fuller and Clarke (1994) urged to pay more attention to cultural contingencies when conducting school effectiveness studies in developing countries.

Furthermore, each country has its own educational policies and goals/functions (e.g. Heneveld and Craig 1996 highlighted the different educational goals of primary education of Madagascar and Swaziland), and these system-wide differences in educational goals emphasizes that the criteria for judging/determining school effectiveness should take into account the contextual factors within which each school/nation operates. Lockheed and Levin (1993), in the introductory chapter of the edited book (Levin and Lockheed 1993) suggested that the success of the initiatives of school effectiveness studies was attributable to their *flexibility* and *adaptation* to local circumstances. Cheng (1996) makes a systematic analyses on the interactions between the goals and functions of schooling and judgement of school effectiveness from the perspectives of organizational management. Simple comparison of literacy or numeracy scores between the countries/schools as a single criterion of school effectiveness is flawed. Scheerens (2001b), similarly, calls for "the importance of taking into account the macrolevel context when study school effectiveness in developing countries, both in the sense of structural and cultural conditions" (p.356). Elsewhere researchers have been persistently arguing for the importance of educational contexts and goals of a specific system when considering the effectiveness of a school. Various questions remain such as effectiveness for whom, for what, and at what (Slee *et al.* 1998). As Harber and Davies (1997) argue: "Ineffective schools are usually effective for someone or for some interest" (p.167), and therefore school effectiveness indicators/dimensions should be understood contextually due to the significant material and ideological differences between schools (Harber and Muthukrishna 2000). For example, South African's educational ideology aimed at fostering a non-violent, non-racist and democratic society are rarely featured "in the indexes of Western books on school effectiveness" (Harber and Muthukrishna 2000: 430). "Great care is needed in the automatic international transfer of school effectiveness characteristics." (*ibid.*, 432).

It is equally important to follow the same procedures as described in section 3.2 to start a whole process of identifying significant variables and blocks of variables from data of each individual school system to develop optimal model(s) of school effectiveness pertinent to that particular school system only. This will be reported in SeeQ Working Paper No. 2 (see section 5 below).

4.3 Consultative Workshops in Tanzania Mainland and Zanzibar

Consultation workshops with educational policy makers, teachers and other key stakeholders form an integral and routine part of the dissemination, engagement and knowledge transfer of the SeeQ project. At recent workshops at Tanzania mainland and Zanzibar (July/August 2007), we asked the participants the following two questions:

In your professional view, are the student, teacher and school factors identified in this analysis the most important to take into account when estimating school quality and "school effectiveness" and/or explaining the effectiveness of schools?
When conducting the SeeQ case studies of more or less or mixed effective schools, what other factors would you recommend that we examine in detail in terms of successfully promoting educational quality, student retention/enrolment and enhancing student achievement in literacy and numeracy?

The feedback data collected from the workshops attendees will be analyzed to explore the discrepancies in the importance of certain variables towards effective schooling as considered by the stakeholders and as demonstrated in the multilevel analyses. Findings from the feedback data will be added to this working document.

5. FURTHER SACMEQ II ANALYSES AND STEPS FORWARD

Overall the analysis on data of the fourteen school systems is fairly robust given the large sample size and is useful not only to summarize the "average" impact of student and family characteristics, school context and process factors on student achievements in reading comprehension and mathematics but also to identify some generic school factors that may be used by international donors and policy makers to promote school effectiveness across the fourteen systems in Sub-Saharan Africa. The findings are also important as a baseline to compare against individual country results (e.g., see 4.2). However, due to economic, social and political differences between the school systems, it is essential for education policy makers of a particular school system to understand not only the generic school effectiveness model that may be relevant to their particular educational contexts (because sub-Saharan African countries share some similarities in the quality and delivery of primary education) but also, and probably more importantly, a school effectiveness model that is developed from the data collected from that particular school system only. Indeed, the findings of the analyses using data of the fourteen school systems indicate significant differences between countries in "school effects" which require further exploration (e.g. some factors may not be perfectly equivalent between countries). Therefore, although the sample sizes are smaller, individual country results in some cases may provide better model fit and will better reflect the specific context of different education systems. Therefore, following the same approaches as described in section 3.2, we are conducting two-level (pupil and school) analyses on data of selected individual school systems (to be reported in SeeQ Working Paper No. 2). Additional analyses are also under way to explore the differential school effects for different student groups in terms of their gender, social economic status, family stability and locations (e.g., rural vs. urban). Any finding which is considered counter-intuitive to common sense and research evidence from other school effectiveness studies conducted in sub-Saharan Africa and low-income countries will be explored further. Throughout the project, we discuss our findings and interpretations of the findings with educational policy makers and other key stakeholders in sub-Saharan Africa through consultation workshops as well as other channels. In addition, a number of case studies will be conducted to understand the enablers of effective education in relation to the conditions and contexts of student, school and teacher characteristics (e.g. teacher effectiveness, teaching and evaluation strategies, school and community relationships), and to explore the possibilities for school self-evaluation as a scheme of school improvement and quality management and monitoring.

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APPENDICES

Table 1 SACMEQ II ANALYSIS: ACROSS 14 COUNTRIES (Reading)

	Model A Estimate (n=41686)	Model B Estimate (n=41686)	Model E Estimate (n=41433)	Model G Estimate (n=39310)	Model G+ Estimate (n=33155)
Fixed part (coefficients)					
Cons (Intercept)	498.02	481.80	400.80	357.30	380.70
Pupil variables					
Age in months (centred grand mean)		-0.2799	-0.2558	-0.2381	-0.2563
Gender: girl		3.427	3.575	3.83	1.407
PENGLISH (Ref: never) sometimes		24.09	23.61	22.56	19.59
Often		17.82	17.51	16.04	13
PSTAY (Ref: with parents): with relatives		-9.52	-9.278	-8.294	-7.002
In a hostel		-14.13	-14.41	-13.9	-12.5
Myself		-17.32	-17.14	-16.33	-16.44
PBOOKSHM (Ref: no books): 1-10books		3.601	3.23	2.874	3.178
11-50 books		10.88	10.26	9.544	7.194
51-100 books		17.9	17.28	17.49	13.75
101+ books		17.42	16.57	16.07	12.46
PREAD (Ref: never) asked to read at home: sometimes		4.964	4.853	4.323	4.558
Most of the time		ns	ns	ns	ns
PLOOKWK (Ref: never): home work looked: sometimes		ns	ns	ns	ns
Most of the time		4.321	4.251	2.818	3.403
PQUESTR (Ref: never)questioned in reading at home: sometimes		2.19	2.091	ns	ns
Most of the time		ns	ns	ns	ns
PQUESTM (Ref: never): questioned in maths at home: sometimes		ns	-2.327	-2.346	-2.811
Most of the time		-5.618	-6.013	-6.603	-6.715
PCALC (Ref: never): asked to calculate at home: sometimes		3.355	3.112	2.504	2.316
Most of the time		ns	ns	ns	ns
PEXTENG: take extra tuition in reading		-2.166	-1.901	ns	-5.299
PEXTMAT: take extra tuition in maths		4.802	4.76	4.838	2.597
PEXTOTH: take extra tuition in other subjects		7.407	7.285	7.217	3.003
PABSENT: days absent		-1.711	-1.673	-1.581	-1.484
PABWHY2: YES: being ill		-2.595	-2.286	-2.905	ns
PABWHY4: YES: have to work		-7.64	-7.134	-7.46	-7.043
PABWHY6: YES: fees not paid		-5.913	-6.067	-5.351	-4.596
PREPEAT (Ref: never): once		-23.05	-22.85	-22.65	-21.72
Twice		-23.54	-23.75	-23.62	-23.43
Three times or more		-26.71	-26.66	-25.59	-26.35
PREPEAT6: repeated at Grade 6		-2.358	-2.339	ns	ns
ZPSES (centred around grand mean)		4.812	3.83	3.471	3.183
School Context variables					
STYPE: school type: private			9.718	ns	ns
ZSLOCATI (Ref: isolated/rural): small town			ns	ns	ns
Large city			14.91	9.453	9.05
ZSPUPTOTAL: total number of pupils in school			-0.01319	-0.00961	-0.00763
YCLSIZE: class size			0.5923	0.6598	0.4592
ZPSESschoolmean			9.714	4.521	4.662
School process variables					
XMEEUSUA: percentage of parents meeting teacher				0.2574	0.2055
ZSCOMM04: textbooks contributed by community				7.293	8.042
PBORROW (Ref: no library) can't borrow				-6.92	-6.49
Can borrow				ns	ns

Table 1 contd.

ZPMAT01: exercise book: lack				-12.34	-10.76
ZPMAT03: pencils: lack				-2.686	-2.987
ZPMAT06: rulers: lack				-4.9	-5
ZPMAT07: pens or ballpoint pens: lack				-16.19	-15.6
ZPSIT: having own sitting place				10.61	10.54
ZPWRITE: having own writing place				10.63	11.23
ZSRTOT22: total resources				2.282	1.889
ZYACCES2: access to English dictionary				6.603	7.858
SQACADEM3: academic qualifications of headteacher: HE				8.477	ns
ZSTCHYR: average teacher training years				4.437	3.809
SPUPPO2 (Ref: never): absenteeism of pupils: sometimes				-11.47	-13.23
often				-12.47	-11.42
SPUPPRO4 (Ref: never): dropout of pupils: sometimes				-12.91	-9.346
often				-9.443	ns
ZSTCHPRO1 (Ref: sometimes/often): teachers arriving late: never				12.09	9.614
ZSTCHPRO2 (Ref: sometimes/often): teachers absenteeism: never				5.662	5.277
XQACAD (Ref: primary): teacher academic qualification: junior secondary				10.75	8.331
Senior secondary				7.059	ns
A-level				7.472	ns
Tertiary				7.402	ns
XSATIS01 (Ref: not important): teachers' views on the importance of travel distance: of some importance				9.973	9.993
Very important				7.226	9.702
XSATIS04 (Ref: not important): teachers' views on the importance of teacher housing availability: of some importance				ns	ns
Very important				-7.587	-9.026
ZXSATIS08 (Ref: not important/some importance): teachers' views on the importance of level of salary: very important				7.223	5.597
PHMWKDN: someone other than the teacher makes sure homework is done (Ref: no homework): never				19.53	20.32
Sometimes				19.57	19.83
Most of the time				23.95	24
Teachers subject knowledge (centred around grand mean)					0.05303
Random part (variances)					
Between Countries					
Cons (Intercept)	1955.215	1219.641	1408.008	1241.107	1127.487
Between Schools					
Cons (intercept)	3170.996	2057.337	1736.161	1465.355	1233.161
Between Pupils					
Cons (intercept)	4722.385	4257.664	4243.761	4205.198	3793.542
TOTAL	9848.596	7534.642	7387.930	6911.660	6154.190
Intra country correlation %	19.85	16.19	19.06	17.96	18.32
Intra school correlation %	32.20	27.31	23.50	21.20	20.04
Intra pupil correlation %	47.95	56.50	57.44	60.84	61.64
Percentage of total variance explained Percentage of country variance explained Percentage of school variance explained Percentage of pupil variance explained		23.5 37.6 35.1 9.8	25.0 28.0 45.2 10.1	29.8 36.5 53.8 11.0	37.5 42.3 61.1 19.7
-2*log (likelihood)	476879.5	471830.8	468544.1	443868.6	370860.3

Note:

1. Further analyses are required to understand the negative impacts of having a library but students are not allowed to borrow from the library (PBORROW).
2. Due to the fact that three countries did not have data on teacher knowledge/skills, we analysed the data in Models G and G+ excluding and including teacher knowledge/skill respectively.

Table 2 SACMEQ II ANALYSIS: ACROSS 14 COUNTRIES (Mathematics)

	Model A Estimate n=41352	Model B Estimate 41348	Model E Estimate 41103	Model G Estimate 39466	Model G+ Estimate 32978
Fixed part (coefficients)					
Cons (Intercept)	498.465	490.303	422.732	407.654	416.713
Pupil variables					
Age in months (centred grand mean)		-0.2143	-0.1982	-0.1835	-0.221
Gender: girl		-8.679	-8.608	-8.277	-9.975
PENGLISH (Ref: never) sometimes		22.27	21.87	21.08	16.3
Often		13.17	12.88	11.7	7.034
PSTAY (Ref: with parents): with relatives		-8.429	-8.14	-7.743	-6.036
In a hostel		-10.83	-11.31	-10.41	-9.212
Myself		-13.98	-13.83	-13.13	-13.99
PBOOKSHM (Ref: no books): 1-10books		2.654	2.325	1.98	2.729
11-50 books		10.97	10.42	9.629	6.758
51-100 books		17.27	16.67	16.26	11.32
101+ books		13.06	12.28	11.55	5.43
PREAD (Ref: never) asked to read at home: sometimes		2.914	2.773	2.262	2.977
Most of the time		ns	ns	ns	ns
PLOOKWK (Ref: never): home work looked: sometimes		2.339	2.355	ns	ns
Most of the time		ns	ns	ns	ns
PQUESTR (Ref: never) questioned in reading at home: sometimes		ns	ns	ns	ns
Most of the time		ns	ns	-2.7	-3.163
PQUESTM (Ref: never): questioned in maths at home: sometimes		ns	ns	ns	ns
Most of the time		-4.578	-4.846	-5.429	-4.422
PCALC (Ref: never): asked to calculate at home: sometimes		3.572	3.33	2.996	3.631
Most of the time		ns	ns	ns	ns
PEXTENG: take extra tuition in reading		ns	ns	ns	-4.134
PEXTMAT: take extra tuition in maths		5.364	5.394	5.331	2.506
PEXTOTH: take extra tuition in other subjects		7.762	7.642	7.268	2.727
PABSENT: days absent		-1.369	-1.346	-1.325	-0.9603
PABWHY2: YES: being ill		-3.908	-3.65	-3.755	-1.857
PABWHY4: YES: have to work		-8.424	-7.965	-8.329	-8.711
PABWHY6: YES: fees not paid		-5.572	-5.802	-4.585	-5.002
PREPEAT (Ref: never): once		-18.28	-18.19	-18.02	-16.99
Twice		-17.75	-17.93	-17.58	-17.95
Three times or more		-21.53	-21.6	-20.85	-21.72
PREPEAT6: repeated at Grade 6		ns	ns	ns	2.292
ZPSES (centred around grand mean)		3.365	2.576	2.323	1.968
School Context variables					
STYPE: school type: private			10.23	ns	ns
ZSLOCATI (Ref: isolated/rural): small town			ns	ns	ns
Large city			7.301	ns	ns
ZSPUPTOTAL: total number of pupils in school			-0.01463	-0.01156	-0.00901
YCLSIZE: class size			0.598	0.6468	0.2994
ZPSESschoolmean			8.069	3.064	3.322
School process variables					
YMEEUSUA: percentage of parents meeting teacher				0.1915	0.1444
ZSCOMM04: textbooks contributed by community				6.654	5.049
PBORROW (Ref: no library) can't borrow				-6.644	-4.606
Can borrow				ns	ns

Table 2 contd.

ZPMAT01: exercise book: lack				-9.373	-7.624
ZPMAT03: pencils: lack				ns	-2.62
ZPMAT06: rulers: lack				-4.674	-4.996
ZPMAT07: pens or ballpoint pens: lack				-14.36	-13.74
ZPSIT: having own sitting place				ns	ns
ZPWRITE: having own writing place				8.214	9.231
ZSRTOT22: total resources				1.928	1.58
ZYACCES2: access to English dictionary				7.483	8.696
SQACADEM3: academic qualifications of headteacher: HE				ns	ns
ZSTCHYR: average teacher training years				8.283	7.556
SPUPPO2 (Ref: never): absenteeism of pupils: sometimes				-17.44	-15.91
often				-16.81	-14.01
SPUPPRO4 (Ref: never): dropout of pupils: sometimes				-17.97	-8.539
often				-17.28	-9.97
ZSTCHPRO1 (Ref: sometimes/often): teachers arriving late: never				12.25	8.123
ZSTCHPRO2 (Ref: sometimes/often): teachers absenteeism: never				4.6	4.716
YQACAD (Ref: primary): teacher academic qualification: junior secondary				6.103	ns
Senior secondary				ns	ns
A-level				8.071	ns
tertiary				ns	ns
YSATIS01 (Ref: not important): teachers' views on the importance of travel distance: of some importance				6.591	13.38
Very important				ns	6.19
YSATIS04 (Ref: not important): teachers' views on the importance of availability of teacher housing: Of some importance				ns	ns
Very important				ns	ns
ZYSATIS08 (Ref: not important/some importance): teachers' views on the importance of level of salary: very important				ns	-5.08
PHMWKDN: someone other than the teacher makes sure homework is done (Ref: no homework): never				21.16	22.66
Sometimes				21.47	22.29
Most of the time				24.27	25.52
Teachers subject knowledge (centred around grand mean)					0.02325
Random part (variances)					
Between Countries					
Cons (Intercept)	2200.442	1496.189	1491.663	1493.914	1588.178
Between Schools					
Cons (intercept)	2739.557	2065.598	1906.955	1629.015	1335.275
Between Pupils					
Cons (intercept)	4791.346	4479.567	4468.550	4461.145	3833.715
TOTAL	9731.345	8041.354	7867.168	7584.074	6757.168
Intra country correlation %	22.61	18.61	18.96	19.70	23.5
Intra school correlation %	28.15	25.69	24.24	21.48	19.8
Intra pupil correlation %	49.24	55.71	56.80	58.83	56.7
Percentage of total variance explained Percentage of country variance explained Percentage of school variance explained Percentage of pupil variance explained		17.4 32.0 24.6 6.5	19.2 32.2 30.4 6.7	22.1 32.1 40.5 6.9	30.5 27.8 51.3 20.0
-2*log (likelihood)	473353.0	470081.1	467038.7	448068.2	369349.8

Note:

1. Further analyses are required to understand the negative impacts of having a library but students are not allowed to borrow from the library (PBORROW).
2. Due to the fact that three countries did not have data on teacher knowledge/skills, we analysed the data in Models G and G+ excluding and including teacher knowledge/skill respectively.

Table 3 SACMEQ II ANALYSIS: Tanzania (Reading)

	Model A Estimate 2854	Model B Estimate 2854	Model E Estimate 2854	Model G Estimate 2794	Model G+ Estimate 2769
Fixed part (coefficients)					
Cons (Intercept)	540.557	516.657	492.612	309.423	306.2
Pupil variables					
Age in months (centred grand mean)		-0.2723	-0.2356	-0.2315	-0.2303
Gender: girl		-17.24	-17.34	-17.52	-17.83
PENGLISH (Ref: never) sometimes		21.73	21.7	16.03	16.1
Often		17.4	15.75	ns	ns
PSTAY (Ref: with parents): with relatives		-16.19	-15.56	ns	ns
In a hostel		-16.28	-15.37	-18.56	-18.46
Myself		ns	ns	ns	ns
PBOOKSHM (Ref: no books): 1-10books		12.52	11.97	7.907	7.605
11-50 books		ns	ns	ns	ns
51-100 books		ns	ns	ns	ns
101+ books		ns	ns	ns	ns
PREAD (Ref: never) asked to read at home: sometimes		ns	ns	ns	ns
Most of the time		ns	ns	ns	ns
PLOOKWK (Ref: never): home work looked: sometimes		12.34	11.9	12.68	12.77
Most of the time		11.18	10.52	13.95	14.05
PQUESTR (Ref: never) questioned in reading at home: sometimes		21.26	21.5	15.82	15.52
Most of the time		26.82	27.18	20.85	20.54
PQUESTM (Ref: never): questioned in maths at home: sometimes		ns	ns	ns	ns
Most of the time		ns	ns	ns	ns
PCALC (Ref: never): asked to calculate at home: sometimes		ns	ns	ns	ns
Most of the time		ns	ns	ns	ns
PEXTENG: take extra tuition in reading		ns	ns	ns	ns
PEXTMAT: take extra tuition in maths		16.81	16.41	13.4	13.07
PEXTOTH: take extra tuition in other subjects		ns	ns	ns	ns
PABSENT: days absent		-2.946	-2.923	-2.832	-2.963
PABWHY2: YES: being ill		ns	ns	ns	ns
PABWHY4: YES: have to work		-17.77	-16.4	-13.77	-13.04
PABWHY6: YES: fees not paid		ns	ns	ns	ns
PREPEAT (Ref: never): once		-22.08	-21.27	-18.05	-17.72
Twice		-36.32	-35.02	-35.05	-34.53
Three times or more		-15.11	ns	-16.48	-16.68
PREPEAT6: repeated at Grade 6		ns	ns	ns	ns
ZPSES (centred around grand mean)		7.519	6.163	5.46	5.433
School Context variables					
STYPE: school type: private			--	--	--
ZSLOCATI (Ref: isolated/rural): small town			24.89	31.5	33.47
Large city			ns	ns	ns
ZSPUPTOTAL: total number of pupils in school			ns	ns	ns
YCLSIZE: class size			-0.4882	ns	ns
ZPSESschoolmean			6.648	7.131	6.911
School process variables					
XMEEUSUA: percentage of parents meeting teacher				ns	ns
ZSCOMM04: textbooks contributed by community				ns	ns
PBORROW (Ref: no library) can't borrow				ns	ns
Can borrow				11.6	10.42
ZPMAT01: exercise book: lack				ns	ns
ZPMAT03: pencils: lack				ns	ns

ZPMAT06: rulers: lack				-14.02	-14.77
ZPMAT07: pens or ballpoint pens: lack				ns	ns

Table 3 contd.

ZPSIT: having own sitting place				34.05	34.39
ZPWRITE: having own writing place				34.09	34.24
ZSRTOT22: total resources				ns	ns
ZYACCES2: access to English dictionary				ns	ns
SQACADEM3: academic qualifications of headteacher: HE				--	--
ZSTCHYR: average teacher training years				ns	ns
SPUPPO2 (Ref: never): absenteeism of pupils: sometimes				ns	ns
often				ns	ns
SPUPPRO4 (Ref: never): dropout of pupils: sometimes				ns	ns
often				ns	ns
ZSTCHPRO1 (Ref: sometimes/often): teachers arriving late: never				ns	ns
ZSTCHPRO2 (Ref: sometimes/often): teachers absenteeism: never				ns	ns
XQACAD (Ref: primary): teacher academic qualification: junior secondary				ns	ns
Senior secondary				ns	ns
A-level				ns	ns
tertiary				ns	72.11
XSATIS01 (Ref: not important): teachers' views on the importance of travel distance: of some importance				ns	ns
Very important				ns	ns
XSATIS04 (Ref: not important): teachers' views on the importance of teacher housing availability: of some importance				ns	ns
Very important				ns	ns
ZXSATIS08 (Ref: not important/some importance): teachers' views on the importance of level of salary: very important				ns	ns
PHMWKDN: someone other than the teacher makes sure homework is done (Ref: no homework): never				19.74	20.54
Sometimes				18.47	19.65
Most of the time				14.69	15.62
Teachers subject knowledge (centred around grand mean)					0.1912
Random part (variances)					
Between Schools					
Cons (intercept)	2466.321	1343.513	1121.466	862.906	761.865
Between Pupils					
Cons (intercept)	5349.167	4609.395	4602.976	4372.784	4362.931
TOTAL	7815.488	5952.908	5724.442	5235.69	5124.796
Intra school correlation %	31.56	22.57	19.59	16.48	14.87
Intra pupil correlation %	68.44	77.43	80.41	83.52	85.13
Percentage of total variance explained Percentage of school variance explained Percentage of pupil variance explained		23.83 45.53 13.83	26.76 54.53 13.95	33.01 65.01 18.25	34.43 69.11 18.44
-2*log (likelihood)	32977.43	32482.66	32452.8	31598.48	31294.42

Note:

1) PBORROW (see Table 1)
2) STYPE: In Tanzania data, there was no "private schools"
3) None of the school headteachers had higher education experience.

Table 4: SACMEQ II analysis: Tanzania (Mathematics)

	Model A Estimate 2769 out of 2854	Model B Estimate 2849	Model E Estimate 2849	Model G Estimate 2801	Model G+ Estimate 2625
Fixed part (coefficients)					
Cons (Intercept)	517.900	496.418	469.939	341.695	337.808
Pupil variables					
Age in months (centred grand mean)		ns	ns	ns	ns
Gender: girl		-30.97	-31.06	-31.04	-30.84
PENGLISH (Ref: never) sometimes		24.7	24.59	19.25	18.97
Often		16.2	15.13	9.824	10.58
PSTAY (Ref: with parents): with relatives		ns	ns	ns	ns
In a hostel		-17.3	-16.49	-16.21	-15.53
Myself				ns	ns
PBOOKSHM (Ref: no books): 1-10books		11.04	10.61	7.708	8.5
11-50 books		ns	ns	ns	ns
51-100 books		ns	ns	ns	ns
101+ books		ns	ns	-12.83	ns
PREAD (Ref: never) asked to read at home: Sometimes		ns	ns	ns	ns
Most of the time		ns	ns	ns	ns
PLOOKWK (Ref: never): home work looked: sometimes		9.176	8.897	ns	ns
Most of the time		9.017	ns	9.724	ns
PQUESTR (Ref: never): questioned in reading at home: sometimes		16.45	16.68	13.16	13.16
Most of the time		18.75	19.07	15.37	14.63
PQUESTM (Ref: never): questioned in maths at home: sometimes		9.661	9.878	ns	ns
Most of the time		ns	ns	ns	ns
PCALC (Ref: never): asked to calculate at home: sometimes		ns	ns	ns	ns
Most of the time		ns	ns	ns	ns
PEXTENG: take extra tuition in reading		ns	ns	ns	ns
PEXTMAT: take extra tuition in maths		15.38	15.08	12.13	13.48
PEXTOTH: take extra tuition in other subjects		ns	ns	ns	ns
PABSENT: days absent		-2.197	-2.157	-2.062	-2.227
PABWHY2: YES: being ill		ns	ns	ns	ns
PABWHY4: YES: have to work		-15.7	-14.69	ns	ns
PABWHY6: YES: fees not paid		ns	ns	ns	ns
PREPEAT (Ref: never): once		-23.34	-22.82	-21.03	-20.62
Twice		-37.68	-36.43	-37.87	-36.81
Three times or more		-17.62	-16.01	-20.36	-22.73
PREPEAT6: repeated at Grade 6		ns	ns	ns	ns
ZPSES (centred around grand mean)		5.846	4.618	3.964	3.771
School Context variables					
STYPE: school type: private			--	--	--
ZSLOCATI (Ref: isolated/rural): small town			ns	ns	ns
Large city			ns	ns	ns
ZSPUPTOTAL: total number of pupils in school			ns	ns	ns
YCLSIZE: class size			ns	ns	ns
ZPSESschoolmean			7.48	7.91	7.82
School process variables					
YMEEUSUA: parent/teacher communication (percentage of parents meeting teacher)				ns	ns
ZSCOMM04: textbooks contributed by community				ns	ns
PBORROW (Ref: no library) can't borrow				ns	ns
Can borrow				ns	ns

Table 4 contd.

ZPMAT01: exercise book: lack				ns	ns
ZPMAT03: pencils: lack				-8.479	ns
ZPMAT06: rulers: lack				-14.31	-15.24
ZPMAT07: pens or ballpoint pens: lack				-12.78	-13.36
ZPSIT: having own sitting place				25.97	30.25
ZPWRITE: having own writing place				19.01	ns
ZSRTOT22: total resources				ns	ns
ZYACCES2: access to English dictionary				ns	ns
SQACADEM3: academic qualifications of headteacher: HE				--	--
ZSTCHYR: average teacher training years				ns	ns
SPUPPO2 (Ref: never): absenteeism of pupils: sometimes				ns	ns
often				ns	ns
SPUPPRO4 (Ref: never): dropout of pupils: sometimes				ns	ns
often				ns	ns
ZSTCHPRO1 (Ref: sometimes/often): teachers arriving late: never				ns	ns
ZSTCHPRO2 (Ref: sometimes/often): teachers absenteeism: never				ns	ns
YQACAD (Ref: primary): teacher academic qualification: junior secondary				ns	ns
Senior secondary				ns	ns
A-level				ns	ns
tertiary				--	--
YSATIS01 (Ref: not important): teachers' views on the importance of travel distance: of some importance				ns	ns
Very important				ns	ns
YSATIS04 (Ref: not important): teachers' views on the importance of availability of teacher housing: Of some importance				ns	ns
Very important				40.25	41.72
ZYSATIS08 (Ref: not important/some importance): teachers' views on the importance of level of salary: very important				ns	ns
PHMWKDN: someone other than the teacher makes sure homework is done (Ref: no homework): never				21.48	20.4
Sometimes				18.31	15.75
Most of the time				15.7	ns
Teachers subject knowledge (centred around grand mean)					ns
Random part (variances)					
Between Schools					
Cons (intercept)	1751.612	1057.701	958.434	818.4	813.122
Between Pupils					
Cons (intercept)	5284.149	4518.501	4514.682	4383.432	4476.192
TOTAL	7035.761	5576.202	5473.116	5201.832	5289.314
Intra school correlation %	24.90	18.97	17.51	15.73	15.37
Intra pupil correlation %	75.10	81.03	82.49	84.27	84.63
Percentage of total variance explained Percentage of school variance explained Percentage of pupil variance explained		20.74 39.62 14.49	22.21 45.28 14.56	26.07 53.28 17.05	24.82 53.58 15.29
-2*log (likelihood)	32834.33	32337.75	32321.77	31677.48	29738.850

Notes:

No maths teacher in the dataset had higher education experience.
See also notes below Table 3.

Table 5: SACMEQ II analysis: Zanzibar (Reading)

	Model A Estimate 2514	Model B Estimate 2514	Model E Estimate 2514	Model G Estimate 2024	Model G+ Estimate 1950
Fixed part (coefficients)					
Cons (Intercept)	473.481	463.934	439.174	342.469	340.346
Pupil variables					
Age in months (centred grand mean)		-0.2035	-0.1964	-0.2052	-0.2395
Gender: girl		-6.918	-6.925	-8.383	-8.295
PENGLISH (Ref: never) sometimes		29.47	28.04	25.83	24.57
Often		35.04	35.25	39.24	37.17
PSTAY (Ref: with parents): with relatives		ns	ns	ns	ns
In a hostel		-22.97	-22.68	-24.64	-24.64
Myself		-25.49	-25.62	ns	ns
PBOOKSHM (Ref: no books): 1-10books		ns	ns	ns	ns
11-50 books		ns	ns	ns	ns
51-100 books		ns	ns	ns	ns
101+ books		ns	ns	ns	ns
PREAD (Ref: never) asked to read at home: sometimes		ns	ns	ns	ns
Most of the time		ns	ns	ns	ns
PLOOKWK (Ref: never): home work looked: sometimes		ns	ns	ns	ns
Most of the time		13.4	13.43	14.14	14.23
PQUESTR (Ref: never) questioned in reading at home: sometimes		ns	ns	ns	ns
Most of the time		ns	ns	ns	ns
PQUESTM (Ref: never): questioned in maths at home: sometimes		-6.91	-7.097	ns	ns
Most of the time		-12.38	-12.5	-14.13	-13.24
PCALC (Ref: never): asked to calculate at home: sometimes		ns	ns	ns	ns
Most of the time		ns	ns	ns	ns
PEXTENG: take extra tuition in reading		-9.409	-9.64	-9.68	-9.072
PEXTMAT: take extra tuition in maths		ns	ns	ns	ns
PEXTOTH: take extra tuition in other subjects		12.75	12.14	14.71	13.77
PABSENT: days absent		-1.846	-1.836	-1.501	-1.567
PABWHY2: YES: being ill		ns	ns	ns	ns
PABWHY4: YES: have to work		ns	ns	ns	ns
PABWHY6: YES: fees not paid		ns	ns	ns	ns
PREPEAT (Ref: never): once		-18.59	-18.39	-19.8	-19.53
Twice		-25.89	-25.25	-29.16	-30.08
Three times or more		-32.65	-32.71	-34.54	-34.36
PREPEAT6: repeated at Grade 6		-17.55	-17.75	-13.55	-12.3
ZPSES (centred around grand mean)		4.114	3.695	3.072	3.2
School Context variables					
STYPE: school type: private			ns	ns	ns
ZSLOCATI (Ref: isolated/rural): small town			ns	ns	ns
Large city			ns	ns	ns
ZSPUPTOTAL: total number of pupils in school			ns	ns	ns
YCLSIZE: class size			ns	ns	ns
ZPSESschoolmean			ns	ns	ns
School process variables					
XMEEUSUA: percentage of parents meeting teacher				ns	ns
ZSCOMM04: textbooks contributed by community				ns	ns
PBORROW (Ref: no library) can't borrow				ns	ns
Can borrow				ns	ns

Table 5 contd.

ZPMAT01: exercise book: lack				-16.58	-15.48
ZPMAT03: pencils: lack				ns	ns
ZPMAT06: rulers: lack				ns	ns
ZPMAT07: pens or ballpoint pens: lack				-27.68	-28.48
ZPSIT: having own sitting place				ns	ns
ZPWRITE: having own writing place				ns	ns
ZSRTOT22: total resources				ns	ns
ZYACCES2: access to English dictionary				ns	ns
SQACADEM3: academic qualifications of headteacher: HE				ns	ns
ZSTCHYR: average teacher training years				ns	ns
SPUPPO2 (Ref: never): absenteeism of pupils: sometimes				ns	ns
often				ns	ns
SPUPPRO4 (Ref: never): dropout of pupils: sometimes				ns	ns
often				ns	ns
ZSTCHPRO1 (Ref: sometimes/often): teachers arriving late: never				ns	ns
ZSTCHPRO2 (Ref: sometimes/often): teachers absenteeism: never				ns	ns
XQACAD (Ref: primary): teacher academic qualification: junior secondary				ns	ns
Senior secondary				ns	ns
A-level				ns	ns
tertiary				--	--
XSATIS01 (Ref: not important): teachers' views on the importance of travel distance: of some importance				37.15	38.1
Very important				ns	ns
XSATIS04 (Ref: not important): teachers' views on the importance of availability of teacher housing: Of some importance				ns	ns
Very important				22.27	21.73
ZXSATIS08 (Ref: not important/some importance): teachers' views on the importance of level of salary: very important				ns	ns
PHMWKDN: someone other than the teacher makes sure homework is done (Ref: no homework): never				28.5	29.62
Sometimes				31.8	32.28
Most of the time				30.21	30.91
Teachers subject knowledge (centred around grand mean)					ns
Random part (variances)					
Between Schools					
Cons (intercept)	1361.735	1065.023	970.691	656.955	667.344
Between Pupils					
Cons (intercept)	3680.945	3242.751	3241.047	3093.729	3092.615
TOTAL	5042.680	4307.774	4211.738	3750.684	3759.959
Intra school correlation %	27.0	24.7	23.0	17.52	17.75
Intra pupil correlation %	73.0	75.3	77.0	82.48	82.25
Percentage of total variance explained Percentage of school variance explained Percentage of pupil variance explained		14.57 21.79 11.90	16.48 28.72 11.95	25.62 51.76 15.95	25.44 50.99 15.98
-2*log (likelihood)	28066.36	27732.93	27720.34	22190.19	21379.78

Table 6: SACMEQ II analysis: Zanzibar (Mathematics)

	Model A Estimate 2459 out of 2514	Model B Estimate 2459 out of 2514	Model E Estimate 2459 out of 2514	Model G Estimate 2045 out of 2514	Model G+ Estimate 1925 out of 2514
Fixed part (coefficients)					
Cons (Intercept)	487.040	477.266	485.660	418.434	429.253
Pupil variables					
Age in months (centred grand mean)		ns	ns	ns	ns
Gender: girl		-11.99	-11.97	-10.63	-10.18
PENGLISH (Ref: never) sometimes		16.25	14.38	ns	ns
Often		15.81	15.85	18.34	19.61
PSTAY (Ref: with parents): with relatives		ns	ns	ns	ns
In a hostel		ns	ns	ns	ns
Myself		ns	ns	ns	ns
PBOOKSHM (Ref: no books): 1-10books		ns	ns	ns	ns
11-50 books		ns	ns	ns	ns
51-100 books		ns	ns	ns	ns
101+ books		ns	ns	ns	ns
PREAD (Ref: never) asked to read at home: sometimes		ns	ns	ns	ns
Most of the time		ns	ns	ns	ns
PLOOKWK (Ref: never): home work looked: sometimes		ns	ns	ns	ns
Most of the time		12	12.09	10.74	10.93
PQUESTR (Ref: never) questioned in reading at home: sometimes		ns	ns	ns	ns
Most of the time		ns	ns	ns	ns
PQUESTM (Ref: never): questioned in maths at home: sometimes		ns	ns	ns	ns
Most of the time		ns	ns	ns	ns
PCALC (Ref: never): asked to calculate at home: sometimes		ns	ns	ns	ns
Most of the time		-9.548	-9.505	ns	-10.67
PEXTENG: take extra tuition in reading		ns	ns	ns	ns
PEXTMAT: take extra tuition in maths		ns	ns	ns	ns
PEXTOTH: take extra tuition in other subjects		10.95	10.49	12.17	12.31
PABSENT: days absent		-0.804	-0.7813	ns	ns
PABWHY2: YES: being ill		ns	ns	ns	ns
PABWHY4: YES: have to work		ns	ns	ns	ns
PABWHY6: YES: fees not paid		ns	ns	ns	ns
PREPEAT (Ref: never): once		-10.54	-10.45	-8.88	-10.81
Twice		ns	ns	ns	ns
Three times or more		-38	-37.5	-38.35	-38.41
PREPEAT6: repeated at Grade 6		ns	ns	ns	ns
ZPSES (centred around grand mean)		1.671	1.73	1.847	2.104
School Context variables					
STYPE: school type: private			141.5	98.4	94.2
ZSLOCATI (Ref: isolated/rural): small town			ns	ns	ns
Large city			ns	ns	ns
ZSPUPTOTAL: total number of pupils in school			ns	ns	ns
YCLSIZE: class size			ns	ns	0.5738
ZPSESschoolmean			-6.806	ns	-6.633

Table 6 contd.

School process variables					
YMEEUSUA: percentage of parents meeting teacher				ns	ns
ZSCOMM04: textbooks contributed by community				ns	ns
PBORROW (Ref: no library) can't borrow				-13.09	-12.77
Can borrow				ns	ns
ZPMAT01: exercise book: lack				ns	ns
ZPMAT03: pencils: lack				ns	ns
ZPMAT06: rulers: lack				ns	ns
ZPMAT07: pens or ballpoint pens: lack				-13.13	ns
ZPSIT: having own sitting place				ns	ns
ZPWRITE: having own writing place				ns	ns
ZSRTOT22: total resources				-3.226	-3.76
ZYACCES2: access to English dictionary				ns	ns
SQACADEM3: academic qualifications of headteacher: HE				ns	ns
ZSTCHYR: average teacher training years				24.43	26.18
SPUPPO2 (Ref: never): absenteeism of pupils: sometimes				ns	ns
often				ns	ns
SPUPPRO4 (Ref: never): dropout of pupils: sometimes				ns	ns
often				ns	ns
ZSTCHPRO1 (Ref: sometimes/often): teachers arriving late: never				ns	ns
ZSTCHPRO2 (Ref: sometimes/often): teachers absenteeism: never				ns	ns
YQACAD (Ref: primary): teacher academic qualification: junior secondary				ns	ns
Senior secondary				ns	ns
A-level				ns	ns
tertiary				--	--
YSATIS01 (Ref: not important): teachers' views on the importance of travel distance: of some importance				ns	ns
Very important				ns	ns
YSATIS04 (Ref: not important): teachers' views on the importance of availability of teacher housing Of some importance				ns	ns
Very important				ns	ns
ZYSATIS08 (Ref: not important/some importance): teachers' views on the importance of level of salary: very important				ns	ns
PHMWKDN: someone other than the teacher makes sure homework is done (Ref: no homework): never				ns	ns
Sometimes				ns	ns
Most of the time				ns	ns
Teachers subject knowledge (centred around grand mean)					ns
Random part (variances)					
Between Schools					
Cons (intercept)	1360.701	1286.972	1020.099	768.833	742.04
Between Pupils					
Cons (intercept)	2666.296	2499.786	2499.432	2551.979	2576.429
TOTAL	4026.997	3786.758	3519.531	3320.812	3318.469
Intra school correlation %	33.79	33.99	28.98	23.15	22.36
Intra pupil correlation %	66.21	66.01	71.02	76.85	77.64
Percentage of total variance explained Percentage of school variance explained Percentage of pupil variance explained		5.97 5.42 6.24	12.6 25.03 6.26	17.54 43.50 4.29	17.59 45.47 3.37
-2*log (likelihood)	26703.62	26546.18	26516.08	22062.76	20783.08

Table 7: SACMEQ II analysis: South Africa (Reading)

	Model A Estimate 3163	Model B Estimate 3163	Model E Estimate 3139	Model G Estimate 2991
Fixed part (coefficients)				
Cons (Intercept)	483.406	468.780	340.576	233.465
Pupil variables				
Age in months (centred grand mean)		-0.476	-0.466	-0.415
Gender: girl		10.75	10.98	11.68
PENGLISH (Ref: never) sometimes		13.93	13.51	13.13
Often		22.53	22.18	21.63
PSTAY (Ref: with parents): with relatives		ns	ns	ns
In a hostel		-28.12	-25.84	-23.6
Myself		-13.54	-11.8	-10.72
PBOOKSHM (Ref: no books): 1-10books		ns	ns	ns
11-50 books		ns	ns	ns
51-100 books		ns	ns	ns
101+ books		ns	ns	ns
PREAD (Ref: never) asked to read at home: sometimes		ns	ns	ns
Most of the time		ns	ns	ns
PLOOKWK (Ref: never): home work looked: sometimes		ns	ns	ns
Most of the time		ns	ns	ns
PQUESTR (Ref: never) questioned in reading at home: sometimes		ns	ns	ns
Most of the time		ns	ns	ns
PQUESTM (Ref: never): questioned in maths at home: sometimes		ns	ns	ns
Most of the time		ns	ns	ns
PCALC (Ref: never): asked to calculate at home: sometimes		ns	ns	ns
Most of the time		ns	ns	-8.437
PEXTENG: take extra tuition in reading		ns	ns	ns
PEXTMAT: take extra tuition in maths		-7.306	-6.887	-6.568
PEXTOTH: take extra tuition in other subjects		ns	ns	ns
PABSENT: days absent		ns	ns	ns
PABWHY2: YES: being ill		ns	ns	ns
PABWHY4: YES: have to work		ns	ns	ns
PABWHY6: YES: fees not paid		-21.52	-20.67	-19.01
PREPEAT (Ref: never): once		-17.77	-17.87	-16.41
Twice		-25.66	-25.91	-24.45
Three times or more		-23.73	-23.04	-18.97
PREPEAT6: repeated at Grade 6		ns	ns	ns
ZPSES (centred around grand mean)		4.688	3.769	3.203
School Context variables				
STYPE: school type: private			ns	ns
ZSLOCATI (Ref: isolated/rural): small town			ns	ns
Large city			58.65	32.51
ZSPUPTOTAL: total number of pupils in school			ns	-0.03
YCLSIZE: class size			ns	ns
ZPSESschoolmean			14.92	5.669
School process variables				
XMEEUSUA: percentage of parents meeting teacher				0.3034
ZSCOMM04: textbooks contributed by community				ns
PBORROW (Ref: no library) can't borrow				ns
Can borrow				-12.73

Table 7 contd.

ZPMAT01: exercise book: lack				-14.26
ZPMAT03: pencils: lack				ns
ZPMAT06: rulers: lack				ns
ZPMAT07: pens or ballpoint pens: lack				-13.92
ZPSIT: having own sitting place				ns
ZPWRITE: having own writing place				ns
ZSRTOT22: total resources				4.367
ZYACCES2: access to English dictionary				ns
SQACADEM3: academic qualifications of headteacher: HE				ns
ZSTCHYR: average teacher training years				21.59
SPUPPO2 (Ref: never): absenteeism of pupils: sometimes				ns
often				ns
SPUPPRO4 (Ref: never): dropout of pupils: sometimes				ns
often				ns
ZSTCHPRO1 (Ref: sometimes/often): teachers arriving late: never				ns
ZSTCHPRO2 (Ref: sometimes/often): teachers absenteeism: never				ns
XQACAD (Ref: primary): teacher academic qualification: junior secondary				32.45
Senior secondary				ns
A-level				ns
tertiary				ns
XSATIS01 (Ref: not important): teachers' views on the importance of travel distance: of some importance				21.44
Very important				ns
XSATIS04 (Ref: not important): teachers' views on the importance of availability of teacher housing: Of some importance				26.88
Very important				ns
ZXSATIS08 (Ref: not important/some importance): teachers' views on the importance of level of salary: very important				ns
PHMWKDN: someone other than the teacher makes sure homework is done (Ref: no homework): never				39.22
Sometimes				40.53
Most of the time				48.58
Teachers subject knowledge (centred around grand mean)				
Random part (variances)				
Between Schools				
Cons (intercept)	9089.989	5714.255	2681.947	1873.720
Between Pupils				
Cons (intercept)	4640.643	4114.420	4119.616	3965.223
TOTAL	13730.63	9828.675	6801.563	5838.943
Intra school correlation %	66.2	58.14	39.43	32.09
Intra pupil correlation %	33.8	41.86	60.57	67.91
Percentage of total variance explained Percentage of school variance explained Percentage of pupil variance explained		28.42 37.14 11.34	50.46 70.50 11.23	57.48 79.39 14.55
-2*log (likelihood)	36291.54	35854.64	35465.92	33632.86

Table 8: SACMEQ II analysis: South Africa (Mathematics)

	Model A Estimate 3135 out of 3163	Model B Estimate 3135	Model E Estimate 3113	Model G Estimate 3005
Fixed part (coefficients)				
Cons (Intercept)	478.095	483.955	384.592	344.527
Pupil variables				
Age in months (centred grand mean)		-0.168	-0.157	ns
Gender: girl		ns	ns	ns
PENGLISH (Ref: never) sometimes		10	9.229	9.461
Often		20.24	18.97	17.3
PSTAY (Ref: with parents): with relatives		-9.425	-8.705	-9.446
In a hostel		-17.48	-15.22	ns
Myself		ns	ns	ns
PBOOKSHM (Ref: no books): 1-10books		ns	ns	ns
11-50 books		9.61	9.258	ns
51-100 books		ns	ns	ns
101+ books		ns	ns	ns
PREAD (Ref: never) asked to read at home: sometimes		ns	ns	ns
Most of the time		-10.85	-10.64	-9.85
PLOOKWK (Ref: never): home work looked: sometimes		ns	ns	ns
Most of the time		ns	ns	ns
PQUESTR (Ref: never) questioned in reading at home: sometimes		ns	ns	ns
Most of the time		ns	ns	ns
PQUESTM (Ref: never): questioned in maths at home: sometimes		ns	ns	ns
Most of the time		ns	ns	ns
PCALC (Ref: never): asked to calculate at home: sometimes		ns	ns	ns
Most of the time		-9.168	-9.738	-9.016
PEXTENG: take extra tuition in reading		ns	ns	ns
PEXTMAT: take extra tuition in maths		-6.436	-5.702	-5.647
PEXTOTH: take extra tuition in other subjects		ns	ns	ns
PABSENT: days absent		-1.345	-1.382	-1.371
PABWHY2: YES: being ill		ns	ns	ns
PABWHY4: YES: have to work		ns	ns	ns
PABWHY6: YES: fees not paid		ns	ns	ns
PREPEAT (Ref: never): once		-16.01	-15.77	-15.12
Twice		-18.61	-18.36	-17.47
Three times or more		-22.65	-21.76	-19.63
PREPEAT6: repeated at Grade 6		ns	ns	ns
ZPSES (centred around grand mean)		3.882	3.125	3.003
School Context variables				
STYPE: school type: private			ns	ns
ZSLOCATI (Ref: isolated/rural): small town			ns	ns
Large city			40	ns
ZSPUPTOTAL: total number of pupils in school			ns	ns
YCLSIZE: class size			ns	ns
ZPSESschoolmean			12.76	ns
School process variables				
YMEEUSUA: percentage of parents meeting teacher				ns
ZSCOMM04: textbooks contributed by community				ns
PBORROW (Ref: no library) can't borrow				-10.28
Can borrow				ns

Table 8 contd.

ZPMAT01: exercise book: lack				-14.19
ZPMAT03: pencils: lack				ns
ZPMAT06: rulers: lack				ns
ZPMAT07: pens or ballpoint pens: lack				ns
ZPSIT: having own sitting place				ns
ZPWRITE: having own writing place				ns
ZSRTOT22: total resources				3.649
ZYACCES2: access to English dictionary				ns
SQACADEM3: academic qualifications of headteacher: HE				ns
ZSTCHYR: average teacher training years				24.12
SPUPPO2 (Ref: never): absenteeism of pupils: sometimes				ns
often				ns
SPUPPRO4 (Ref: never): dropout of pupils: sometimes				-37.8
often				-32.75
ZSTCHPRO1 (Ref: sometimes/often): teachers arriving late: never				57.59
ZSTCHPRO2 (Ref: sometimes/often): teachers absenteeism: never				ns
YQACAD (Ref: primary): teacher academic qualification: junior secondary				ns
Senior secondary				ns
A-level				ns
tertiary				ns
YSATIS01 (Ref: not important): teachers' views on the importance of travel distance: of some importance				32.36
Very important				22.39
YSATIS04 (Ref: not important): teachers' views on the importance of availability of teacher housing Of some importance				ns
Very important				ns
ZYSATIS08 (Ref: not important/some importance): teachers' views on the importance of level of salary: very important				ns
PHMWKDN: someone other than the teacher makes sure homework is done (Ref: no homework): never				ns
Sometimes				ns
Most of the time				ns
Teachers subject knowledge (centred around grand mean)				
Random part (variances)				
Between Schools				
Cons (intercept)	7140.228	4944.094	3028.112	1835.734
Between Pupils				
Cons (intercept)	4190.718	3926.808	3931.277	3805.654
TOTAL	11330.95	8870.902	6959.389	5641.388
Intra school correlation %	63.02	55.73	43.51	32.54
Intra pupil correlation %	36.98	44.27	56.49	67.46
Percentage of total variance explained Percentage of school variance explained Percentage of pupil variance explained		21.71 30.76 6.30	38.58 57.59 6.19	50.21 74.29 9.19
-2*log (likelihood)	35631.08	35377.95	35054.75	33671.52

Note

South Africa did not have data on teachers' knowledge, therefore no Model G+

Table 9: SACMEQ II analysis: Model A for 14 countries (Reading)

Variable	Botswana (3322 out of 3322 cases)		Kenya (3299 out of 3299 cases)		Lesotho (3155 out of 3155 cases)		Malawi (2333 out of 2333 cases)	
	Estimate	S. Error	Estimate	S. Error	Estimate	S. Error	Estimate	S. Error
Fixed part (coefficients)								
Cons (Intercept)	523.199	3.733	550.921	4.689	454.337	2.947	427.834	2.439
Random part (variances)								
Between schools								
Cons (Intercept)	2073.1	258.102	3788.675	422.850	1412.103	162.060	723.761	99.526
Between pupils								
Cons (intercept)	5772.579	145.280	4872.048	123.472	2129.792	55.437	1758.746	53.112
Total	7845.679		8660.723		3541.895		2482.507	
Intra school correlation %	26.42		43.75		39.87		29.15	
Intra pupil correlation %	73.58		56.26		60.13		70.85	
-2*log (likelihood)	38552.63		37872.78		33581.33		24340.61	

Variable	Mauritius (2945 out of 2945 cases)		Mozambique (3177 out of 3177 cases)		Namibia (5048 out of 5048 cases)		Seychelles (1484 out of 1484 cases)	
	Estimate	S. Error	Estimate	S. Error	Estimate	S. Error	Estimate	S. Error
Fixed part (coefficients)								
Cons (Intercept)	531.157	5.330	508.484	2.949	541.697	3.377	580.538	8.504
Random part (variances)								
Between schools								
Cons (Intercept)	3774.993	497.078	1355.458	163.192	2743.993	265.056	1445.089	499.028
Between pupils								
Cons (intercept)	10701.67	286.420	3100.737	80.046	6153.383	125.896	14274.67	528.304
Total	14476.66		4456.195		8897.376		15719.76	
Intra school correlation %	26.08		30.42		30.84		9.2	
Intra pupil correlation %	73.92		69.58		69.16		90.8	
-2*log (likelihood)	35993.79		34940.31		58968.77		18452.86	

Variable	South Africa (3163 out of 3163 cases)		Swaziland (3139 out of 3139 cases)		Tanzania (2854 out of 2854 cases)		Uganda (2642 out of 2642 cases)	
	Estimate	S. Error	Estimate	S. Error	Estimate	S. Error	Estimate	S. Error
Fixed part (coefficients)								
Cons (Intercept)	483.406	7.436	531.449	3.254	540.557	3.955	483.999	5.774
Random part (variances)								
Between schools								
Cons (Intercept)	9089.989	1016.662	1616.150	194.094	2466.321	297.429	5178.877	601.855
Between pupils								
Cons (intercept)	4640.643	119.941	2991.326	77.613	5349.167	146.308	3679.039	104.497
Total	13730.63		4607.476		7815.488		8857.916	
Intra school corelation	66.2		35.08		31.56		58.47	
Intra pupil correlation	33.8		64.92		68.44		41.53	
-2*log (likelihood)	36291.54		34434.07		32977.43		29698.79	

Variable	**Zambia (2611 out of 2611 cases)**		**Zanzibar (2514 out of 2514 cases)**	
	Estimate	S. Error	Estimate	S. Error
Fixed part (coefficients)				
Cons (Intercept)	432.736	3.711	473.481	3.298
Random part (variances)				
Between schools				
Cons (Intercept)	2059.802	256.064	1361.735	185.167
Between pupils				
Cons (intercept)	4561.238	130.633	3680.945	106.956
Total	6621.04		5042.68	
Intra school corelation	31.11		27.0	
Intra pupil correlation	68.89		73.0	
-2*log (likelihood)	29759.59		28066.36	

Table 10: SACMEQ II analysis: model A for 14 individual countries (Mathematics)

Variable	Botswana (3321 out of 3322 cases)		Kenya (3296 out of 3299 cases)		Lesotho (3144 out of 3155 cases)		Malawi (2323 out of 2333 cases)	
	Estimate	S. Error	Estimate	S. Error	Estimate	S. Error	Estimate	S. Error
Fixed part (coefficients)								
Cons (Intercept)	513.870	3.211	564.538	4.133	448.617	2.602	433.782	2.137
Random part (variances)								
Between schools								
Cons (Intercept)	1482.640	190.171	2860.553	328.653	1053.075	127.398	471.306	76.424
Between pupils								
Cons (intercept)	5258.558	132.483	5253.717	133.209	2472.281	64.184	2720.433	82.341
Total	6741.198		8114.27		3525.356		3191.739	
Intra school correlation %	21.99		35.25		29.87		14.77	
Intra pupil correlation %	78.01		64.75		70.13		85.23	
-2*log (likelihood)	38195.94		38026.62		33863.54		25152.31	

Variable	Mauritius (2870 out of 2945 cases)		Mozambique (3136 out of 3177 cases)		Namibia (4990 out of 5048 cases)		Seychelles (1482 out of 1484 cases)	
	Estimate	S. Error	Estimate	S. Error	Estimate	S. Error	Estimate	S. Error
Fixed part (coefficients)								
Cons (Intercept)	577.844	5.981	525.347	2.172	437.877	4.015	553.160	7.234
Random part (variances)								
Between schools								
Cons (Intercept)	4690.559	628.827	679.248	88.542	4163.994	374.609	1039.215	361.077
Between pupils								
Cons (intercept)	14189.91	383.612	2634.796	68.486	3407.370	70.140	10663.84	394.939
Total	18880.47		3314.044		7571.364		11703.06	
Intra school correlation %	24.84		20.50		55.00		8.88	
Intra pupil correlation %	75.16		79.50		45.00		91.12	
-2*log (likelihood)	35882.34		33902.13		55598.4		17995.08	

Variable	South Africa (3135 out of 3163 cases)		Swaziland (3138 out of 3139 cases)		Tanzania (2849 out of 2854 cases)		Uganda (2619 out of 2642 cases)	
	Estimate	S. Error	Estimate	S. Error	Estimate	S. Error	Estimate	S. Error
Fixed part (coefficients)								
Cons (Intercept)	478.095	6.607	518.354	2.755	517.900	3.415	504.099	6.790
Random part (variances)								
Between schools								
Cons (Intercept)	7140.228	802.277	1096.511	139.196	1751.612	221.005	7215.391	832.3
Between pupils								
Cons (intercept)	4190.718	108.823	3287.003	85.296	5284.149	144.640	4258.965	121.535
Total	11330.95		4383.514		7035.761		11474.36	
Intra school correlation	63.02		25.01		24.90		62.88	
Intra pupil correlation	36.98		74.99		75.10		37.12	
-2*log (likelihood)	35631.08		34647.25		32834.33		29855.29	

Variable	**Zambia (2590 out of 2611 cases)**		**Zanzibar (2459 out of 2514 cases)**	
	Estimate	S. Error	Estimate	S. Error
Fixed part (coefficients)				
Cons (Intercept)	430.280	2.796	487.040	3.239
Random part (variances)				
Between schools				
Cons (Intercept)	1057.938	145.457	1360.701	178.507
Between pupils				
Cons (intercept)	4157.651	119.493	2666.296	78.391
Total	5215.589		4026.997	
Intra school corelation	20.28		33.79	
Intra pupil correlation	79.72		66.21	
-2*log (likelihood)	29199.94		26703.62	

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