African Population and Health Research Center

THE QUALITY OF EDUCATION IN UGANDA

A Case of Iganga and Mayuge Districts

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Abbreviations

ACS	Average class size
APHRC	African Population and Health Research Centre
CTT	Classical test theory
DEO	District Education Officer
DIF	Differential item functioning
DSA	Demographic Surveillance Area
EFA	Education For All
ESSP	Educational Sector Strategic Plan
FGD	Focus group discussions
GDP	Gross domestic product
HDREC	Higher Degrees Research and Ethics Committee
IMHDSS	Iganga Mayuge Health and Demographic Surveillance System
JICA	Japan International Cooperation Agency
MDGs	Millennium Development Goals
MoES	Ministry of Education and Sports
MUSPH	Makerere University School of Public Health
NAPE	National Assessment of Progress in Education
NER	Net enrollment rate
PLE	Primary Leaving Examinations
SACMEQ	Southern and Eastern Africa Consortium for Monitoring Educational Quality
SE	Standard error
SFP	School feeding program
SIDA	Swedish International Development Agency
SSA	Sub-Saharan Africa
STR	Student-teacher ratio
TFR	Total fertility rate
UNCST	Uganda National Council of Science and Technology
UNEB	Uganda National Examinations Board
UPE	Universal Primary Education

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Map of Uganda

Map showing districts including the original Iganga District that was later split into Iganga and Mayuge districts.

Executive Summary

In the last two decades, Uganda, like many sub-Saharan African countries, has established universal primary education policies, which have enhanced access and improved enrollment in the country. This is consistent with the EFA goals that focus on zones of exclusion and access. In this regard, Uganda introduced the Universal Primary Education (UPE) policy in 1996; the free primary education policy in 1997 and the compulsory primary education policy in 2008. Following the introduction of these policies, the net enrollment rate (NER) of Uganda primary education improved from less than 60% in 1996 to almost 98% in 2012. However, in spite of the remarkable improvement in school enrollment, learning outcomes remain poor in Uganda, implying little progress on the EFA goal on quality education.

For example, only about 45% and 40% of the P6 students who took part in the National Assessment of Progress in Education (NAPE) survey in Uganda in 2012 were considered to have reached the desired proficiency levels in mathematics and English literacy, respectively (UNEB, 2012). In a regional education survey, only about 38% of children aged 10-16 in Uganda passed a combined mathematics and literacy test, which is especially poor when compared to the proportion of their counterparts passing this test in Kenya (63%) and Tanzania (50%) (UWEZO, 2013). In addition, results from the latest SACMEQ survey, which was conducted in 2007 in collaboration with the Ministry of Education and Sports, showed that only about 31% and 7% of P6 students in Uganda were ranked in the top four out of eight competency levels in reading literacy and mathematics, respectively (Hungi & Thuku, 2010). In terms of comparison by subgroups of students, past studies in Uganda at primary school level have consistently indicated that performance in mathematics and literacy is worse among girls, children from impoverished families, government schools and school located in remote rural areas (see for example Hungi & Thuku, 2010; UNEB, 2010, 2012).

It is against this backdrop that African Population and Health Research Center (APHRC), in collaboration with the Iganga-Mayuge Health and Demographic Surveillance System (IMHDSS) and in consultation with the Ministry of Education and Sports (MoES) in 2014, undertook the study covered in this report among grade 3 (P3) and grade 6 (P6) students attending schools that serve families residing in the IMHDSS. The main purpose of this study was to examine the schooling pattern as well as the quality of education received by children living in rural settlements in Uganda. Specifically, the study sought to identify the key barriers that have the most effect on learning outcomes. The ultimate anticipation is that the evidence generated in this study will be used by policymakers in Uganda to improve the provision of quality basic education for all children living in rural settings in Uganda.

As aforementioned, the desired target population for this study was all P3 and P6 students attending schools serving families living in the IMHDSS in July and August 2014. Although students were the desired target population, the study was also concerned with collecting data that described the students' families, their teachers and their schools. The study employed a

cross-sectional design that involved schools and households in the IMHDSS.

During the process of the study design and before data were collected, the APHRC team, with assistance from the IMHDSS leadership, made a successful oral presentation about the study to the Sector Policy and Management Working Group at the Ministry of Education and Sports headquarters in Kampala in February 2014. Following this presentation, approval was granted by the Ministry for this study to go ahead. The team also sought study approval from the Uganda National Council for Science and Technology (UNCST) and the approval was granted in June 2014. Because the IMHDSS is hosted by Makerere University, the study protocol also went through the university's internal approval process. This internal process is a major prerequisite for the approval of any study to be carried out in Uganda by the UNCST.

In total, the study collected data from 82 schools involving 2,913 P3 and 2,711 P6 students, their teachers (297) and their families. Both qualitative and quantitative methods were used to collect data. To measure achievement, P3 and P6 students completed English and mathematics tests. In addition, the P3 students completed a literacy test in Lusoga while the P6 students completed a questionnaire about their personal and home backgrounds. P3 and P6 mathematics teachers completed a mathematics knowledge test and a teacher questionnaire covering their personal and professional backgrounds. For qualitative data, a total of seven focus group discussions (FGD) were conducted with teachers and parents to establish their perceptions on schooling patterns, quality of education and learning barriers. In addition, a total of 158 P3 and P6 English and mathematics classroom lessons were recorded on video in an effort to observe classroom processes and how these processes could relate to learning barriers at the classroom level. These classroom observation data were subjected to a rubric developed to systematically analyze the video recordings.

Key findings

The main findings of the study are summarized under the subheadings that follow.

School characteristics

- With the exception of textbooks in Lusoga language, the private schools had better textbook-student ratios than public schools. On average, two students in private schools shared a textbook while three students in public schools shared a textbook.
- The overall student-teacher ratio (STR) was 36 and this was within the stipulated national benchmark, which is 43 students per teacher. However, this varied significantly by school type and district. The STR for public schools was 42 while that of private schools was about 19. The STR for Mayuge was 48 while for Iganga it was 32.
- The average number of students per class was 69. This average was slightly outside the nation's set benchmark, which is 61 students per class. On average, classes in public schools were significantly more congested than classes in private schools.

Student characteristics

- P6 students involved in this study were, on average, older than expected, regardless of the type of school they attended. Furthermore, P6 students in public schools were, on average, one year older than their counterparts in private schools. The average age of the P6 students was about 14 years for public schools and 13 years for private schools.
- Overall, about 42% of the P6 students reported that they had not attended pre-primary school before joining P1, and most of the students who had not attended pre-primary school were in public schools.
- Student absenteeism, measured by the percentage of the sampled P6 who were absent for at least one day in the last school week preceding data collection, was significantly higher in public schools than in private schools. About 34% and 27% of the P6 students in public and private schools, respectively, reported being absent for at least one day in the school week preceding data collection.

Student achievement in literacy and mathematics

- The mean scores of the P3 students in English, Lusoga and mathematics were about 27%, 20% and 50%, respectively, while the mean scores of the P6 students in English and mathematics were about 43% and 31%, respectively. For both grades and for all the three subjects considered, the observed mean scores were considered unsatisfactory, especially bearing in mind that the tests were based on skills taught in the official primary school curriculum in Uganda for P3 and P6.
- P3 and P6 students attending private schools outperformed their counterparts in the public schools across all subjects assessed. In addition, in all subjects considered and based on descriptive statistics, the mean performances of P3 and P6 students were better in Iganga schools than in Mayuge schools and better in schools located in urban or peri-urban areas than in schools located in rural areas.
- For both English and mathematics, P6 students who had attended pre-primary school for at least two years before joining P1 significantly outperformed their counterparts who had never attended pre-primary school.
- In general, younger P6 students were likely to perform better than their older counterparts and this was more evident in English scores than in mathematics scores.
- By and large, P3 students who performed well in Lusoga also performed well in English and those who did poorly in Lusoga also did poorly in English (correlation coefficient = 0.80). In addition, P3 students who performed well in English or Lusoga also performed well in mathematics and vice versa.
- Overall, in the literacy assessments, students did well on items related to knowledge domain (above 50% for P3) but performed poorly on items related to application.

Teachers and teaching practices

- On average, teachers taught 11 lessons a week, an equivalent of 6.4 hours a week, 1.3 hours a day or 256 hours in a 40-week school year, , and this did not differ by school type. In Uganda, teachers are supposed to teach for at least 6 hours a day or 30 hours a week.
- Overall, teachers in public schools had a slightly higher (42%) mastery of the mathematics content and pedagogy than their counterparts (38%) in private schools. In both public and private schools, P3 teachers had lower mean scores (36%) than the P6 teachers (44%).
- In the teachers' test, items on pedagogical knowledge (how to teach) were the most poorly performed, with a mean of 30%. This might inhibit instructional delivery or present a barrier to student learning.
- Teachers' years of teaching, a measure of experience, did not enhance learning – the more the years of teaching, the lower the student test scores. Furthermore, recently employed teachers had among the highest teacher test scores.
- Teaching styles were heavily teacher-centered and reproductive styles that might not develop critical thinking among learners. Teachers applied similar styles, regardless of the grade they were teaching. One would have expected this to vary by grade, given the age differences of students in P3 and P6, but this was not the case.
- Between 34% and 47% of lesson time was spent on activities that did not directly enhance learning, for example, transitioning from one activity to another.

Perceptions of parents and teachers regarding learning barriers

- In general, parents perceived that the quality of education was better in private schools than in public schools. Because of this, parents with children in private schools in the IMHDSS indicated that they would continue to keep their children in those schools.
- Parents considered that private schools offer better quality learning due to manageable class sizes in those schools and the commitment of teachers, who ensured that their schools perform better.
- It was evident from the discussions with teachers that schools cannot improve the quality of teaching without the support of parents. From the teachers' perspective, there were many household-based learning barriers in the IMHDSS with the main ones being child labor, parents not supportive of their children's education, and poverty.
- Teachers strongly felt that parents needed to play their part as key stakeholders in order for them to solve some of the problems that afflict the education of their children. In this regard, teachers felt that parents needed to provide their children with basic learning materials and show more interest in their children's education by following up on their children's performance in school.

- Teachers were of the opinion that long distances to school affected their ability to teach as well as the ability of the students to learn.

The key learning barriers

- The most important predictors of English achievements among P6 students in the IMHDSS were school location, existence of a school feeding program, mean pre-primary school attendance, teachers' source of lighting, grade repetition, student age and use of lesson plans.
- For mathematics, the most important predictors among P6 students were school location; subject advisor visits; parental involvement, classroom resources and basic student learning materials; existence of a school feeding program; whether or not teachers were from the local district; teachers' traveling distance to school; and whether or not the teacher kept student mathematics progress records.

Key recommendations for policy and practice

- Teachers and school committees should develop performance goals that can be tracked and evaluated at the end of the school year. Schools should avoid using curriculum coverage as a measure of teacher performance and should instead use learning outcomes as the main indicator of how well the teaching and learning goals have been achieved.
- Teachers' teaching assignments should be based on their individual competence (their content and pedagogical knowledge).
- District Education Officers (DEOs) should closely monitor what is happening in schools with a view to ensuring that the available teachers are fully utilized. This could be achieved by ensuring that teachers adhere to the ministry's recommendations of a teaching workload of 30 hours per week, and that all teachers attend school and lessons without fail.
- Government should discourage the incidence of over-age students in schools. This could be done by encouraging parents to enroll their children at the official school entry age (6 years) and minimizing incidents of grade repetition by providing early interventions for students at risk.
- Government, through the MoES, should encourage parents to enroll their 3-6-year-old children in pre-primary schools. In order for this to work, it would be important for the MoES to start new pre-primary schools in areas with shortages of these institutions.
- Government should consider building teacher housing within school compounds and installing these houses with electricity or providing teachers in remote rural schools with gas lamps.
- Subject advisors should visit all classrooms more often to work with teachers to improve

learning outcomes. In particular, the subject advisors should work with head teachers to monitor incidents of teachers without teaching documents (schemes of work, lesson plans, records of work and student progress records) in schools and assist teachers in reducing these incidents.

- Ministry of Education and Sports should provide each primary school student with at least one exercise book for each key subject in the curriculum. In addition, head teachers and teachers should encourage parents to support their children's education by providing them with basic learning materials, such as pencils, rulers and erasers.
- The MoES should conduct a survey to identify the teaching challenges faced by teachers from outside the local district. When challenges are identified, the DEOs should be tasked with providing in-service training on how to deal with these challenges for newly appointed and existing teachers in their districts.

1. Introduction

This report covers a study that was carried out by the African Population and Health Research Center (APHRC) in collaboration with the Iganga-Mayuge Health and Demographic Surveillance System (IMHDSS) among grade 3 (P3) and grade 6 (P6) students attending schools that serve families residing in the IMHDSS geographic area of operation. The study sought to examine schooling patterns and to identify the key learning barriers among primary school students in the IMHDSS.

1.1 Uganda education system

The Ugandan education system consists of seven years of primary school, four years of lower secondary, two years of upper secondary and at least three years of university education (7-4-2-3). The official school starting age is six years. Some children go through pre-primary school at ages 2 to 5, although pre-primary school education is not compulsory in Uganda. Basic education in Uganda comprises pre-primary school education, primary education (P1 to P7) and lower secondary (S1 to S4). Primary education is divided into three phases: lower primary (P1 through P3), transition year (P4) and upper primary (P5 through P7). On completing P7, students must sit for the National Primary Leaving Examinations in order to progress to lower secondary.

1.2 Successes and challenges

Uganda experienced periods of civil strife between 1971 and 1985, which led to low enrollment in primary schools, amounting to only 50% of children of school going age. Girls and students residing in rural areas were particularly affected. Additionally, gross domestic product (GDP) declined and education expenditure declined from 3.4% to 1.4% of GDP. Moreover, over 40% of teachers were untrained and most schools lacked basic infrastructure and instructional materials (MoES, 1999).

With these challenges in the education sector, the Ugandan government initiated a number of education policies and reforms in the early 1990s which aimed to improve access to, equity in and quality of education, with special emphasis on primary education because it directly benefits the rural poor (MoES, 2005). In 1996, the Universal Primary Education (UPE) policy was introduced with an effort to improve the primary education sector indicators of (i) access, (ii) equity, (iii) efficiency, and (iv) quality. The following year (1997) primary education was made free in Uganda and in 2008 it was made compulsory. Initially, the free primary education program targeted only four children per family. However, the criteria for selection of the four children per family raised serious challenges and consequently the program was extended to cover all school-age children in the family.

Following the introduction of UPE, the net enrollment rate (NER) of Ugandan education improved from less than 60% in 1996 to 97.5% in 2012 (MoES, 2012). In addition, the gender gap in primary school enrollment (which was markedly skewed in favor of boys), reduced drastically and since 2006 there has barely been any gender gap in primary school enrollment

(JICA, 2012; MoES, 2012). According to the World Bank (2012), another UPE success was the improvement of primary school completion rates although, in absolute terms, the P7 completion rates by 2012 were still poor among boys (68%) and even poorer among girls (66%).

Despite the improvement in access following UPE, there are still many challenges facing the primary school sector in Uganda. In 2012, JICA commissioned a study to carry out a comprehensive in-depth analysis of the education sector in Uganda. The study, which also assessed the progress towards Millennium Development Goals (MDGs) and Education for All (EFA) goals, identified the main challenges affecting the improvement of primary school sector. They include (i) low retention and P7 completion rates, (ii) high student-teacher ratios, (iii) low levels of learning achievement among students, (iv) high levels of absenteeism among teachers, (v) shortage of textbooks, and (vi) insufficient participation in education by parents and local residents (JICA, 2012).

The current Educational Sector Strategic Plan (ESSP) 2007-2015 specifies three main Ministry of Education and Sports (MoES) policy objectives. They are (i) making significant and permanent gains in achieving equitable access to education at all levels, (ii) improving the quality of education and ensuring an education system that is relevant to Uganda's development goals, and (iii) assuring universal access to primary education as well as to post-primary education, with a view to achieving equitable access to education at all levels and continuing support for UPE . The policy objectives are aimed at meeting the broad requirements of the MDGs, the EFA goals, and the ministry's mission.

One of the highest priority areas for the MoES in the 2007-2015 ESSP is to address the challenge of learning basic skills in primary school. The MoES plans to achieve this through (i) making the curriculum rational and practical, (ii) adopting effective methods of instruction and training teachers in their use, (iii) devoting more instructional time to reading, writing and mathematics, (iv) consolidating other vocational and other subjects into less time, (iv) examining students only in reading, writing and mathematics, and (v) implementing measures to minimize teacher and student absenteeism.

Nevertheless, in spite of the above-mentioned policies and the remarkable improvement in primary school enrollment, schooling outcomes remain poor in Uganda, implying little progress on the EFA goal of quality education. By 2012, the P7 completion rates were still poor (68% for boys and 66% for girls). In addition, the drop-out rates were high: 4.8% for boys and 4.4% for girls (MoES, 2013a). Levels of learning achievement have also remained wanting. For example, in 2010, only about one half of P6 students who took part in the National Assessment of Progress in Education (NAPE) survey had reached the desired proficiency levels in both mathematics and literacy: 54.8% and 50.2%, respectively (UNEB, 2010). Results from the latest 2012 NAPE survey revealed a more worrying situation with less than one half of the P6 students demonstrating that they had acquired the desired competencies specified in the P6 curriculum in both mathematics and literacy: 45.2% and 40.2%, respectively (UNEB, 2012).

In addition, results from the same survey indicated that performances at P3 and P6 levels were even worse in rural areas, government schools, among girls (especially in mathematics), among students who had never attended pre-primary school (especially in literacy), and among students who were not proficient in local languages (especially in literacy at the P3 level).

Apart from NAPE, results from other surveys have also indicated poor learning outcomes in Uganda. For example, the UWEZO (2011) survey reported that 9 out of 10 children in P3 could not read and understand an English story set for grade 2; and that 51% of students in P3 could not read a single word in their local language. In the 2000 SACMEQ study, Uganda was ranked 9th in reading and 8th in mathematics at the P6 level out of 14 countries in the study. Results from the latest SACMEQ study (2007) were worse: Uganda was ranked 11th out of 15 countries in the study in both subjects (SACMEQ, 2010). In terms of comparison by student sex and school location, the latest SACMEQ results showed that boys had higher scores than girls, and that urban areas had higher scores than rural areas.

Thus, learning achievement levels are clearly low in Ugandan primary schools. The low achievement levels may be explained by the existence of barriers to learning. The Hattie (2009) synthesis of over 800 meta-analyses on learning achievement concluded that there are six contributors to learning barriers; namely, (i) the individual student, (ii) the home, (iii) the school, (iv) the curricula, (v) the teacher, and (vi) the approach to teaching.

1.3 Study site profile

This study was conducted in Iganga and Mayuge districts in eastern Uganda, in the geographic area where the Iganga-Mayuge Health and Demographic Surveillance System (IMHDSS) operates. The IMHDSS was established in August 2004 through Makerere University's collaboration with the Karolinska Institute in Sweden, with seed funding from the Swedish International Development Cooperation Agency (SIDA). The site is about 120 kilometers east of Kampala City along the Ugandan-Kenya highway. The IMHDSS is in a rural setting covering 65 villages and over 65,000 households. The population within these two districts is largely homogeneous, with about 80% of people belonging to a single ethnic group (Busoga) of whom 51% are female. More than 60% of the population is below 15 years of age.

According to the 2002 national census and IMHDSS (2007) data, the two districts of Iganga and Mayuge had the most fertile population with total fertility rates of 7.2 and 6.9 respectively. On educational backgrounds, about half of the IMHDSS population had never completed P7 level. Only about 12% had been educated above P7, of which only 4% had completed the S4 level of secondary education. In 2009, about 98% of all children of primary school-going age (6-12 years) were in school, mostly due to the government's free UPE programme. In the agriculture sector, subsistence farming was the predominant economic activity with about 90% of people engaged in growing food crops, mainly maize, rice, sweet potatoes, beans, cassava, yams and groundnuts. Regarding cash crop farming, rice and sugarcane were mostly grown alongside fish farming.

1.4 Collaboration with IMHDSS

The IMHDSS conducts routine surveillance data collection on birth, deaths, in- and out-migrations, verbal autopsies and monitored pregnancies. Besides the routine surveillance data collection, the IMHDSS collaborates with researchers within and outside Uganda to conduct special studies, some of which are nested on the IMHDSS database. The IMHDSS deals partly with education-related information about the households and this gave APHRC the opportunity to initiate this education survey.

1.5 Purpose of the study

The main objective of this education study was to examine the patterns of schooling and the quality of education received by children living in rural settlements in Uganda. This report will specifically identify the critical barriers that have the most effect on access to schooling and learning. It is hoped that the study findings will contribute to our understanding of the learning barriers and the quality of education in rural Uganda. The evidence generated from this study will be used to engage and inform policymakers in Uganda about learning barriers and learning outcomes. It is anticipated that the evidence will be used by policymakers to improve the provision and quality of basic education for all children living in rural settings in Uganda.

The specific objectives of the study were to:

i. Identify the critical learning barriers that have the most effect on learning outcomes, and

ii. Understand the pathways through which learning barriers affect learning outcomes.

In order to achieve the above objectives, this study was guided by the following broad research questions:

i. What were the critical individual, home, teacher and school-level learning barriers?

ii. What were the effects of mother tongue instruction on literacy in English and mathematics achievement?

iii. What were the pathways through which the barriers identified in 1. affect learning achievement?

1.6 Justification of the study

The philosophy of APHRC is to generate policy-relevant research evidence that improves the wellbeing of Africans, and in its strategic plan for 2012-2016 it underscores the central role of education in empowering young people to face the challenges of becoming productive citizens and also as a determinant of health, population dynamics and economic development. The universal education policies in sub-Saharan Africa (SSA) place emphasis on access and are silent on learning outcomes and effective classroom teaching. Through this research project

we aim to use the evidence from the research to engage the Ministry of Education and Sports in Uganda and its development partners in improving learning outcomes. The engagement will require the development of an explicit strategy for balancing the expansion of access and the improvement of quality (quantity-quality trade off). The engagement will also include the integration of learning outcome measures in government education policy formulation and implementation.

APHRC has consolidated its work in Kenya and now wants to further understand learning barriers in sites in Uganda, a key East African state with similar major educational challenges to those faced in Kenya. Having evidence from both countries will enable the ministries of education to speak authoritatively about regional challenges and also to position themselves to mitigate the challenges. Learning is a multifaceted process involving different players, such as school leaders, teachers, parents, students and policymakers. Uganda's successful policies on access to schooling have not translated to meaningful learning for schoolgoing children. The findings illuminate understanding of the barriers to learning and access to basic quality education among rural children in Uganda. The evidence generated will form a platform for engaging Ugandan policymakers and informing them about issues related to learning barriers and learning outcomes.

1.7 Study design

This study used a cross-sectional design and targeted all the primary schools within the IMHDSS and those within a one-kilometer radius around the IMHDSS — that is, primary schools likely to be accessed by the children of families living in the IMHDSS. In these schools, the target population was students in the P3 and P6 classes, their respective mathematics and English teachers, their parents and the head teachers of the targeted schools.

1.8 Sampling

A three-stage cluster sampling was used for this study. In the first stage, all the schools within the IMHDSS and those within a one-kilometer radius were included. In total, 82 schools were reached; 62 and 20 in Iganga and Mayuge districts, respectively. The second stage involved a random selection of one P3 and one P6 class per school in cases where the school had more than one P3 or P6 class. The last stage involved a random selection of 40 P3 and 40 P6 students from the selected classes. If a class had less than 40 students, all the students in that class were included in the study. The English and mathematics teachers of the selected P3 and P6 classes were also included in the study, together with the head teachers of the targeted schools. Overall, the sample achieved in this research was 82 head teachers, 2,913 P3 and 2,711 P6 students, and 297 teachers. In addition, a total of 158 English and mathematics classroom lessons were observed and lessons recorded on video.

1.9 Focus group discussions

For the qualitative data, a total of six focus group discussions (FGDs) comprising of four for parents and two for teachers were conducted. The sample for participation was purposively selected by listing the government and private schools with the highest enrollment in each district. The reason for their selection is that such schools are stable, in terms of management, and act as a community focus. From the selected schools, a random sample of seven P3 and seven P6 students were selected from the sample of the 40 students in each grade participating in the survey. The selected students were given invitation letters to take to their parents for participation in the discussions.

Two FGDs with parents per district were conducted—one FGD with parents whose children were in public schools and another for parents whose children were in private schools. For the selection of teachers for FGD participation, all the public and private schools with the highest enrollment were listed. All P3 and P6 teachers within the two districts teaching in the public schools were invited for one FGD while their counterparts in the private schools were invited for the other. The head teachers of these schools were given letters addressed to teachers and the head teachers participated in the distribution of invitation letters. However, all the teachers in the selected public schools came and consequently the group was split into two, with 11 teachers in the Iganga group and 12 teachers in the Mayuge group. The distributions of the FGD participants by school type and district are shown, together with the venue of the FGD, in Table 1.1.

Table 1.1 → Selection of the FGD participants

Venue	Group of participants	Type of school	District
Top Hill Primary School	Parents	Private	Mayuge
Mbaale Primary School	Parents	Government	Mayuge
Iganga Children's Centre	Parents	Private	Iganga
Nakalama Primary School	Parents	Government	Iganga
Iganga Victory Primary School	Teachers	Private	Iganga
Iganga Victory Primary School	Teachers	Government	Mayuge
Buwolya Muslim School	Teachers	Government	Iganga/ Mayuge

1.10 Test design

English, Lusoga and mathematics students' tests were designed to assess students' competencies in literacy and mathematics and estimate the effects of learning barriers. The teachers' mathematics test was designed to assess the teachers' content knowledge,

pedagogical knowledge and pedagogical content knowledge in mathematics. The comparison of the teacher and student scores could facilitate the understanding of learning barriers that could be associated with teacher subject-matter knowledge. More details about the tests and how they were constructed can be found in Chapter 3, together with the performance of the students in these tests.

1.11 Quantitative survey tools

Eight quantitative survey tools were used to capture data from students, their English and mathematics teachers, their head teachers and the general school infrastructure. The eight quantitative survey instruments were a primary school institutional questionnaire, a classroom observation checklist, a subject teacher questionnaire, a P3 and P6 teacher mathematics test, a P6 student questionnaire, P3 and P6 student English and mathematics tests, and a P3 Lusoga test.

i. **Primary school institutional questionnaire:** This questionnaire was administered to the head teacher (or deputy) at each targeted school. The questionnaire collected information on school infrastructure, availability of teaching resources, staffing (number, qualification, absenteeism and recruitment), school charges (tuition, construction, examination fees and school meals), class sizes, school enrollment and absenteeism, school ownership (government versus private) and management (presence of elected committee).

ii. **Classroom observation checklist:** This checklist was completed through classroom observations by field interviewers. It collected information on lesson preparations by English and mathematics teachers, number of students present and absent during the date of data collection, availability of teaching materials in the classroom, and elements of the classroom environment such as sitting and writing spaces, classroom lighting, ventilation, and student seating arrangement.

iii. **Subject teacher questionnaire:** This tool was administered to P3 and P6 English and mathematics teachers. This questionnaire collected data on teachers' demographic characteristics (sex and age), highest level of education attained, pre- and in-service training, years of experience as a teacher and in teaching English or mathematics, supervision by school leadership (head teacher or deputy) and subject advisor, teacher workload, interactions with parents, availability of teaching materials and classroom teaching practices.

iv. **Teacher mathematics test:** This assessment tool was administered to P3 and P6 mathematics teachers to assess the teachers' content knowledge, pedagogical knowledge and pedagogical content knowledge in mathematics.

v. **P6 student questionnaire:** This questionnaire was administered to P6 students only in the selected schools. This tool gathered information on students' socio-demographic characteristics (e.g., student age, student sex, grade repetition, parental education,

household possession, and source of lighting), homework, language most spoken outside school, student absenteeism, and student schooling history.

vi. **P3 and P6 student mathematics test:** This assessment tool was used to assess P3 and P6 students' mathematics achievement.

vii. **P3 and P6 student English test:** This assessment tool was used to assess P3 and P6 students' literacy skills in English. Two modules were done, which involved a whole class administration and one-on-one interviews.

viii. **P3 student Lusoga test:** This tool was used to assess P3 students' literacy skills in Lusoga. The purpose of this was to help understand whether mother tongue is a barrier to learning in other subjects.

1.12 Qualitative survey tool

In order to capture the pathways that best explain the barriers to education, the perceptions of teachers and parents were sought using group discussions. FGDs were used in an attempt to capture effects that might otherwise not be captured by quantitative survey tools.

1.13 Classroom video recording

Videos recorded 158 teachers teaching English and mathematics in either P3 or P6 to capture information about classroom teaching and learning processes, including teacher pedagogical and content knowledge and student participation, and interactions between teachers and students.

1.14 Translation and validation of tools

It is worth noting that the same set of items was used to assess P3 students in English and Lusoga. A panel of practitioners led by an expert from the Makerere University School of Linguistics translated the P3 literacy test from English to Lusoga. This panel was also involved in the validation and improvement of the translated P3 literacy test, including pre-testing of the test with students in schools. The validation exercise included checking to see that the translated versions of the items were applicable to the local context.

1.15 Ethical issues

One of the reasons for conducting research is to benefit society and, as such, there are systems that promote societal benefits while safeguarding against unethical practices during research activities. In Uganda, any foreign organization wishing to conduct any research in any context must partner with a locally registered organization with similar interests. In this regard, the partnership between APHRC and the IMHDSS was logical. Because the IMHDSS is hosted by Makerere University, the initial step in conducting research was to seek ethical approval from the Higher Degrees, Research and Ethics Committee (HDREC) of Makerere University

School of Public Health. The proposed study went through two iterative review processes culminating in approval for research commencement. Additionally, all research activities in Uganda are legally required to be registered with the Uganda National Council of Science and Technology. After approval by HDREC, the required documents were presented to the UNCST and approval was obtained.

In addition, the team obtained administrative approval from the DEOs of Iganga and Mayuge as well as from all the head teachers of the schools in the study. Moreover, the team sought and obtained consent from all study participants including teachers, parents and students. Participation in the study was voluntary and participants were not coerced. Interviews were conducted in privacy and confidentiality was upheld.

1.16 Recruitment, training and pre-testing

APHRC, in collaboration with the IMHDSS, advertised for candidates to work as field interviewers (enumerators). Amongst other qualifications, they were required to have previously participated in either APHRC or IMHDSS data collection exercises; have a minimum of a bachelor's degree or advanced school level (S6) in education attainment and be conversant with the local dialect (Lusoga). Over 100 applicants were chosen for the shortlist and invited for interviews. Based on aggregated merits after interviews, 55 applicants were successful. They were contacted and invited for research fieldwork training.

A week-long training course for the successful field interviewers was conducted by both APHRC and IMHDSS staff in an undisturbed environment. The recruited enumerators were thoroughly trained in the use of survey tools and assessments, marking the student assessment tests using a prescribed rubric, best practices while conducting interviews and ethical issues involved in this research. The training also included role plays for pairs of enumerators, with one enumerator assuming the role of an interviewee while the other assumed the role of an interviewer. Eventually, all the enumerators were assigned alphanumeric codes for ease of identification. The field interviewers were divided into 12 teams; each team consisted of four members. One member of the team assumed the role of team leader. Five field interviewers were chosen for video recording and two became the supervisors. The two supervisors and five video shooters were chosen because they had had previous experience in similar tasks in other APHRC projects in Uganda. The roles of the field interviewers, team leaders, video shooters and field supervisors were spelt out as follows:

Enumerator

i. Complete all required interviews and assessments.

ii. Check the completed survey tools to ensure that all questions were asked and all responses legibly recorded.

iii. Mark all the assessments every day after administration, using provided rubrics.

Team leader

i. Make the necessary preparations for fieldwork (e.g., telephone the head teacher a day before the interviews, gather all tools).

ii. Supervise the work of all field interviewers in their team.

iii. Carry out data quality checks and fix any problems identified in the completed tools before leaving the school.

Field supervisor

i. Ensure that the enumerators and team leaders meet all quality assurance standards.

ii. Carry out spot checks at random to ensure that all is well, that research protocols are being followed and that quality data are being collected.

iii. Ensure that any frequently made errors observed are promptly communicated to all team leaders so that they can be avoided for the rest of the survey.

For pre-testing, four schools, which were not in the targeted sample because they were situated outside the IMHDSS, were used for pre-testing the survey tools and assessments. This was necessary to accustom enumerators with the survey tools, assessments tests and data collection ethics. The enumerators were grouped into four teams for the pre-testing exercise in the four schools (Mulanga, Ibulanku, Naisanga and Walanga Primary Schools). The head teachers of these schools had previously been contacted for permission for the exercise in their schools. After the pre-testing exercise, various experiences were shared and suggestions and opinions on how to deal with logistical issues were discussed.

Data collection

Data collection was planned to take two school days in each school and therefore, schools which were in the same area were grouped together for convenience. Each school was assigned a specific team and two teams were provided with one vehicle for use during field work. The team leaders were given letters of introduction addressed to the specific head teachers of the schools, which was signed and stamped by the respective District Education Officers (DEO). The team leaders were also provided with airtime to help them make prior communications with the head teachers of the specific schools.

After data collection, the enumerators were required to check and correct responses that were deficient and personally consult the respondents before leaving school. This was mandatory for each team member before submitting their filled and complete survey tools to their team leader for further checks. In addition, experienced researchers from APHRC did spot checks in schools. This was to ensure that the data collected was of high quality.

1.17 Data processing

The program for data entry was designed to allow only specific characters (numerals or texts) to be entered into the database. On completion of data entry, 10% of the survey forms were subjected to double data entry for each survey tool. From this exercise, there was no variation that could call for re-entry of the same data. After data entry, the data were subjected to stringent measures during data cleaning so as to maintain high quality data. Any emergent errors were fixed in consultation with enumerators, APHRC researchers and schools. Descriptive and multivariate methods were used to analyze the data.

1.18 Summary

This chapter has summarized all the activities of the planning process for carrying out the research in Uganda. The collaboration with the IMHDSS and the cooperation of respondents was invaluable in allowing the month-long data collection exercise to proceed without technical hitches. Trained field interviewers collected data from 82 head teachers and 5,624 P3 and P6 students, and observed 158 English and mathematics lessons and 297 class teachers for P3 and P6. This chapter presents the background information of schools and students participating in the study. Overall, 5,624 P3 and P6 students in 82 schools in both Iganga and Mayuge participated. The results are stratified by the type of school and the study district. The information reported in this chapter was mainly gathered using head teacher and student characteristics questionnaires, which collected detailed information related to the schooling of P3 and P6 students and the homes of P6 students. As a result, more information will be presented for P6 students than for P3 students.

2. Characteristics of Students and Their Schools

2.1 School background characteristics

The study was undertaken in two rural districts of Iganga and Mayuge and involved 82 schools, of which 60 (73%) were government schools (referred to as public schools). Table 2.1 summarizes some key characteristics of the school study sample as reported by the head teachers. Most of the schools (62) were located in Iganga District with 66% of these schools being public. In Mayuge, only one of the 20 schools was private.

Teacher absenteeism has an effect on the amount of time for which students receive teaching. Perennial teacher absenteeism can therefore affect not only syllabus coverage but also student performance. In this regard, head teachers were asked to state whether teacher absenteeism was a recurrent problem in their schools. Overall, 55% of the public head teachers reported that absenteeism affected only a few of the teachers. In private schools, the head teachers reported that teacher absenteeism was not a problem. Despite these observations from head teachers, responses from the teachers themselves showed that in public schools, 34% were absent for at least one day in a school week; in private schools the proportion was slightly less than half (16%) of that in public schools. Female teachers were more likely to be absent (35%) than male teachers (23%). The most cited reasons for teacher absenteeism were illness, domestic responsibilities and living far from the school.

Table 2.1 → School background characteristics

	Public		Private		Significance
Characteristics	**N**	**%**	**N**	**%**	**p-value**
Overall	60	73.17	22	26.83	
District					
Iganga	41	66.13	21	33.87	
Mayuge	19	95.00	1	5.00	
Teacher absenteeism					
For a few teachers	33	55.00	4	18.18	0.307
Not a problem	27	45.00	18	81.82	
Availability of textbooks (yes)	60	100.00	17	77.27	
Library/reading area (yes)	15	25.00	5	22.73	0.832
Separate toilets for boys & girls (yes)	46	76.67	17	77.27	0.954
Sufficient drinking water (yes)	42	70.00	19	86.36	0.133
Inspector/assurance officer visits (yes)	59	98.33	22	100.00	
Feeding program (yes)	43	71.67	22	100.00	

Table 2.1 presents selected school background characteristics disaggregated by school type. These characteristics did not vary significantly by school type. Among the characteristics presented in the table are the existence of school libraries and the textbook student ratio.

According to Greenwood, Creaser, and Maynard (2008) primary school libraries and reading areas are critical elements not only for evaluating the reading culture of students but also for enhancing or instilling reading habits. In the study context, only one quarter of the schools had a reading area or a library. This was in contrast to the availability of textbooks for use by students. That is, all public schools had textbooks for use by students, while about three quarters of the private schools had textbooks. Nearly all schools had been visited by the inspector of schools or a quality assurance officer in the last 12 months. In terms of school sanitation, 70% and 86% of the public and private schools reported having sufficient drinking water for their students. Moreover, three quarters of the schools had separate blocks for girls' and boys' toilets.

2.2 Use of mother tongue for instruction

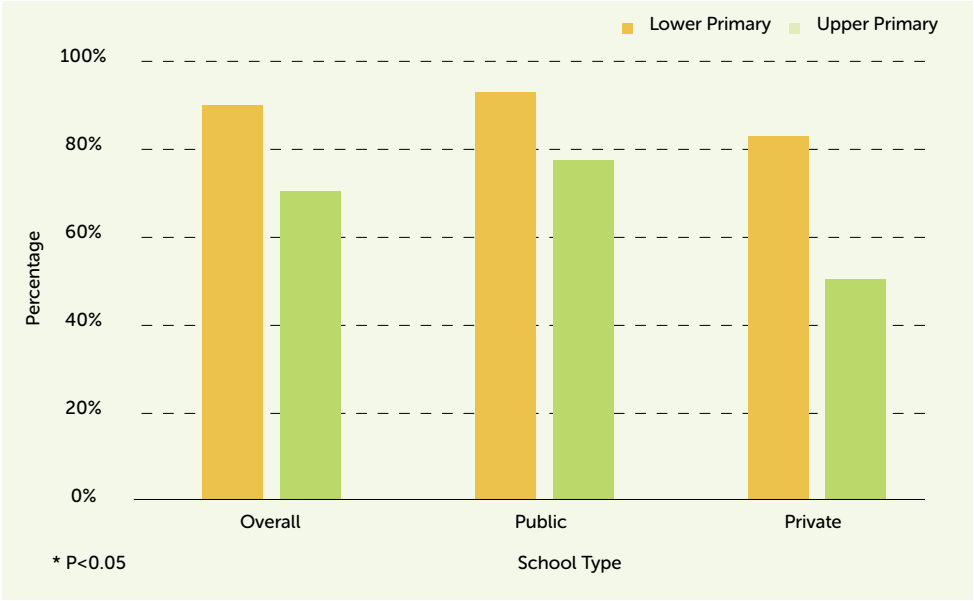
Table 2.2 presents results on the use of mother tongue for classroom instruction as reported by the school heads. As expected, the use of the mother tongue seemed to decrease with higher primary school grades. Despite this, a considerable number of schools were reported to use mother tongue sometimes or always in upper primary schools.

Table 2.2 → Use of mother tongue as a medium of instruction

Mother tongue	Never		Rarely		Sometimes		Always	
Grade	Number	%	Number	%	Number	%	Number	%
P1	7	8.54	2	2.44	27	32.93	46	56.10
P2	7	8.54	4	4.88	27	32.93	44	53.66
P3	8	9.76	7	8.54	35	42.68	32	39.02
P4	14	17.07	11	13.41	48	58.54	9	10.98
P5	20	24.39	18	21.95	41	50	3	3.66
P6	27	32.93	25	30.49	28	34.15	2	2.44
P7	37	45.12	25	30.49	18	21.95	2	2.44

Primary grades 1 to 3 in Uganda are referred to as lower primary school, P4 is the transition year while P5 to P7 are the upper primary grades. Overall, the school heads reported that 89.0% and 69.5% of subject teachers in the lower and upper primary grades used mother tongue for instruction, respectively (Figure 2.1). As regards school type, a significant difference was observed in upper primary schools where a higher proportion of public schools than private schools were reported to use mother tongue.

Figure 2.1 → **Proportion of schools reported to use mother tongue for instruction, by school type**



2.3 School enrollment and attendance

Table 2.3 shows the average school enrollment, average class size and attendance rates, stratified by school type and study district. The school enrollment rate was measured by checking the records given by the school heads and confirming by actual count and reporting within the class. The TTEST column shows whether the indicator of interest significantly differed by school type or study district.

Overall, public schools had significantly higher enrollment than the private schools. For instance, while the public school had on average 678 students, the private had 262 students. In terms of study district, the enrollment rates did not differ significantly. The average number of students per class was 69, which was slightly outside the nation's set benchmark, which is 61 students per class (GoU, 2010). On average, classes in public schools (82) were significantly more congested than classes in private schools (34).

School attendance was measured by the actual count of the students that were present during the interview day. The attendance rate is expressed as the proportion of students present on the interview data given the total enrollment. The school attendance rate significantly differed by both type of school and by study district. The private schools recorded significantly higher attendance rates as compared to the public school. For instance, the overall attendance rate differed by about 15 percentage points difference in favor of private schools and by 13 percentage points in favor of Iganga.

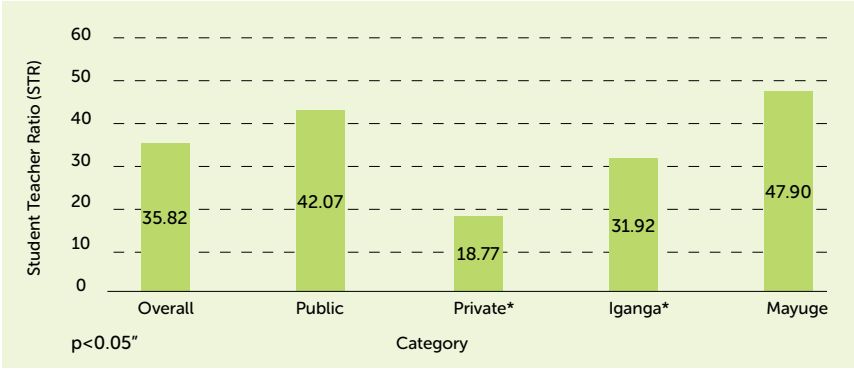
Table 2.3 → School enrollment and attendance rates

	Iganga	Mayuge	Public	Private	TEST	
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	School Type	District
Enrollment						
Boys	274.2 ± 169.4	275.3 ± 128	326.8 ± 149.5	131.7 ± 78.9	0.001	0.978
Girls	293.4 ± 181.6	287.9 ± 141.6	351.3 ± 159	130.5 ± 74.7	0.001	0.901
Total	567.6 ± 316.4	563.2 ± 268.5	678.1 ± 267.5	262.2 ± 149.5	0.001	0.955
Streams	8.3 ± 2.4	7.4 ± 1.6	8.3 ± 2.5	7.4 ± 1.2	0.098	0.116
Av. class size	67.4 ± 33.6	75.9 ± 33.6	82.3 ± 28.9	34.4 ± 15.4	0.001	0.327
School Attendance						
Boys	72.8 ± 17.9	61 ± 16.1	65.9 ± 16.7	80.7 ± 17.8	0.001	0.011
Girls	74.7 ± 18.1	62 ± 14.8	67.2 ± 15.4	83.3 ± 19.8	0.001	0.006
Total	73.9 ± 17.2	61.4 ± 14.8	66.8 ± 15.7	82 ± 17.3	0.001	0.004

2.4 Student-teacher ratio

Student-teacher ratio (STR) is the ratio of the number of students enrolled in a school to the number of teachers in that school. Figure 2.2 presents the average STR, overall and stratified by school type and study site. The overall STR was 36 students a teacher. According to UNESCO (2012), in 2012, Uganda's STR was 57, which was above the SSA STR of 44. The STR for the public schools surveyed was 42, which was close to the SSA STR though it was significantly higher than that of the private schools. In terms of district, Mayuge had a STR of 48, compared to 32 in Iganga.

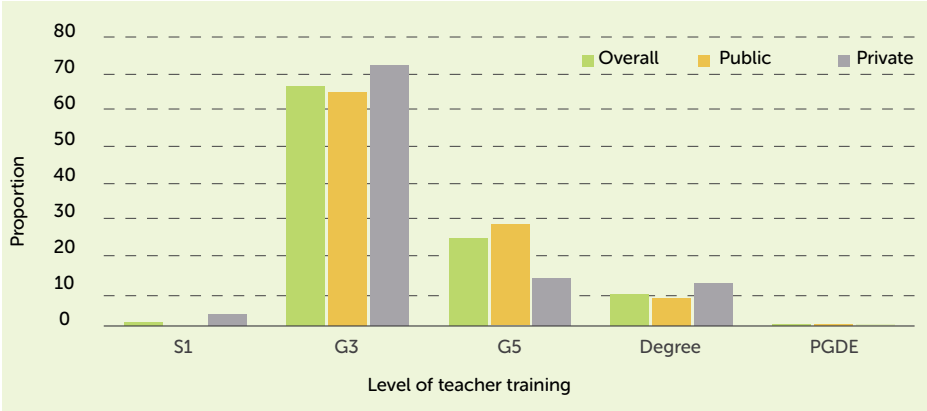
Figure 2.2 → Average student-teacher ratio by study district and school type



2.5 Teacher professional development

Figure 2.3 shows the proportion of teachers in the sampled schools who had attained the different levels of teacher training by school type. Most of the teachers (70%) had Grade III (GIII) teacher training certificates. This was expected since the majority of primary school teachers in Uganda are trained at government-mandated primary teacher colleges, which, in most cases, awards the trainees with GIII certificate upon successful completion. Less than 0.5% of the surveyed teachers were graduates. The professional qualifications of primary teachers in Uganda are categorized as the Grade III teaching certificate,, the Grade V diploma in Education, the Postgraduate Diploma in Education (PGDE) or the Bachelors of Education Degree.

Figure 2.3 → Proportion of teachers with different levels of teacher training



2.6 Textbook-student ratio

Reading materials are important in both teaching and learning. The availability of textbooks and the ratio in which the students share a single subject textbook are therefore critical. In this study, we sought information on the key textbooks. The textbook-student ratio was calculated by dividing the number of textbooks by the number of students enrolled in that grade (Table 2.4). The availability of Lusoga textbooks is only presented for P3, in which grade the language is taught. With the exception of Lusoga textbooks, the private schools seemed to have a better textbook ratio than public schools, though it was not statistically significant. That is, while the private schools had a ratio of slightly above 0.5, which implied about two students sharing a textbook, the public schools had about 0.3, which implied three students sharing a textbook. In Lusoga, the public schools had a significantly better textbook ratio than the private schools. As expected, there was no difference in textbook-student ratio between the two districts (Iganga had an average of 0.40 and Mayuge, 0.38).

Table 2.4 → Textbook-student ratio by school type and district

Grade & Subject	Public			Private			Iganga			Mayuge		
	Mean	95% CI		Mean	95% CI		Mean	95% CI		Mean	95% CI	
P3 English	0.43	0.14	0.73	0.66	0.03	1.30	0.54	0.19	0.90	0.31	0.16	0.45
P3 Lusoga*	0.35	0.22	0.48	0.02	-0.01	0.05	0.25	0.12	0.38	0.34	0.20	0.48
P3 Math	0.37	0.22	0.52	0.62	-0.03	1.26	0.40	0.19	0.60	0.52	0.11	0.94
P3 Science	0.19	0.09	0.28	0.62	-0.03	1.26	0.30	0.11	0.50	0.23	-0.01	0.47
P6 English	0.42	0.28	0.56	0.70	0.16	1.25	0.49	0.29	0.69	0.46	0.23	0.70
P6 Math	0.37	0.22	0.52	0.62	-0.03	1.26	0.40	0.19	0.60	0.52	0.11	0.94
P6 Science	0.36	0.18	0.53	0.57	0.23	0.91	0.44	0.25	0.64	0.29	0.10	0.48

The textbook-student ratio varied by grade and subject. For instance, in P3, science had the fewest textbooks among public schools, with a ratio of about 0.2, meaning 5 students shared a single science textbook, while in private schools it was Lusoga. In grade 6, English had the largest ratio in both public (ratio of 0.42) and private (ratio of 0.70).

There was a remarkable range in the ratio of textbooks between schools. This is a clear demonstration of the wide confidence intervals, suggesting that some schools were better equipped with textbooks while others were not. For instance, in P3 English, the confidence interval of the mean textbook student ratio ranged from 0.14 to 0.73 in public schools, implying some schools could have 10 students sharing a single English textbook while in others, almost each student had a copy. Similarly, among the private schools, some schools had a ratio of 0.03 to 1.30 in P3 English, showing that while some private schools had close to only a teacher's copy, in others one child had more than one textbook in the same subject.

2.6 Student characteristics

This section presents the characteristics of the students included in the study. First, overall characteristics for both P3 and P6 students are presented. Thereafter, more information from the P6 student characteristics tool is presented. Overall, 5,624 students in P3 and P6 participated in the study. The sample consisted of a slightly higher number of female students (53%) than male students. As expected, 76% of the students were from Iganga, which had 62 schools. The sample consisted of 4,418 students enrolled in the 60 public schools. P3 had slightly more students participating in the study than P6, as shown in Table 2.5.

Table 2.5 → Distribution of student sample

District	Public (4,418)		Private (1,206)		All schools (5,624)	
	Number	%	Number	%	Overall	%
Overall	4,418	78.56	1,206	21.44		
District						
Iganga	3,143	71.14	1,140	94.53	4,283	76.16
Mayuge	1,275	28.86	66	5.47	1,341	23.84
Student sex						
Boys	2,022	45.77	603	50.00	2,625	46.67
Girls	2,396	54.23	603	50.00	2,999	53.33
Grade						
P3	2,274	51.47	639	52.99	2,913	51.8
P6	2,144	48.53	567	47.01	2,711	48.2

Out of the 2,711 P6 students participating in the study, about 99% (2,671) completed the student characteristic questionnaire. The background characteristics of the P6 students are presented in Table 2.6. Slightly more than half (about 55%) of the P6 students participating in the study were girls. There was a one-year difference in the mean age of students in public and private schools. That is, the mean age was about 14 years for public schools and 13 years for private schools. The expected P6 student age at the date of collection of the data for this study was 12.5 years. Thus, P6 students involved in the study were generally older than expected, regardless of the type of school they attended.

The EFAs recognize the importance of early childhood care in relation not only to education but also to other spheres, such as health. Despite this recognition, Vargas-Baron and Schipper (2012) note that, while there is some progress, most governments have not paid much attention to promoting early childhood care, more so in education. In this study, P6 students were asked whether they had attended pre-primary school, and for those who had, for how long. Pre-primary school participation was higher among private schools students than among those in public schools. In the public schools, 48% of the students had not attended pre-primary school compared with about 23% in private schools; for those who had attended, a good proportion had attended either for about one year or for three years.

The two districts were occupied by Lusoga-speaking people, and therefore Lusoga was the predominant language spoken at home by most P6 students, irrespective of the school type. However, about 13% of the students reported that they mostly spoke English at home. A few of

the students were from households where other languages, mainly Luganda, were spoken. In terms of the wealth index, among the private schools, about half of the students were ranked in the least poor category while in the public schools, the majority (38%) were ranked in the poorest category.

Table 2.6 → Grade six student background characteristics

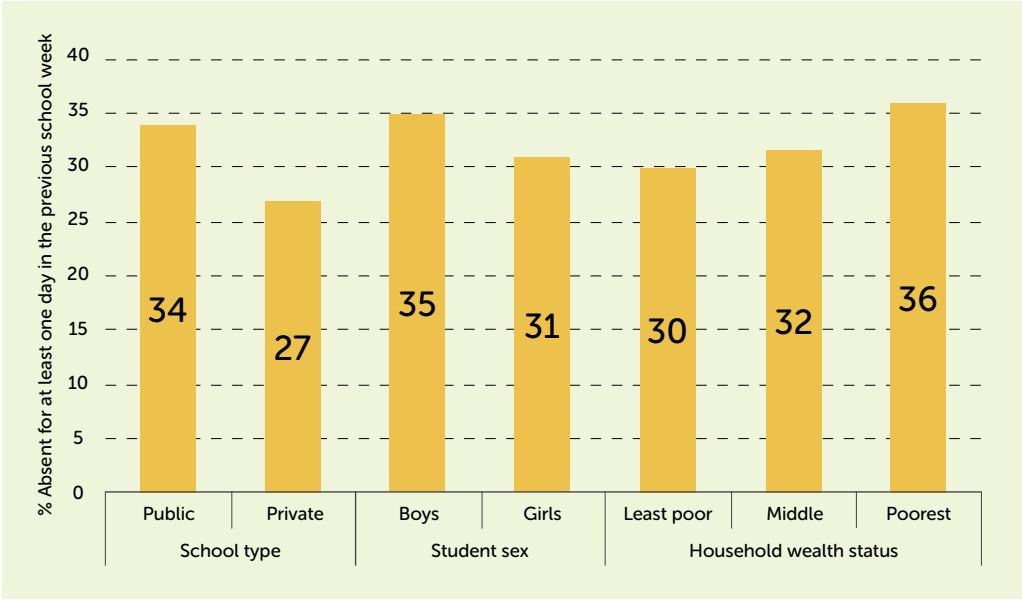
	Public (2,119)		Private (552)		P-value
	Number	%	Number	%	
Sex					
Boys	917	43.28	247	44.75	Ns
Girls	1,202	56.72	305	55.25	
Mean age	13.68	1.65	12.93	1.32	Ns
Pre-primary school					
No	1,022	48.23	126	22.83	0.001
Yes, less than 1 year	256	12.08	49	8.88	
Yes, for 1 year	405	19.11	180	32.61	
Yes, for 2 years	201	9.49	74	13.41	
Yes, for 3 years	235	11.09	123	22.28	
Language spoken at home					
Mostly Lusoga	1,666	78.62	407	73.73	0.001
Mostly English	285	13.45	71	12.86	
Others (e.g. Luganda)	168	7.93	74	13.41	
Student wealth index					
Least poor	609	28.74	282	51.09	0.001
Middle Poor	709	33.46	181	32.79	
Poorest	801	37.80	89	16.12	

2.7 Student absenteeism

P6 students were asked to report on their school attendance in the last complete school week prior to the survey. For those absent, information on the number of days absent was collected (Figure 2.4). Absenteeism was insignificantly higher in the public schools. That is,

among public schools, 34% of the students reported being absent from school for at least one day in the last school week compared to 27% in private schools.

Figure 2.4 → School absenteeism as reported by P6 students



2.8 Perception of students about teacher absenteeism

In Table 2.1 (in section 2.1), head teachers in public schools reported that teacher absenteeism was a problem among few teachers, while in the private schools it was reported not to be a problem. Primary 6 students were also asked to report on teacher absenteeism on two items: absent from lessons, even if the teacher was in school, and completely absent from school (Table 2.7). Skipping of lessons by teachers would seem to be a real problem in the studied schools. Students in both types of school reported that some of the teachers skipped lessons. Teachers were also reported to have been absent from school altogether. For instance, about 45% of the students reported that teachers were either sometimes, often or very often absent from school.

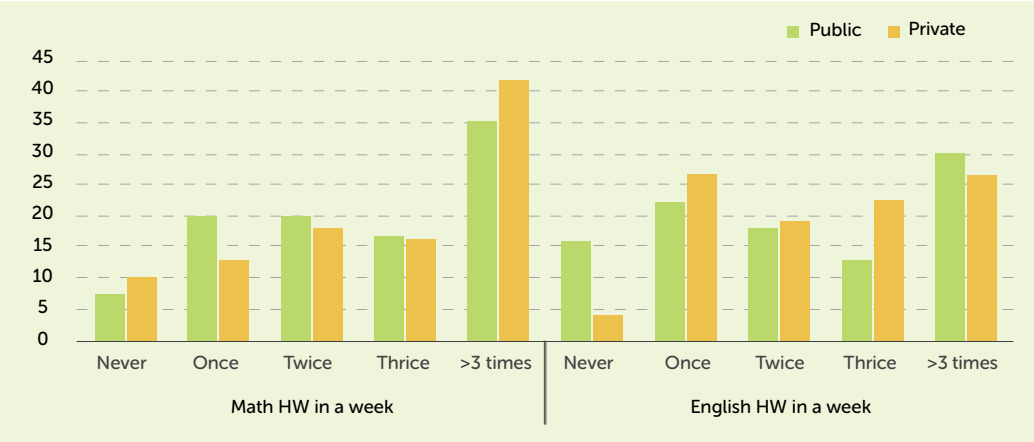
Table 2.7 → **Teacher absenteeism as reported by students**

How often teachers were absent from:	Public (2119)		Private (552)		P-value
	Number	%	Number	%	
Lessons					
Very often	212	10.00	63	11.41	0.001
Often	239	11.28	27	4.89	
Sometimes	405	19.11	119	21.56	
Rarely	430	20.29	49	8.88	
Never	833	39.31	294	53.26	
School					
Very often	177	8.35	59	10.69	0.001
Often	268	12.65	39	7.07	
Sometimes	505	23.83	152	27.54	
Rarely	565	26.66	49	8.88	
Never	604	28.50	253	45.83	

2.9 Homework

Figure 2.5 shows the proportion of students that reported receiving English and mathematics homework, by school type. Overall, the majority of the students received homework in both subjects; however, the frequency varied by subject but not by school type. For instance, in mathematics, the majority of the students in both types of school reported receiving homework more than three times in a week, while in English the frequency of homework spiked at both once in a week and more than three times in a week. In English, the frequency of homework seemed to be higher in private schools.

Figure 2.5 → Proportion of students that reported receiving homework



In addition to homework, P6 students were asked to state whether they received support with their homework within their households (Table 2.8). There were significant differences in parental homework support by school type. Students in private schools were less likely to receive homework support from their parents or guardians. In both private and public schools, those who received homework support received it "sometimes". It is perhaps important to note that a slightly higher proportion of mothers than fathers were reported to offer support. In most of the households, homework support seemed to have been delegated to the brothers and sisters in the household. This is evidenced by about 60% of the students reporting they received homework support from their siblings.

Table 2.8 → Homework support by household members

How often do the following give you support in homework:	Public (2119)		Private (552)		P-value
	Number	%	Number	%	
Mother/female guardian					
Often	475	22.42	58	10.51	0.001*
Sometimes	609	28.74	176	31.88	
Rarely	211	9.96	40	7.25	
Never	824	38.89	278	50.36	
Father/male guardian					
Often	375	17.70	48	8.70	0.001*
Sometimes	531	25.06	165	29.89	
Rarely	281	13.26	44	7.97	
Never	932	43.98	295	53.44	

How often do the following give you support in homework:	Public (2119)		Private (552)		P-value
	Number	%	Number	%	
Brother/sister					
Often	583	27.51	99	17.93	0.001*
Sometimes	649	30.63	227	41.12	
Rarely	366	17.27	77	13.95	
Never	521	24.59	149	26.99	

2.10 Summary of the key findings

School characteristics

- Most of the 82 primary schools serving families living in the IMHDSS were in Iganga district (62). Overall, about 73% of the sampled schools were public.
- About 55% and 18% of the head teachers in public and private schools reported absenteeism to affect a few teachers, respectively. In both public and private schools, the most common reasons for teacher absenteeism given by by the head teachers were illness, domestic responsibilities and living far from the school.
- The overall student-teacher ratio (STR) was 36 students to one teacher, which was within the stipulated national benchmark of 43 students per teacher. However, this varied significantly by school type and district. The STR for public schools was 42 while the STR for private schools was about 19. The STR for Mayuge was 48 while that of Iganga was 32.
- The average number of students per class was 69. This average was slightly outside the nation's set benchmark, which is 61 students per class. On average, classes in public schools were significantly more congested than classes in private schools.
- Nearly all schools had been visited by an inspector of schools or quality assurance officer in the last 12 months.
- About three quarters of the primary schools in this study had separate toilet blocks for girls and boys.
- Overall, the head teachers reported that about 89% and 70% of subject teachers in lower (P1 to P3) and upper (P4 to P7) primary grades, respectively, used mother tongue for instruction. In the upper primary school level, a higher proportion of public schools was reported to use mother tongue than to private schools.
- The vast majority of the teachers (70%) in the sampled schools had Grade 3 (GIII) teacher training certificates while less than 0.5% of the teachers had university degrees.

Student characteristics

- P6 students involved in this study were, on average, older than expected, regardless of the type of school they attended. Nevertheless, P6 in public schools were one year older on average than their counterparts in private schools. The average age of the P6 students was about 14 years for public schools and 13 years for private schools.
- Overall, about 42% of P6 students reported they had not attended pre-primary school at all before joining P1; about 33% of the students reported they had attended pre-primary school for a few months to one year while 25% reported they had attended for at least two years. Pre-primary school attendance had been considerably higher among P6 students in private schools than among P6 students in public schools.
- Most P6 students reported that they spoke Lusoga at home and this was expected because the two districts were occupied by Lusoga-speaking people. Nevertheless, about 13% of the students said they mostly spoke English at home.
- Student absenteeism, measured by the percentage of the sampled P6 students who had been absent for at least one day in the last school week preceding data collection, was significantly higher in public schools than in private schools. About 34% and 26% of the P6 students in public and private schools reported being absent for at least one day in the school week preceding data collection, respectively.
- In terms of homework, about 53% and 44% of the P6 students reported receiving mathematics and English homework at least three times a week, respectively.

3. Students' Achievement in Mathematics and Literacy

This chapter focuses on the literacy and mathematics achievement of the P3 and P6 students in this study. One hypothesis of this study is that student performance in mother tongue in lower primary school grades (P1 to P3) is strongly correlated with student performance in other school subjects such as English and mathematics. In order to examine this hypothesis, P3 students were assessed in both English and Lusoga literacy using an equitable set of items. However, the P6 students were only assessed in English because, according to the official policy, mother tongue is only supposed to be taught and used as the language of instruction in the lower primary school grades.

The results presented in this chapter were derived from mathematics and literacy tests that were based on a careful analysis of the official primary school curriculum in Uganda. The assessment tests were adapted from our previous study in the same grade levels at other sites in Uganda. The tests were prepared in consultation with experienced practicing teachers drawn from Iganga and Mayuge districts. During the process of test development and before the tests were administered, they were piloted and refined to improve their measurement properties and to ensure that they conformed to the national syllabus. The piloting was carried out with P3 and P6 students in schools in Iganga and Mayuge districts that were outside the IMHDSS boundary — the study site.

The number of items in the P3 mathematics and literacy tests was 45 and 74, respectively, while the corresponding number in the P6 tests were 46 and 63, respectively. A similar set of 74 literacy items was used to assess P3 students in both English and Lusoga. An expert from Makerere University School of Linguistics led a panel of practitioners in translating the P3 literacy test from English to Lusoga and validating it.

After the main collection, each individual student was scored on the different items. One mark was awarded for each item that the student answered correctly and the individual marks were then tallied to form a total raw score for each student. Thereafter, the raw scores for each subject were converted into percentages and these are the literacy and mathematics student scores used in this report. This approach was also used to calculate student percentage scores for the various domains that were tested for each subject.

In this chapter, for both P3 and P6, the student scores for each subject are usually presented split by district, school type, school location and student sex. In addition, student scores are presented for the different domains that were tested for each of the subjects. Apart from the assessment, the P6 students were also interviewed about their individual and home background, such as being asked about household possessions and parental education. Consequently, for P6, the scores are also presented split by some selected background characteristics. Such background information was not collected from P3 students because these students were considered too young to provide reliable responses to the interviews.

3.1 Overall P3 achievement in English, Lusoga and mathematics

The overall mean test scores for P3 students are displayed in Table 3.1 for literacy (in English and Lusoga) and mathematics, together with the standard errors (SE) associated with the mean scores. Also displayed in this table are the mean scores of various groups of students, split by selected variables; namely, district, school ownership (type), school location and student sex. The differences between the mean scores of the students in each group under consideration are also given. A single asterisk (*) and two asterisks (**) are used in the table to flag the significant differences at 5% and 1% levels, respectively.

Table 3.1 → P3 student mean scores for English, Lusoga and mathematics

	Literacy						Mathematics		
	English			Lusoga					
	Mean	SE	Sig	Mean	SE	Sig	Mean	SE	Sig
District									
Iganga	30.1	2.16		22.4	1.73		53.4	1.48	
Mayuge	14.2	1.14		12.1	1.17		41.8	2.53	
Mean difference	15.9	2.44	**	10.3	2.09	**	11.6	2.93	**
School type									
Public	22.7	1.86		18.7	1.66		48.3	1.46	
Private	40.1	2.79		25.6	1.60		59.8	1.82	
Mean difference	-17.4	3.35	**	-6.9	2.31	**	-11.5	2.33	**
School location									
Rural	20.1	1.38		15.2	0.89		47.0	1.39	
Urban/peri-urban	39.3	3.40		29.8	3.02		58.4	2.31	
Mean difference	-19.2	3.68	**	-14.6	3.15	**	-11.4	2.69	**
Student sex									
Boys	25.4	1.97		19.8	1.61		51.8	1.53	
Girls	27.6	2.08		20.4	1.80		49.9	1.35	
Mean difference	-2.2	2.87	Ns	-0.6	2.41	Ns	1.9	2.04	Ns
Overall	26.5	1.70		20.1	1.37		50.9	1.29	

Notes: * Significant at 5%; ** Significant at 1%; ns = Not significant

The results in Table 3.1 show that the mean performance of the P3 students was below 30% for both English and Lusoga, and about 50% for mathematics. This implies that the vast majority of

these students performed poorly in the assessment tests, especially in literacy, both in English and in Lusoga. The results also show that, for all the three subjects under consideration, there were some statistically significant variations in mean scores across districts, school types or school locations. In this regard, students attending schools in Iganga District significantly outperformed those attending schools in Mayuge District, students in private schools did better than those in public schools, while students attending schools located in urban or peri-urban areas performed better than their counterparts attending schools in rural areas. The magnitudes of the differences in performance across districts, school type and school location were more noticeable in English than in either Lusoga or mathematics. For example, the difference in performance between students in private and public schools in English was about 17 percentage points while the corresponding differences in performance in Lusoga and mathematics were about 7 and 12 percentage points, respectively. However, based on these descriptive analyses, for all the three subjects, the differences in performance between boys and girls were small and these differences were not statistically significant.

The correlation coefficient between student scores in Lusoga and English was strong (0.80), implying that, by and large, students who performed well in Lusoga also performed well in English and that those who performed poorly in Lusoga also performed poorly in English. The correlation coefficients between these two languages and mathematics were less strong and stood at 0.73 and 0.64 for Lusoga and English, respectively. Though these coefficients were less strong they nevertheless indicated that students who did well in the two languages also did well in mathematics, and vice versa.

3.2 P3 achievement in English, Lusoga and mathematics, by domain

The P3 assessment data were further analyzed using curriculum content areas and skills tested. The results of these analyses for literacy and mathematics are presented in this section.

Studies have shown that student performance can vary substantially by specific subject area as well as by specific cognitive domain (See, for example, Sturman, et al., 2012a&b; Thomson, et al., 2012b&c; Surgenor et al., 2004.) For instance, an Irish study by Surgenor, et al. (2006) revealed that the mean score of Grade 4 students on mathematics items related to data (69%) was higher than their mean score on mathematics items related to measurement (49%). The same study found that students performed better on mathematics items involving the less challenging cognitive skills of understanding and recalling (62%) compared to their performance in more the challenging cognitive skills of application and problem solving (48%).

P3 English and Lusoga domains

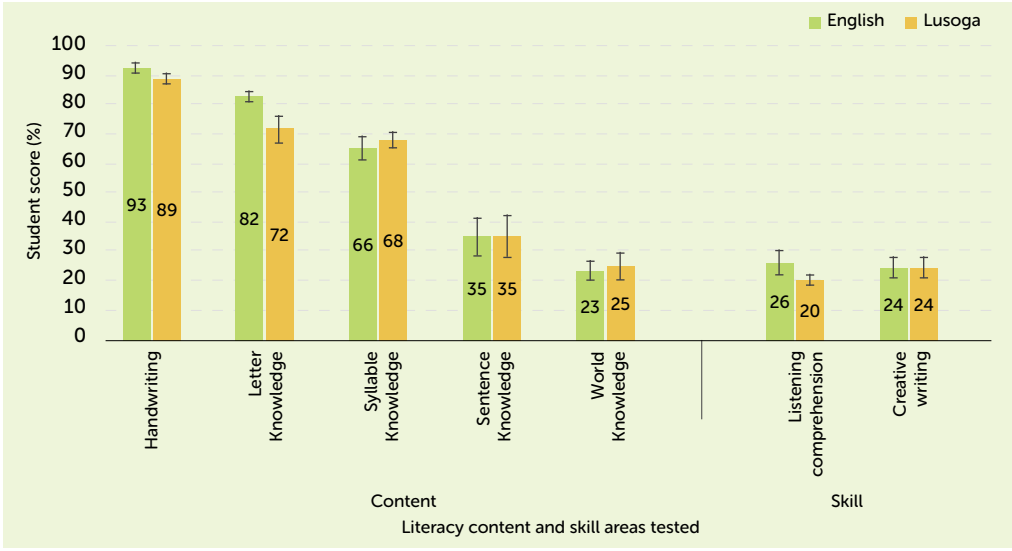
The items in both English and Lusoga involved five curriculum content domains and two skill domains (namely, listening comprehension and creative writing). The curriculum content domains were handwriting and knowledge of letters (letter naming), syllables, words and sentences. Handwriting tasks required students to copy some given texts correctly. In the

letters, syllables and words knowledge tasks, the students were required to write letters, syllables or words read to them by the test administrator. In some of these tasks, the students were required to fill in missing letters in words or write the names of common objects shown in pictures. In sentence knowledge, the students were expected to rewrite short sentences correctly or fill in missing words in sentences.

In the listening comprehension tasks, the learners were required to listen to a short story or passage read out to them by the test administrator and then answer simple questions that required recall or understanding of the story. Finally, in the creative writing tasks, the students were required to write a short composition guided by pictures or on a given topic in a coherent manner using the correct spelling, punctuation marks and capitalization.

Figure 3.1 shows how the P3 students performed in the different literacy content areas and skills tested in English and Lusoga. Interestingly, for each content area or skill tested, the mean performance of the students in English was about the same as their mean performance in Lusoga. The exception to this was in letter knowledge where student performance in English was noticeably better than their performance in Lusoga, perhaps implying that the students were taught letter naming in English. Across the two languages, students achieved high scores in handwriting, letter naming and syllable knowledge but low scores in words and sentences reading. The students also scored poorly in the two skills tested — listening comprehension and creative writing. Student performance in sentence knowledge was slightly better than their performance in word knowledge, which was surprising because word knowledge is a lower order task than sentence knowledge. Likewise, it was surprising that performance in listening comprehension (a task that required students to remember simple facts from a story) was about the same as the performance in creative writing, which is a high-order thinking skill (Anderson and Krathwohl, 2011).

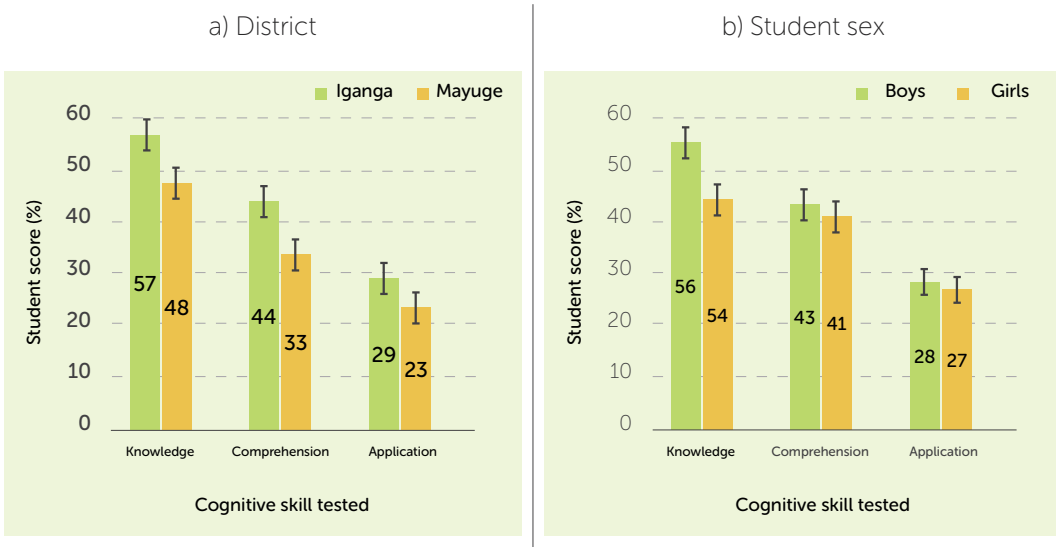
Figure 3.1 → P3 mean scores in English and Lusoga by content and skill areas tested



P3 mathematics domains. Items in the P3 mathematics test involved three categories of the cognitive skills defined by Bloom's taxonomy; namely, knowledge, comprehension and application (Anderson and Krathwohl, 2011). A vast majority of these items tested the lower order cognitive skills of knowledge and comprehension (70%) but a few tested application (30%), and this generally followed the scope of content found in the P3 mathematics curriculum in Uganda. In terms of curriculum content, most of the items in the P3 mathematics tests focused on measurement, whole numbers and addition — this also followed the scope of content in the P3 curriculum.

The P3 mean scores for mathematics cognitive skills, disaggregated by district and student sex, are depicted in Figure 3.2. As expected, student performance generally decreased with complexity of the cognitive skill involved and this was consistent across the two districts and across boys and girls. Students attending schools in Iganga District significantly outperformed their counterparts attending schools in Mayuge District, especially in the knowledge and comprehension cognitive domains. Boys performed slightly better than girls in all the cognitive skills tested. However, for each skill area under consideration, the difference between the mean scores for boys and girls was not statistically significant.

Figure 3.2 → P3 mean scores for mathematics skill areas, tested by district and student sex



3.3 Overall P6 achievement in English and mathematics

The same procedure used to analyze the P3 student assessment data was used to analyze the P6 data. However, the achievement scores in this section are presented disaggregated by the additional information collected from P6 students, such as home wealth background, pre-primary school attendance and student age.

Table 3.2 shows the overall mean scores as well as the mean scores for various groups of P6 students in English and mathematics. The overall mean was 43% for English and 30.5%

for mathematics, indicating that the P6 students performed poorly in these two subjects in general. As was observed with the P3 achievement scores for both subjects, students attending schools in Iganga District significantly outperformed those attending schools in Mayuge District; students in private schools did much better than their counterparts in government schools, and students in schools located in urban or peri-urban areas achieved better scores than students in rural schools. Also consistent with the P3 results, the differences in performance between P6 boys and girls were small and these differences were statistically significant for neither subject. In terms of family background, the mean scores in both English and mathematics were higher among students from households in the highest wealth index (top 25%) than among the students from the lowest wealth index (bottom 25%).

Further analyses were carried out on the P6 assessment data, split by pre-primary school attendance and age, and the results of these analyses are displayed in Figure 3.3 and Figure 3.4 for student pre-primary school attendance and student age, respectively. It is generally expected that attending pre-primary school will provide students with the fundamental skills required for adapting to learning in primary school and thriving. On the other hand, age is thought to influence learning because of its link to cognitive development as well as its influence on classrooms interactions (Hattie, 2008; Huitt, Huitt, Monetti, & Hummel, 2009; Hungi, Ngware, & Abuya, 2014).

Table 3.2 → P6 student mean scores for English and Mathematics

	English			Mathematics		
	Mean	**SE**	**Sig**	**Mean**	**SE**	**Sig**
District						
Iganga	46.2	1.92		31.9	1.18	
Mayuge	33.3	1.54		26.4	1.16	
Mean difference	12.9	2.46	**	5.5	1.65	**
School type						
Public	40.7	1.75		29.5	1.03	
Private	51.5	2.66		34.5	2.05	
Mean difference	-10.8	3.19	**	-5.0	2.29	*
School location						
Rural	37.5	1.55		27.7	0.89	
Urban	54.0	2.34		36.2	1.72	
Mean difference	-16.5	2.81	**	-8.5	1.94	**
Student sex						
Boy	43.3	1.55		30.7	1.01	
Girl	42.8	1.76		30.4	1.03	
Mean difference	0.5	2.34	Ns	0.3	1.45	ns
Wealth index						
Least poor (Top 25%)	47.2	2.21		33.2	1.38	
Poorest (Bottom 25%)	38.9	1.48		28.0	0.85	
Mean difference	8.3	2.66	**	5.2	1.62	**
Overall	43.0	1.51		30.5	0.92	

Notes: * Significant at 5%; ** Significant at 1%; ns = Not significant

Pre-primary school education has been linked with future desirable schooling outcomes such as better academic performance and lower school drop out rates. For example, a study in Argentina by Berlinski, Galiani and Gertler (2006), showed that a year of pre-primary school

increases average third grade test scores by 8% of a mean of the test scores. Results from the 2007 SACMEQ study revealed that Grade 6 students in SACMEQ countries who had attended preschool performed significantly better in reading and mathematics than pupils who had never attended preschool, even after controlling for other important variables, such as pupil sex, socioeconomic background and pupil age (Hungi, 2011a).

In this study, about 42% of the P6 students reported that they had not attended pre-primary school at all before joining P1; about 33% of the students reported they had attended pre-primary school for a few months to one year; and 25% reported they had attended for at least two years. From the results in Figure 3.3, it can be seen that student performance was positively related to years of pre-primary school attendance for both English and mathematics. Students who had attended pre-primary school for a few months to one year outperformed students who had never attended pre-primary school but the difference in performance was not statistically significant. Importantly, students who had attended pre-primary school for at least two years significantly outperformed those who had never attended pre-primary school. These results imply that pre-primary school attendance for at least two years was advantageous to students in terms of English and mathematics achievement.

Table 3.3 → P6 mean scores for English and mathematics by student pre-primary school attendance

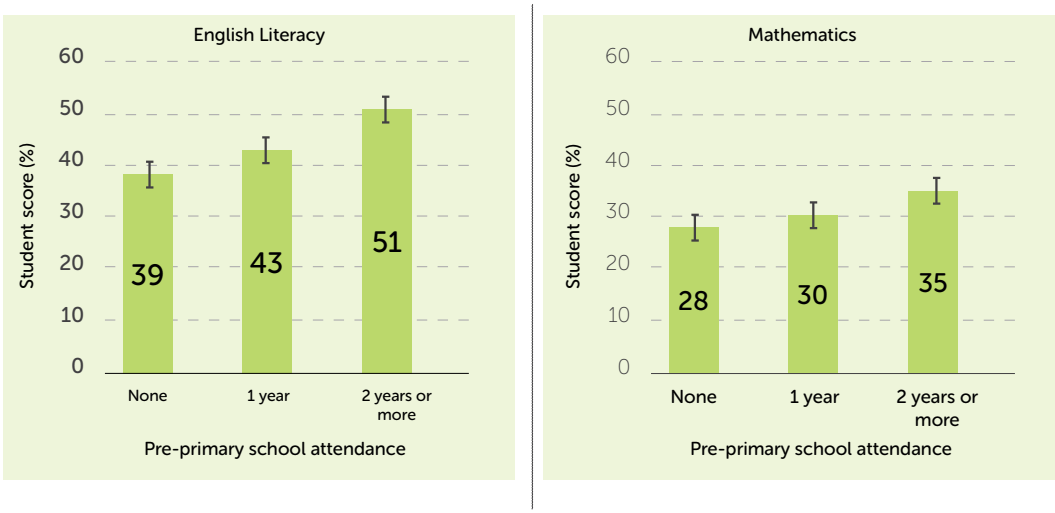
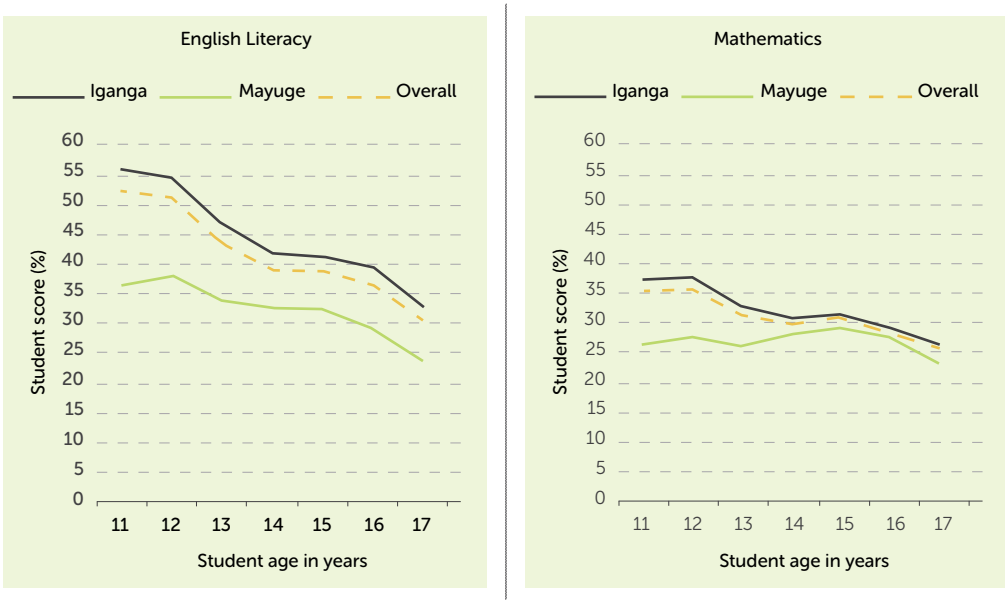


Figure 3.4 shows the distribution of English and mathematics scores by student age across Iganga and Mayuge districts. In general, younger students were likely to achieve better scores than older students and this was more evident in literacy scores than in mathematics scores, and also more evident among students attending schools in Iganga District than those attending schools in Mayuge District.

Figure 3.4 → **Distribution of P6 mean scores for English and Mathematics by student age and district**



3.4 P6 achievement in English and mathematics by domain

In this section, results of the analyses of the P6 assessment data by domains tested are presented.

P6 English domains

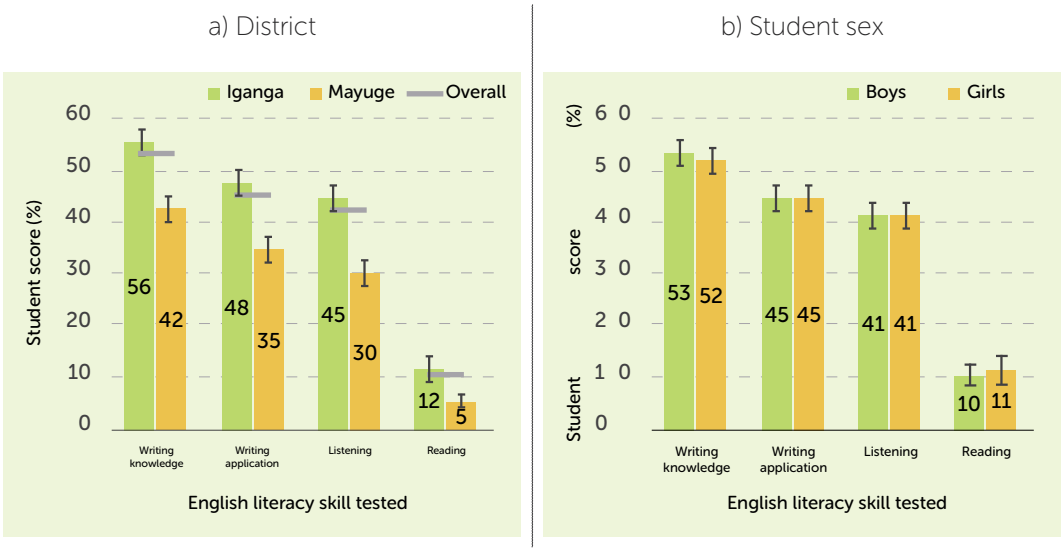
The P6 English items involved different curriculum content and cognitive domains (and Krathwohl, 2011). The main English literacy skills tested included writing knowledge, writing application, reading, and listening comprehension. The items were not mutually exclusive in terms of curriculum content or cognitive domains and they could fall into more than one content or cognitive area.

In writing knowledge, the students were required to rearrange words in a certain order; fill in missing words in a passage to make it meaningful by selecting the most suitable word from a list of given words, and complete a form with their personal information. In writing application, the students were required to write a short composition on a given topic in a coherent manner using correct spelling, punctuation marks and capitalization. In reading, students were expected to read out a passage and then answer questions related to the passage. Finally, in listening, the learners were required to listen to a conversation between two people read to them by the test administrator and to fill in the missing words to complete the conversation, and listen to a short story read out to them twice by the same test administrator and then write down the story using correct spelling and punctuation.

In general, across the two districts and across student sex, performance was better in writing knowledge than in all the other three English skills tested (results in Figure 3.5). This was

followed by performance in writing application, and listening, in that order. Compared to the performance in the other English skills that were tested, performance in reading was strikingly low. This should be worrying to the education authorities, teachers and parents in these two districts, especially given the importance of readingcompetence for learning other school subjects. In terms of performance by districts, Iganga consistently outperformed Mayuge in all the English skills tested. The differences in performance between Iganga and Mayuge districts were statistically significant for all the English skills under consideration. Boys marginally outperformed girls in most of these English skills but the differences in performance between boys and girls were not statistically significant for any of the skills considered.

Figure 3.5 → P6 mean scores for English domains by district and student sex district



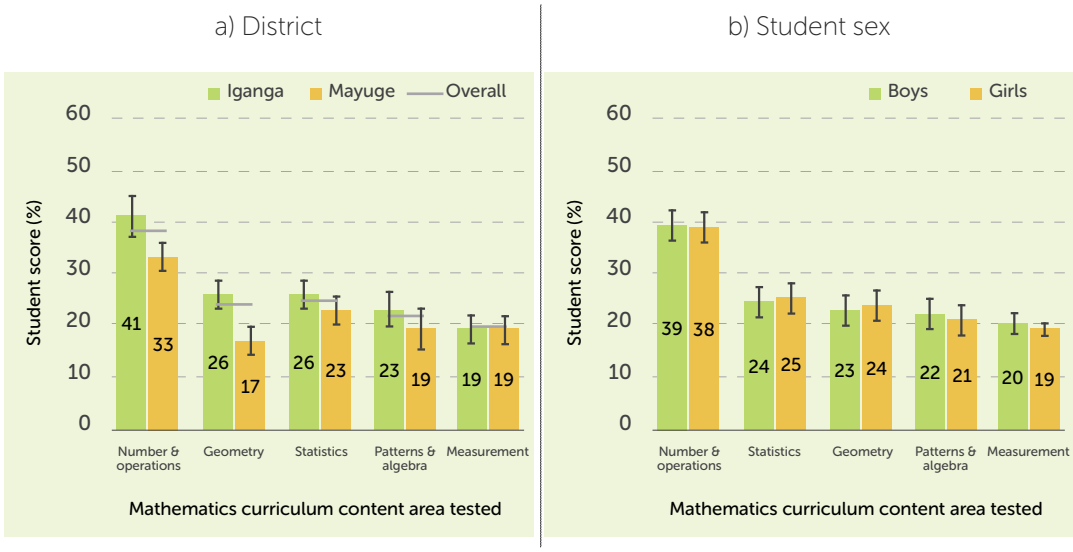
P6 mathematics domains

Items in the P6 mathematics test were grouped into five main categories of content domain (namely, number and operations, measurement, statistics, geometry, and patterns and algebra) and four categories of cognitive domain (memorization, procedure without connections, procedure with connections, and doing mathematics). The majority of the items were from the number and operations content area, and focused mainly on the first three cognitive domains (memorization, procedure without connections, and procedure with connections).

The P6 mathematics assessment data were analyzed using curriculum content areas and the results are depicted in Figure 3.6, split by district and student sex. Across the two districts and across boys and girls, performance was significantly better in the number and operations content area than in the other mathematics content areas. For all groups under consideration, performance was lowest in the measurement content area and this was closely followed by performance in patterns and algebra. Student in Iganga District consistently outperformed those in Mayuge District in all the mathematics domains. The differences in mean scores between Iganga and Mayuge districts in two domains (number and operations, and geometry)

were statistically significant. On the other hand, boys outperformed girls in three domains (number and operations, patterns and algebra, and measurement) while girls outperformed boys in two domains (statistics and geometry). However, the difference in performance between boys and girls in any of the domains was minimal and not statistically significant.

Figure 3.6 → P6 mean scores for mathematics domains by district and student sex



3.5 Summary of the key findings

- Overall, the mean scores of P3 students in English, Lusoga and mathematics were about 27%, 20% and 50%, respectively, while the mean scores of the P6 students in English and mathematics were about 43% and 31%, respectively. For both grades and for all the three subjects considered, the observed mean scores were considered unsatisfactory, bearing in mind that the tests were based on the official primary school curriculum in Uganda for P3 and P6.

- P3 and P6 students attending private schools outperformed their counterparts in the public schools across all subjects assessed. In addition, in all subjects considered and based on descriptive statistics, the mean performances of P3 and P6 students were better in Iganga schools than in Mayuge schools and better in schools located in urban or peri-urban areas than in schools located in rural areas.

- For both English and mathematics, P6 students who had attended pre-primary school for at least two years before joining P1 significantly outperformed their counterparts who had never attended pre-primary school.

- In general, younger P6 students were likely to achieve better their older counterparts and this was more evident in English scores than in mathematics scores.

- By and large, P3 students who performed well in Lusoga also performed well in English

and those who performed poorly in Lusoga also performed poorly in English (correlation coefficient = 0.80). In addition, P3 students who performed well in English or Lusoga also performed well in mathematics, and vice versa.

- In terms of the English and Lusoga content domains, the mean performance of P3 students was high in handwriting, letters and syllables but low in word and sentence knowledge. The performance of the P6 students in reading was low when compared to their mean performance in the other three English content domains assessed (namely, writing knowledge, writing application and listening).
- Overall, in the literacy assessments, students performed well on items related to knowledge domain (above 50% for P3) but performed poorly on items related to application.
- Across the mathematics curriculum outcomes areas, students performed relatively better on items related to number concepts and operations (about 40% for P6) and performed relatively poorly on items related to patterns, algebra and measurement (below 25% for P6).

4. Teachers and Teaching Practices

In this chapter, we examine the teaching environment by presenting teachers' personal and professional characteristics, their workload, their school attendance and how they interacted with students in terms of learning assignments as well as meeting with their parents. To understand what was happening inside the classroom, we explored their teaching styles by analyzing lesson videos as well as reporting on the availability of teaching and learning materials inside the classroom.

4.1 Teachers' personal and professional characteristics

Table 4.1 presents teachers' personal and professional characteristics. Of interest is the proportion of teachers (slightly over 10%) who had a primary or junior secondary (S2) level of education. Their average age was 33 years, with about 9 years of teaching experience. Given their low levels of academic education, the concern here would be their ability to master and deliver primary school curriculum. It is noteworthy that MoES already has in place a policy that requires minimum pre-service entry qualifications to primary teacher training colleges to be a minimum of O-level (S4) with passes in six subjects, including mathematics, English and at least two sciences (Kasiisa & Tamale, 2013).

Table 4.1 → Teachers' personal and professional characteristics

	Public school		Private school		P-Value
	Number	%	Number	%	
Number of teachers interviewed	220	74.07	77	25.93	
Teacher sex					
Female	124	56.36	27	35.06	0.001
Male	96	43.64	50	64.94	
Age	35.891	-	27.422	-	0.001
Education					
Primary education or JSE*	23	10.45	10	12.99	0.272
Secondary education (O-level)	103	46.82	36	46.75	
Secondary education (A-level)	83	37.73	23	29.87	
Bachelors degree or higher	11	5.00	8	10.39	
Pre-service training					
Untrained teacher	2	0.91	9	11.69	0.001
Certificate in education	142	64.55	56	72.73	
Diploma in education	66	30.00	7	9.09	
Degree in education	10	4.55	5	6.49	
In-service Training: Yes	70	31.82	35	45.45	
Experience: Average years of teaching	11.553	-	5.314	-	0.001
# of teaching years in current school	5.605	-	2.826	-	0.001
Workload (average # of lessons in a week)**	10.567	-	11.258	-	0.540

Notes: * Only 2 teachers had a JSE—Junior Secondary Education certificate, that is, secondary grade 2-level education; ** the length of a P3 lesson was 30 minutes, while that of a grade 6 lesson was 40; 1=Standard deviation of 7.49; 2= Standard deviation of 7.99; 3= Standard deviation of 6.48; 4= Standard deviation of 5.62; 5=Standard deviation of 4.55; 6= Standard deviation of 3.22; 7= Standard deviation of 8.06; 8= Standard deviation of 9.57.

Figure 4.1 shows the distribution of workload among teachers in the study sample. The findings show that, on average, teachers taught 11 lessons a week (about 6.4 hours a week, 1.3 hours a day or 256 hours in a 40-week school year) and this did not differ by school type. However, in every week, P6 teachers taught an average of 1 hour more than those of P3, even after taking into account the fact that some P3 teachers also taught upper classes, especially in the afternoon. This was expected, given that many P3 lessons end at lunch time.

The available literature shows that in Uganda, teachers teach between 480 and 500 hours a year compared to between 700 and 1,000 hours in other countries (UNESCO, 2005). Using SACMEQ data, Kasirye (2009) reported a teaching load of 12-30 lessons per week for lower grades (P1-P3) and 40-50 lessons in the upper grades (P4-P7). Our school-based data was self-reported from the mathematics and English teachers and paints a different picture from what we find in the literature. In the context of this study, the annual teaching load was very low, an indication of gross underutilization of teachers. Teachers in lower grades (P1–P3) are expected to teach 10 lessons of 30 minutes each, while those in upper grades (P4-P7) teach 8 lessons of 40 minutes each (UNESCO, 2010).

The successes of the Uganda Universal Basic Education program included the high number of trained teachers inside the classroom – almost all teachers in public primary schools and about 88% in private schools. However, the gains made in teacher training may be compromised by the low pedagogical and subject content knowledge, as shall be seen later in this section. Our data also shows that mathematics and English teachers in public primary schools were predominantly female (slightly over half), while in private schools, they were predominantly male (about two-thirds). In most of the reported characteristics, there was a statistically significant difference between teachers in public and private primary schools.

Figure 4.1 → Proportion of teachers and their respective workload in a school week

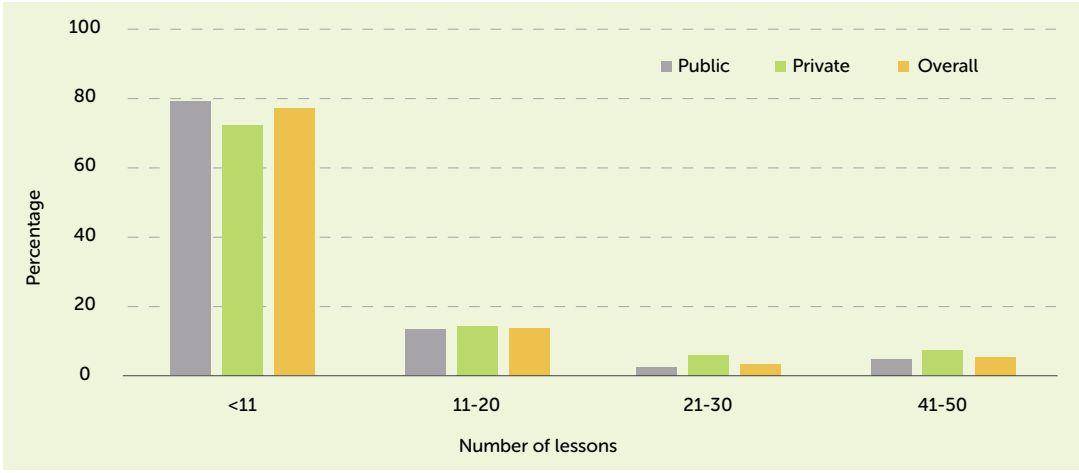


Table 4.2 presents some classroom practices and types of support that, if well utilized, enhance teaching. We found no statistically significant difference by frequency of occurrence in most of these practices and types of support, or by school type. However, the overall picture shows that more than three quarters of both mathematics and English teachers felt that they

were adequately or very adequately prepared to teach the subject. There was evidence of the presence of classroom support mechanisms in the schools. For instance, head teachers observed about one third of the mathematics and English teachers during lesson teaching. When this good practice is performed effectively (when it occurs regularly, with constructive feedback provided and when the teacher uses the comments to improve performance) it can improve teaching styles.

Occasional visits by subject specialists and/or quality assurance personnel reinforce classroom observations by head teachers and/or deputy head teachers for purposes of feedback. In our study, we found that in the last 12 months prior to data collection, more than 60% of the teachers in both public and private schools had been visited at least once by an academic advisor. About 39% and 46% of teachers in public and private schools, respectively, had asked parents or guardians to sign homework books indicating that their children had done the homework. Teachers also received support from parents and guardians with more than 59% in public schools and 61% in private schools indicating that parents came to school at least twice a term to discuss their children's academic performance.

Table 4.2 → Quality of teaching and classroom support

Items	Public school		Private school		P-Value
	Number	%	Number	%	
Number of observations	232	73.19	85	26.81	
Preparedness to teach subject					
Inadequate	9	3.88	6	7.06	0.211
Somewhat adequate	38	16.38	11	12.94	
Adequate	139	59.91	44	51.76	
More than adequate	46	19.83	24	28.24	
Lesson observation by head teacher					
Often	76	32.76	32	37.65	0.978
Sometimes	117	50.43	41	48.24	
Rarely/never	39	16.81	12	14.12	
Lesson observation by d/head teacher					
Often	78	33.62	24	28.24	0.518
Sometimes	104	44.83	36	42.35	
Rarely	32	13.79	16	18.82	
Never	18	7.76	9	10.59	
Visit by academic advisor in last 12 months					
Never	87	37.50	31	36.47	0.867
At least once	143	61.64	51	60.00	0.791
At least twice	91	39.22	23	27.06	0.046
Three times	55	23.71	18	21.18	0.635
Asked p/g to sign homework books (Yes)	90	38.79	39	45.88	0.255
Met parents to discuss performance					
Never	22	9.48	2	2.35	0.004
Once a year	27	11.64	3	3.53	
Once a term	137	59.05	52	61.18	
Once or more a month	46	19.83	28	32.94	

To improve the effectiveness of teaching, the use of teaching and learning materials during lessons is critical. The available literature on the use of teaching resources in mathematics

classrooms shows that they improve delivery mechanisms and, ultimately, students' achievement (Mbugua, 2011). According to Greenwald, Hedges, and Laine (1996), teaching aids are positively related to learning achievement; this was reiterated by Hattie (2009) in meta-analysis of more than 800 studies on learning achievement. In this study, we found both basic and non-basic teaching materials being used in classrooms in about half of the lessons observed. Basic teaching materials included the chalkboard, recommended textbooks and writing materials; non-basic materials included visual aids such as wall charts and student-made materials.

4.2 Classroom observations

During the study, 158 P3 and P6 mathematics and English lessons were observed. Using a time analysis video rubric that allowed examination of classroom interactions in 5-minute intervals, classroom instructional mathematics and English tasks were analyzed and grouped into 3 broad activities; namely, individual seat work, recitation, and teacher-class activity, based on the amount of time spent on the tasks in that activity during instruction. For example, tasks under individual seatwork included tasks like "copying instructions" and "solving problems individually as the teacher circulates in the class". Appendix 4A lists all the tasks under each of the three broad activities.

The broad activities

In lessons dominated by individual seatwork, the students were involved in copying instructions or notes, and solving problems individually as the teacher circulated in class or while the teacher was working on another task unrelated to what the students were doing. The teacher was checking individual work as students solved the problem, and checking individual work after students had stopped solving the problem. Individual seatwork provides limited interaction between teacher and students, though the teacher keeps the student busy with tasks. In such lessons the teacher walks into the classroom, instructs the students on the day's content—mainly an introduction followed by a mathematics task in the form of an example or two—then students are asked to complete a similar task (Ngware, Oketch, Mutisya, & Abuya, 2010). Thereafter, an exercise may be given either on the chalkboard or from a recommended textbook.

In recitation, "question and answer" sessions with cued elicitation dominate the lesson (Ackers & Hardman, 2001; Carnoy & Chisholm, 2008; Hardman et al., 2009; Ngware, Mutisya, & Oketch, 2012; Ngware et al., 2010; Sorto, Marshall, Luschei, & Carnoy, 2009). This teacher-led activity has three moves—an "initiation", usually in the form of a question from a teacher, a "response" in which a student attempts to respond to the question and a "follow-up action", in which the teacher provides feedback to the student's response in the form of praise or affirmation (Smith, Hardman, & Tooley, 2005). The interactions are characterized by closed teacher questions, brief student responses and, often, minimal diagnostic feedback. Though it is a directed instruction, compared to the other dominant activities, recitation has more opportunities for student participation during the lesson.

Activities involved in recitation lessons include a teacher asking an individual student a question and the student giving a verbal or non-verbal answer; individual students asking a question with the teacher or another student responding, occasional whole class chorus and group reporting, individuals reading orally, the whole class reading orally, students solving problem on the chalkboard, students giving instructions, and individuals demonstrating both verbally or non-verbally. Such lessons are interactive and stimulating, and students learn from the teacher and their peers.

The other dominant teaching practice was the "teacher class activity". It involves the teacher dominating most of the tasks or a heavily teacher-centered or lecture-like lesson (see for example (Carnoy & Chisholm, 2008). Lessons dominated by teacher class activities are characterized by the following tasks: the teacher giving the entire class task instructions, the teacher carrying out a demonstration, a whole class lecture, the teacher giving a review or recapitulation of a lesson, and the teacher evaluating the lesson objectives. Whole class chorus is a common feature in classroom interaction dominated by teacher class activities, as evidenced by other studies, for instance Moloi, Morobe, and Urwick (2008) in Lesotho; Hardman, Abd-Kadir, and Smith (2008) in Nigeria; Ackers and Hardman (2001), Hardman et al. (2009), Ngware et al. (2010) and Pontefract and Hardman (2005) in Kenya.

Table 4.3 shows the number and proportion of lessons using a dominant activity across grades and subjects for both public and private schools. Without taking into account the subject, in P3 and P6 lessons the dominant teaching activities were individual seatwork and teacher class activity, respectively. After taking the subject into account, and regardless of the grade, we found that teacher class activity and recitation were the dominant activities for mathematics and English respectively. Teaching styles did not statistically significantly differ by either grade or subject.

Table 4.3 → Proportion of lesson time used in each teaching activity by grade and subject

	Dominant Activities								P-Value
	Individual seatwork		Recitation		Teacher class activity		Two dominant activities		
	N*	%**	N	5	N	%	N	%	
Primary 3									
Public	24	45.28	21	39.62	6	11.32	2	3.77	0.725
Private	8	42.11	7	36.84	2	10.53	2	10.53	
Primary 6									
Public	18	27.27	18	27.27	28	42.42	2	3.03	0.387
Private	3	15.00	7	35.00	8	40.00	2	10.00	
Math									
Public	21	36.84	12	21.05	24	42.11	0	0.00	0.498
Private	7	36.84	3	15.79	8	42.11	1	5.26	
English									
Public	21	33.87	27	43.55	10	16.13	4	6.45	0.383
Private	4	20.00	11	55.00	2	10.00	3	15.00	

Notes: * Number of lessons using the dominant activity shown in the column heading; ** this is computed out of the total number of lessons observed in the category shown in the row heading.

To further understand the teaching styles, we examined the proportion of lesson time used in a dominant activity. As indicated in Table 4.4, in P3 mathematics half of the lesson in public schools was taught using recitation—the dominant activity—while in private schools about 43% of the lesson was taught through individual seatwork as the dominant activity. In the same grade, about 51% of the time in English lessons in public schools was used either in individual seatwork or in teacher class activity; while in private schools, 60% of the lesson time used individual seatwork only. From the observations of P3 lessons in public schools, there was no single style that took most of the time in lessons across the two subjects. However, in private schools, teachers spent most of the lesson time using individual seatwork as an instructional delivery approach.

Table 4.4 also presents the proportions of P6 mathematics and English lessons time by dominant activity. In mathematics, about 47% of lesson time in public schools was spent in individual seatwork, while in private schools the proportion was slightly lower (41%). In the same

grade, almost half (49%) of English lesson time in public schools was used in recitation; while in private schools, a similar (48%) proportion of lesson time was used. From these observations of P6 lessons, there was a consistent use of recitation in the English lessons across the two school types, and the proportion of lesson time spent using this activity was almost the same.

Table 4.4 → Average proportion of lesson time spent on a dominant teaching activity

	Public schools				Private schools			
	N	Mean* (%)	95% CI		n	Mean* (%)	95% CI	
Primary 3								
Math								
Individual seatwork	9	45.00	39.63	50.37	6	42.77	34.34	51.19
Recitation	8	50.27	42.50	58.04	3	40.57	26.83	54.31
Teacher class activity	5	40.63	30.92	50.34	2	41.67	38.17	45.17
Two dominant activities					1	26.67		
English								
Individual seatwork	14	51.23	45.73	56.72	3	59.95	25.40	94.51
Recitation	13	48.12	41.41	54.84	4	55.20	41.04	69.36
Teacher class activity	1	51.22						
Two dominant activities	2	39.72	32.48	46.97	1	43.18		
Primary 6								
Math								
Individual seatwork	11	46.85	43.90	49.80	2	41.25	38.63	43.87
Recitation	4	38.05	33.98	42.12				
Teacher class activity	18	43.04	36.47	49.62	6	53.47	40.35	66.59
English								
Individual seatwork	7	48.44	42.68	54.21	1	45.00		
Recitation	14	49.26	41.19	57.33	7	48.08	36.61	59.54
Teacher class activity	10	47.37	39.02	55.71	2	34.32	25.28	43.36
Two dominant activities	2	37.21	27.92	46.50	2	41.99	30.21	53.77

Active teaching activities

In teaching, some tasks directly engage the students; for example, a Q&A task requires the learner to either ask or answer the questions. In this study, we refer to such tasks as active teaching activities or active teaching tasks. The tasks identified as active are presented in Appendix 4B. We further examined the lesson time used in such active teaching activities.

Figure 4.2 to Figure 4.5 present the distribution of time use across these 11 active activities by subject, school type and grades.

Figure 4.2 → Proportion of mathematics lesson time used in active activities by grade

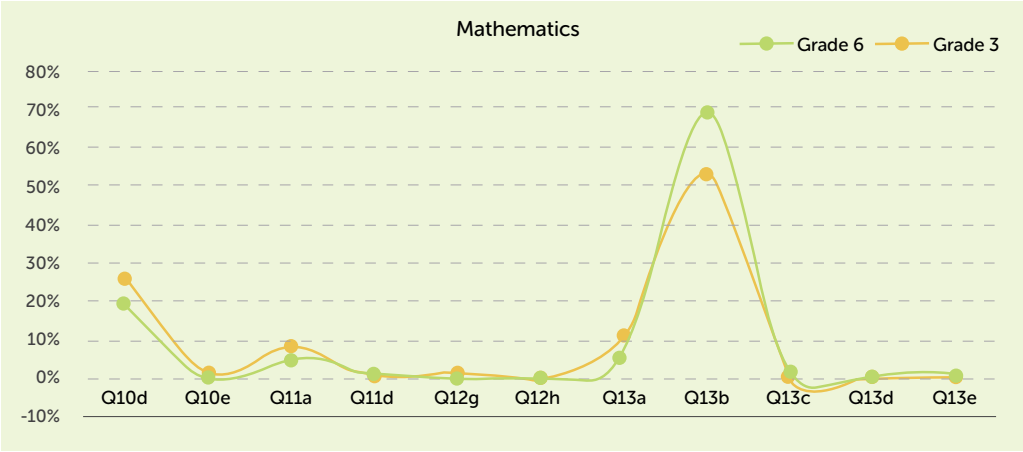


Figure 4.3 → Proportion of English lesson time used in active activities by grade

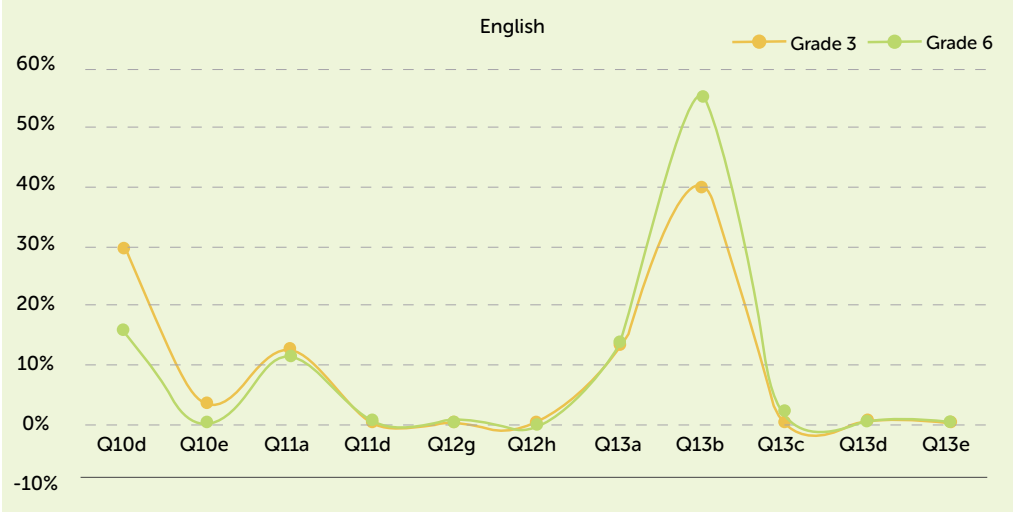


Figure 4.2 and Figure 4.3 present the proportion of time spent on each of the active teaching activities in mathematics and English lessons, controlling for grade. From these figures, three

key observations emerge: (i) the pattern in the proportion of time spent on active teaching activities is similar in the two subjects. Four activities took up most of the active teaching time and these were "Q10d—teacher checking work individual (working)", "Q11a—individual learner (Teacher asks)", "Q13a—whole class task instructions (Teacher only)" and "Q13b—whole class demonstrations (Teacher only)". (ii) "Q13b—whole class demonstrations" was utilized in more than half of the mathematics active lesson time, and at least 40% of the English active lesson time. This means that in most of the active time during a lesson, teachers used the command style where they took control of the class and were talking most of the time. This involved giving instructions to students, illustrating a concept or providing an example to the students. During this time, the students were passive listeners. (iii) Teachers, regardless of the grade they were teaching, applied similar styles. One would have expected this to vary by grade, given the age differences of students in P3 and P6, but this was not the case.

In Figure 4.4 and Figure 4.5, the proportion of time used in active teaching activities in mathematics and English lessons is presented, controlling for school type. In these figures, a similar pattern of time use to that observed after controlling for grade is evident in active teaching activities. Regardless of school type (public or private), the use of time in active teaching activities was similar among all teachers teaching P3 and 6. Perhaps this can be explained by the pre-service training program provided in primary teacher training colleges and offered to all prospective teachers, regardless of the school grade they will be teaching. However, it is notable that about 12% of teachers in private schools and less than 1% of those in public schools were untrained.

Figure 4.4 → Proportion of mathematics lesson time used in active teaching activities by school type

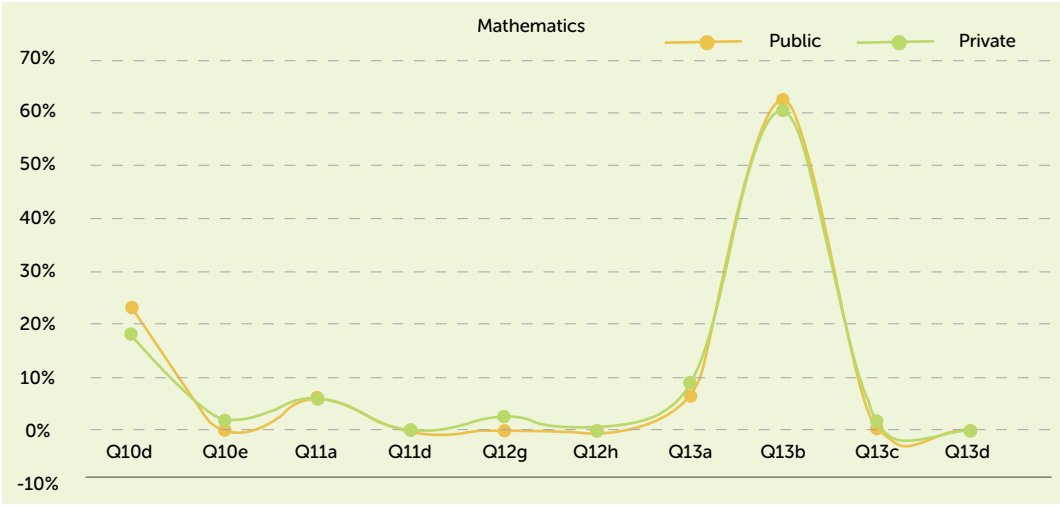
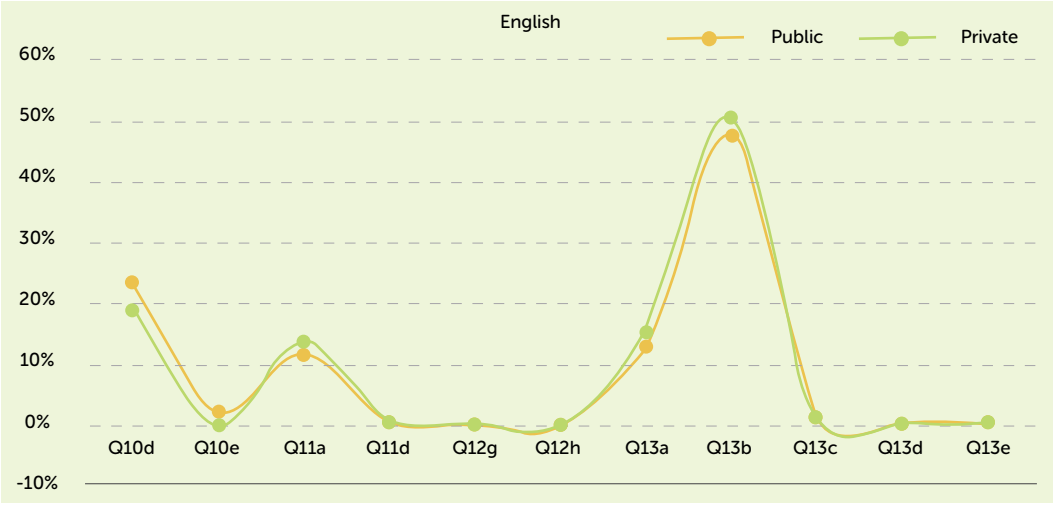


Figure 4.5 → Proportion of English lesson time used in active teaching activities by school type



From the analysis of dominant activities during lesson time, the observed teaching styles in primary schools in Iganga and Mayuge districts are comparable to the command and/or task style in Mosston's spectrum of teaching styles (McCullick & Byra, 2002; Mueller & Mueller, 1992). This implies a heavily teacher-centered and reproductive style that may not develop critical thinking among learners. It is termed "reproductive" because students will most likely reproduce what the teacher told them.

Table 4.5 shows a cross-sectional representation of how teaching time is spent in a typical lesson. Between 34% and 47% of lesson time is spent on activities that do not directly enhance learning (see zone A) while 42–57% of lesson time is spent on only four activities (shown in zone C). Our analysis further shows that in mathematics, more than three quarters of the teachers observed spent at least 30% of the lesson time in zone A; in English, about 60%of the teachers observed spent at least 30% of the lesson time in zone A. This is a clear demonstration that in a considerable proportion of lessons, teaching time is not optimized in a way that enhances learning opportunities. But even if it were to be optimized, the reproductive inclination in teaching styles will compromise any gains made on active teaching time.

Table 4.5 → **Distribution of teaching time during a lesson**

Subject/grade	Zone A	Zone B	Zone C
	% inactive teaching time	% active teaching time	
Math P3	37.83	1.27	55.21
Math P6	46.34	1.14	42.12
English P3	37.54	2.13	58.84
English P6	34.83	1.51	56.88
	Activities that do not directly enhance learning opportunity, e.g., transitioning	Activities 10e, 11d, 12g, 12h, 13c, 13d & 13e—common activities in a lesson (see Appendix 4B)	Activities Q10d, Q11a, Q13a & Q13b—common activities in a lesson

4.3 Teacher knowledge

To understand mathematics teachers' knowledge, we assessed those who were currently teaching mathematics to P3 and P6 students. The teachers' mathematics test assessed knowledge in three domains—mathematics content, pedagogy and pedagogical content knowledge. Table 4.6 presents the mean scores of 156 teachers disaggregated by various sub groups, including dominant teaching activity, school type, grade and study district. Among P3 teachers in public primary schools, those who used teacher class activity as the dominant style had the highest mean score of about 48%, excluding the one teacher who used at least two of the dominant activities in equal proportions. This was about 10 percentage points higher than the mean score of the second highest subgroup of dominant teaching activity, that is, recitation. In P3 in private schools, the teachers who mostly used recitation had the highest mean scores(41%), with a 10 percentage point difference with the dominant activity subgroup that follows. Overall, P3 teachers in public schools had higher mean scores (38%) than their counterparts in private schools (34%), though the difference was not statistically significant. On the whole, P3 teachers in both public and private schools had low scores. The literature on early grade learning outcomes show that at this early stage of learning, skilled teachers are necessary if early graders are to achieve the basic learning competencies that will enable them to progress through the school system with few learning difficulties (Croninger, Rice, Rathbun, & Nishio, 2003). Teachers with low math proficiency assigned to lower or early grades will therefore produce students who progress through the school system with mathematics learning difficulties.

Among P6 mathematics teachers in public primary schools, the highest mean score (48%) was similar to that of P3 teachers and in the same dominant activity subgroup—teacher class activity. Unlike the case of P3 teachers, the difference in mean score between the highest-scoring subgroup and other subgroups was smaller and ranged between one and six

percentage points. In P6 in private schools, the teachers who mostly used individual seatwork had the highest mean scores (49%), with those not filmed (their lessons were not observed) coming a close second. Teachers who used teacher class activity as the dominant style had the lowest mean scores; this is unlike what we observed in public schools where such P6 teachers had the highest mean scores.

Table 4.6 → Teachers' mean scores disaggregated by dominant teaching activity and school type

Dominant teaching activity subgroups	n	Grade	Public (%)	Private (%)	Overall (%)
Individual seatwork	13	3	39.60	27.10	34.82
Recitation	11	3	35.40	41.31	36.35
Teacher class activity	7	3	48.19	31.07	43.88
Two dominant activities	1	3	-	59.18*	59.18
Not filmed	44	3	36.45	39.01	36.80
Individual seatwork	12	6	44.76	49.25	45.02
Recitation	4	6	42.35	-	42.35
Teacher class activity	24	6	47.64	36.58	45.58
Not filmed	40	6	46.49	45.11	46.11

Teacher mean scores (%) by school type and district	n	Mean	Std Error	95%	CI
Category					
Public P3	56	37.94	1.93	34.12	41.75
Public P6	59	45.87	1.81	42.29	49.45
Private P3	20	34.29	2.87	28.63	39.95
Private P 6	21	41.79	2.64	36.56	47.01
Iganga District	117	41.74	1.35	39.08	44.40
Mayuge District	39	38.72	2.14	34.49	42.95

Notes: * There was only 1 math teacher who used at least two of the dominant activities in equal proportions.

On the whole, P6 teachers in public schools had higher mean scores (48%) than their counterparts in private schools (42%) but the difference was not statistically significant. Though these results are mixed, four observations emerge: (i) Teachers who predominantly used teacher-centered styles had higher mean scores—an indication that they had a better

mastery of content, hence, they would "tell it all" to their students. This was more common in public schools. (ii) In private schools, there was no clear pattern and/or association between the dominant teaching activity and teachers' mathematics assessment mean scores. (iii) Overall, teachers in public schools had a better mastery of mathematics content and pedagogy than their counterparts in private schools. (iv) In both public and private schools, P3 teachers had lower mean scores than P6 teachers—an indication that head teachers may be assigning the weak teachers to the lower grades.

4.4 Teacher mathematics knowledge domains

Table 4.7 presents teachers' math test mean scores in mathematics knowledge domains by district, grade and school type. Following the Shulman (1987) model that emphasizes the interrelationship between content knowledge and pedagogy, the study assessed three domains of teacher knowledge: content knowledge, pedagogical knowledge, and pedagogical content knowledge—see for example (Hlas & Hildebrandt, 2010; Ngware et al., 2010).

Table 4.7 → Teacher mathematics test scores (%) by knowledge domain

Subgroup of teachers	N	Content knowledge (CK)		Pedagogical knowledge (PK)		Pedagogical content knowledge (PCK)	
		Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Iganga District	117	51.54	20.43	29.15	15.00	37.61	16.39
Mayuge District	39	48.21	18.41	29.91	12.53	33.21	15.07
Primary 3	76	44.87	19.80	27.92	13.52	33.16	16.41
Primary 6	80	56.25	18.55	30.69	15.13	39.69	15.31
Public schools	115	51.65	19.81	29.76	14.76	37.87	16.72
Private schools	41	48.05	20.31	28.18	13.40	32.68	13.88
Overall	156	50.71	19.94	29.34	14.39	36.51	16.14

Content knowledge (CK) is the subject matter knowledge or what teachers teach. Pedagogical knowledge (PK) is the "how" of teaching (Ball, 2000). It is usually acquired through training, whether pre-service or in-service, and through classroom experience. Pedagogical content knowledge (PCK) is the hands-on knowledge used by teachers to guide their decisions in highly contextualized classroom settings (Shulman, 1987). For example, in teaching mathematics, PCK would mean responsiveness to ways of presenting mathematics subject content to students with different academic and social backgrounds; knowledge of the common mathematics language, misconceptions, and knowledge of the specific teaching strategies (Rowan, Schilling, Ball, & Miller, 2001).

From Table 4.7, it is evident that the mean score in content knowledge (CK) ranged from 44% to 56% across the various subgroups. Except for the mean scores between the two

grades (P3 and P6), there were no major differences by district and/or school type—at about 4 percentage points difference, the difference was not statistically significant. The difference in CK mean scores between P3 and P6 teachers was slightly over 10 percentage points and it was highly statistically significant (p=0.001). According to Baumert et al. (2010), the range of teaching strategies, alternative mathematical representations and explanations at the disposal of a teacher during instruction are largely dependent on the mastery of the subject. Though it can be argued that P3 teachers do not require high-level mathematics content, in the absence of an adequate number of teachers in a school, they are relied upon to teach upper primary school classes, especially in the afternoons after their early graders have completed their lessons for the day. The teachers' employers expect that their CK should be higher than this if they are to have a better command of the teaching of mathematics, especially in upper primary school grades. The teachers' test had nine items borrowed from the students' mathematics test. Despite the low performance in CK, teachers scored a mean of 62% compared to a P6 students' mean of 25% on the nine items borrowed from the P6 mathematics test. However, 18 of the 156 teachers who sat for the teachers' test scored not more than 25% in the nine items—the majority of them being P3 teachers.

The items testing pedagogical knowledge (PK) were the most poorly done across all subgroups, with an average of about 30% for each of the subgroups in Table 4.7. Teachers in our study had low knowledge of how to teach and this may inhibit instructional delivery and/or present a barrier to student learning. The poor demonstration of mastery of PK may be a reflection of shortcomings in the teacher support and training systems—the literature shows that PK is mainly acquired through training or experience (Ball, 2000). Performance in PCK was between 32% and 40% and showed no major differences between any comparable subgroups—districts, grades or school type. According to Rowan et al. (2001), PCK requires a teacher to be well versed in CK, to understand how students think, and to be aware of alternative pedagogical strategies. Skills in the latter areas are mainly acquired through training.

4.5 Association between teacher characteristics and teacher mathematics mean scores

To understand teacher's mathematics mean scores in more details, we examined the association between these scores and teacher sex, age, level of academic qualifications, training and experience while controlling for grade and school type. This was 5.1 and 11.0 percentage points lower in public and private schools, respectively. We also found statistically significant (p=0.05) differences in mean scores by teachers' level of training, especially among P6 teachers. We did not find any statistically significant difference by age, level of academic qualification or years of teaching experience. Further analysis showed that in P3, teachers' mathematics mean scores was a strong predictor (the students' score significantly increased by 0.22 of a standard deviation) of students' mathematics scores; this was not the case in P6.

To explore the association between students' mean scores and teacher characteristics, we examined years of teaching experience and students' mean scores in various assessments (see

Appendix 4B). In P3, students' mean scores generally decline with teacher years of teaching. This is true for English, mother tongue (Lusoga) and mathematics. In P6, after removing outliers (the very few teachers who had taught for more than 30 years), we found a similar pattern to that observed among P3 teachers. What is emerging from these observations is that teacher years of teaching, a measure of experience, did not enhance learning. In fact, recently employed teachers had among the highest mean scores.

4.6 Summary of the key findings

- The proportion of teachers (slightly over 10%) who had a primary or junior secondary (S2) level of education was low (about 10%); this raises concerns about their ability to master and deliver primary school curriculum.
- On average, teachers taught 11 lessons a week, an equivalent of 6.4 hours a week, 1.3 hours a day or 256 hours in a 40-week school year, and this did not differ by school type. In Uganda, teachers are supposed to teach for at least 6 hours a day or 30 hours a week.
- Almost all teachers in public schools were trained in teaching, while at least 88% of those in private schools had been trained.
- More than three quarters of both mathematics and English P3 and P6 teachers felt that they were adequately or very adequately prepared to teach these subjects.
- Head teacher and deputy head teacher classroom support was evidenced; a third of the teachers indicated that their seniors observe them while teaching a lesson. Thereafter a feedback session is provided.
- Parent-teacher interactions were fairly good with about 60% of teachers indicating that parents come to school at least twice a term to discuss academic performance though, in some schools, parent involvement was cited as a challenge.
- Overall, teachers in public schools had a slightly higher mastery of the mathematics content (42%) and pedagogy than their counterparts (38%) in private schools.
- In public schools, teachers who predominantly used teacher-centered styles had higher mean scores (48%) in a teacher test—an indication that they had a better mastery of content, hence, they would "tell it all" to their students.
- In both public and private schools, P3 teachers had lower mean scores (36%) than the P6 teachers (44%)—an indication that head teachers may be assigning the weak teachers to the lower grades.
- In the teachers' test, items on pedagogical knowledge (how to teach) were the most poorly performed, with a mean of 30%. This may inhibit instructional delivery and/or present a barrier to student learning.
- Teacher years of teaching, a measure of experience, did not enhance learning—the more the years of teaching, the lower the students' test scores. Furthermore, recently employed teachers had among the highest teachers' test scores.

- Regardless of the grade, we found that teacher-led classroom activities and recitation were the dominant teaching approaches for mathematics and English, respectively.
- From the observation of P3 lessons in public schools, there was no single style that took most of the lesson time in mathematics or English. However, in private schools, most of the lesson time was spent using individual seatwork as an instructional delivery approach.
- In P6 lessons, there was a consistent use of recitation in the English lessons across public and private schools, and the proportion of lesson time spent using this activity was almost the same.
- The pattern in the proportion of time spent on active teaching activities was similar in both mathematics and English.
- Four activities took up most of the active teaching time and these were "teacher checking work (individual working)", "individual learner (teacher asks)", "whole class task instructions (teacher only)" and " whole class demonstrations (teacher only)".
- "Whole class demonstrations" was utilized in more than half of the mathematics active lesson time and in at least 40% of the English active lesson time.
- In most of the active time during a lesson, teachers used the command style where they took control of the class and were talking most of the time.
- Teachers, regardless of the grade they were teaching, applied similar styles. One would have expected this to vary by grade, given the age differences of students in P3 and P6, but this was not the case.
- Teaching styles were heavily teacher-centered and reproductive styles that may not develop critical thinking among learners.
- Between 34% and 47% of lesson time was spent on activities that do not directly enhance learning, for example, transitioning from one activity to another.

5. Perceptions of Parents and Teachers Regarding Learning Barriers That Affect Learning

This chapter focuses on the perceptions of parents and teachers with regard to the schooling decisions and barriers that affect learning—individual, home, and school. It highlights parents and teachers' narratives with regard to why parents send their children to particular schools, whether public or private, and the barriers that affect children in the respective schools. The narratives are derived from the FGDs, which were separately done with parents and teachers—in both government and private schools—whose characteristics are shown in Table 5.1 and Table 5.2, respectively. The narratives focused on the following: reasons for sending the children either to private schools or to public schools, barriers that affect learning (individual, school, and home), and ways of mitigating the barriers that affect learning. The narrations were analytically organized to create a dichotomy of perspectives of parents who represented children who are attending either public or private schools, and teachers teaching children in the public or private schools. In this way it was possible to highlight the views and perception of parents and teachers affiliated with either public or private schools.

Table 5.1 → Characteristics of the parents' FGD

	Participants		Government school				Private school		
	Count	%	Mayuge		Iganga		Iganga		Mayuge
Sex of participant									
Male	22	46%	6	55%	5	50%	7	54%	4	29%
Female	26	54%	5	45%	5	50%	6	46%	10	71%
Total	48	100%	11	100%	10	100%	13	100%	14	100%
Grade of child									
P3	23	48%	6	55%	5	50%	6	46%	6	43%
P6	25	52%	5	45%	5	50%	7	54%	8	57%

Table 5.2 → Characteristics of the teachers' FGD

	Participants		Government school				Private school			
	Count	%	Mayuge		Iganga		Iganga		Mayuge	
i) Sex of respondent										
Male	17	53%	5	45%	5	42%	7	78%	0	0%
Female	15	47%	6	55%	7	58%	2	22%	0	0%
Total	32	100%	11	100%	12	100%	9	100%	0	0%
ii) Respondents' level of education										
Commercial college	20	63%	9	82%	6	50%	5	56%	0	0%
Middle-level college	7	22%	0	0%	4	33%	3	33%	0	0%
Undergraduate	4	13%	1	9%	2	17%	1	11%	0	0%
Postgraduate	1	3%	1	9%	0	0%	0	0%	0	0%
iii) Grade currently teaching										
P3	11	34%	3	27%	4	33%	4	44%	0	0%
P6	7	22%	2	18%	4	33%	1	11%	0	0%
Both P3 & P6	14	44%	6	55%	4	33%	4	44%	0	0%

5.1 Reasons why children attend either private or public schools

Cost of schooling

Both parents and teachers who were affiliated with the public school system were unanimous that cost was one of the reasons why parents would keep children in the public school system in Uganda or move the children from private schools. Parents explained that private schools were costly and they were not able to afford to send their children to them. Teachers in the public schools could not have agreed more with the parental perceptions. They were of the opinion that the lower cost of public schools led parents to keep their children in public schools. A parent in a mixed FGD, while explaining why they keep their children in a public school, said, "private schools are very expensive and some schools are very far from us, that's why we resort to government cheap schools."

However, scores of parents and teachers who were affiliated with private schools in Iganga Mayuge in Uganda rallied around three main reasons why, in their opinion, a considerable number of children would continue to attend the private schools. These reasons were: quality of teaching and learning, which included better teaching, commitment of teachers in private

schools and performance of private schools; fewer children in private school classrooms than in public schools; and shorter distances to private schools.

Quality of teaching and learning

Parents and teachers who were affiliated with private schools were of the opinion that one main reason why parents would keep their children in private schools is that, in their opinion, the teaching was better than and different from what they observed in the public schools. A male parent affiliated with a private school explained it in this way:

> What leads us to bring our children to these private schools is that the teaching differs. We want to create a difference because there is no teaching or learning in government schools, so we yearn for quality education which is in private schools … The standards of urban private schools is better in that you cannot compare my child in P3 with another child in P5 of a rural government school … (Mixed FGD, Parents, Iganga, 12072014)

Moreover, the teachers representing private schools pointed out that the commitment of teachers in the private schools led to the better performance of children in these schools, thereby attracting more parents to the private schools. This goes to show that the good reputation of a school is often linked to its performance in the national exams. Teachers felt that parents also judged their commitment to teaching by how their schools performed. A teacher affiliated to a private school had this to say while representing the views of private school teachers:

> … to me, the reason why parents send their children to this school is that the school … is a private school; the performance in our school is good. So, when they hear how children performed the previous year … at the end their child too will make it … They also have a feeling that teachers in the school teach under all conditions, whether paid or not. They do the work equally, and because of that, they call it a performing school … Their children should go through that school—because it is one of the best day schools in the whole district, if not the best, then the second. It is the best at the end of the year. So, those are some of the factors why parents send their children to this school … (Mixed FGD, Teachers, Iganga, 19072014)

Number of children in classrooms

Parents and teachers who were affiliated with private schools were of the opinion that in private schools there were fewer children per classroom and therefore, teachers could teach better and pay attention to all the children in the process of teaching and learning. Teachers intimated that a smaller class allowed them to teach well and attend individually to the children. This implies that the quality of teaching and learning is dependent on the number of students in the classroom and, moreover, that a crowded class is not beneficial for children. An overcrowded class makes the children uncomfortable and therefore impairs learning. This is what a female teacher attending an FGD of teachers affiliated with a private school explained

about the teachers' plight when faced with a large number of students in the class:

> Then the other thing is concerning the seating facilities ... when you have a large number of students and there are inadequate seats, there is no way that children can sit on the few seats and be comfortable. (Mixed FGD, Teachers, Iganga, 19072014).

The parents who were affiliated with private schools also emphasized that the number of students in a class determined how well a teacher would teach. They were of the opinion that an increased number of children in a class reduced the chances of children learning well. The parents explained that the reason why they would not consider public schools is because in these schools the numbers were high in the classrooms; hence slow learners would be left behind. According to the parents, teachers were not able to move along with each child's pace as they taught. When some children are left behind in the process of teaching and learning, it negates the essence of the free primary education spirit and contravenes the rights of all children to free basic education. A male parent in a mixed parental FGD explained the concerns of these parents in this manner:

> There are private and government schools. You find a large number of students in government schools. In the class still you find slow learners, but you find slow learners left behind because of the bigger numbers of students. That is why most people tend to take their children to private schools where students get better education. (Mixed FGD, Parents, Iganga, 12072014)

Shorter distances to private schools

Parents who were affiliated with private schools were also of the opinion that shorter distances to private schools were a reason why parents chose to send their children to private schools. They argued that it was easier for parents to send children to schools that were much nearer their residences than to those that were farther off. A parent affiliated with a private school said, in relation to distance as one of the main reasons why they kept their children in private schools, "... the reason for me bringing her [referring to child] here is that it is a shorter distance from home to school ... They are served with food, hence studying with a settled mind ..." (Mixed FGD, Parents, Private School, Mayuge, 12072014)

Teachers who were affiliated to public schools also confirmed the opinion of the parents associated with private schools that distances to the schools determined where children were sent to school. For these teachers, sending children to a school nearby was also associated with the preference that parents had for schools that were within the vicinity of their homes and communities. A female parent affiliated with a public school explained what motivated them to send their children to schools that were near their homes:

> Most of the children of this school come from around our school. It is one of the nearby schools they choose to bring their children to. This depends on the locality of our school. It is church founded school, so it is a traditional school among the schools around. So,

parents think their children should go through this school and they have it that it is a blessed school. Whoever goes through this school is blessed. It is the feeling they have, they have the school at heart. It is the best among the day schools around ... (Mixed FGD, Teachers, Iganga, 19072014).

5.2 Perceptions of parents and teachers about barriers to learning

This section will detail the parental and teacher views in regard to barriers to learning among children attending schools in the IMHDSS. First we will present participants' views with regard to individual-level barriers to learning. Secondly we will detail parents' perception of home-level barriers and thereafter with school-level barriers to learning. Lastly we will discuss some of the mitigating factors for these barriers to learning.

Individual-level barriers

Individual-level barriers are those barriers that are inherent in the individual child. Some of the characteristics highlighted in the literature that may deter a child from attending, learning and completing school include the child's gender, age, cognitive skills, nutritional and health status, and peer influence (Aloise-Young, Cruickshank, & Chavez, 2002; Hunt, 2008; Lloyd, Mensch, & Clark, 2000). Different reasons were given by teachers and parents in regard to individual barriers. The parents affiliated with public schools were of the opinion that children were easily sidetracked into cinemas, while parents affiliated with private schools asserted that fear of teachers and ailments that stop children from attending school were the main individual barriers. Teachers who were affiliated with public schools were of the opinion that the main factor that could derail learning was the age of the child. The older the child attending primary school, the greater the likelihood that they would be lured away by distractions in their environment. For instance, older children, particularly girls, were often lured away by "boda-boda" operators in the area of the study.

Lure of cinema halls

The parents' opinion was that children who were not sufficiently motivated to attend school found themselves easily enticed by the cinema halls during school time. These children would not have attended any lesson in school, but would reappear home as if they had been in school. A female parent, while representing the views of parents affiliated with public schools in Mayuge, explained it in this way:

What has led children not to bother to learn are the cinema halls. You may tell children to go to school but they do not go to school, though they leave home claiming that they are going to schools; instead they end up in cinema halls. They keep narrating action movies, Nigerian movies. As time for coming back home nears, they put their books smartly as if they are from schools and yet they are from cinema halls. If you try to counsel and guide the child, he or she uses obscene words. They get them from pornographic films. Children nowadays mature at an early age, hence hindering learning ... (Mixed FGD, Parents, Mayuge, 12072014)

Fear of teachers

Parents were also of the opinion that when children feared their teachers, they were not able to learn effectively. Fear was attributed to children's lack of self-confidence. Therefore, for children to learn, their self-confidence has to be boosted. A male parent affiliated to a private school said, "what hinders our children learning is lack of self-confidence. Children fear teachers, and others, not so teachers should build self confidence in learners..." (Mixed FGD, Parents, Private School, Iganga, 12072014)

Ailments that prevent children attending school

Research evidence suggests a causal relationship between health and education, which could result from childhood experiences. The body of evidence suggests that children who exhibit poor health will more likely obtain less schooling and consequently be more likely to be unhealthy adults in future. Moreover, older children who were sick or malnourished as young children are more likely to miss school, less likely to learn while in school, and ultimately accrue fewer years of schooling (Case, Fertig, & Paxson, 2005). Then again, children who are prone to sickness are also more likely to become sick adults (Case, Lubotsky, & Paxson, 2002). It is on this basis of evidence linking health to children's schooling that Miguel and Kremer (2004) demonstrated that providing children with drugs for deworming increases years of schooling in Kenya.

With respect to this study, parents expressed concern that children constantly suffered from ailments which then impaired their ability to attend school. In the eventuality that they attended school, they might not be able to learn effectively. The perspective of the parents is in tandem with the body of evidence that has accrued over time in relation to the link between education and heath among schoolgoing children. A female parent affiliated with private schools explained:

> My child has a persistent headache, which normally starts during examination times, leading to her poor performance ... My child is ever worried; he is in an extended family. That lets him not to concentrate. His school fees is not readily available. He feeds poorly. I, alone, cannot handle him. Thank you for listening ... Sometimes diseases affect children, for example, my child has retinal problems hence she loses concentration ... (Mixed FGD, Parents, Mayuge, 12072014)

Age of children

Research evidence suggests that the age of a child is important for school entry and school dropout (Lloyd et al., 2000). Moreover, children who start school late tend to have fewer years of schooling, on average, than those who enter school early. Furthermore, those who are at the right age for their grade perform better academically (Hungi, Ngware & Abuya, 2014). The narratives from the teachers affiliated to public schools suggest that age was an important individual barrier to learning. They observed that this was particularly true for girls who are older and are easily lured by the "boda-boda" operators in the Iganga and Mayuge study sites.

This is what a teacher affiliated with a public school in a mixed FGD said:

> ... we have big children. These big children, as they move long distances to school, they are interfered with and interrupted by boda-boda who may love to sugar daddy them. If the child is not persistent she may end up being a dropout caused by the boda-boda ... (Mixed FGD, Teachers, Iganga, 19072014)

5.3 Home-based barriers that affect learning

Home-related barriers that affect learning are those barriers present in the home that affect the learning of children. Research evidence shows that the main home characteristics that impact on school completion rates are the size of the household, parental education, household income and assets (Chimombo et al., 2000; Guryan, 2004; Hanushek, Lavy, & Hitomi, 2006). The level of wealth in a household determines the ability of a family to invest in the child's education (Connelly & Zheng, 2003; Guryan, 2004). The likelihood a child not continuing with school is dependent on the opportunity cost for the family of the index child being in school. For instance, if the opportunity cost of a child being in school is high for a particular family, the chances of that child dropping out of school are higher (Chimombo et al., 2000). According to (Hunt (2008), children from better-off families are more likely to stay in school than those from poor households. In addition, children from poor households may never attend school and, if they attend, they are less likely to learn, and the chances of dropping out remain high. Moreover, older children from poorer backgrounds are often under pressure to withdraw from school due to the increased opportunity cost of their time.

Parents and teachers alike were concerned about the numerous home-based barriers to learning in Iganga and Mayuge districts. In the perception of parents and teachers, the home-based barriers included child labor, inadequate parental support for children (parents do not take care of and are not connected to their children; parents are not interested in their children's education; parents do not readily provide basic learning materials for the children, such as pencils, erasers and rulers), poverty and a host of family issues, including broken families and sick parents.

Child labor

Child labor was one of the home hindrances to learning that was put forward by both parents and teachers affiliated with public and private schools. The parents and teachers advanced the notion that children who were engaged in any form of child labor, whether domestic or for the generation of income, were not able to concentrate in school. Furthermore, some of these children did not even reach school after leaving home because of the lure of earning money, particularly in the sugarcane plantations. A male parent attending an FGD affiliated with a public school had this to say:

> ... a girl child is the mother and for boys they are the fathers in a family. Boys turn into sugarcane shamba-boys in search for food, sugar and other basic needs for their families,

> and parents become happy because they are relieved with the burden of taking care of the family. When this continues the child misses school for months, hence performs poorly at the end of the term. There are so many reasons hindering a child's learning but because of time let me end here ... (Mixed FGD, Parents, Mayuge, 12072014)

Child labor was not just about children earning money for their respective families. In the opinion of the teachers, there was a nexus between the family's need for money earned by the child and the head of the household's literacy level and the value they attach to education. For instance, some of these parents would weigh the cost of sending a child to school against the amount that would accrue to the family as a result of the child working and opt for the latter. The teachers were of the opinion that the parents who preferred their children to earn money were those that attached a low value to education. A female teacher who was affiliated with a private school explained the phenomenon in this way:

> Maybe to add on the uneducated parents, some parents are not educated, and are earning big sums of money. So in this situation, you find the child demands to go to school and a parent might answer ... I didn't learn, am I not getting money? Some parents take their children to work for the family, hence child labor discouraging the child from coming to school. They imagine leaving the five thousand shillings and a child goes to school, is a loss. (Mixed FGD, Teachers, Iganga, 19072014)

Inadequate parental support of children

Instances of inadequate parental support of children referred to in this study included parents not interested in their children's education, parents not taking care of their children and not being connected to their children, and parents not providing learning materials for their children. Research evidence continues to show that higher levels of parental involvement with the learning of their children has a positive impact on the child's school performance (Fan & Chen, 2001; Hill & Taylor, 2004; Miedel & Reynolds, 1999) and this is accurate for children in both primary and secondary schools (Feinstein & Symons, 1999). Parental involvement with children has been found to lead to improved academic achievement, superior cognitive competency, improved skills in problem solving, improved school attendance, better school enjoyment and fewer behavioral problems in school (Melhuish, Sylva, Sammons, Siraj-Blatchford, & Taggart, 2001). The parental and teacher narratives pointed to inadequate parental support for children's schoolwork as a barrier to learning.

Parental involvement in children's education

According to the narratives of parents, schools were doing the best that they could to enable children to learn. However, parents were not following up on their children's performance in school. Some of the parents waited up to one year before they went to the schools that their children attended. It was the feeling of some parents that non-involvement was greater when parents resided farther away from the schools. The end result was that the children who came from far off stayed in rented accommodation, with no one to monitor their behavior

and ascertain whether they are going to school. Consequently, these children did not attend school regularly. A parent who attended an FGD and affiliated with a private school had this to say:

> In private schools, there is teaching but the parents do not follow up their children's performance but the parent spends the whole year minus coming to school. Then there are parents who come from very far like those coming from Mayuge who have an interest in this school but cannot afford the payment of the boarding fees. So, tend to rent out houses for their children. But, these children go out with other people to make money. So, children have bags where they put clothes and as she reaches on the way, removes the uniform and puts on the leisure clothes so I do not know. (Mixed FGD, Parents, Iganga, 12072014)

There was a connection between this lack of interest in children's schooling and the engagement of such children in various forms of income-generating activities. Parents who were not interested in their children's education encouraged their children to engage in forms of income generation that ranged from selling goods in the market and picking scrap metal to working in the sugar cane plantations. The end result was that children missed school for a certain number of days in a given school week. This jeopardized the ability of these children to learn effectively. This is how a male parent affiliated to a private school explained the linkage between parental interest in education and children's engagement in income-generating activities.

> According to what I have seen, some parents use the children to take goods to town to sell. Parents do not want to miss any opportunity to get money. So, a child misses like three days in week, or some time a child goes to school this week, and does not go the following week … Some parents tend to send their children to scrap-picking materials with sacks taking them for sale. Then in villages, you find children in sugar cane plantations very busy cutting … and it is the parents who send them. Then there I was near the beach, children go fishing and do not go to school. For children in government schools reach at ten o'clock and leave earlier … [emphasis added]. (Mixed FGD, Parents, Iganga, 12072014)

Parents did not take care of their children and were not connected to their children

From the narratives of parents, it was also clear that parents did not take care of their children. Taking care was related to the general cleanliness and health of their respective children. Those children who were not being provided with clothes were often ill dressed for school. Such children felt isolated from the rest of the class and hence they could not concentrate well. Those children who were often sick and whose parents did not pay attention were also seldom in school and when in school they were not able to concentrate. In an FGD among parents who are affiliated with public schools a parent said:

> But challenges are on us parents; children are poorly taken care of. Some of the children are poorly dressed in the sense that some have clothes and other others do not. Hence they

are isolated by others, and finally this affects his or her performance in school. (Male Parent, Public School, Iganga, 12072014).

Moreover, some children come to school dirty. Cleanliness influences the health of children and the ability of children to learn. Cleanliness is the prerogative of the parents in the household and yet the parents blamed teachers for not ensuring that their children are clean. Some parents transferred their responsibilities to the teachers—exposing the burden that teachers often carry when parents abdicate their duties and expect that these should be performed by teachers at school. This is what a parent affiliated to a public school said in relation to cleanliness as a barrier affecting children in the respective schools:

Even cleanliness is a major barrier. Teachers do not bother to check on the cleanliness of the children. You find them with very long fingernails, jiggers and most of them are very dirty. A child with jiggers has no ability to pick up content. So my appeal to teachers is that you help us ... (Male Parent, Public School, Mayuge, 12072014).

Lack of learning materials

Teachers' narratives suggested that parents did not provide the learning materials needed by their children to be effective students. Children went to school without exercise books, pens or pencils, which are basic requirements for school. When parents do not provide learning materials they fail, on their part as parents, to support the effective learning of their children when they are in school. This is what a male teacher who is affiliated with a public school had to say about the lack of scholastic materials, "... next is that there is inadequate support from our parents, that you find children without enough stationary, with two books, two books, three books, which do not help ..." (Mixed FGD, Teachers, Iganga, 19072014)

Poverty

Poverty was enumerated as one of the barriers that hindered the learning of children in Iganga-Mayuge. Poverty among households manifested itself in terms of parents not having enough income to enroll and keep their children in school. Therefore, parents were in many cases not able to afford to keep children in school, resulting in intermittent attendance of school by children. A female teacher attending a mixed FGD and affiliated to a public school said, "one of the barriers that can affect the ability of a child to learn is poverty. Many parents love their children but don't have what is enough to send them to school ..." Moreover, teachers noted that if parents did not have enough resources to keep their children in school, it was unsurprising that they might not buy the learning materials their children needed for school. In the description of the teachers, poverty was brought about by the climatic conditions that lead to inadequate food supply from the farms. Coupled with this, parents might also not have adequate money to buy food for their children. Such children came to school having not eaten enough; hence, cannot concentrate in class. A female teacher affiliated to a public school explains:

> Then we have famine or hunger ... brought about by ... climatic conditions. Sometimes due to lack of enough money to buy food for the whole family, and sometimes due to lack of enough land for the parents to grow more food, enough for the children ... Children end up going without lunch or supper and come to school with empty stomachs ... (Mixed FGD, Teachers, Iganga, 19072014)

Host of family issues

From the narratives of teachers it was highlighted that children were exposed to a host of family-related issues that hindered their learning. These issues included harassment by stepparents of children living with the stepparents. Teachers noticed that such children did not concentrate in class. A female teacher affiliated to a public school explained:

> ... then harassment by step parents or guardians. Sometimes parents or guardians are very harsh and this harassment causes fear to the children ... You will teach a child who is full of fear. He is in class but thinking how to go home. What type of parent will he find? You teach but he thinks of what happened to him yesterday (Mixed FGD, Teachers, Iganga, 19072014)

In addition, other family-related issues pertained to cultural practices within the respective families that prohibited children from attending school. Other family-related issues might be related to the the household living arrangements of children. For instance, living with sick parents or divorced parents hindered the ability of children to concentrate in school. A teacher affiliated to a private school remarked:

> Cultural practices—some people practice cultural norms. The norms sometimes demand for a child not to go to school. Jealousy of stepmothers as they hope the other family will not prosper ... sick parents. Some children come from home when parents are sick ... As they come to school they still think what happened, hence affecting their learning. Broken families, when children stay with divorced parents. These are children who run away from school to look for money to feed ... (Mixed FGD, Teachers, Iganga, 19072014)

5.4 School-based barriers to schooling

Research evidence suggests that there are several school factors that may predispose children to poor learning outcomes and therefore increase the children's vulnerability to dropping out of school. These factors include distance to school, quality of teaching instruction in schools, and costs incurred by households in keeping their children in schools, particularly if the school is not perceived to be of good quality. For instance, if a school is perceived to be of poor quality and is not providing the children with the necessary skills, households may decide not to invest in their children's education. Therefore, poor school quality may discourage households from educating their children and instead prefer that children be engaged in income-generating activities (Chimombo et al., 2000). According to Lee and Burkam (2003), in schools where there is a positive relationship between teachers and students, dropout rates are low. Hanushek et al. (2006) argue that students attending higher-quality schools tend to

stay in school longer and complete higher grades. These factors that have been described by scholars in previous research were identified in the narratives of teachers and parents in Iganga and Mayuge. Teachers particularly identified with the school-related factors that impaired their ability to be able to teach effectively.

Distance to school

The teachers particularly highlighted the impact of the distances to school on teaching and learning. Teachers were of the opinion that distance affected the ability of teachers to teach and that it also affected the ability of students to internalize what they were taught. This was because teachers and students got to school already tired from walking or cycling long distances. A male teacher affiliated with a public school observed:

> ... About long distances moved by the students: It is true and most schools lack staff quarters for teachers, so it affects both students and teachers. Some students and teachers ride bicycles for over ten to twenty kilometers to school. By the time they reach school, they are already tired and hungry [emphasis added]. The solution would be the construction of schools, like, per village to reduce on distances and to construct houses for teachers ... (Mixed FGD, Teachers, Mayuge, 19072014)

Parent and teacher relationships

Research evidence underscores the importance of parents' involvement with their children's schooling (Hill & Taylor, 2004) When parents are involved with school personnel there is a positive interaction between the parents and teachers, thereby encouraging learning. This is particularly true because increased parental involvement increases social capital (Hill & Taylor, 2004; Putnam, 2000). Enhanced parent and school interaction improves parents' skills and acquisition of information, which leads to better assistance to students for school-related activities from their parents (Hill & Taylor, 2004). Parents are informed about the school's expectation of students, in terms of behavior and homework, and how to assist their children with homework and enhance children's learning at home, as they continuously relate with the school personnel (Lareau, 1996), and form a positive working relationship with the teachers. When parents interact with school personnel and other parents, they obtain avenues to meet other parents who will add to their knowledge of school policies, practices and extra-curricular activities (Hill & Taylor, 2004). Moreover, parents who become involved in their children's learning by interacting with the teachers learn three important aspects of their children's learning: which teachers are good, difficult situations that exist and how they have been managed, and the parental expectations of their children's teachers (Hill & Taylor, 2004). Other scholars argue that, when parents are involved and have a positive attitude towards their children's teachers, they develop multifaceted strategies for working with children and the schools that they attend to promote their achievement (Stevenson & Baker, 1987).

The second mechanism through which parental involvement affects student's learning is social control (Hill & Taylor, 2004). This refers to the building of consensus between families

and schools about the suitable behavior that can be effectively communicated to children, at school and at home (McNeal, 1999). In addition, when parents in a school system know each other, they tend to develop a consensus on goals—both academic and behavioral—which serves as an inhibiting factor against problem behaviors.

The narratives of teachers from Iganga and Mayuge showed that in some instances, parents and teachers had a poor relationship. Parents did not follow up with the children after they had enrolled the children in school. Parents were not aware how the children performed in school. Therefore teachers neither knew where the children came from, nor who their parents were. This created a gap between parents and teachers, leading to poor performance, which, prevented a fulfilling learning experience for the children. A male teacher who was affiliated with a private school described the relationship between parents and teachers in some schools in Iganga in this manner:

> Poor parent-teacher-student relationship: There are some parents who just bring their children to school and bring them for teachers only. They cannot follow up whether they are performing well or have any problem at school; they just leave them there. And some teachers do not know where children come from, so if the parent does not come, he creates a gap and the child will not be helped well. (Mixed FGD, Teachers, Iganga, 19072014)

Overcrowding of classes

Overcrowding of classes was also an important school-based barrier to children's learning. This was mentioned by parents, and was particularly a problem in the public schools. Parents complained that a large number of students in class made it impossible for teachers to teach effectively. The only students who benefitted were those who were seated in the front of the classes, where the teachers could see them. A male parent affiliated with a public school explained:

> Large numbers of students in one class, hence, inability of the teachers to teach effectively. Teachers tend to do more with students that seat at the front and the back benchers are left out. (Mixed FGD, Parents, Iganga, 12072014)

Poor-quality education in government schools

Parents felt that the quality of education in the public schools was poor. This could be the reason why parents chose to send their children to private schools, as observed earlier in this chapter. It was noted earlier that parents chose to send their children to private schools because of the quality of teaching and learning, as well as the commitment of teachers in the private schools. On the contrary, the standard of public schools is thought to have declined and it is felt that teachers generally do not care enough and have no commitment to the process of teaching and learning. A male parent affiliated with a public school explained:

> Secondly, teachers have neglected our children. Me, I studied from this school: Mbaale primary school. Teachers by then were strict on time management. By then, students could

> all be at school by 7:30 am but nowadays you find a student coming to school past 9:00 am. Teachers are not helping us; students leave our home early morning but do not care because teachers do not care too ... Next is the low standard of our schools. Our school has declined beyond the previous standards ... (Mixed FGD, Parents, Mayuge, 12072014)

In addition to those barriers that hindered learning that were similar to those identified in the literature, other school-related barriers were enumerated by both parents and teachers. These barriers included the language barrier, differential teaching of day scholars and boarders, delays in payment of teacher salaries, which demotivated teachers, and incompetent teachers.

The language barrier in Ugandan classrooms

Uganda has in place a language education policy, which promotes the teaching of local languages in the first four years of schooling (Tembe & Norton, 2008). According to Tembe and Norton (2008), the use of local languages in the local Ugandan schools promotes identity and cultural maintenance, but one concern remains—that is, how to ensure Ugandan children's upward mobility and fulfil the desire to be part of wider and more international communities. Moreover, while the use of languages such as Luganda and Kiswahili are seen to have benefits in communicating with wider communities, English is still seen as the language that has a more global reach. Tembe and Norton (2008) posit that although many communities in Uganda are aware of the new local-language policy, they continue to be uncertain about its implementation in schools.

The language policy seemed to be a barrier to teaching and learning in Ugandan schools. Teachers explained that the policy of teaching in local languages disadvantaged children who spoke a different language from that commonly used in the school locale. Such children were not able to learn what the teachers in their respective classes were teaching. A female teacher affiliated with a government school said, "... the government policy of teaching in local language has brought about language barrier ... you teach students of different tribes; the Basoga do not understand Teso and vice versa ...." (Mixed FGD Teachers Mayuge, 19072014)

Moreover, use of the local language hindered the children's ability to write exams set in English for subjects other than English language. Since the subjects, particularly in lower grades, had been taught in mother tongue, some of the students found it hard to translate concepts into English during exam time. A female teacher affiliated with a public school expressed her opinion in this way:

> There is this issue of language translation. You find that ... English is taught in English and the rest of the subjects are taught in mother tongue. So, when it comes to exams, you find that exams are prepared in English, and children do the exams in English in literacy, numbers; yet they have been using their mother tongue in learning, and you find children failing exams ... (Mixed FGD, Teachers, Mayuge, 19072014)

The use of local language in Uganda was further complicated by the adoption of the thematic

curriculum in 2010. The thematic curriculum implemented in lower grades was taught in the local languages. There were some schools that implemented the thematic curriculum and taught in English. Differential implementation of the thematic curriculum and the adoption of the use of local language in some schools complicated the teachers' ability to effectively implement the thematic curriculum, as well as use the local language. A female teacher affiliated with a public school described the confusion caused by the use of the local languages and the adoption of the thematic curriculum:

> That there was a government policy to teach in vernacular but also with thematic curriculum. That all schools should teach from Primary One up to Primary Three in thematic, and all teachers were to use the local language to teach the strands ... I came this way in 2010 as a teacher from Namugongo site. When I came this way, I found the thematic curriculum continuing ... We were following thematic curriculum but we are teaching in English. They asked me for the class of interest, and I said Primary One, but I did not know Lusoga. I was sent to Primary Four. But in Primary Four, changing from Lusoga to English was a problem. We had meetings and agreed to teach using the thematic curriculum but in English. Now it is good because we have children in Primary Three, Primary Four and they can read, so we should change the teaching from vernacular to English as a language of discussion (Mixed FGD, Teachers, Mayuge, 19072014)

The language policy points to some of the inconsistencies between policy and the nemesis of implementation. This gap between what the policy stipulates on paper and its implementation often becomes a nightmare for the teachers who find themselves in the schools where the "rubber meets the road".

Differential teaching of day scholars and boarders

The parental narratives also showed that they perceived the differences in learning time between the day scholars and the boarders to be a learning barrier. Parents felt that boarders spent more time in school and the teachers were able to give them extra lessons, even at night, while day scholars left school at the end of the school day. This made it impossible for the day scholars to be at par with the boarders who were taught after school. A female parent affiliated to a private school described this phenomenon in this manner:

> ... We have two categories of children, the day scholars and the boarders. Boarders get extra lessons while day scholars do not. So, I do not know whether day scholars are taught what was taught to the boarders the previous night. So, children miss some concepts ... they are subjected to questions but when they fail, and you ask why the exam was failed, the answer can be it was taught to boarders in our absence ... (Mixed FGD, Parents, Iganga, 12072014)

Delay in payment of teachers' salaries

It was also revealed that delays in payment of teachers' salaries were a barrier to effective teaching and learning. Teachers could not afford their daily basics and this affected their

classroom teaching. In private schools, the money to pay teachers often came from school fees that were paid by the parents. When parents did not pay fees in good time, schools were not able to meet their obligation to pay teachers on time. A male parent affiliated to a private school while attending an FGD explained:

> The delay of payment of teachers' salaries as a result of delay in payment of school fees by parents leads to teachers demonstrating. These teachers in town do not have any gardens where they can get food. And most teachers cannot be supported by the shops around, because shopkeepers have it that they do not pay … I think late payment of school fees is also a great barrier to learning because the schools cannot run without money and the source of finances is fees … (Mixed FGD, Parents, Iganga, 12072014)

While the delay in teachers' salaries in the private schools might be a hindrance to effective teaching, school administrators also did not motivate teachers in their respective schools, even when the teachers performed well. A male teacher explained, "… the major problem is poor motivation. School administrators do not motivate teachers. Teachers lose appetite for learners when not motivated. Even when a child emerges the best and is not motivated, he or she will not be encouraged next time …" (Mixed FGD, Parents, Iganga, 12072014)

Incompetent teachers

From the teachers' narratives, and particularly the teachers in Iganga, incompetence of teachers was identified as one of the barriers impairing the ability of teachers to impart knowledge. Incompetent teachers did not possess and could not impart the knowledge that students required to learn effectively in the various classes. Therefore, teachers did not have the necessary pedagogical content knowledge in some of the subjects that they taught. Quantitative data reported in this study show that teachers scored a mean of less than 50% in the teachers' mathematics test assessing subject content and pedagogical knowledge. The end result was that children were exposed to different content from different teachers, depending on the mastery of content that each of the teachers possessed. A male teacher affiliated to a private school described the incompetence of teachers in this way:

> … There are some teachers who are not knowledgeable enough. So when they are not knowledgeable enough, they give wrong information to the children … children might have had the correct information but when they go to another school, they get wrong information and get perturbed. Teachers can use wrong articles like a female sheep … some teachers put article 'an' and yet it is supposed to be "a" and have wrong spellings and pronunciations … come the examination time students will write "an" … which is wrong … (Mixed FGD, Teachers, Iganga, 19072014)

Incompetence coupled with other challenges, like the delay of their salaries, meant that teachers were not motivated to teach their respective classes. Such teachers were often seen as unprepared for class, disorganized during their lessons, and the teachers who wielded a cane every time they were in class teaching. As such, they instilled fear in the children, who

ended up learning very little. A male teacher affiliated to a private school explained the lack of in-class teacher motivation in this manner:

> ... Lack of motivation in class, hence teachers bore the learners. Sometimes teachers of math are described as rough, a disorganized teacher, unready teacher. You find that when a teacher of math is without a stick he or she cannot teach. And students can nickname him/her Mr /Miss Harsh and no content will be understood by learners. Even teachers tell students to get good sticks, and this brings a negative attitude of learners towards learning ... (Mixed FGD, Teachers, Iganga, 19072014)

Moreover, some of these teachers do not follow what is in the schemes of work or what was supposed to be taught in the successive lessons. They teach the children without following a clear plan. In addition, the content was ill delivered to the learners and the teachers were not teaching for the stipulated number of minutes that was required for the various lessons. From the narratives of teachers in Iganga, teachers were not teaching the whole lesson time. Some of the lower class teachers were not able to teach math. A male teacher affiliated with a private school attending a mixed FGD said:

> This is to do with the schemes, lesson plans; we put aspects in the schemes but when teaching we leave whatever is schemed and lesson planned. Things to do with language skills, how are you delivering the content. You find a teacher's lesson plan of forty minutes but you find him teaching for either less than or more than ... Children become bored, and so you end up teaching yourself and not the learners. There will not be mastery of any point. Then there is an issue of lower teachers. They are given math but the way they are handling it, sometimes makes it hard for the learners. (Mixed FGD, Teachers, Iganga, 19072015)

Inadequate staff in schools

Finally, one of the major barriers identified in schools was inadequate staff numbers in the schools. This led to some of the classes in various schools not having adequate syllabus coverage as some classes remained unassigned to specific teachers for specific subjects. A male parent affiliated to a private school explained:

> There is a barrier of inadequate staff in some schools leading to failure of teachers to cover the syllabus ... you find teachers not as many as the subject, yet students have to be divided ... you find a teacher not allocated for that subject and hence, a child lacks the approach to the question ... (Mixed FGD, Teachers, Iganga, 19072014)

Despite this perception from parents, the quantitative data in this study show that teachers taught for about 6.4 hours in a school week as opposed to the 30 hours contained in the MoES guidelines. It might be the case that parents were ignorant of teacher workload and what they perceived as "inadequate staff" could actually pass for teacher absenteeism. However, quantitative data shows an STR of 42 in public schools and about 19 in private schools. It is unlikely that MoES education budget can afford an STR lower than what the study finds in public schools.

5.5 Potential mitigating strategies for the learning barriers

Parents and teachers proposed several ways in which the learning barriers that had been observed could be mitigated. From their narratives, some of the potential solutions included: recruit more teachers to reduce the teacher workload; sensitize parents on their role as parents in fostering the education of their children (this role should not be abdicated to teachers—they should provide learning materials to the children and forge a close working relationship with the teachers and other stakeholders); and improve infrastructure in schools to reduce overcrowding.

Recruiting more teachers

Parents affiliated to the public schools were of the opinion that more teachers should be recruited so as to reduce the number of students that one teacher is responsible for. More teachers joining the teaching force would enable the teachers to be able to offer individualized instruction to the children. A male parent attending an FGD and affiliated with a public school said this:

> ... also recruit more teachers, hence having more streams or groups per class, hence reducing the student-teacher ratio ... As a parent who has love for the school, I suggest that many teachers should be employed to reduce the teachers' work load. Let's say the student-teacher ratio should drop from ... one teacher to one hundred students to one teacher to thirty students. (FGD, Parents, Iganga, 1207014)

From the parents' opinions, it would appear that their major concern here was with STR and not the teaching load. Addressing the former would mean more teachers in school, but from the findings regarding the latter, most of the teachers would not teach, hence increasing inefficiency in teacher utilization.

Sensitize parents on their role in the success of their children's education

From the teachers and parental narratives, parents were seen as being a big part of the solution to the barriers deterring their children from learning. Parental narratives particularly from the government schools pointed out that when the government introduced free education into the schools in Iganga and Mayuge, some of the parents construed this to mean that the government was going to do everything for the children. Therefore, some parents had left their duty of providing the necessities for school to the government. The parents urged their fellow parents rather to take charge and buy the necessities for school. A male parent attending an FGD and affiliated with a public school said:

> ... but most parents are weak at buying books for children, weak at feeding their children since they think it is the role of the government to feed children, buy books and other necessities for a child ... let the government provide a forum of discussion between parents and the management committee so that they may let parents pay money for feeding their children instead of bringing the food by parents directly at schools ... (FGD, Parents, Iganga, 1207014)

Therefore, it was suggested that parents should provide learning materials to their children so that they could effectively learn. These learning materials included books, pencils and pens. In so doing, the children would be able to write when they were in school and they would also be able to do their homework. Parents affiliated with a government school explained:

> R2: ... still students should be provided with good uniforms to give confidence to children ... R6: Us parents should play our part of providing basic needs for example uniforms and other learning materials like books, pens, pencils and shoes [emphasis added] ... R7: The government will not do everything for the parents like buying books, uniforms, shoes, pens, pencils amongst others, yet we eat every day. Let us stop working for what to eat only. Let us be developmental. We should look for what to do in turn ... (FGD, Parents, Iganga, 12072014)

In order to solve some of the challenges affecting their children so that they could acquire primary school education, parents were urged to forge close working relationships with the teachers who teach their respective children, as well as other stakeholders. Parents affiliated with private schools suggested that parents need not leave everything about schooling of their children to teachers. They had a role to play in their children's education—whether their children were day scholars or boarders. This is what a male parent connected to a private school said in respect of how parents in private schools should forge closer working relationship with the teachers:

> ... we need to coordinate and not to leave everything to teachers. When there is no money for fees, follow up your child and talk to the concerned authorities, they understand because they are people like us. If a child is a day scholar, check their books regularly and if they are boarders, check their books when you visit them at school and then discuss with the teachers to help each other ... (FGD, Parents, Iganga, 12072014)

Closely connected to the forging of the relationship with teachers was the need for parents to work with other stakeholders around the schools who might be contributing in one way or the other to children not attending school. For instance, one of the challenges that had been cited earlier was that children were going to the cinema halls and not to school on school days. A parent affiliated to a public school explained how parents of children in public schools would want parents to work with stakeholders around the schools in order to ensure learning takes place:

> ... as I mentioned before, it is also a business whereby the owners of these cinema halls expect profit at the end of the day. So, parents should be responsible enough to make sure students are at school and to mobilize and sensitize them on the advantages and disadvantages of cinemas. I do not agree with closing cinema halls because it brings enmity between the parents and owners. Let the village leaders inspect the cinema halls during school hours to make sure no children escape schools to go to the cinemas. Let us talk about parents' absence when called for meetings at schools ... (FGD, Parents, Mayuge 1907014)

Improvement in infrastructure in schools

Teachers also felt that school infrastructure should be improved in order for students to be less crowded in class, which would enable teachers to be more effective in their teaching. The teachers felt that splitting the classes would bring down the student-teacher ratio. What perhaps they did not realize was that this needed to go with additional teaching personnel in the respective schools. A male teacher affiliated to a public school, while expressing how overcrowding in Ugandan classrooms had been a challenge to their teaching, said:

> By improving the infrastructure in schools, for example two rooms per respective class will reduce on the student-teacher ratio ... for example others have just only six class rooms for the whole school. As rooms are constructed, students are streamed or divided, hence reduction of student-teacher ratio ... (FGD, Teachers, Mayuge, 12072014)

5.6 Summary of key findings

- The poor quality of learning is still inherent in public schools and because of this, many parents in Uganda will continue to keep their children in private schools.
- Private schools are considered to offer superior learning, due to the commitment of teachers who ensure that their schools perform better.
- The schools cannot improve the quality of teaching without the support of the parents and households. This is because there are a lot of barriers originating in the households, including child labor, parents who are not supportive of their children's education and poverty.
- Parents need to play their part as key stakeholders in order for them to solve some of the problems that afflict the education of their children.

6. The Key Barriers to Student Achievement in Mathematics and English

This chapter reports on multilevel analyses that were carried out to identify what influenced learning outcomes among students in this study. A better understanding of what influences student achievement is essential to understanding the learning barriers in order to to improve the quality of education in the two districts. However, knowledge and understanding do little on their own; an important criterion is that educational policies in Uganda are informed by objective evidence. This chapter, therefore, sets out to provide useful and relevant evidence, which could be used by policymakers and planners to improve the quality of education.

The analyses reported in this chapter are based on the P6 data only. Similar analyses for P3 data were not considered because P3 students were not interviewed about their background information. This is because the P3 students were considered to be too young to give reliable responses to the interviews.

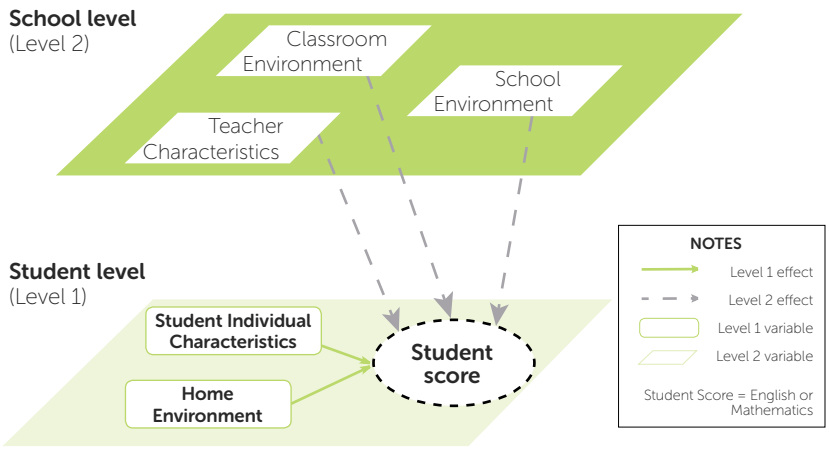
There are four main sections in this article. The first section describes the preliminary work undertaken before the multilevel analyses. The second section describes the multilevel analyses and their results. In the final two sections, the results of the multilevel analyses are interpreted and their implications to policy and practice presented.

6.1 Hypothesized multilevel model of student achievement

The outcome variables of interest in this chapter are P6 test scores (percentage) and these were derived from standardized English and mathematics tests as described in Chapter 3. The predictor variables examined in this chapter were collected using four main questionnaires; student, teacher, classroom observation and school.

Figure 6.1 shows the general two-level model that was hypothesized for factors influencing student achievement. This model was examined separately for English and mathematics data. The model is based on existing literature on student learning, especially the model of school learning (Carroll, 1963) and the model of effectiveness classrooms (Creemers, 1994).

Figure 6.1 → Hypothesized two-level model of student achievement



The hierarchical structure of the model shown in Figure 6.1 was students at level 1 and schools at level 2. Two categories of variables were hypothesized to directly influence achievement at the student level; namely, student individual characteristics (e.g. sex and age) and home environment (e.g., household wealth index, number of siblings and parents alive). Three categories of variables were hypothesized to directly influence achievement at the school level. These were teacher characteristics (e.g., sex, education and professional qualifications), classroom environment (e.g., class size, classroom resources, textbooks and homework), and school environment (e.g., school resources, type of school and school mother tongue use policy). A comprehensive list of all the predictor variables (and their details) in each of these categories has been presented in Appendix 6A. Over 108 different variables were examined in this study, 39 at the student level and 69 at the school level. An interesting aspect of this study is that teachers were assessed in mathematics. Teachers' overall scores from this assessment are used as predictors of student achievement in the mathematics model.

6.2 Multilevel analyses

The multilevel analyses were carried out using HLM6 (Raudenbush, 2005), following the logic employed by Raudenbush and Bryk (2002) in their descriptions of these types of models. Two multivariate data matrices (popularly known as MDM) files were built, one for English and the other for mathematics. All the predictor variables listed in Appendix 6A were examined in the multilevel models following the steps described in the next paragraphs.

The initial step in HLM analyses was to run null models in order to obtain the amounts of variance available to be explained at each level of the hierarchy (Bryk & Raudenbush, 1992). The null models contained only the dependent variables and no predictor variables were specified at the student and school levels.

The second step undertaken was to build up the student-level model and this involved adding student-level predictors to the model, but without entering predictors at the school-level. At this stage, a step-up approach (Bryk & Raudenbush, 1992) was followed to examine which of the student-level variables had a significant (at p£0.05) influence on the outcome variables. The next task involved adding school-level predictors to the model using the step-up strategy mentioned earlier. The level-2 exploratory analysis sub-routine available in HLM6 was employed for examining the potentially significant school-level predictors (as shown in the output) in successive HLM runs.

6.3 Multilevel results

The results of the final estimation of variance components for the final English and mathematics models and the results of the variance components obtained from the corresponding null models have been presented in Table 6.1 in rows "a" and "b" respectively. From the information in Table 6.1 rows "a" and "b", the information presented in rows "c" to "e" was calculated. A discussion of the calculations involved here is to be found in Raudenbush and Bryk (2002).

Estimates of fixed effects (also called path or regression coefficients) from the final multilevel models for English and mathematics have been given in Table 6.2.

Table 6.1 → Variance available and variance explained in the final multiple level models

	English			Mathematics		
	Student (N=2649)	School (N=82)	Total	Student (N=2662)	School (N=82)	Total
Null model	233.98	191.48	425.46	79.92	67.23	147.15
Final model	215.98	73.89		75.42	20.38	
Variance available	55.0%	45.0%		54.3%	45.7%	
Variance explained	7.7%	62.4%		5.6%	69.7%	
Total variance explained	4.2%	27.6%	32.2%	3.1%	31.8%	34.9%

At the student level, the results in Table 6.2 show that English achievement was directly influenced by eight variables—namely, student sex, student age, grade repetition, days absent, reading at home, mother education, hearing problems and parents alive. Five of these variables (student sex, student age, grade repetition, days absent and hearing problems) also had significant influences on mathematics achievement. In addition, four variables (pre-primary school attendance, homework given and corrected, meals per week and learning materials) had significant influences on mathematics achievement but not on English achievement. Surprisingly, the variable home possessions (Student SES) did not have significant effect on any of the two subjects even when this variable was added into the multilevel models as the only predictor.

Table 6.2 → Final results using multiple level models

Code	English				Mathematics						
	Metric SE	Std'zed	T	p	Metric	SE	Std'zed	t	p		
Grand mean	**(intercept)**	**25.081**	**4.277**		**5.865**	**0.000010**	**22.568**	**2.387**		**9.453**	**0.000010**
School feeding program	ZSFP	8.722	2.827	0.175	3.085	0.002838	3.516	1.412	0.120	2.489	0.015156
School location	ZSCHLOC	7.891	2.196	0.185	3.594	0.000576	4.332	1.073	0.173	4.037	0.000135
Teacher source of lighting	ZTLIGHT	2.051	0.725	0.133	2.829	0.005968	xx	xx	xx	xx	xx
Lesson plans	ZTLPLAN	4.220	1.910	0.103	2.210	0.030115	xx	xx	xx	xx	xx
Subject advisor visits	ZTADVISO	xx	xx	xx	xx	xx	1.566	0.423	0.159	3.705	0.000415

Code	English				Mathematics						
	Metric SE	Std'zed	T	p	Metric	SE	Std'zed	t	p		
Teacher distance to school	ZTDISTC	xx	xx	xx	xx	xx	-0.237	0.079	-0.116	-2.996	0.003765
Teacher from local district	ZTNATIVE	xx	xx	xx	xx	xx	2.850	1.022	0.118	2.788	0.006801
Lack of parental involvement	ZTPINVO	xx	xx	xx	xx	xx	-3.494	1.272	-0.133	-2.748	0.007596
Classroom resources	ZTCRES	xx	xx	xx	xx	xx	0.954	0.372	0.127	2.566	0.012399
Student progress records	ZTPROGRE	xx	xx	xx	xx	xx	2.665	0.947	0.111	2.815	0.006308
Mean learning materials	MPMAT	xx	xx	xx	xx	xx	1.775	0.704	0.122	2.521	0.013950
Student sex	ZPSEX	-2.985	0.550	-0.073	-5.428	0.000010	-1.544	0.389	-0.064	-3.966	0.000075
Student age	ZPAGE	-1.493	0.206	-0.104	-7.263	0.000010	-0.399	0.142	-0.047	-2.812	0.006174
Grade repetition	ZPREPEAT	-2.470	0.379	-0.105	-6.519	0.000010	-0.612	0.215	-0.044	-2.851	0.004392
Days absent	ZPABSENT	-1.128	0.285	-0.060	-3.963	0.000076	-0.846	0.184	-0.075	-4.591	0.000005
Reading at home	ZPHREAD	1.634	0.349	0.082	4.687	0.000003	xx	xx	xx	xx	xx
Mother education	ZPMOEDUC	0.405	0.199	0.036	2.040	0.041450	xx	xx	xx	xx	xx
Student hearing problem	ZPHEAR	-2.856	0.795	-0.043	-3.592	0.000334	-1.572	0.527	-0.040	-2.981	0.002899
Parents alive	ZPPALIVE	1.795	0.562	0.045	3.193	0.001425					
Pre-primary school attendance	ZPRESCH	xx	xx	xx	xx	xx	0.783	0.215	0.052	3.636	0.000282
Homework given and corrected	ZPHMWKMC	xx	xx	xx	xx	xx	1.263	0.352	0.074	3.590	0.000565
Meals per week	ZPMEAL	xx	xx	xx	xx	xx	0.158	0.044	0.065	3.627	0.000500
Learning materials	ZPMAT	xx	xx	xx	xx	xx	0.279	0.136	0.035	2.050	0.040463

Notes: xx Means that this variable was not significant at $p<0.05$; Metric is unstandardized regression coefficient; SE is standard error of the metric coefficient; Std'zed is standardized regression coefficient, also called effect size; t is t-ratio value; p is probability value (p-value).

At the school level, ten variables had significant influences on achievement in mathematics. These variables were school feeding program, school size, school location, classroom visits by subject advisor, teacher travel distance to school and teacher originating from the local district. Others were parental involvement, classroom resources, student progress reports and mean learning materials. Two of these eleven variables (school feeding program and school location) also had significant influences on achievement in English. In addition, English achievement was influenced by two other variables—lesson plan and mean pre-primary school attendance. Conspicuously, the variable school type and the dummy variable for Mayuge District did not have significant effects in both the English and the mathematics models. Also notably missing in the list of significant predictors were teacher mathematics score (for the mathematics model), teacher frequency of use of mother tongue in lessons and frequency of using mother tongue as a language of instruction in the school.

6.4 Interpretation of the multilevel results

In the next two subsections, discussions of the effects recorded in Table 6.2 on achievement in English and mathematics among P6 students at the various levels of hierarchy are summarized. In these subsections, it is assumed that students differed only in the factor being considered and all other factors were equal. The results of variance (presented in Table 6.1) are discussed later, in a separate section.

Individual-level factors influencing student achievement

The following effects on achievement in English and mathematics were recorded among P6 students in this study when other factors were equal.

i. **Student sex:** Boys were estimated to have achieved better scores than girls in both English and mathematics. These results were somewhat surprising because, when analyzing the same data using simple univariate non-multilevel methods, the effects of student sex were not found to be significant (see Chapter 3). Perhaps this emphasises the importance of using multivariate methods as well as taking into account the hierarchical nature of the data when dealing with educational data. Nevertheless, the findings of the current study about student sex are consistent with what have been reported in SACMEQ studies (Hungi, 2011b){ at P6 level in Uganda, using similar analytical techniques.

ii. **Student age:** Younger students outperformed their older counterparts in both subjects. Being either over-age or underage has also been associated with poor academic performance in other education studies involving P6 students in Uganda—see for example (UNEB, 2010, 2012).

iii. **Grade repetition:** Students who had never repeated classes were estimated to have achieved better scores in English and mathematics than students who had repeated classes once or more times. Again, this is consistent with findings from SACMEQ studies in Uganda.

iv. **Days absent:** Students who were rarely absent from school or were never absent from school performed better in both English and mathematics when compared to students who were often absent from school.

v. **Hearing problems:** Students who reported that they suffered from hearing problems achieved lower scores in English and mathematics than students who said they had no such hearing problems.

vi. **Reading at home:** Students who reported that, apart from the homework they are given at school, they often read books at home, did much better in English than their counterparts who reported that they rarely or never read books at home.

vii. **Parents alive:** Students who had both biological parents alive were estimated to perform better in English than students who had lost one or both parents.

viii. **Mother education:** Students whose mothers (or female guardians) had completed higher levels of education performed better in English than those students whose mothers (or female guardians) had completed lower levels of education or had not gone to school at all.

ix. **Pre-primary school attendance:** Students who had attended pre-primary school for longer durations achieved better scores in mathematics than students who had attended pre-primary school for shorter durations or students who had never attended pre-primary school at all. Pre-primary school attendance was not significant in the English model.

x. **Homework given and corrected:** Students who were often given homework and had this homework corrected by their teachers were estimated to perform better in mathematics than students who were rarely given homework or were given homework that was rarely or never corrected.

xi. **Number of meals per week:** Students who ate more meals per week were estimated to perform better in mathematics than students who ate fewer meals per week.

xii. **Learning materials:** Students who had most of the basic learning materials (pencils, pens, rulers, erasers, exercise books and folders) were estimated to achieve better in mathematics than students who had limited learning materials or no learning materials at all.

Group-level factors influencing student achievement

The following school-level effects on achievement in English and mathematics were recorded among P6 students in this study, all other things being equal.

i. **School location:** Students attending schools located in urban or peri-urban areas outperformed students attending schools in rural areas in both English and mathematics.

These results are consistent with what was found using the descriptive statistics discussed in. Chapter 3.

ii. **School feeding program:** For both subjects, students in schools with school feeding programs were estimated to have performed better than students in schools without such programs.

iii. **School size:** Students attending schools with many students were estimated to have performed better in mathematics than students attending schools with fewer students. This effect was not significant in the English model.

iv. **Teachers' source of lighting:** Students who were taught by teachers who had better sources of lighting at home (for example, gas lamps or electricity) achieved better scores in English than students who were taught by teachers who had poor sources of lighting (for example, fire or candle) or no source of lighting at all.

v. **Teachers' distance to school:** Students taught by teachers who had to travel long distances to school achieved worse scores in mathematics than their counterparts taught by teachers who traveled short distances to school.

vi. **Teachers' district of origin:** Students taught by teachers who said they were originally from the local district were estimated to have achieved better scores in mathematics than students taught by teachers from other districts.

vii. **Lesson plans:** Students who were taught by teachers who had English lesson plans did better in English than those taught by teachers without this document.

viii. **Students' progress reports:** Students who were taught by teachers who kept student progress records for mathematics outperformed those taught by teachers who did not keep such records.

ix. **Subject advisor visits:** Students who were taught mathematics by teachers who were frequently visited by subject advisors in classrooms achieved better scores in mathematics than thos e whose teachers were rarely visited by subject advisors.

x. **Parental involvement:** Students taught by teachers who reported a lack of parental involvement in their classes were estimated to achieve worse results than those taught by teachers who said they rarely faced lack of parental involvement in their classes.

xi. **Classroom resources:** Students in classrooms which had the most teaching and learning resources (useable chalkboards, chalk or other markers, wall charts, cupboards or lockers, bookshelves, a classroom library or book box, and a teachers' table and chair) were estimated to have achieved better scores in mathematics than students who were in classrooms which had the least of these resources.

xii. **Mean pre-primary school attendance:** Students in classrooms where a majority of

the students had attended pre-primary school before joining P1 were likely to perform better in English than students in classrooms where a majority of the students had not attended pre-primary school.

xiii. **Basic learning materials:** Students in classrooms where most students had the basic learning materials, such as pencils, rulers and exercise books, were estimated to have performed better in mathematics than students in classrooms where most students did not have these learning items.

It should be emphasized that the above effects were noted after controlling for other key variables in the multilevel models, in other words, after "leveling the playing field" or removing the effects of students' and schools' characteristics to enable fair comparisons of student scores.

Factors with the greatest impact on student achievement

Absolute values of standardized coefficients (effect sizes) are useful in ranking variables in terms of their relative degree of influence on the outcome—see (Hox, 1995). Other similar studies in education have considered a standardized regression coefficient as important if its magnitude, taken in absolute terms, is ≥0.10 (see, for example, Hungi, 2008). Therefore, based on the standardized coefficients given in Table 6.2, it would appear that the key predictors of student achievement among the P6 students in this study were as shown in Table 6.3.

Table 6.3 → The most important predictors of achievement among P6 students

a) For English	b) For mathematics
School location (0.185)	School location (0.173)
School feeding program (0.175)	Subject advisor visits (0.159)
Mean pre-primary school attendance (0.155)	Lack of parental involvement (-0.133)
Teacher source of lighting (0.133)	Classroom resources (0.127)
Grade repetition (-0.105)	Mean learning materials (0.122)
Student age (-0.104)	School feeding program (0.120)
Lesson plans (0.103)	Teacher from local district (0.118)
	Teacher distance to school (-0.116)
	Student progress records (0.111)

Note: The numbers given in parenthesis are the effect size of the predictors.

Variations in student achievement

Arguably, school-level (between-school) variance is of prime interest to education authorities because it indicates the levels of inequity in the quality of education offered in the schools under their jurisdiction. Between-school variance is also important to education authorities because this is the variance they can most influence through school-level interventions involving provision of resources and changes in policies and practices.

From the variance results in Table 6.1, the percentages of variances available at student- and school-levels were 55 and 45, respectively, for English and 54.3 and 45.7, respectively, for mathematics. Thus, the between-school variances for the two subjects were very similar.

It is worth noting that results from the SACMEQ III project indicated that the between-school variance at P6 level in Uganda in 2007 was 49% for reading English and 37% for mathematics (Hungi, 2011b). Therefore, for English, the between-school variances reported here (for primary schools in the IMHDSS) are comparable to the between-school variance in this subject at P6 primary school level in Uganda. Nevertheless, it should be noted that the SACMEQ study focused on the whole of Uganda and mainly on one aspect of English (namely, reading) whereas the current study covers one site in rural Uganda and focuses on several aspects of English including reading, listening and writing. For mathematics, the between-school variance reported here for the primary schools in the IMHDSS (54.3%) is much larger when compared to the variance reported from the SACMEQ studies at the P6 level in mathematics (37%).

It can be seen from the results in Table 6.1 that, using the variable included in the models, 32.2% and 34.9% of the total variances in English and mathematics were explained. These amounts are not very high and clearly other variables that are important in these schools are missing from these models. Nevertheless, a closer look at these results reveals that these models explained most of the between-school variance in English (62.4%) and mathematics (69.7%). These are important pieces of information because they imply that the models give an indication of what education authorities can do to reduce the inequity in the quality of education offered in primary schools in this site.

6.5 Summary of the key findings

- The most important predictors of English achievements among P6 students in the IMHDSS were school location, school feeding program, mean pre-primary school attendance, teacher source of lighting, grade repetition, student age and lesson plans.
- For mathematics, the most important predictors among P6 students were school location, subject advisor visits, parental involvement, classroom resources and average student learning materials, school feeding program, whether or not teacher was from the local district, teacher traveling distance to school and whether or not the teacher kept student mathematics progress records.
- School type, teachers' mathematics overall scores, use of mother tongue by teachers to explain lessons, and use of mother tongue as a language of instruction in the school did not have significant effects on English or mathematics scores in the multilevel analyses.

7. Summary, Conclusions and Way Forward

This report covers a study that was carried out among P3 and P6 students in primary schools that served families living in the IMHDSS between July and August 2014. This study, which was carried out by APHRC in collaboration with the IMHDSS, aimed at identifying the critical individual, home, teacher and school-level barriers that have most effects on learning outcomes. The study was motivated by the fact that, in spite of the remarkable improvement in school enrollment in the last decade in Uganda, learning outcomes remain low in this East African nation. At the same time, there were indications from existing literature that the low learning outcomes in Uganda could be explained by the existence of learning barriers.

Summaries of the main chapters included in this report are given next, together with the key findings from these chapters. An attempt has also been made to outline the implications of the findings for policy and practices.

Chapter 2: This chapter examined the characteristics of the schools and the students involved in this study in an attempt to understand the schooling patterns and the background characteristics of the study sample. The results showed that, on the whole, about 73% of the sampled schools were public. The average enrollment in public schools (678) was higher than in private schools (262) but school attendance (that is, students present on the interview day given the enrollment) was much better in private schools than in public schools. School attendance was better in Iganga District than in Mayuge District by 13 percentage points. Student absenteeism, measured by the percentage of the sampled P6 students who were absent for at least one day in the last school week preceding data collection, was significantly higher in public schools (34%) than in private schools (26%). Moreover, teacher absenteeism was perceived by head teachers to be a problem among more teachers in public schools than among those in private schools.

In terms of provision of school inputs and services, the average student-teacher ratio was much better in private schools (19) than in public schools (42), and; better in Iganga District (32) than in Mayuge District (42). Likewise, the average class size in public schools (82) was almost two and half times bigger than in private schools (34). On average, two students in private schools shared a textbook while three students shared a textbook in public schools. However, the levels of teacher training in both public and private schools were about the same, with the vast majority of the teachers in the two school types possessing GIII teacher training certificates (70%) while only a handful (0.5%) had university education. Encouragingly, all schools, regardless of school type, had been visited by a school inspector in the 12 months preceding the date of data collection. It was also encouraging that about three quarters of the sampled schools had separate blocks for girls' and boys' toilets, though it would be preferable for all schools to have separate toilet blocks.

In terms of student characteristics and language of instruction, the average age of the sampled P6 students (13.5 years) was higher than the expected average age (12.5 years) of grade 6 students in Uganda at the time of data collection. Nevertheless, the sampled P6 students in public schools were, on average, one year older (14 years) than their counterparts in private

schools (13 years). Interestingly, pre-primary school attendance had been considerably higher among P6 students in private schools than among P6 students in public schools. The results further showed that, regardless of school type, most P6 students spoke Lusoga at home. This was expected because the two districts are occupied by Lusoga speaking people. However, in lower primary school, there was not much difference in the levels of usage of mother tongue, as a language of instruction in classroom,s by school type. In the upper primary school level, on the other hand, a higher proportion of public than private schools was reported to use mother tongue.

Thus, in general, the results presented in Chapter 2 revealed that most of the desired school- and student-level attributes were were found in private schools and schools located in Iganga district. From the school-level attributes (for example student-teacher ratios, class size and textbook-student ratio) it can be concluded that private schools were better resourced than public schools. Private schools were also less disadvantaged in terms of student and teacher absenteeism and these factors, together with the school attributes, could explain the better student achievement recorded in private schools in this study. This implies that the Ugandan government, through its relevant agents, needs to concentrate on improving the level of resources in public schools and reducing absenteeism among students and teachers if they wish to minimize the effects of learning barriers associated with these factors.

Chapter 3: This chapter focused on the literacy and mathematics achievement of the P3 and P6 students. Bearing in mind that the tests used in this study were based on the official primary school curriculum in Uganda for P3 and P6, the overall performance of the P3 students in English and Lusoga was poor and stood at 26.5% and 20.1% for the two subjects, respectively. The mean performance of the P3 students in mathematics (50%) was also unsatisfactory, though much better than their performance in the two languages. Despite the poor performance in Lusoga, it was a strong predictor of literacy in English and mathematics. This indicates that it is beneficial to use it as a language of instruction in the lower grades in Iganga and Mayuge districts.

The average performance of the P6 students in English and mathematics was equally unsatisfactory and was estimated as 43% and 30.5%, respectively. For both grade levels and for both literacy and mathematics, students were estimated to perform relatively better than otherwise if they were attending schools in Iganga District, school located in urban or peri-urban areas or private schools. These were indications of inequity in learning outcomes across the two districts, across government and public schools, and; across rural, urban or peri-urban schools.

In terms of literacy content domains, the performance of P3 students was good in handwriting, letters and syllables but poor in word and sentence knowledge. Thus, teachers would need to pay special attention to these two content areas (word and sentence knowledge) if they were to improve literacy achievement among the P3 students in general. For the same reason, at the P6 level, the teachers would need to concentrate more on reading skills. P6 students

performed very poorly in reading skills compared to how they performed in the other English skills tested.

The performances of P6 student in nearly all the mathematics content domains were poor and, in almost all cases, the mean scores were around 25% or below. Thus, teachers would need to pay attention to all mathematics content areas if they were to uplift the achievement of their P6 students in this subject.

Chapter 4: This chapter examined what was happening in the classrooms together with the characteristics of the teachers involved in this study. In public schools the mean age of teachers was 36 years while in private schools it was 27; the majority of teachers in public schools were female (56%), while male (65%) teachers dominated private schools. There were indications that many trained teachers did not teach the subject in which they were competent. For instance, a large number of teachers taught mathematics, yet they scored very low in a teacher mathematics competency test, especially those in private schools. About 10% of the sampled teachers had a primary or junior secondary level of education and this may be contributing to the low mean scores in the teachers' mathematics competency test. However, this proportion is anticipated to diminish in future as the MoES has revised upwards the entry qualification to teacher training colleges.

The results also indicated that the sampled teachers had light workloads in their duty stations. On average, teachers taught 11 lessons a week, an equivalent of 6.4 hours a week, 1.3 hours a day or 256 hours in a 40-week school year. This is far below the MoES expectation of at least 6 hours a day or 30 hours a week. Administrative data indicate that the sampled teachers teach 12–30 lessons per week for lower grades and 40–50 lessons in the upper grades. Although the school-based data in this study was self-reported by the mathematics and English teachers, it nevertheless depicts a completely different picture from what is found in the literature.

In terms of teaching style, most of the sampled teachers used teacher-centered teaching styles that are of the least effective teaching styles, such as the command style. This should be troubling to education authorities in Uganda because the available literature on the effectiveness of teaching styles indicates that such styles do not lead to independent learning or critical thinking among learners, but instead produces learners who reproduce what the teacher has instructed them to do during the lesson. It should also be troubling that, on average, teachers used more than a third of the lesson time on transition activities that do not directly enhance learning.

Teachers who predominantly used teacher-centered teaching styles, especially in public schools, had higher mean scores (48%) in the teachers' mathematics competency test than teachers who used other teaching styles. Thus, it is concluded that such teachers had a better mastery of content,hence, they would "tell it all" to their students. The sampled teachers had low competency in pedagogical knowledge (how to teach) with items in this domain being the most poorly performed, with a mean of 30%. This low level of pedagogical knowledge

could inhibit instructional delivery or present a barrier in student learning. Unfortunately, teacher years of teaching did not improve the situation. It was found that the more the years of teaching, the lower the student test scores; with recently employed teachers having the highest teacher test scores.

In summary, the results from Chapter 4 show that classroom teachers' pedagogical skills are more inclined to reproductive styles that teach learners how to reproduce what they are taught instead of promoting comprehension and the application of what they have learnt. Furthermore, the more the years of teaching experience, the lower the student scores. The teacher support mechanisms outlined in the next three paragraphs are therefore necessary to address these concerns that present learning barriers among primary school children in the IMHDSS and other areas with similar settings in Uganda. However, the suggested measures cannot operate effectively in isolation.

Teaching performance goals: Tracking learning achievement is critical ifr the efforts of the MoES are to improve the quality of education. Teachers are key players in such efforts. However, results from this study showed that the students taught by experienced teachers scored lower. To reverse this trend, teachers and school committees should develop performance goals that can be tracked and evaluated at the end of the school year. Schools should not use curriculum coverage as a measure of teacher performance but should instead use learning outcomes as the main indicator of how well the teaching and learning goals are achieved.

Teacher workload and assignments: Results showed low demonstration of mathematics knowledge (content and pedagogical) among the sampled teachers. One way to address this concern is to require primary school teacher training colleges to adhere to the MoES minimum entry qualifications for teacher training colleges. Such a move has implications for teacher recruitment and deployment, especially in marginalized geographical areas. This study also found low teacher utilization, witha weekly workload of about 6.4 hours. This is unacceptable given the high teacher wage bill. The District Education Officers should closely monitor what is happening in schools with a view to ensuring that teachers attend school and lessons without fail. Furthermore, the MoES can effectively control the teacher wage bill by reducing new recruitment and instead optimizing teacher utilization.

Teacher professional support: Continuous professional and academic development among teachers needs to be prioritized in view of the student learning barriers that have been identified in the report. Such support should focus on improving the low pedagogical skills and the teaching styles. The support should be take the form of coaching and mentoring that is systematic, regular and geared towards improving the delivery of instructions at the classroom level. Teachers,particularly early grades teachers, require monthly professional in-class coaching and feedback sessions by Teacher Advisory Center tutors, head teachers or other senior teachers targeted at improved learning achievement.

Chapter 5: This chapter looked into the perceptions of teachers and parents on schooling

patterns, quality of education and learning barriers. From the results presented in this chapter, it was clear that despite free primary education being provided in Uganda, parents perceived the quality of education to be better in private schools than in public schools. Because of this, parents with children in private schools in the IMHDSS indicated that they would continue to keep their children in those schools. The superior quality of learning in private schools was also attributed to manageable class sizes in these schools and the commitment of teachers, who thus ensured that their schools performed better.

It was evident from the teachers' point of view that schools could not improve the quality of teaching without the support of the parents. although teachers are the key ingredient in solving the learning crisis in East African classrooms, teachers cannot do soif parents are not supportive of their children's education. Therefore, parents have to play their part as key stakeholders in order to solve some of the problems that hamper the education of their children. The findings also underscored the need to involve the private sector in the provision of education because of the emergent overcrowding that is the result of increased enrollment.

Chapter 6: The main purpose of this chapter was to identify what influenced the English and mathematics achievement of the P6 students in this study. In order to achieve this purpose, a two-level model of student achievement was hypothesized and analyzed using multilevel procedures for each of the two subjects.

At the individual level, the results from the multilevel analyses revealed that achievements in both English and mathematics were influenced by the students' sex, age, grade repetition, days absent, and whether or not the student suffered from hearing problems. In addition, reading at home, mothers' education and having living parents had significant effects in English but not in mathematics. On the other hand, pre-primary school attendance, homework given and corrected by the teacher, number of meals eaten by the student per week, and learning materials had significant effects in mathematics.

At the school level, the multilevel results showed that achievement in both English and mathematics were influenced by school location and the presence of a feeding program in the school. Apart from these two variables, achievement in English was also influenced by whether or not the teacher had or used a lesson plan, teacher source of lighting at hom, and the average pre-primary school attendance of students in theclass. On the other hand, achievement in mathematics was also significantly influenced by school size, visits of subject advisor to classroom, teacher traveling distance to school, whether or not the teacher was originally from that district and classroom resources. Other variables that had significant effects on mathematics achievement were parental involvement, use of student progress reports and average student learning materials in class. Notably, school type, teachers' mathematics score, use of mother tongue by teachers to explain lessons and use of mother tongue as a language of instruction in the school did not have significant effects on the outcome variables.

Importantly, based on the magnitudes of standardized regression coefficients of the variables

in the final multilevel models, results showed that the most important predictors of English achievements among P6 students in this site were school location, school feeding program, mean pre-primary school attendance, teacher source of lighting, grade repetition, student age and lesson plans. For mathematics, the most important predictors were school location, subject advisor visits, parental involvement, classroom resources, and average student learning materials. Other important predictors for mathematics were school feeding program, whether or not teachers were from the local district, teachers' traveling distance to school and whether or not the teacher kept student mathematics progress records.

The percentages of variances available at the student- and school-levels were 55 and 45 for English, respectively, and 54.3 and 45.7 for mathematics, respectively. For both subjects, most of the variances available at the school-level were explained by the variables included in the final model. However, the total variances explained by the variables included in the final model were not much and stood at 32.2% and 34.9% for English and mathematics, respectively.

What are the policy implications of the key factors influencing student achievement? The Ministry of Education and Sports could at least ensure action is taken on the variables that proved to be very important in predicting the differences among P6 students in this site, if they are to reduce the effects of learning barriers associated with these variables. The kinds of action that can be taken are given in the next paragraphs, using school location, school feeding program and grade repetition as examples.

School location: Students in urban or peri-urban (to be collectively referred to as urban) schools overwhelmingly outperformed their counterparts in rural schools in both subjects. This means that, at the P6 primary school level, there are large differences between the quality of education provided in urban schools and the quality of education provided in rural schools in the IMHDSS, and this should be of concern to parents, the Ministry of Education and the government in general.

Perhaps it is worth noting that, in this data, urban schools were on average much better resourced than rural schools in that they had more facilities and teaching aids. In addition, urban schools tended to have better student-teacher ratios than rural schools. On average, the student-teacher ratio for urban schools (28.4) was much lower than that of rural schools (42.8)—that is, about one-and-a-half times the ratio for urban schools. Moreover, in terms of teaching documents, such as schemes of work, lesson plans and student progress records, teachers in urban schools seemed better prepared to teach than their rural counterparts. For example, 57.3% of the students in urban schools were taught mathematics by teachers who had mathematics lesson plans while the percentage for rural schools was 44.5%. About 41% of the students in urban areas had access to a school library while only about 17% had access to this learning facility. These differences in the resource levels between urban and rural schools cannot be ignored. Evidently, insufficient resources could have contributed to the poor performance of children in rural schools. Therefore, the Ministry of Education and the government as a whole should take action to improve resource levels in rural schools.

This should help to improve the quality of education in primary schools in the IMHDSS and in Uganda in general.

School feeding program: Students attending schools with school feeding programs (SFPs) achieved better scores in English and mathematics than students in schools without such programs. Some media reports in some sub Saharan African countries, especially in Kenya, have linked student participation in education and improved school attendance to the availability of meals in school, especially in rural areas. Hungi (2011b) argued that SFPs are important for the improvement of school time management because the time spent on meal breaks can be reduced and the time saved can be used for remedial teaching, targeted teaching, nd private study by the students. Moreover, in poor areas, school meals ensure that the students get at least the basic nutrients needed for growth, development and concentration on learning activities. Thus, the education authorities could encourage parents to work with head teachers to introduce SFPs in schools. The authorities could achieve this by sensitizing parents about the importance of these meals and also by offering subsidies for these meals, especially for students from the poorest households.

Grade repetition: Students who had never repeated a class performed better than students who had repeated a grade one or more times. Brophy (2006) argues that grade repetition lowers the academic motivation of the repeating student. On average, just over half of the students (about 55%) in this study reported that they had repeated a class at least once since starting schooling. This percentage is consistent with the grade repetition level (53%) found in the SACMEQ III study among P6 students in Uganda. Clearly, this level of grade repetition is high and it shows inefficiency in the education system. In most cases, students are made to repeat grades because it is believed that this would improve their academic performance. However, this is evidently not the case, as has been found in this study and in others. Therefore, the Ministry of Education should find ways to discourage grade repetition without lowering the standards of achievement in this site. Brophy (2006) recommends several strategies that could be employed to assist students at risk of grade repetition, such as early intervention, collaboration with parents, and supplementary instruction.

A summary of the policy suggestions for the key factors influencing student achievement in this study are set forth in Table 7.1 The specific actions to be taken have been laid out next to each policy suggestion, together with an indication of the relative cost and implementation time for each suggestion. For example, it is recommended that grade repetition should be reduced. For students at risk, specific actions, such as remedial teaching and collaboration with parents, are needed. Reduction of grade repetition is a long-term objective but the cost is low.It is interesting to note that many of the variables important variables described in this chapter were also identified by teachers and parents as important learning barriers in the FGDs reported in Chapter 5, which shows consistency in results across qualitative and quantitative methods. For example, at the individual level, student age and learning materials were identified as important in the FGDs and also in the study. At the school level, teachers' traveling

distance to school, lack of parental involvement and inadequate preparation of lesson plans by teachers featured in the FGDs and also here..

Table 7.1 → Summary of policy suggestions for mitigating learning barriers

Factor/ barrier	Policy suggestions	Specific actions (suggestions)	Time frame	Cost
School location	Improve level of material and human resources in rural schools	• MoES should conduct an audit in all rural schools to identify shortfalls in school resources (human and material) and rectify shortfalls	Medium	High
Grade repetition	Reduce grade repetition	• Schools should intervene early. • Teachers should collaborate with parents. • Schools should provide remedial instruction for students at risk.	Long	Low
School feeding program	Introduce school feeding programs in needy schools without these programs	• Schools should sensitize parents about the importance of school meals in improving learning achievement. • Government to work out mechanism for providing subsidies for parents who cannot otherwise afford these meals.	Medium	High
Pre-primary school attendance	Improve pre-primary school attendance among 3–5 year-old children	• Government should encourage parents to enroll their 3–5-year-old children in early childhood education (ECD) centers. This can be achieved by educating parents on the importance of ECD for easy transition to school and success in primary school. • The Ministry of Education should start ECD centers to serve areas with shortages of these centers; and to attach ECD centers to each primary school.	Long	High
Student age	Reduce incidence of over-age students in schools	• Government should encourage parents to enroll their children at the official school entry age (6 years). • Government should discourage grade repetition.	Long	Low

Factor/ barrier	Policy suggestions	Specific actions (suggestions)	Time frame	Cost
Teacher source of lighting	Improve teachers' source of lighting	• Government should consider building teacher housing within school compounds and installing electricity or providing the teachers in remote rural schools with gas and/or solar lamps.	Long	High
Teacher distance to school	Reduce teachers' traveling distance to school			
Teacher performance not measured	Introduce measurable teaching performance goals	• Schools should set annual performance goals that are linked to learning outcomes and not to syllabus coverage	Short	Low
Low teaching load and lesson attendance	Enhance monitoring of lesson attendance and delivery	• Students and parents, in addition to school management and DEOs office, should monitor teachers' workload and assignments.	Short	Low
Ineffective classroom teaching styles	Enhance professional support for teachers	• MoES should instituionalize school-based teacher mentoring and coaching	Medium	Medium
Subject advisor visits	Increase subject advisor visits to classrooms	• Ministry of Education should encourage and facilitate subject advisors to visit all classrooms more often to assist teachers in improving school attendance, lesson attendance and, ultimately, learning outcomes.	Medium	Medium
Lesson plans	Improve teacher lesson preparedness especially among schools in rural areas	• Head teachers and subject advisors from the Ministry of Education should mentor teachers and provide coaching on use of lesson plans and student progress records in schools	Short	Low
Student progress records				
Lack of parental involvement	Reduce incidence of lack of parental involvement in schools	• MoES to train teachers to deal with lack of parental involvement. • MoES should conduct trial of intervention programs in selected areas for improving parental involvement and interest in children's schoolwork. If successful, implement these programs across the IMHDSS and across Uganda in general.	Long	Medium

Factor/ barrier	Policy suggestions	Specific actions (suggestions)	Time frame	Cost
Classroom resources	Improve levels of classroom resources in schools	• MoES should conduct audit in all classrooms, especially in public schools, and fix shortages.	Medium	High
Learning materials	Improve levels of learning materials among students	• Schools should encourage parents to provide all children with at least one of each of the following basic learning materials: a pencil, a pen, an eraser, a ruler and a folder. • The ministry should provide each child with at least one exercise book for each key subject in the curriculum.	Short	Medium
Teacher originating from outside local district	Improve the performance of teachers from outside the local district	• MoES should conduct survey to identify the teaching challenges faced by teachers from outside the local district. • When challenges are identified, the [ministry/ government] should brief teachers and existing teachers on dealing with these challenges.	Medium	Low
Language of instruction in lower grades	Promote the use of local language as a medium of instruction in lower grades	• DEOs to report on the uptake of the language of instruction policy	Short	Low

Apart from the key factors identified in this chapter, the government could also ensure that action is taken for the other variables that were found to have smaller but nonetheless significant effects on student achievement, such as student absenteeism and homework. Having said all the above, it should be noted that, in all research that attempts to identify the important variables "there must be a political will to try to improve the educational system and to use factual evidence of this kind rather than anecdotal evidence" (Hungi & Postlethwaite, 2009).

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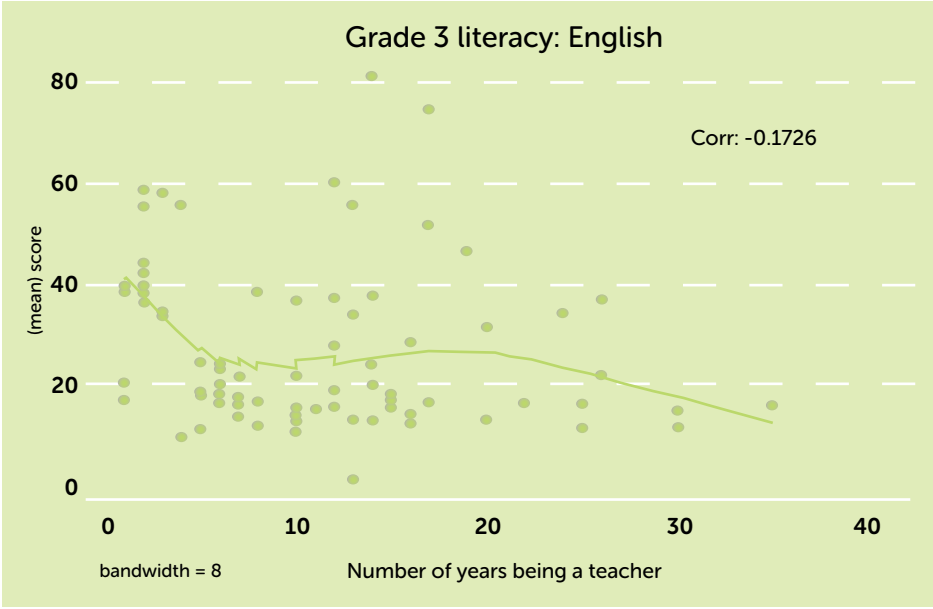
9. Appendices

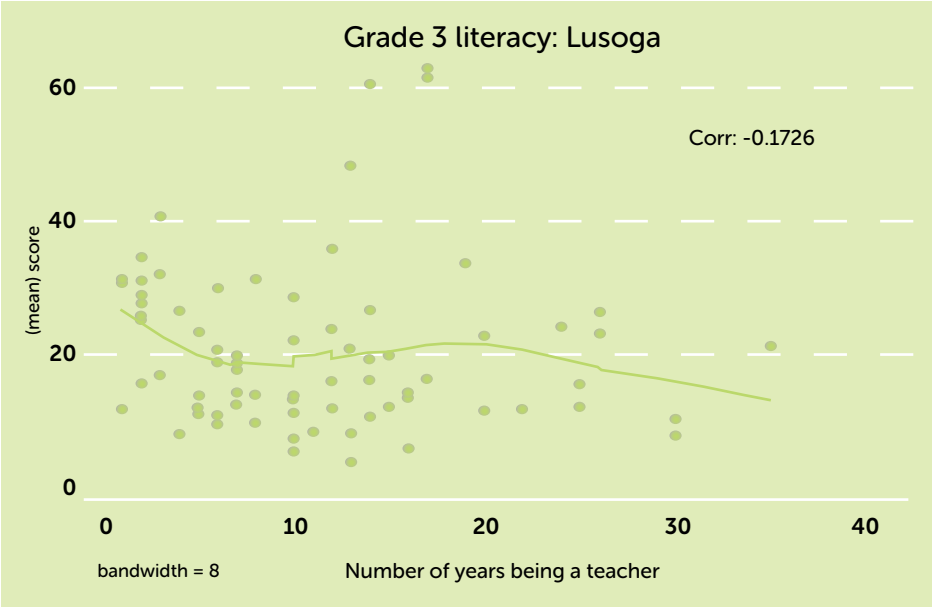
Appendix 4A → Items used to analyze lesson videos

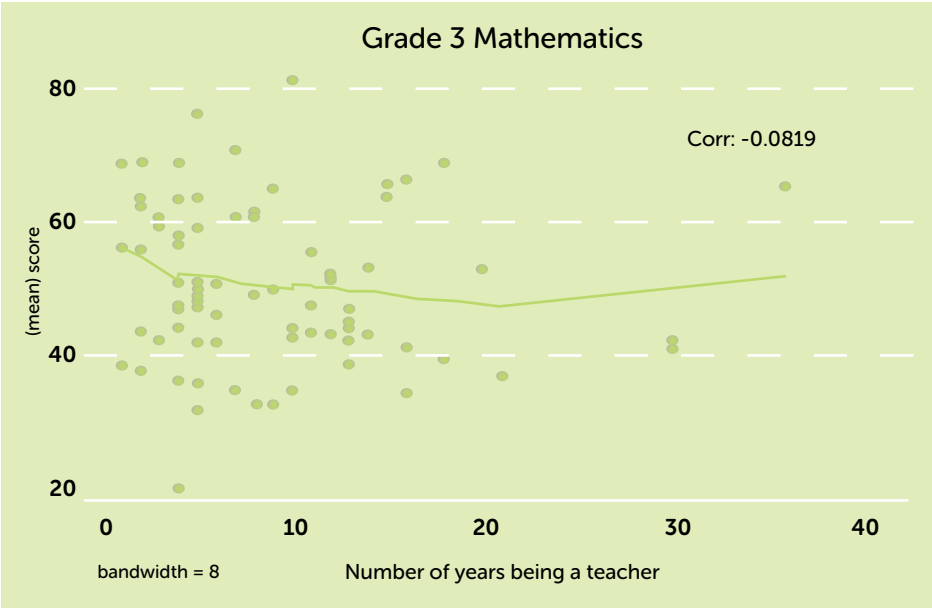
Item No	Broad activity	Specific activity or task	Active Teaching Activity
Q10a	Individual work	Copying instructions/Problems	
Q10b	Individual work	Solving problems individually (teacher circulating)	
Q10c	Individual work	Solving problems individually (teacher on other tasks)	
Q10d	Individual work	Teacher checking work (individual working)	Q10d
Q10e	Individual work	Teacher checking work (individual stopped)	Q10e
Q11a	Recitation	Q_A: Individual learner (teacher asks)	Q11a
Q11b	Recitation	Q_A: Individual learner (verbal answer)	
Q11c	Recitation	Q_A: Individual learner (non-verbal answer)	
Q11d	Recitation	Q_A: Individual learner (learner asks)	Q11d
Q11e	Recitation	Q_A: Whole class (chorus)	
Q11f	Recitation	Q_A: Whole class (groups reporting)	
Q11g	Recitation	Individual learner (read orally)	
Q11h	Recitation	Whole class (read orally	
Q11i	Recitation	Solve at blackboard (learner)	
Q11j	Recitation	Learner gives instruction	
Q11k	Recitation	Individual demonstrates (verbal)	
Q11l	Recitation	Individual demonstrates (non-verbal)	
Q12a	Group work	Individual solving (quiet—teacher circulating)	
Q12b	Group work	Individual solving (quiet—teacher on other tasks)	
Q12c	Group work	Individual solving (talking—teacher circulating)	
Q12d	Group work	Individual solving (talking—teacher on other tasks)	
Q12e	Group work	Group discussion (oral)	
Q12f	Group work	Group solving (multi-task)	
Q12g	Group work	Teacher checking (work group working)	Q12g
Q12h	Group work	Teacher checking (work group stopped)	Q12h
Q13a	Whole class	Whole class task instructions (teacher only)	Q13a

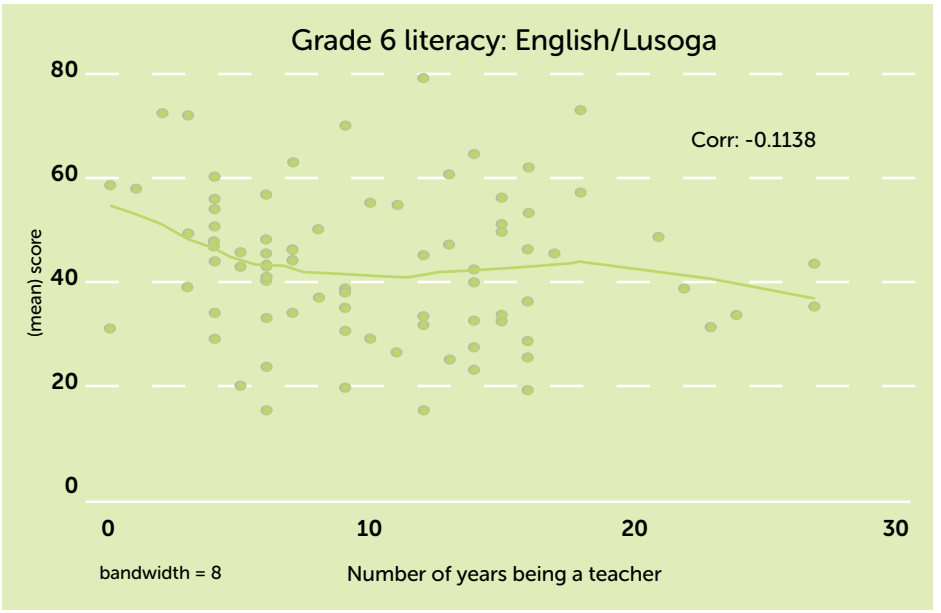
Q13b	Whole class	Whole class demonstrations (teacher only)	Q13b
Q13c	Whole class	Whole class lecture (teacher only)	Q13c
Q13d	Whole class	Whole class review/recap (teacher only)	Q13d
Q13e	Whole class	Whole class evaluate lesson (teacher only)	Q13e
Q14a	Other	Transition (to other tasks, etc.)	
Q14b	Other	Interruption (from within)	
Q14c	Other	Interruption (from outside)	

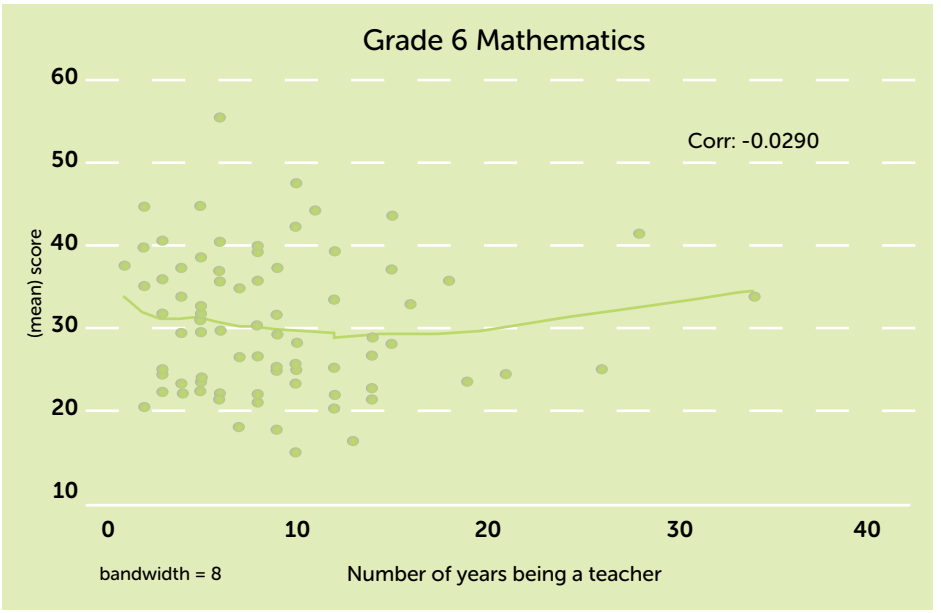
Appendix 4B → Association between students' mathematics mean scores and teachers' years of teaching experience




Grade 3 literacy: Lusoga
Corr: -0.1726
(mean) score
60
40
20
0
0
10
20
30
40
bandwidth = 8
Number of years being a teacher


Grade 3 Mathematics
Corr: -0.0819
(mean) score
80
60
40
20
0
10
20
30
40
bandwidth = 8
Number of years being a teacher


Grade 6 literacy: English/Lusoga
80
60
40
20
0
(mean) score
Corr: -0.1138
0
10
20
30
bandwidth = 8
Number of years being a teacher


Grade 6 Mathematics
60
50
40
30
20
10
(mean) score
Corr: -0.0290
0
10
20
30
40
bandwidth = 8
Number of years being a teacher

Appendix 6A → Variables: names, values and codes

	Variable		Code
Level 1 (Students or individual level)			
	Student individual characteristics		
	Student sex (0=Boy; 1=Girl)		ZPSEX
	Student age (Mean=13.53 years; Std. dev=1.62)		ZPAGE
ls s	Grade repetition since joining P1 (0=Never; 1=Once; 2=Twice; 3=Three times or more)		ZPREPEAT
	Days absent during last school week (0=Not absent; 1= Absent for one day; ...; 5=Absent for five days)		ZPABSENT
	Student pre-primary school attendance (0=No pre-primary school; 1=A few months to 1 year; 2 years or more)		ZPPRESCH
	School transfer since entering P1 (0=Never; 1=Changed school at least once)		ZPTRANS
	Extra tuition outside school hours	a) For English	ZPEXTUIR
	(0=No extra tuition; 1=Takes extra tuition) b) For mathematics	ZPEXTUIM	
	Reading at home (0=Never; 1=Once a week; 2=Twice a week; 3=More than twice a week)		ZPREAD
	Student has hearing problem (0=No; 1=Yes)		ZPHEAR
	Student has vision problem (0=No; 1=Yes)		ZPVISION
	Home environment		
	Home possessions (student SES) I.e., sum of the existence of the following items at home: electricity; television; video player (VCR/DVD); telephone (landline/ mobile); refrigerator; piped water; table to write on; cement, carpet or tiled house floor; Concrete, cut stone or burned brick house wall; and metal sheet, concrete or tiled house roof. (Low values=Poor homes; Large values = Wealthy homes)		ZPSES

	Variable	Code
Level 1 (Students or individual level)		
	Speaks English at home (0=Never; 1=Sometimes; 2=All the time)	ZPENGLIS
	Meals taken per week (Mean=16.84 meals; Std. dev=4.94)	ZPMEALS
	Biological mother alive (0=No; 1=Yes)	ZPMALIVE
	Biological father alive (0=No; 1=Yes)	ZPFALIVE
	Biological parents alive (0=No parents alive; 1=One parent alive; 2=Both parents alive)	ZPPALIVE
	Mother (female guardian) highest level of education (0=No educ.; 1=Some primary; 2=Completed primary educ.; 3=Some secondary educ.; 4=Completed secondary educ.; 5=Completed some training after secondary sch.; 6=Completed university)	ZPMOEDUC
	Father (male guardian) highest level of education (0=No educ.; 1=Some primary; 2=Completed primary educ.; 3=Some secondary educ.; 4=Completed secondary educ.; 5=Completed some training after secondary sch.;6=Completed university)	ZPFAEDUC
	Books at home (0=No books; 1=1-10 books; 2=11-50 books; 3=51-100 books; 4=101-200;5=201 or more books)	ZPHBOOKS
	Student traveling distance to school (Mean=1.93; Std. dev=4.27)	ZPDIST
	Source of lighting at home (0=No lighting/fire; 1=Candle; 2=Paraffin or oil lamp; 3=Gas lamp; 4=Electricity)	ZPLIGHT
	Staying with parents or in boarding school (0=No; 1=Yes, staying with parents or in boarding school)	ZPSTAY
	Asked about school performance at home (0=Never/rarely; 1=Often/sometimes)	ZPHWASKS

	Variable	Code
Level 2 (School or group level)		
	Teacher characteristics	
	Teacher sex (0=Male; 1=Female)	ZTSEX
	Teacher education level (0=Primary; 1=Junior sec. 2="O" or "A" level; 3=First degree or higher)	ZTEDUC
	Teacher pre-service training (0=No training; 1=GIII certificate; 2=Diploma; 3=B.Ed. or PGDE)	ZTPROF
	Teacher perception on how adequately prepared (0=Very inadequately/inadequately; 1=Somewhat adequately; 2=Adequately/very adequately)	ZTPREP
	Teacher number of in-service courses in the last 18 months (0=None; 1=One; 2=Two; 3=Three; 4=Four times or more)	ZTINSERC
	Teacher total years as a teacher (0=Less than 1 yr; 1=1 yr; 2=2 yrs; ...; 6=6 yrs or more)	ZTTNMYRS
	Teacher total years teaching this subject (0=1 yr or less; 2=2 yrs; 3=3 yrs or more)	ZTTSUBJT
	Teacher observed teaching by head teacher (HT) or deputy HT (0=Rarely/never; 1=Often/sometimes)	ZTSHWTCH
	Subject advisor visits to classroom in last 18 months (0=None; 1=One time; 2=Two times; 3=3 times or more)	ZTADVISOR
	Teacher number of periods per week (Mean=21.37; Std. dev.=11.31)	ZTTLOAD
	Teacher days absent during last school week (0=Not absent; 1= Absent for one day; ...; 5=Absent for five days)	ZTABSENT
	Teacher travel distance to school (Mean=4.83 KM; Std. dev=5.56)	ZTDISTC
	Teacher original home district (0=Other district; 1=Local district, i.e. where school is located)	ZTNATIVE
	Families of students known by teacher (0=None; 1=Most; 2=All)	ZTPKNOW
	Teacher meeting with parents to discuss students' progress (0=No meetings; 1=Once per term or year; 2=Once per month)	ZTPMEET

	Variable	Code
Level 2 (School or group level)		
	Teacher frequency of giving written tests (0=No tests; 1=Once a term or less; 2=Once a month 3=More than once a month)	ZTTESTS
	Teacher source of lighting at home (0=No lighting/fire; 1=Candle; 2=Paraffin or oil lamp; 3=Gas lamp;4=Electricity)	ZTLIGHT
	Teacher number of books at home (Mean=7.77; Std. dev=14.84)	ZTHBOOKS
	Teacher has scheme of work (0=No; 1=Yes)	ZTSCHEME
	Teacher has lesson plans (0=No; 1=Yes)	ZTLPLAN
	Teacher has student progress records (0=No; 1=Yes)	ZTPROGRE
	Teacher mathematics score (Mean=45.56%; Std. dev=13.87)	ZTMSCORE
	Classroom environment	
	Number of students in the class (Class size) (Mean=62.03; Std. dev=27.64)	ZCSIZE
	Classroom resources I.e., Ssum of existence of the following items in the classroom: Useable chalkboards, chalk or other markers, wall charts, cupboards or lockers, bookshelves, classroom library or book box, teacher table and tchair (Mean=4.23; Std. dev=1.65)	ZTCRES
	Teacher frequency of dealing with student discipline problems (0=At least once a day; 1=Once to several times a week; 2=Less than once a month; 3=Never)	ZTPBEHAV
	Teacher has to deal with lack of parental involvement frequently (0=No; 1=Yes)	ZTPINVO
	School report has specific section for English/mathematics comments (0=No; 1=Yes)	ZTREPORT

	Variable		Code
Level 2 (School or group level)			
	Homework given and corrected (0=No homework/homework given but rarely/never corrected; 1=Homework given and sometimes/Most of the time corrected; 2=Homework given and always corrected)	a) For English	ZPHMWKRC
		b) For mathematics	ZPHMWKMC
	Student learning materials I.e., sum of possession of at least one of each of the following six items by student: pencil, pen, ruler, eraser, exercise book and folder (Mean=4.12; Std. dev=1.57)		ZPMAT
	Use of textbooks in classroom (0=Student has no textbook/shares with two or more students 1=Student has own textbook/shares with one student)	a) For English	ZPRDTEXT
		b) For mathematics	ZPMATEXT
	School environment		
	Mayuge (0=School in Iganga District; 1=School in Mayuge District		ZMAYUGE
	School library (0=No library; 1=Library)		ZSLIB
	Students can borrow books from school (0=No; 1=Yes)		ZSPBORO
	School has books for use by students (0=No; 1=Yes)		ZSPBOOKS
	School poverty level (percentage of students ranked in poorest 40%) (Mean=39.88%; Std. dev=24.99)		ZSPOVETY
	School type (0=Public school; 1=Private school)		ZSCHTYPE
	School location (0=Urban/peri-urban school; 1=Rural school)		ZSCHLOC
	Student-teacher ratio (Mean=38.03; Std. dev=14.87)		ZSPTR
	Student-toilet ratio (Mean=86.64; Std. dev=49.61)		ZSTOILET

	Variable	Code
Level 2 (School or group level)		
	School use of mother tongues in P1 to P3 (0=Never/rarely; 1=Sometimes/all the time)	ZSMOTQ13
	School use of mother tongues in P6 (0=Never/rarely; 1=Sometimes/all the time)	ZSMOTQ6
	School has adequate drinking water (0=No; 1=Yes)	ZSWATER
	School has electricity (0=No; 1=Yes)	ZSLECTRC
	School inspector visits in the last 12 months (Mean=3.9; Std. dev=2.7)	ZSINSPT
	School feeding program (SFP) (0=No SFP; 1=SFP)	ZSFP
	Mean home possessions	ZMPSES
	Mean student age	MPAGE
	Mean grade repetition	MPREPEAT
	Mean student days absent	MPABSENT
	Mean school transfer	MPTRANS
	Mean pre-primary school attendance	MPRESCH
	Mean speaking English at home	MPENGLIS
	Mean mother education	MPMOEDUC
	Mean father education	MPFAEDUC
	Mean father alive	MPFALIVE
	Mena mother alive	MPMALIVE
	Mean parents alive	MPPALIVE
	Mean student traveling distance to school	MPDIST
	Mean meals per week	MPMEAL
	Mean learning materials	MPMAT

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