[Speaker Presentation]

What do We Mean by Quality of Education? - From Multiple Viewpoints

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Introduction

This paper quotes extensively from four important documents to address the important issue of quality of education. These are TIMSS 2007 report on science and mathematics achievement, a document presented at the 2003 ADEA Biennial conference in Mauritius, UNESCO 2005 Global Monitoring Report, and Country Analytical report on access to basic education in Ghana.

There are many perspectives as to what counts as quality of education. These perspectives provide different lenses through which quality of education may be viewed. One perspective is to describe quality of education in terms of factors such as inputs, processes, outputs, outcomes, and value added. UNICEF (2000) defines quality of education in terms of six characteristics: "learners who are healthy and ready to learn; environments that are sage and adequately resourced; content reflected in relevant curricula for acquiring basic skills; processes that use child-centered learning; outcomes that encompass knowledge; skills and attitudes and link to national educational goals and civic participation" (Vespoor, 2005, p. 54). UNESCO expanded the definition of quality to include a special emphasis on gender perspective and a demand for education to reflect upon its relevance to the world outside of school and social dimensions. The different definitions highlight the different elements of the basic input-process-output model. This model emphasizes the importance of both cognitive and affective results measured by the extent to which pupils achieve knowledge, skills and behaviours specified by a national curriculum.

The sixth EFA goal aims at improving all aspects of the quality of education and ensuring excellence of all so that recognized and measurable learning outcomes are achieved by all, especially in literacy, numeracy and essential life skills. However, the EFA Global Monitoring Report (2005) issued by UNESCO reports that "in the many countries that are striving to guarantee all children the right to education, the focus on access often overshadows attention to quality. Yet quality determines how much and how well children learn and the extent to which their education translates into a range of personal, social and developmental benefits" (p. 4). Even though Goal 6 of the Dakar Framework for Action emphasizes the need to improve all aspects of the quality of education, Schaefer (2000) in a global study on "Assessing Learning Achievement" indicate that African countries are among countries with less than 50% of its children achieving literacy, numeracy and life skills mastery. Schaefer concluded that a large proportion of children do not have basic functional skills to read, write and enumerate after year four of their educational experience. The UNESCO (2005) report confirms these findings and shows that too many pupils are leaving school without mastering a minimum set of cognitive and non-cognitive skills. According to UNESCO (2005), there is mounting evidence that the quality of human resources, as measured by test scores, is directly related to individual earning, productivity and economic growth.

The quantity of children who participate in schooling and the number of years of schooling by themselves are therefore not as important as the quality of education they receive. If children attend school but are not able to achieve better learning outcomes, especially in literacy, numeracy and essential life skills, then there is no meaningful access to education. Unfortunately, the quantitative aspects of education rather than the qualitative aspects have become the main focus of attention in recent years for policy makers and governments (UESCO, 2005).

Even though there is a growing consensus about the need to provide access to education of good quality, there is much less agreement about what the term is much less agreement about what the term actually means in practice. The concept of quality of education is a very complex one and has been approached differently by different educational researchers and educationists. Factors usually considered when determining the quality of education can be grouped into input variables, process and systematic factors, outcome variables (such as examination results), and proxy measures (such as repetition and dropout rates). The questions that remain are what are the critical factors that determine the quality of education offered by schools and how do these factors influence the performance of learners? This seems to differ from country to country as the goals of education are not the same.

Formal schooling is presumed to be one of several important contributors to the development of individual skills and human capital. The relationship between the quality of measured labour force and economic growth of a nation on one side, and the impact of human capital and school quality on individual productivity and incomes, are extremely important. It can be argued that a more educated society is more likely to translate into higher rates of innovation, higher overall productivity and faster introduction of new technology. Schools therefore play an important role as skills training and education take place there. The need to get all children of school going age in school is therefore paramount to the accumulation of human capital in any society or country. This means that there must be equitable access to education for all citizens of a country. This requires special attention to be given to the enrolment of the poor, disabled and girls as well as the elite and boys (Vespoor, 2005).

A UNESCO report in 2005 shows that returns to school quality in studies in six countries including Ghana, Morocco and Kenya are very high. The report indicates that improved cognitive skills and years of schooling are important contributing factors in determining earnings. According the UNESCO (2005), elsewhere, one standard deviation increase in test scores was associated with wage increases ranging from 12% to 48%, suggesting a substantial return to higher levels of cognitive skills and probably, therefore, to higher levels of school quality. It is obvious that students who do better in school, as evidenced by either examination grades or scores on standardized achievement tests tend to go further in schooling (training institutions, polytechnics, universities).

The Dakar Framework for Action in 2000 includes a specific target on quality. The target stresses the achievement of measurable learning outcomes as evidence for attainment of quality education in literacy, numeracy and essential life skills. The Millennium Challenge Account, the Fast Track Initiative, the G8 summit and the USA No Child Left Behind Act 2001, all express similar concern about the quality of basic education. It is therefore not surprising that there is mounting evidence that the quality of human resources, as measured by test scores, is directly related to individual earnings, productivity and economic growth after allowing for quantity of schooling, age or work experience, and other factors that might influence earnings and the potential to alleviate poverty. These arguments provide strong reasons for being concerned about the quality of schooling.

This paper focuses on two of the many factors which are used to determine quality of education. These are allocation of financial resources to education and cognitive outcomes as measured through summative evaluation. The paper looks at quality education through the lenses of only these two factors in the case of Ghana. The purpose is not to compare Ghana to any other country but rather to look at how quality of education is being delivered.

Resource Allocation into Basic Education in Ghanaian

Even though the education literature has no consensus on the impact of specific resource policies on achievement, there is evidence that sufficient resources are necessary if education of acceptable quality is to be attained. Also, well-implemented increases in resources are an important means of improving educational quality in developing countries. The level of financial resources allocated to basic education (primary and junior high school) by the Government of Ghana (GoG) and bilateral and multilateral agencies are therefore discussed in this section.

Since the education reforms of 1987 in Ghana, substantial government and donor funds have gone into funding the basic education sector. Apart from government and external sources, non-statutory funding sources to education have included internally generated funds (IGF) arising from textbook user fees, local authority levies, local authority funds, contributions from school management committees, parent teacher associations (SMC/PTAs) and other benevolent societies.

Since 1995 basic education in Ghana has been administered and funded under a sub-sector programme whose sources of funds generally break down as follows: (i) Ghana Government Ministry of Education Budget, (ii) External Funding Agencies (Development Partner contributions and HPIC relief funds), (iii) Ghana Education Trust Fund (GETFund), (iv) District Assemblies Common Fund (DACF), (v) Internally Generated Funds (IGF), and (vi) Private Sector/ Non-governmental Organisations (NGOs) and Community based Organisations (CBOs). Donor funding and other sources (e.g. from NGOs) go directly to fund school quality improvement, with external/donor inflows often used to supplement GoG shortfalls. These resources reflect expenditures under educational programmes/projects supported by the international funding agencies. Within the external/donor inflow, resources are made available for education from HIPC debt relief. Since 2005 an additional external funding source has been the EFA catalytic funds. Donor funding is thus a major component of non-salary expenditure in education.

An analysis of recent trends in funding shows that the government of Ghana funding of Education (total resource envelop) has declined, whilst donor funding has remained generally below 10 percent (Akyeampong et al., 2007). These funding patterns raise the importance of making strategic choices and reassessing the targets and goals for achieving EFA in Ghana. Without a significant injection of funds to basic education, sustainable gains in access where expansion and quality improvement take place concurrently to ensure meaningful access are unlikely to be achieved.

The expansion of basic education from 9 to 11 years in 2007, coupled with other commitments of the GoG to expand and improve access to post-basic education has huge financial and capacity implications. According to the 2006 education sector performance report (MOESS, 2006), the 10-year work plan for the education sector was estimated in 2006 to cost $15.4 billion (annually about $1.5 billion). Further increases in basic school enrolments would raise these levels even more. Unless donors increase their investment significantly and directly to support the expansion of basic education, increased enrolments will be difficult to sustain. Already, expenditure on primary education is falling behind the targets set in Ghana's Education Strategic Plan (see Table 1). The lesson from history suggests that expanding access is not simply a question of adequate financial resources; it is also about the system's capacity to address the non-financial constraints of expansion. Ensuring that children start school early is important but is no guarantee that they will complete the full cycle of basic education if the needed educational inputs and facilities are not present to mutually reinforce the effects.

Table 1: Education Strategic Plan (ESP) Targets

	Year	2002	2003	2004	2005	2010	2015
ESP target	% recurrent expenditure on primary education	34.7%	36.6%	37.6%	37.7%	37.2%	34.4%
Actual Expenditure	Recurrent Expenditure on Primary Education	892,738	1,492,132	1,688,808	1,988,137		
	% Recurrent Expenditure on primary education	34.8%	39.7%	31.6%	31.8%		

(Source: MOESS, 2006)

Rapid expansion without measures to ensure that those enrolled get quality education is likely to reverse possible benefits. It is important to factor in adequate teacher supply and improved school infrastructure to sustain enrolment gains. According to the Ministry of Education's (MOESS, 2006) own evaluation, the introduction of the capitation grant scheme has made the need to tackle deficits in classroom infrastructure more pressing. To achieve the UPE target by 2015 (primary enrolment rising from 2.78 million in 2003 to 3.73 million assuming a population growth rate of 2.5%) will create a deficit of 1,048 classrooms to be built every year for the next 4 years in the public basic schools in the country. This translates to one additional public basic school annually for each district (MOESS, 2006). If teacher supply requirements are factored into this, it immediately becomes obvious that expanding access is much more than simply removing fee barriers. It is equally about providing other educational inputs that can cope with the expected surge in enrolments. Thus, a more comprehensive initiative based on an analysis of teacher supply needs, infrastructure requirements and textbooks is required if investments to improve access are not to go waste.

There is also the issue of demand. Expansion policies need to introduce initiatives and incentives that can motivate demand for basic education by improving its quality and opportunities to access post-basic education. The charge that basic education has little or no value and relevance, especially in rural areas is often linked to limited access to secondary education (Pryor & Ampiah, 2003). Expansion policies that are supply driven often assume the problem to be simply that of inadequate infrastructure and fees. A key challenge is how to expand access to post-basic education when there is still a lot more to be done to improve access to basic education. It is also about how best balanced growth can be achieved within realistic budget constraints with appropriate shares for basic education, post-basic education and higher. The lesson is that expansion to basic education should be seen in terms of realistic trade-offs and expansion of other sectors in education. This is necessary for quality education for all school-going age children in Ghana.

Student Achievement

Cognitive development is identified as a major explicit objective of all education systems (UNESCO, 2005). However, if quality is defined in terms of cognitive achievement, ways of securing increased quality are neither straightforward nor universal. In spite of this difficulty, the relationship between quality education and levels of economic growth and personal incomes are well established. Thus, quality exists when students demonstrate knowledge. Assessment of learners' progress, using cognitive tests, serves a number of purposes. It can provide an indication of how well items in the curriculum are being learned and understood. Also, it can provide a signal as to how well learners have done at the main exit points from the school system, thereby typically helping educational institutions or employers to select those best qualified for further education or for various kinds of work. This type of summative assessment is used as a means of facilitating access to social and economic hierarchies (UNESCO, 2005). Even though one of the beneficial effects of summative assessment is helping to ensure that the intended curriculum, the negative effect is likely to be excessive attention to passing examinations rather than to broader aspects of learning.

In Ghana, the measurement of the quality of education has focused principally on resource inputs and outcomes. Three indicators are usually used to measure quality of education at the basic school level. These are the Pupil Teacher Ratio (PTR), pupil core textbook ratio (PCTBR). The BECE results at the JHS level reflect the quality of education pupils had received from the primary school level to the JHS level. The BECE is considered a good indicator of quality of education nationally. The BECE is administered by the West African Examination Council. Currently, each year over 300,000 students after nine years of basic education take the BECE with the hope of obtaining a place in Senior High School. However, the BECE as a measure of quality of education faces the following criticisms:

- In comparing performance across schools, BECE results do not take into account the number of students who do not even attempt to write the exam. Example: One school could send only its top 4 students and they all pass, resulting in a score of 100% while another school has all 40 students write the exam while only 30 pass, resulting in a score of 75%.

- Some schools teach towards the examination and in doing so risk teaching pupils how to have impressive output in a single context rather than applicable knowledge reflective of meaningful quality education.
- The BECE does not take into account the disparity between urban and rural resources that aid the teaching and learning process.
- The BECE does not take into account where the pupils receive the foundations of their education (BS1-BS6). For example, pupils may have received a superior private education from BS1-BS6 and then attended a public JHS. In such instances, the BECE would credit the JHS for obtaining quality results when pupils may have acquired most skills and knowledge elsewhere.

There is evidence that the quality of human resources as measured by test scores, is directly related to individual earning, productivity and economic growth (UNESCO, 2005). International assessments of cognitive skills suggest that school quality differs widely among and within countries. It has been found that children who live in developing countries not only receive fewer years of education but also reach lower achievement levels. The quality of education as measured by Trends in International Mathematics and Science Studies (TIMSS) test scores is illustrated using the case of Ghana. The aim is not to compare Ghana's performance with other countries but to use the performance in TIMSS to illustrate the case of poor but improving quality of education.

Ghana participated in the 2003 and 2007 TIMSS with students from both private and public schools at the Grade 8. The performance of the Grade 8 students in mathematics and science are discussed in the sections which follow.

Overall mean achievement in science and mathematics

TIMSS uses the international average and scale average in reporting students' achievement in science and mathematics. The scale average fixed at 500 with each cycle of TIMSS provides a fixed point of comparison through time. This is different from the international average, which is obtained by averaging across the mean scores for each of the participating countries. The international average is therefore not fixed but changes from one year to the other depending on the number of participating countries.

TIMSS uses four points on the scale as international benchmarks and describes achievement at those benchmarks in relation to students' performance on the test questions. The benchmarks which represent the range of performance shown by students internationally are as follows:

- Advanced International Benchmark is 625,
- High International Benchmark is 550,
- Intermediate International Benchmark is 475,
- Low International Benchmark is 400.

In the TIMSS 2007, the Grade 8 Ghanaian students obtained a mean scale of 303 in science. The average achievement is significantly lower than the scale average of 500. None of the Grade 8 Ghanaian students could reach the Advanced International Benchmark of 625 in science. This means that none of the students exhibited fluency on items involving the most complex topics and reasoning skills in the TIMSS 2007 Science Framework. Only 1 percent of Ghanaian students reached the High International Benchmark of 550, with 6 percent and 19 percent reaching the Intermediate (475) and Low (400) International Benchmarks respectively. Thus, the greater proportion of Ghanaian students (74%) could not even reach the lower benchmark of 400 in science. The performance of Ghana in the TIMSS 2007 at the Grade 8 level can therefore be described as very low. Hence, the overwhelming majority of students could not recognize some basic facts from life and physical sciences. They did not have some knowledge of the human body, or demonstrate some familiarity with everyday physical phenomena. Students could not interpret pictorial diagrams or apply knowledge of simple physical concepts to practical situations.

Compared to the TIMSS 2003 assessment where the mean scale score was 255, the TIMSS 2007 performance in science is an improvement upon the TIMSS 2003 assessment. The mean performance and its range (as indicated by the difference between the 5th and 95th percentiles) for the two assessments are presented in Table 2.

Table 2 Grade 8 Students' mean science score in TIMSS

	TIMSS 2007	TIMSS 2003
Overall mean science scale score	303 (5.4)*	255 (5.9)*
Range (5th and 95th confidence interval)	124-483	52-450

*Standard error in parentheses

The 5th percentile score indicates the highest score obtained by the bottom five percent of students. Table 2 shows that in 2003 the bottom 5% of the Ghanaian Grade 8 students did not obtain a scale score beyond 52, but in 2007 the 5th percentile scale score went up to 124. Also in 2003, the top 5% of students obtained a scale score of at least 450, but in 2007 the scale score went up to 483. In 2007 therefore, there was a significant improvement of students' achievement over the 2003 average score. In TIMSS 2007, students' performance in science was therefore significantly higher by 48 scale scores (with a standard error of 7.9). In spite of this improvement in science achievement in TIMSS 2007, the overall performance on the TIMSS 2007 science test was very low

In the TIMSS 2007 assessment, the Ghanaian Grade 8 students obtained a mean mathematics score of 309 which is an improvement upon the TIMSS 2003 assessment. The mean performance and its range (as indicated by the difference between the 5th and 95th percentiles) for the two assessments are presented in Table 3.

Table 3 Grade 8 Students' mean mathematics score in TIMSS-2003

	TIMSS 2007	TIMSS 2003
Overall mean mathematics scale score	309 (4.4)	276 (4.7)
Range (5th and 95th confidence interval)	162 - 461	130 - 430

The 5th percentile score indicates the highest score obtained by the bottom five percent of students. Table 3 shows that in 2003, the bottom 5% of the Ghanaian Grade 8 students did not obtain a scale score beyond 130, but in 2007 the 5th percentile scale score went up to 162. Also, in 2003 the top 5% obtained a scale score of at least 430, but in 2007 the 95th percentile scale score went up to 461. The TIMSS 2007 average score was therefore a significant improvement over the 2003 average score. In TIMSS 2007, the Ghanaian Grade 8 students' performance was significantly higher by 34 scale scores (with a standard error of 6.2). It is however important to point out that the Ghanaian students' overall performance on the TIMSS 2007 mathematics test was very low.

Achievement in science and mathematics content and cognitive domains

The TIMSS science assessment is organized around two dimensions; a content dimension specifying the subject matter or content domains to be assessed and a cognitive dimension specifying the thinking processes that students are likely to use as they engage with the content. Each item in the mathematics and science assessment is associated with one content domain and one cognitive domain, providing for both content-based and cognitive-oriented perspectives on student achievement in science. The four content domains and three cognitive domains in mathematics and science listed below constitute independent subgroups with a common reporting metric (or scale) that makes it possible to compare the relative strengths and weaknesses of performance in the different content or cognitive domains. A TIMSS scale average of 500 was used in reporting the performance in the four domains.

The TIMSS 2007 Grade 8 science assessment contained 214 items yielding 240 score points. However, following item review, the 214 items and 240 score points were reduced to 210 items and 231 score points. The Ghanaian students' average percent correct on all items out of the 231 score points was only 20 score points with a standard error of 0.4. Tables 4 and 5 show the average percent correct obtained on all items in the mathematics and science content and cognitive domains respectively.

Table 4 Average Percent Correct in the Science Content Domains

	Science	Content Domain			
		Biology	Chemistry	Physics	Earth Science
Ghana	20(0.5)	19(0.5)	23 (0.6)	20 (0.4)	17 (0.4)

Table 5 Average Percent Correct in the Science Cognitive Domains

	Science	Cognitive Domain		
		Knowing	Applying	Reasoning
Ghana	20 (0.5)	30 (0.6)	15 (0.4)	11 (0.4)

The mean performance of the Ghanaian Grade 8 students in all the four science content areas was as follows: Biology, 304; Chemistry, 342; Physics, 276; and Earth Science, 294. In all the four science content domains, the Ghanaian Grade 8 students' performance was statistically significantly below the TIMSS 2007 scale average of 500 indicating that they were very weak in all four domains.

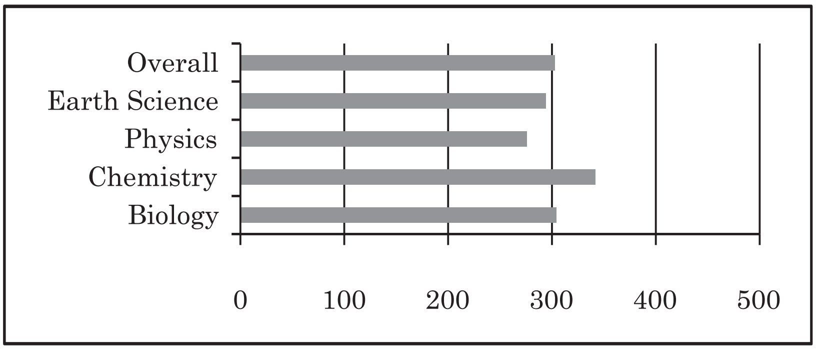

Figure 1: Relative strengths of Grade 8 students in the science content areas tested in TIMSS-2007

To highlight relative strengths and weaknesses in the science cognitive domains, the average achievement in these domains relative to the overall level of performance in the country was also examined. The mean performance of the Ghanaian Grade 8 students in the knowing and applying cognitive categories were 291 and 316 respectively. However, their scores on items in the reasoning cognitive category were too small to allow average achievement to be accurately estimated. The Ghanaian students' average percent correct on all items out of the 236 score points was 18 score points with a standard error of 0.4.

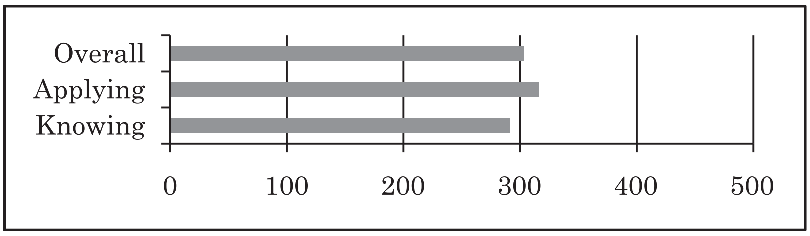

Figure 2: Relative strengths of Grade 8 students in the science cognitive categories

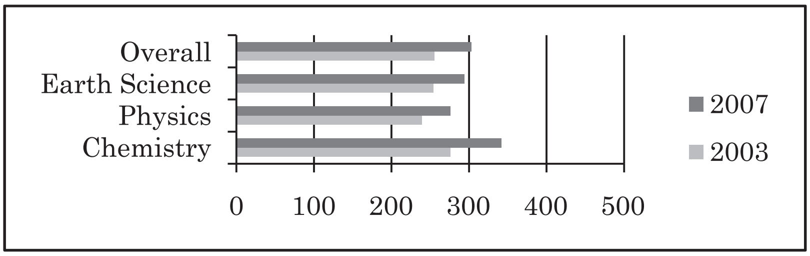

Figure 3: Differences in achievement in the science content categories by Year

Tables 6 and 7 show the average percent correct obtained on all items in the mathematics content and cognitive domains respectively. The score points in the four content domains and three cognitive domains listed above constitute independent subgroups with a common reporting metric (or scale) that makes it possible to compare the relative strengths and weaknesses of performance in the different content domains or cognitive domains. A TIMSS scale average of 500 was used in reporting the performance in the domains.

Table 6 Average Percent Correct in the Mathematics Content Domains

	Maths	Content Domain			
		Number	Algebra	Geometry	Data & Chance
Ghana	18 (0.4)	17 (0.5)	20 (0.5)	17 (0.4)	17 (0.4)

Table 7 Average Percent Correct in the Mathematics Cognitive Domains

	Maths	Cognitive Domain		
		Knowing	Applying	Reasoning
Ghana	18 (0.4)	24 (0.5)	17 (0.4)	10 (0.3)

The mean performance of the Ghanaian Grade 8 students in all the four mathematics content areas was as follows: Number, 310; Algebra, 358; Geometry, 275; and Data and chance, 321. Also, the average percent correct was highest on Algebra items, meaning most students were able to answer questions in this content domain (Table 6). But in all the four mathematics content domains the Ghanaian Grade 8 students' performance was statistically significantly below the TIMSS scale average of 500 indicating that they were very weak in all four domains.

Figure 4 shows differences between average performance in each mathematics content domain and the overall average across content domains. It can be seen from the figure that they performed relatively better in Algebra than the average. They obtained 49 scale scores above the overall country average in Algebra. Their performance in Number and in Data and Chance was about the same as the overall country average but relatively lower in Geometry. They obtained 34 scale scores below the overall country average in Geometry.

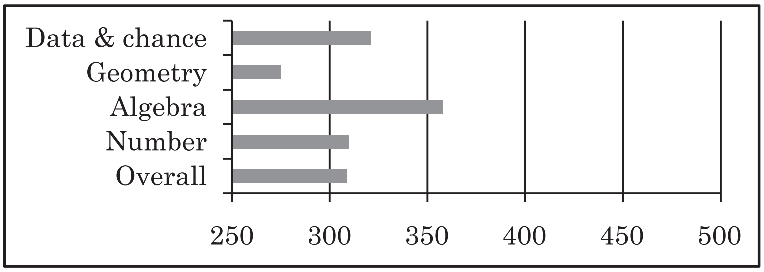

Figure 4: Relative strengths of Grade 8 students in the mathematics content areas tested in IMSS-2007

The mean performance of the Ghanaian Grade 8 students in the knowing and applying cognitive categories were 297 and 313 respectively. But the Ghanaian students' average percent correct on items was highest on knowing items, meaning many of the students (24%) were able to answer questions in this cognitive domain (Table 7). Less number of the students (10%) were able to answer questions in the reasoning domain. Their scale scores on items in the reasoning cognitive category were too small to allow average achievement to be accurately estimated.

Figure 5 illustrates differences between average performance in each mathematics cognitive domain and the overall average across cognitive domains. Just as in the case of the content domains, the performance was significantly lower than the TIMSS scale average of 500 in each of the cognitive categories indicating that the Ghanaian Grade 8 students were very weak in all three categories. It can be seen from Figure 5 that the students' performance in Applying was about the overall same as country average but relatively lower in Knowing. They were just 4 scale scores better in Applying than the average but were 13 scale scores lower than the overall country average in Knowing.

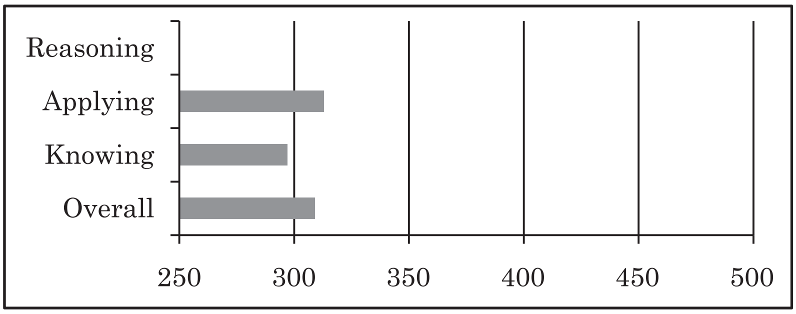

Figure 5: Relative strengths of Grade 8 students in the mathematics cognitive categories

Gender Differences in Achievement in Science Content Areas

The average achievement of the Grade 8 Ghanaian girls and boys who participated in the TIMSS 2007 is presented in Table 8. The performance of both boys and girls was statistically significantly below the TIMSS scale average of 500. However, on the average, the boys performed statistically significantly better than the girls by 29 scale score points.

Table 8 Differences in achievement in the science by Gender

	All	Girls	Boys
Proportion of students in sample	100	45 (0.8)	55 (0.8)
Mean scale score	303 (5.4)	288 (5.9)	316 (5.6)

Figure 6 presents average achievement for boys and girls in each of the content domains. The average achievement for boys was significantly higher than that of girls in all four content domains. Both boys and girls had their best performance in Chemistry, and the worst performance in Physics.

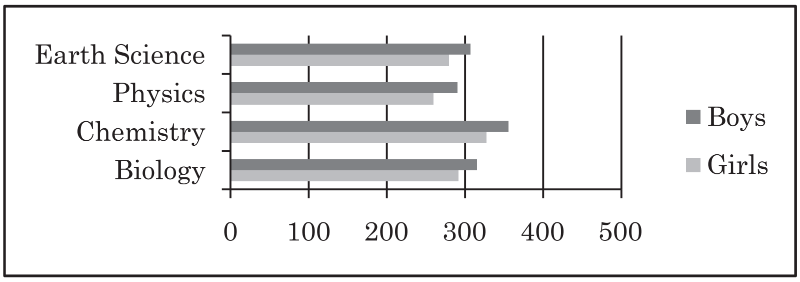

Figure 6: Gender differences in achievement in science content areas

Figure 7 presents average achievement for girls and boys in each of the science cognitive domains. The average achievement for boys was significantly higher in two cognitive domains for which data was available.

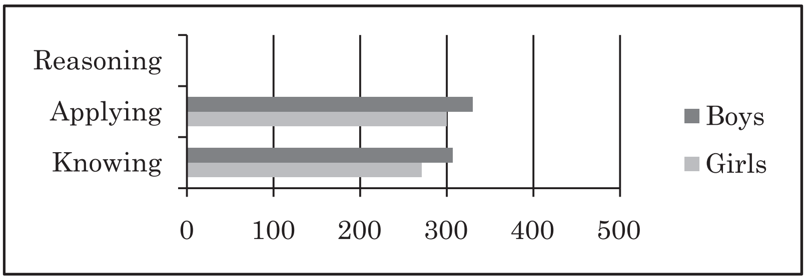

Figure 7: Gender differences in achievement in science cognitive domains

Since data on gender differences in achievement in the three science cognitive domains was unavailable for the TIMSS 2003 assessments, no comparison with the performance in 2007 could be made in this domain. The average achievement in mathematics of the Ghanaian girls and boys who participated in the TIMSS 2007 is presented in Table 8. The performance of the boys and girls was statistically significantly below the TIMSS scale average of 500.

Table 8 Differences in achievement in the mathematics by Gender

	All	Girls	Boys
Proportion of students in sample	100	45 (0.8)	55 (0.8)
Mean scale score	309 (4.4)	297 (5.0)	319 (4.4)

Figure 8 presents average achievement for boys and girls in each of the mathematics content domains. The average achievement for boys was significantly higher in all the four mathematics content domains. Both boys and girls had their best performance in the Algebra domain, and the worst performance in Geometry. On the average, the boys were statistically significantly better than the girls by 22 scale score points.

Figure 9 presents average achievement for girls and boys in each of the cognitive domains. The average achievement for boys was significantly higher in two cognitive domains for which data was available. On the average, the boys were statistically significantly better than the girls by 22 scale score points.

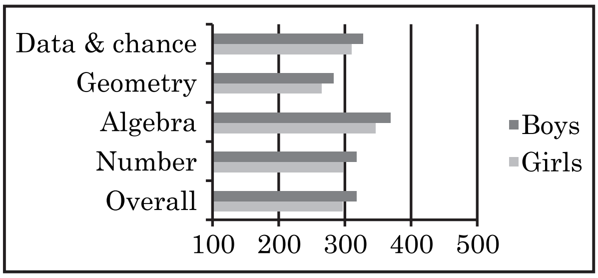

Figure 8: Gender differences in achievement in mathematics content areas

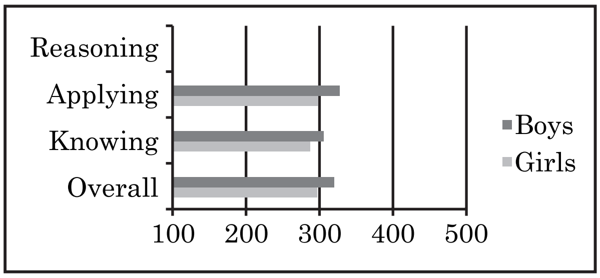

Figure 9: Gender differences in achievement in mathematics cognitive domains

Conclusion

This paper has dwelt extensively on Ghana but the issues discussed can stimulate reflection on commonalities with the experience in developing countries. The paper has highlighted the complexity of the difficult concept of quality and some of the different perspectives from which quality is assessed. The paper focused on only one input variable (funding) and outcome variable (test scores) to assess the quality of education in Ghana. Funding of basic education shows that declining financial resources are being allocated to basic education which could have adverse effect on quality of education.

Even though the sample of students who took part in the TIMMS 2003 and 2007 international tests may not representative of Ghanaian students, the results is an indication of what may be happening in the larger population of students in the Ghanaian school system. Quality of education from the perspective of test scores using TIMSS assessment shows that the quality of education received by Grade 8 Ghanaian students who took part in the TIMSS test was poor but improving. The performance shows the students are not internationally competitive. Also, disparity among students in science and mathematics performance shows that either the students were not receiving similar quality of education or they were not learning enough to be competitive. The performance of boys and girls were significantly different with boys outperforming girls in both content and cognitive domains. Whatever definition of quality of education, the case of Ghana shows that quality of education needs improvement.

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