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WORKING PAPER

Opportunity to Learn: A high impact strategy for improving educational outcomes in developing countries

Introduction

In the 16 years since the first Education for All conference at Jomtien, national governments and international donors have invested billions of dollars in programs and reforms designed to improve access to quality education, with a focus on basic education. These education programs have implemented activities designed to address many of the common obstacles to education: school construction, teacher training, curriculum reform, materials production, community participation, girls' education, decentralization, and many other macro strategies for improving access, equity, and quality of education.

By and large, this effort has been successful in addressing some of the most serious barriers to access. Since 1990, the primary education net enrollment rate (NER) has increased from 81.7 to 84.6 percent on a global scale, and in countries with low initial NER and targeted programs, the increase was substantially better (UNESCO, 2006). However, the impact in terms of educational outcomes, and in particular student learning, has been much less impressive. A recent World Bank study of the impact of Bank education support programs found significant weaknesses in student learning:

Even those receiving quality improvement support from the World Bank have yielded discouraging results. In Ghana, Niger, Peru, and Yemen, no more than 19 percent of sixth graders reached mastery levels in language; and no more than 11 percent do so in mathematics. In Ghana, where average test scores increased over 15 years, fewer than 10% of students have reached the mastery level in maths, fewer than 5% in English. In India, nearly 50 percent of 7-10 year olds could not read fluently in their local language at the first grade level. Mastery in French and maths among grade 6 students in 1999 in Niger was 13 and 11%, respectively; in Yemen, grade 6 students' mastery of Arabic and maths were 19 and 9%, and in Peru they were 8% for Spanish and 7% for maths. In Vietnam, only 51% of grade 5 students were found to perform as "independent readers." (IEG, From Schooling Access to Learning Outcomes: An Unfinished Agenda, 2006).

These findings are not unusual. A 1990–1995 study by the Southern African Consortium for Monitoring Educational Quality (SACMEQ) measured primary school students' reading literacy against standards established by national reading experts and sixth-grade teachers. In four out of seven countries, fewer than half of the sixth graders achieved minimum competence in reading. Low achievement is also evident in the 1996–2001 *Programme d'Analyse des Systèmes Educatifs de la CONFEMEN* (PASEC) study conducted in six French speaking African countries—14 percent to 43 percent of grade 5 pupils had "low" achievement in either French or mathematics. In Senegal, for example, over 40 percent of students had difficulty putting in order several numbers with two decimal points (UNESCO, 2005). In Peru, a study found that "only 25 percent of first graders and 41 percent of second graders were able to read one or more words... at the end of the school year; 75 percent of the first graders could not read at all." (Crouch, et. al., 2005)

The following educational pyramids from the Education Policy and Data Center illustrate the dramatic difference between access and learning in selected countries. Ghana and Peru have received considerable donor support over a long period of time and are considered to be





relative success stories. In terms of access, both Ghana and Peru have been quite successful. However, as the pyramids illustrate in Figures 1 and 2, the outcomes in both countries in terms of learning is poor. It is important to emphasize that the measures of learning in these pyramids are generally at the most basic measure of education—the ability to read a simple sentence. The large international tests such as PISA and TIMSS show that many students are not testing at a competitive level. Other proxy indicators of learning, such as transition to secondary school and primary school pass rates also indicate that students are not learning at adequate levels.

Figure 1: Peru Learning Pyramid

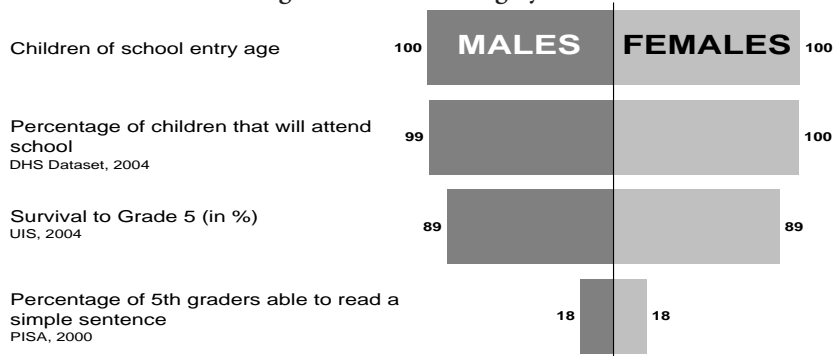
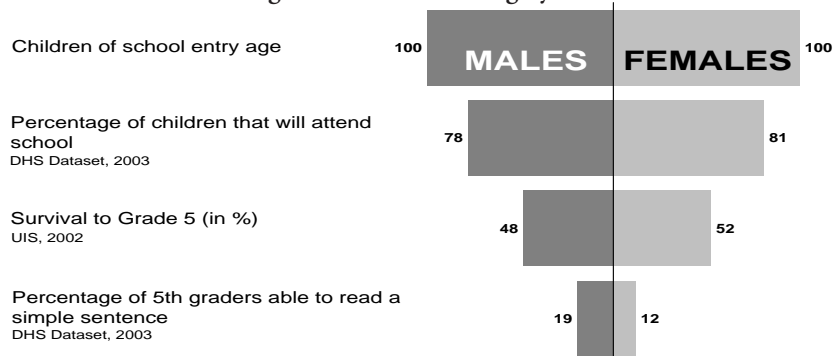


Figure 2: Ghana Learning Pyramid



Why has so much investment yielded so little return? This paper argues that at least a part of the answer is that students are not succeeding because they lack the opportunity to learn (OTL). Learning outcomes are below that expected in government primary schools in developing countries despite huge investments in education reform, teacher training, learning materials, curriculum and infrastructure. Studies of schools outside the government systems (i.e. in Complementary Education Model Schools) show that children are achieving higher learning outcomes with equal or less resources. From reviewing the literature, eight crucial, underlying elements have been identified that, when at a minimum level, create what we refer to as a basic opportunity to learn. These elements are the factors that add up to total instructional time, hours in school year, days school is open, teacher attendance and punctuality, student attendance and punctuality, teacher-student ratio, instructional materials per student, time in classroom on task, and reading skills taught by grade. Education systems can track and monitor these factors as part of their management and school improvement strategy. In many developing country schools, these elements are being overlooked—school hours are insufficient, schools are closed too often, teacher and student attendance and punctuality is low, there are insufficient instructional

materials for home or school use, time-on-task in the classroom is minimal, and children cannot read well enough by the end of grade 3—and there is no evident system to track and improve the situation. Without a strategy to track these elements more closely, and direct funding to ensure that a minimum level is attained, children can not be provided with a basic opportunity to learn.

This is not a new argument—it has been discussed in many fora, and some OTL elements are included in the 2005 EFA Global Monitoring Report. However, this insight has not adequately informed and influenced policy and implementation strategies of either donors or national governments. Perhaps because the answer rests on common sense, solutions are overlooked. A recent EQUIP2 study of complementary education systems highlighted cases that showed a significant improvement in completion and learning over formal schools in providing education to underserved populations. The authors concluded that these systems had no magic formula—they simply were able to provide a consistent opportunity to learn (DeStefano, et al., 2006).

This paper will argue that the basic opportunity to learn does not exist in many countries, and that a concerted management focus to assure that schools provide these basic elements of an opportunity to learn could potentially yield big improvements in learning. The paper will assess the following questions: 1) what basic factors create the opportunity to learn, and 2) to what extent is the lack of these basic elements a problem in developing countries? This working paper, one of a series on donor effectiveness and systems reform, will explore both the elements that create a basic opportunity to learn, and strategies for addressing them.

Opportunity to Learn Index

The thinking behind the opportunity to learn index starts from a relatively simple premise: learning is to some degree a function of time and effort. Without adequate time on task, no learning is possible. This common sense statement is supported by international research. In *A Global Study of Intended Instructional Time and Official School Curricula, 1985-2000*, Benavot and Amadio (2004) state that “pupil achievement increases when students are given greater opportunities to learn, especially when ‘engaged learning time’ is maximized.” Investments in teachers, materials, curricula, and classrooms are wasted if they are not used for a reasonable period of time. For the purposes of this paper, we assume a straightforward relationship between learning and the opportunity to learn. We assume a direct relationship in that each factor that reduces time on task will have an impact on learning (i.e., every day that a teacher is absent reduces potential student learning for all students in the class by one day.) While factors such as more effective teaching methods are certainly important, it stands to reason that a good teacher who is absent is not producing—any teacher can achieve more in 100 hours than in 50 hours.

The concept of opportunity to learn is not new. In the 1960’s, John Carroll wrote that equality of Opportunity to Learn required increasing the amount of instructional time for the least prepared students to enable them to master the curriculum. In the 1980’s, RAND developed a set of institutional quality indicators, including teacher qualification, curriculum, and spending indicators. OTL standards have been applied in the U.S. to address two core concerns – standards of excellence and accountability for results. The rationale for OTL standards is straightforward—it is unfair to hold students responsible for meeting high academic standards unless they have been assured of an opportunity to learn. If schools lack the resources to teach students the material that will be assessed, then accountability and performance standards can have little impact. The OTL standards seek to track whether school quality is adequate to achieve the standards and whether the resources are distributed equitably among schools and districts (Venezia & Maxwell-Jolly, 2007).



Prior to No Child Left Behind legislation in the U.S., the Goals 2000 legislation in 1994 sought to hold schools and school systems accountable for student outcomes through voluntary OTL standards that established criteria to assure that the “resources, practices, and conditions” necessary for student learning are available (Ysseldyke, Thurlow & Shin, 1995). The standards addressed the following areas:

- Curricula and materials;
- Teacher capability;
- Continuous professional development;
- Alignment of curriculum, instructional practices, and assessments with content standards;
- Safety and security of the learning environment;
- Non-discriminatory policies, curricula and practice;
- School financing; and
- Other factors that assure students the fair opportunity to achieve knowledge and skills.

While these standards are appropriate and relevant for all countries, they do not capture the key factors that are most immediately relevant for developing countries. Much of the national and international investment in education has focused on the issues listed above without a commensurate effect. This paper posits that a basic OTL for developing countries needs to focus on a number of more fundamental measures before the above elements become relevant.

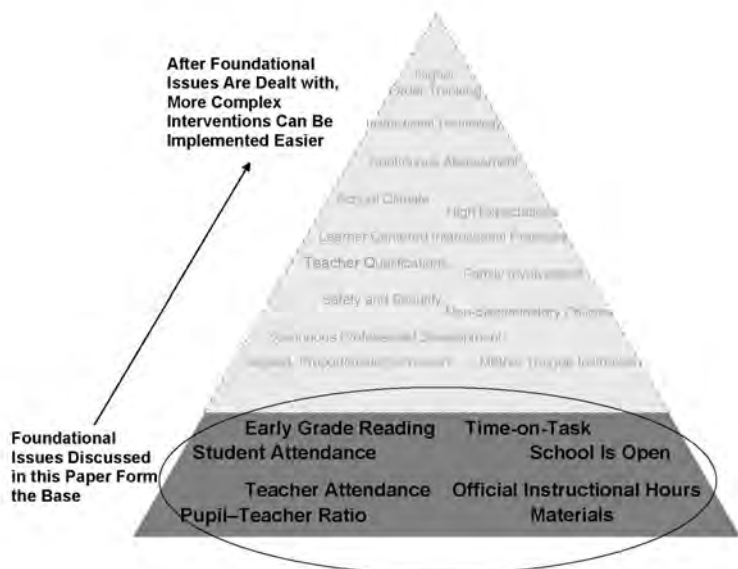
A previous variation of school standards was the Fundamental Quality Level (FQL) approach implemented in a number of African countries in the 1990’s. The FQL system sought to establish standards of inputs and infrastructure necessary to provide equality of school conditions. The FQL program provided a basis for dialogue about investment in education infrastructure. While extremely useful for informing investment decisions and choices, the FQL approach did not capture the management aspects of creating a genuine opportunity to learn.

This paper suggests an index of eight factors that constitute the core elements of an opportunity to learn. A series of additional elements is necessary to bring an education system to a level of high academic performance, but none, or at least very few, of the higher level investments can be effective without a solid foundation. One can easily argue for additional or fewer elements. The literature supports many other factors that influence school performance such as percent of female teachers, school feeding, parent involvement, socio-economic status, etc. This framework does not seek to be comprehensive, but rather to address the basic, common sense elements that have not been adequately addressed.

The OTL pyramid illustrated in Figure 3, shows a progression of issues that need to be addressed and managed for effective education. Levels are illustrative, and the elements in the higher levels are included only to demonstrate the concept of a stepped series of investments, and not to attempt to define a hierarchy of education strategies. The focus of this paper is on the bottom level. We argue that the failure to focus on the fundamental OTL factors undermines all investments in higher level interventions. As one moves up the pyramid, the technical complexities of implementing the improvements increases. However, the lowest level factors reflect the lowest levels of management and technical complexity, and yet have a huge impact on outcomes.



Figure 3: Opportunity to Learn Pyramid



Elements of a Foundational Opportunity to Learn

A basic opportunity to learn can be achieved with the following elements.

Foundational elements: inputs and management

1. The school year has a minimal instructional time of 850-1000 hours per year.
2. The school is open every hour and every day of the school year, and the school is located in the village or at least within 1 km of the student.
3. The teacher is present every day of the school year and every hour of the school day.
4. The student is present every day of the school year and every hour of the school day.
5. The student-teacher ratio is within manageable limits, assumed to be at least below 40-1.
6. Instructional materials are available for all students and used daily.

Foundational elements: pedagogy

7. The school day and classroom activities are organized to maximize time-on-task—the effective use of time for educational purposes.
8. Emphasis is placed on students developing core reading skills by the second or third grade.

For the purpose of this discussion, we make a distinction between the first six elements, which represent management and funding challenges and the last two, which represent a somewhat more complex challenge, reflecting instructional design and school/classroom management challenges that require higher level skills. As one moves up the pyramid, the complexity of the challenge and technical skills or system reforms needed to address them increases. For example, an OTL study in Ghana found that the overly ambitious curriculum was poorly aligned with teacher capability, so that less than half of the material was actually covered during the school year. However, the national examinations measured learning on the entire curriculum, so that the theoretical maximum score that most students could achieve would be 50 percent, even if they learned all of the material covered perfectly.



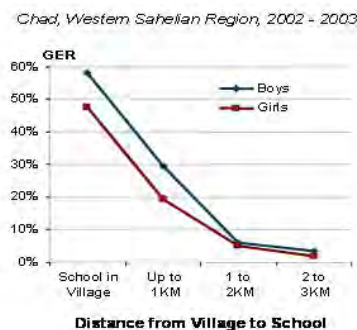
The following discussion will briefly touch on evidence and aspects of these basic elements of an education system. A more comprehensive review can be found in a 2006 World Bank publication by Helen Abadzi, *Efficient Learning for the Poor: Insights from the frontiers of Neuroscience*.

Analysis of Factors affecting the Opportunity to Learn

Factor 1: The school is open and located near the student

The starting point for learning is that there is a place to learn. The exact nature of the minimum physical requirements is open to debate and could be a home, a tent, a three-story building with plumbing, etc. What is less open to debate is that the place to learn needs to be open and near to the students.

Figure 4: Enrollment and Distance in Chad's Western Sahelian Region, 2002–2003
Enrollment and Distance



Data are from the World Bank Rural Access Initiative

The school is nearby. The World Bank Rural Access Initiative found that the location of a school, particularly in some parts of Africa, has a dramatic impact on school attendance. Figure 4 shows how each additional kilometer a child lives from the school causes attendance to drop by 20 percent or more. Simply having a school in the village addresses 50–60 percent of the enrollment challenge for rural children. While the specific ratio will vary according to country context, the base relationship of distance and attendance applies generally.

The school is open. The official instructional time described above represents the theoretical maximum, which should not be confused with actual instructional time; “students almost invariably receive less than the prescribed amount of instructional hours” (Benavot, 2004). In Peru, national policy requires 1,100 hours of primary instruction, which implies 220 days for schools that are organized in two shifts of 5 hours each. The standard in Honduras is 900 hours of instruction—200 days of 4.5 hour school days; in El Salvador, 1,000 hours of instruction resulting from 200 five-hour school days. However, these official schedules are regularly undermined by strikes, holidays, weather, in-service teacher training, bureaucratic demands, cancellations, and other distractions. While definitive data is not collected or available for most countries, what is available suggests a significant loss of instructional time. Research cited by Abadzi found that schools were open only 70 percent of official time in Mali, 57 percent of the time in Honduras, and about 54 percent of the time in Nepal. Furthermore, sub-national variation in instructional time and school year and day length can reasonably be expected to be substantial, with rural areas having the greatest reduction. Such variation was acknowledged, but not measured, by Benavot.

The pressure to increase attendance and meet the EFA access goals can also exacerbate the loss of instructional time. Many countries in all regions use the strategy of double or even triple shifts to compensate for shortages of teachers or school buildings. In these countries, such as Mexico, Senegal, and Bangladesh, the school day is broken into smaller periods. On average, children in Francophone African countries lose 32 percent of their class time (Abadzi, 2006).

Factor 2. Minimum Instructional Time

The 2005 Global Monitoring Report proposes that a quality education must start with at least 850 to 1000 hours per year of instructional time. In many developing countries, this target is difficult to reach with school days split into the two or three shifts required to achieve national coverage with limited infrastructure. Benavot and Amadio's 2004 study of instructional time (Table 1) found that regional averages for grades 1-3 are consistently below the minimum target of 850 hours, and that in four of the seven regions, the median annual instructional hours actually decreased between 1985 and 2000. The global average instructional time in 2000 was below the 850 hour target in all six primary grades.

Table 1: Median Yearly Instructional Hours in Grades 1 to 8, circa 1985 and 2000 (constant cases), by UNESCO Region*

UNESCO Regions	Period	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	# of Cases
SSA	1985	800	800	<i>847</i>	<i>884</i>	<i>908</i>	<i>908</i>	<i>918</i>	<i>918</i>	9-14
	2000	761	795	<i>870</i>	<i>888</i>	<i>925</i>	<i>939</i>	<i>1013</i>	<i>1013</i>	
AS	1985	<i>708</i>	<i>725</i>	<i>731</i>	<i>756</i>	<i>791</i>	<i>808</i>	<i>827</i>	<i>855</i>	14
	2000	<i>768</i>	<i>768</i>	<i>788</i>	<i>813</i>	<i>813</i>	<i>813</i>	<i>888</i>	<i>888</i>	
EAPA	1985	<i>657</i>	<i>674</i>	<i>784</i>	<i>797</i>	863	901	875	875	9-10
	2000	<i>676</i>	<i>711</i>	<i>817</i>	<i>821</i>	821	830	867	867	
SWA	1985	675	675	793	884	884	972	972	972	3-5
	2000	630	630	734	734	734	900	900	900	
LAC	1985	<i>726</i>	<i>730</i>	<i>748</i>	<i>758</i>	<i>790</i>	<i>790</i>	<i>922</i>	<i>922</i>	13-18
	2000	<i>786</i>	<i>786</i>	<i>796</i>	<i>796</i>	<i>800</i>	<i>800</i>	<i>945</i>	<i>945</i>	
NAWE	1985	813	813	859	859	867	860	<i>893</i>	915	13-17
	2000	770	770	808	808	840	840	<i>900</i>	900	
CEE	1985	617	631	666	709	761	785	825	<i>825</i>	10
	2000	561	587	627	645	729	782	818	<i>853</i>	
Global Medians	1985	<i>708</i>	<i>717</i>	<i>761</i>	803	828	840	<i>888</i>	<i>893</i>	71-88
	2000	<i>741</i>	<i>743</i>	<i>784</i>	798	809	813	<i>900</i>	<i>900</i>	

Note: Figures in bold italic indicate an increase in intended instructional time over the 1985-2000 period.

Key to UNESCO-EFA Regions—SSA: Sub-Saharan Africa; AS: Arab States; EAPA: East Asia and the Pacific; SWA: South and West Asia; LAC: Latin America and Caribbean; NAWE: North America and Western Europe; CEE: Central and Eastern Europe.

* Cited from UNESCO website; Instructional time tables by Benavot (2004)



In the context of international competitiveness, it is worth noting that increased instructional time is a topic of debate in developed countries even though the required instructional time is considerably higher than the GMR minimum levels. In the U.S., there is concern that American students spend less time in school than their peers in other industrialized countries (PBS, 2005). The U.S. school year of 180 days is considerably less than major competitors, such as China (251 days), Japan (243 days), and Germany (240 days). In terms of instructional hours on core academic subjects, U.S. high school students spend only 1,460 hours as compared to Germany's 3,528, France's 3,280, and Japan's 3,170. In this context, the challenges and requirements for developing countries hoping to become competitive are clear. At the top level of international education competition, the developed countries are devoting more than three times as much instructional time as are the developing countries. The gap in learning cannot help but to grow.

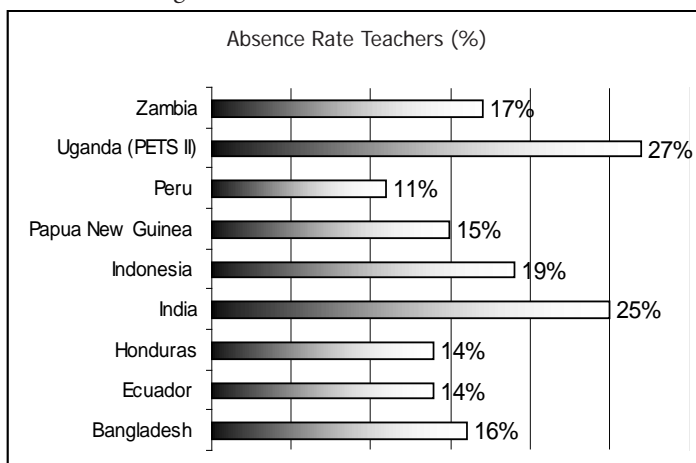
Factor 3. Teacher absenteeism and tardiness

Limited research is available about the extent, causes, and impact of teacher absenteeism on student learning. While there have been a number of surveys in specific regions in developing countries, few national surveys have been undertaken to determine the full scope of the problem. Very few developing countries have sufficiently robust information systems to collect, analyze, and report on average daily attendance of teachers and students, as is the common practice in industrial countries. As with other aspects of these unmeasured indicators, the lack of definitive research is somewhat counterbalanced by the widespread recognition, particularly in rural areas, that teacher absenteeism is a serious problem. Figure 5 illustrates indicative information from country studies.

The magnitude of the problem is supported from other sources as well. In a study of primary school teacher absenteeism in six developing countries—Bangladesh, Ecuador, India, Indonesia, Peru, and Uganda—and based on physical observations, an average of 19 percent of teachers were absent on any given day (Chaudhury, et al., 2005). The figures are even more startling when examined at national levels. In India, a quarter of teachers were considered absent from school, yet only half were in fact teaching in classrooms when observations took place. Across the countries surveyed, absence rates were higher in poorer regions, and in schools with poor infrastructure and no recent school inspections. This analysis indicated that in most cases, absence is not concentrated in a few repeat offenders, but is fairly widespread—teachers present less than 50 percent of the time were documented in four of the six countries surveyed.

As with any type of employment, some degree of absenteeism is natural. Normal reasons for absenteeism include family problems, health, pregnancy, or emergency leave. HIV/AIDS has become a significant factor in teacher attendance in some countries. Other causes are specific to the teaching profession or employment in cash economies, such as teacher training courses that take teachers out of classrooms without providing substitutes, assignments requiring travel, travel to collect salary, or educational leave (Rogers, et al., 2004). Teacher absenteeism is associated with a number of factors including poor, urban communities; limited monitoring and discipline by school directors; infrequent school inspections; and distance from the branch Ministry of Education office (Rogers, et al., 2004). In South Asia, head teachers attributed only 4 percent of absences to non-education-related official duties. Illness was cited no more than 15 percent of the time, even in countries such as Uganda or Zambia with high HIV/AIDS prevalence, where it would be assumed to affect teacher attendance. Unauthorized absences, leaving early, or arriving late account for between 30 and 50 percent of the reasons for absences. But in a sample of 3,000 government-run schools in India, only one teacher was reported as fired because of repeated absence (Chaudhury, et al., 2005).

Figure 5: Rates of Teacher Absenteeism



Source: PETS surveys.

Absenteeism rates at this level will clearly affect both the quality of learning, the motivation of students, and continuity of instruction. These levels, while shocking, probably understate the problem in several ways. First, the problem will be more emphatic in rural areas, isolated schools, and poor areas—the sub-national variation is likely to be considerable. Second, these numbers do not always include tardiness. Assuming a linear relationship between time and learning, the direct impact of teacher absenteeism to reduce potential student learning could range from 14–25 percent.

Neither teacher absenteeism nor tardiness is regularly monitored and reported in most school systems and neither forms part of the school management regime—this issue seldom informs policy decisions at the national level. Strategies for addressing absenteeism are varied, but must start by identifying the issue as a critical management concern. In Nicaragua, parental involvement and administrative autonomy positively influenced teacher attendance, especially in poor, rural areas (King & Ozler, 2001). Similarly, a national survey of teacher absence in Uganda showed that increased monitoring by district officials and proximity of a district education office positively influence teacher attendance (Habyarimana, 2004). Teachers with additional training after their pre-service programs, as well as teachers working in urban schools, are less likely to be absent. Furthermore, lower student-teacher ratios are also associated with lower teacher absence rates.

Factor 4. Student Absenteeism and Tardiness

Considerable statistical evidence exists about the great growth in student enrollment in the past decades. Unfortunately, students don't learn as a result of enrolling, they learn as a result of attending school on a regular basis. At this most basic level of the education production function, most education systems in developing countries neither collect nor analyze attendance data on a consistent basis. In the absence of reliable data on daily student attendance, there is little definitive information. However, periodic studies and anecdotal observations in many countries through random school visits show that registered students are frequently not in school.

A study in Bangladesh found that schools had no policies in place to address student absenteeism. Student attendance was sporadic; observed classes found that student attendance ranged from



43 to 67 percent (BEPS, 2004). Interviews with teachers indicated that only about half of the children regularly attended classes; 20 percent had excessive absences and another 30 percent were absent frequently enough to cause teachers concern. During the study period, half of the students were absent, half were tardy, and over 40 percent left early at least one day in the previous week. Tutors were engaged by almost half of the students to help them outside of school.

Studies have indicated a clear and mutually reinforcing relationship between attendance, school achievement, and promotion. In rural Honduras, a study on the relationship of school attendance and student achievement found that achievement gains influenced the demand for primary schooling and increased student attendance. “An increase in the average score by five points increases school attendance by three to seven days, or between 2 and 5 percent” (Bedi & Marshall, 1999). The strongest factors associated with gains in academic achievement in this case were student-teacher ratios, preschool programs, and teacher quality.

The available evidence supports the commonsense expectation that children who attend school regularly are more successful in school, and are more likely to be promoted. A project evaluation study in Guatemala found that children who were promoted from grade 1 to 2 had a significantly higher attendance and punctuality record than those that did not pass (Chesterfield, 2005). Children who had to repeat first grade were present only about two-thirds of the time, whereas promoted children were present over 80 percent of the time when classes were held (Table 2). A noticeable gender difference was also found in this study; girls had consistently poorer rates of attendance and punctuality than boys.

The study in Guatemala found that punctuality was the single most important variable explaining student promotion for first time students. This is not surprising, as students who arrive on time are able to follow explicit instructions provided by the teacher at the start of classes, whereas those who are late will have difficulty following the class assignments. The impact of punctuality on promotion is also clear. Punctual students were seven times more likely to be promoted than children who were tardy.

Table 2: Promotion by Participation Record and Gender

Participation Record		Overall	Girls	Boys
Attendance	Promoted	.81**	.78**	.84**
	Not Promoted	.67	.66	.68
Punctuality	Promoted	.80**	.78**	.83**
	Not Promoted	.67	.66	.69

t-test +significant at p £ .1; *significant at p £ .05; **significant at p £ .01
 Source: Chesterfield, 2005

As with teacher absenteeism, strategies for addressing student attendance must start with using attendance as a management tool, and in understanding the underlying causes of absenteeism. To some degree, there is a circular influence with other OTL factors—if the teacher does not regularly show up, little learning is taking place; and if the class size is unmanageable, students may not be motivated to attend. Older students who are falling farther behind because they cannot read well are also likely to be absent. Physical and sexual security, the need for child labor at home, and other opportunity costs may also be factors. Strategies for addressing absenteeism can include scholarships, food programs, school-parent activism to assure attendance, and systems of accountability (AED, 2006).

Factor 5. Appropriate class size and student-teacher ratios

A good deal of research and controversy has surrounded the question of ideal class size over the past 40 years. Many of the most rigorous studies have been based in the U.S. The first meta-analysis of class-size literature by Glass, Cahen, and Smith in 1978 indicated that students scored approximately 10 percentile ranks better on standardized tests in a class of 20 rather than 40, and that the “greatest gains in achievement occurred among students who were taught in classes of 15 students or less” (HEROS, 2003). Currently, evidence suggests that reduced class size does improve student achievement, especially in the early grades when measured against performance on standardized tests, and particularly for minority or disadvantaged students.

The fine distinctions of whether classes should have 15 or 20 students are largely irrelevant in the developing world. Class sizes of 80, 100, or even 200 have been found in countries after universal primary education (UPE) policies were implemented. Whereas student-teacher ratios at regional levels show averages of 43 in Sub-Saharan Africa, 21 in Latin America and the Caribbean, and 38 in South Asia, the sub-national variation is significant (UNESCO, 2006). As an example, the sub-national maps of class size and pupil-teacher ratio in Uganda (see Annex) clearly illustrate the range found within a given country.

Class size has been repeatedly shown to have an important influence on student achievement. As is the case in developed countries, class size studies in developing countries have shown that reduced student-teacher ratios improve achievement in the cases of South Africa, Israel, and Bolivia (Case & Deaton, 1998; Angrist & Lavy, 1999; Lavy, 1999; Urquiola, 2001). A large scale statistical analysis using school level data in Uganda from over 2,000 schools indicated that completion drops off sharply when the student-teacher ratio exceeds 50:1 (Moses, 2005). There is also some evidence that lower student-teacher ratios improve teacher performance and satisfaction. “Having fewer children in class reduces the distractions in the room and gives the teacher more time to devote to each child (Mosteller, 1995).”

The ideal student-teacher ratio remains open for debate. There is not a “perfect” class size; the dynamics of multi-grade classrooms, skill level of the teacher, cultural norms, and other factors may well impact the effectiveness of classroom instruction. The Fast Track Initiative (FTI) indicative framework, based on substantial research, establishes a target of 40 students per teacher as a useful benchmark. In the absence of a more definitive measure, the FTI proposed target seems a reasonable goal.

Factor 6: Learning materials are available to every student and regularly used

Learning materials incorporate a broad category of education-related resources that includes textbooks, instructional guides, workbooks, practice exercises, activities, tests, audio-visual materials, and supplementary readers in libraries, classrooms, or homes. Of these, textbooks are the most commonly utilized, studied, and documented input for classroom instruction.

Textbooks are recognized as a critical component of instruction; textbooks support the curriculum and relate directly to the syllabus of the course. During the 1970s and 1980s, school effectiveness studies highlighted the positive impact that relevant, good-quality, affordable textbooks had on achievement (Abadzi, 2006). The EFA 2005 Global Monitoring Report describes textbooks as an “enabling input,” an important resource that is intrinsically interrelated to the teaching and learning processes. Particularly in developing countries, evidence suggests that school effectiveness is linked to direct material inputs such as textbooks, and that textbooks are one of the most cost-effective means of positively impacting quality in poor resource environments (Crossley & Murby,



1994). As early as 1978, the World Bank issued a staff working paper examining the relationship between textbooks and achievement in developing countries. Based on a review of the evidence, “the availability of books appears to be the most consistent school factor in predicting academic achievement”, although the authors caution that the impact was not uniform across schools or countries (Heyneman, et al., 1978).

Availability of quality textbooks for every student in developing countries remains an elusive goal. Accurate data on availability are scarce. In 1989 the World Bank commissioned a research team to review studies produced by The Book Development Council from 1983 to 1989 and determine student-textbook ratios in developing countries (Paxman, et al., 1989). The findings showed wide variation across countries (1:1 in China, 22:1 in Tanzania, and 70:1 in rural Nigeria); within countries (3:2 for urban schools, 70:1 for rural schools in Nigeria); and across grade levels or subjects (5:3 for Portuguese books, 3:1 for math books in Mozambique).

In some cases textbooks were available but of such poor printing or binding quality that they lasted only a few months and necessitated regular replacement. Storage was also a problem when facilities were unavailable to guard books against weather. In rural Ghana, many books fell victim to severe termite damage. In a study of textbook availability sponsored by the International Institute for Educational Planning (IIEP) in the early 1990s, Zambia and Kenya had the lowest reported student-textbook ratios among 10 African countries of 30:1 (Crossley & Murby, 1994). Once the threshold of textbook availability is reached, teachers become the key determinant in putting this resource to its most effective use (UNESCO, 2005).

The ratio of students to textbooks may be the first important factor; the second important factor in the availability of learning materials is the right of students to take the textbooks home. These factors are clearly related—unless textbooks are provided at a ratio of 1:1, students cannot take them home. Even in cases where a sufficient number of books are provided, concerns about loss and damage restrict their use at home.

Little clear evidence exists about the impact on learning when students have freely available materials to use at home. Some studies have found that no difference in test results exists whether the ratio of students to textbooks is 1:1 or 2:1, at least when the textbooks are for in-school use only (Abadzi, 2006). However, when materials are shared, the impact of losses can be significant and reduce the actual availability to 3:1 or 4:1 over time. The lack of reading material means that substantial amounts of class time must be used for copying text, which further reduces available instructional time.

Given that the relative cost of textbooks and learning materials is low compared to infrastructure and teachers, they constitute a strategically important input that increases classroom efficiency and opportunity to learn. A concern about loss and replacement of some percentage of the books is a classic case of “penny wise, pound foolish.”

Factor 7. Time-on-Task

Little is definitively known about the key measure of time-on-task in developing countries, or the effective academic use of the school day. The total time available for schooling is based on policies determining hours of instruction for each subject, number of days in each school year, and number of years for mastery at each level. Beyond this issue, a critical factor is how time is utilized during the school day, and how much of the time is spent on instructional and learning activities. In the early 1960s, learning models were developed suggesting that individual learning

is a function of time spent on learning a task divided by the time needed to learn that task (Wyne & Stuck, 1982). Two significant factors that were included in the equation were opportunity to learn—the amount of time allocated to an academic task—and quality of instruction. Because these factors were directly under the influence of teachers, maximizing the relationship between these two variables became an educational priority. The term time-on-task came into popular use in the 1970s in the U.S. and refers to the amount of time that students are actively engaged in learning and therefore the intersection of the quantity and quality of classroom time.

While the idea of time-on-task seems fairly straightforward, the underlying elements are complex and difficult to measure. In 1990, David Berliner sought to explain the multi-faceted nature of instructional time by identifying nine elements, including:

- Allocated (scheduled) time: the overall and subject instructional times allotted by the state.
- Engaged time: time in which students are paying attention to materials with instructional goals.
- Time-on-task: a subset of engaged time, this measure captures student engagement only on a specific learning task, rather than general engagement that may not be related to the assignment.
- Academic learning time: a more complex measure of successful use of time-on-task for learning.
- Transition time and waiting time: two measures of non-instructional use of the allocated time.
- Aptitude and perseverance: measurements of student ability and willingness to engage in the academic task can also be measured as part of instructional time concepts.
- Pace: a measure of the instructional mix of content and time, and of the tradeoffs of breadth and depth.

In a comparison of instructional time in the U.S., where the average length of a school day is 6 hours and 35 minutes, teachers reported an average of 14 different activities during the school day. Of these activities, only 64 percent were related to academics, the remainder being used in maintenance, enrichment, and recess (Massachusetts 2020). Therefore, the initial measure of allocated time shows a relatively low emphasis on academic learning. Even this is likely to be an overestimate since studies consistently show that allocated time invariably overstates the actual time teachers devote to academic subjects. The situation in developing countries may be even more complex where an overcrowded curriculum and short school days can combine to have minimal time available for any given subject.

Beyond the measure of allocated time, the effort to measure effective instructional time begins with determining how much time the teacher actually spends engaged in the classroom, taking out the non-instructional transition and waiting times. In the worst cases, school observation visits found teachers spending class time smoking, chatting, reading a newspaper, or engaging in other non-instructional activities. Even when teachers are focused on the students, considerable time can be devoted to generic classroom management, transition between activities, preparation, and other non-instructional tasks. The more complex measures of time-on-task and academic learning time get at the core issues of whether the instruction is effective in engaging the students' attention on specific areas, and whether the students are successful. Large scale measures of student attention, much less learning, over the course of a day are largely unavailable for developing countries, because of the extremely labor intensive and costly nature of such studies.

Comparisons between actively engaged students and those less engaged, or engaged less frequently, indicate not only a quantitative but also a qualitative difference in learning gains,



motivation, self-confidence, interest, and attitude toward learning. The level of engagement is determined by a number of factors including the quality of instruction from the teacher and cognitive abilities of the students. “Students cannot actively engage in the learning if the instruction is poor and/or they are unable to comprehend what is being taught and what they are to do” (Bloom, p.340, 1980).

In a study based on classroom observations recording degree of involvement, low achievers spent less time during each class “on task” than high achievers, leading to an aggregate loss of time dedicated to academic activities. This suggests that over time, low achieving students fall further and further behind, which is corroborated by longitudinal studies of student performance on standardized exams (Good & Beckerman, 1978; Bloom, 1980; Stallings, 1980). Low achieving junior high students were engaged in academic activities 40 percent of the time compared with 85 percent for high-achieving students (Stallings, 1980).

The limited number of studies measuring time-on-task in developing countries have indicated that only 63 percent of class time, on average, was used in teaching activities, and 83 percent of that time was predominately lecture-based rather than interactive (Abadzi, 2006). These average numbers are considerably lower for low-performing schools.

Addressing the time on task issue is substantively different and more challenging than the other issues discussed. While many of the other challenges can be tackled with management tools at the school and community level, improving the effective use of instructional time requires a different set of interventions that center on teacher quality, curriculum, and materials. Options for addressing improved time-on-task have included programmed learning, teacher training, classroom management, and even highly scripted requirements. A critical place to start is improving means of measuring and tracking time-on-task in order to better understand the current status.

Factor 8. Learning to Read

The ability to read is a foundation skill for all subsequent learning in school. Students whose reading skills are weak will fall farther and farther behind as they move through primary and lower secondary school. The international data on learning achievement—and even on the most basic measure of reading—is quite weak. A recent publication uses household survey data to demonstrate that in many countries students are failing to master even fundamental reading skills (EPDC, 2005).

The relationship between early reading skills and academic survival and success is well established. Equally importantly, the relationship between the failure to learn to read, and falling farther behind each year is also well documented. The gap between readers and non-readers is not addressed in later years; it continues to grow. Recent work has moved this research forward with insights from neurological science as to how reading skills can be developed (Crouch, et. al, 2005; Abadzi, 2006). The keys to early reading appear to be a simplified and highly focused curriculum in the early grades, and an emphasis on developing reading and study skills. Abadzi’s work indicates that schools can target a verbal reading level of 60 words per minute to develop the basic brain functions needed for comprehension and learning.

This factor is also substantively different than the first six OTL elements, because achievement of early learning requires a curricular focus on a small number of objectives, effective pedagogy, good materials, and time. Assuring that the initial factors are in place is an essential, but not sufficient condition to have time to devote to reading instruction and acquisition. Programs

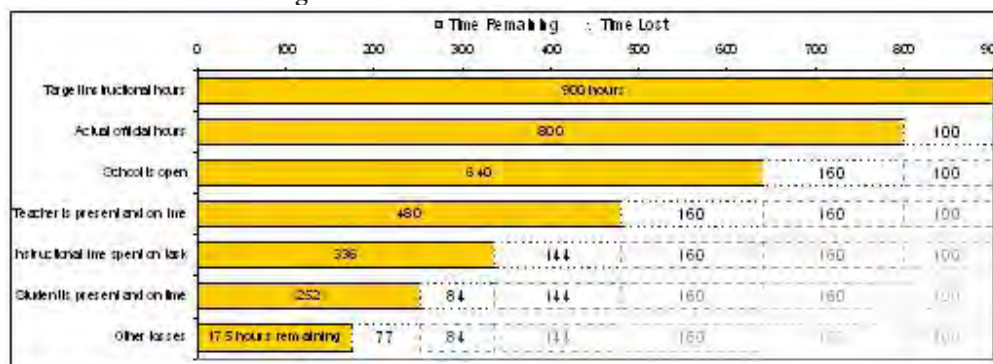
with a specific focus on early literacy and reading, such as the National Literacy Strategy in the U.K., Breakthrough to Literacy in Ghana and the reading program in Namibia emphasize having appropriate available materials and specified amounts of reading time each day. In light of the documented problems in many systems with large numbers of children with poor reading skills, the lessons of these reading-emphasis programs are particularly noteworthy. With sufficient emphasis and time, foundational reading skills can be achieved for many students in a relatively short period.

It is worth emphasizing that reading and literacy are complex skills and concepts. The teaching and assessment of literacy do not lend themselves to simple answers. However, the first step is to recognize the critical importance of early reading, and to concentrate curriculum, time, and pedagogy on seeking to achieve this goal.

The Opportunity to Learn Deficit

Aggregating the OTL factors into a measure of basic system effectiveness is complex and region- and context-specific. Clearly, the existing data is scattered and insufficient to draw global conclusions about the extent to which these factors influence learning. Moreover, the situations are very specific to countries and even sub-regions of countries—the total effective instructional time in rural areas may be very different than in urban schools, and for different reasons. However, the potential for substantial inefficiencies in the educational process is clearly significant. An illustrative analysis of cumulative loss of time-on-task demonstrates the potential loss to instructional time faced by students in developing countries (see Figure 4).

Figure 6: Cumulative Loss of Time-on-Task



These calculations of the overall loss of efficiency are, at best, rough estimates of the general order of magnitude. They do not include the inefficiencies imposed by excessive class size or inadequate reading skills. The estimate is conservative on every measure, but still results in students having only 15-20 percent of the desirable instructional time. This calculation is consistent with estimates of other analyses (Abadzi, 2006). If these estimates are remotely close to reality, the cumulative inefficiency of education systems indicates a large opportunity for improvement by addressing relatively straightforward management and input issues.

The Relationship of OTL and Learning Outcomes

The amount and rigor of substantive research on OTL and other effective instructional time measures is currently limited, with the recent World Bank study as the most comprehensive currently available (Abadzi, 2007). An EQUIP2 study on school effectiveness in Haiti (DeStefano & Miksic, 2007) included a modified form of an OTL index to assess the relationship



to learning outcomes. Two OTL data points were incorporated into their study: the number of days schools were open and student attendance. Of the 54 schools examined, they found that schools were open only 73 percent of the time and students attended only 77 percent of the time. The average showed that these schools provided only 57 percent of the possible opportunity to learn; consequently, these schools could only be expected to accomplish around 50 percent, at best, of what could possibly be covered in a given school year.

Table 3: Opportunity to Learn, September 2005–January 2007

	% Days School Is in Session	Attendance Rate	OTL Index
Community Schools	71%	75%	54%
Private Schools	75%	78%	59%
National Schools	73%	84%	62%
Overall	73%	77%	57%

In addition to these two data points, a modified version of the Early Grade Reading Assessment tool was used to correlate learning and opportunity to learn (Crouch et al, 2005). Given tests in their native and instructional language of Haitian Creole, students were evaluated on their ability to recognize individual letters, identify words in isolation, and read short sections of text. The established threshold associated with reading comprehension is 60 words per minute, but reading at least 30 words per minute indicates a preliminary benchmark that students have learned to recognize and decode some words. In this case, the majority—86 percent—of students tested read well below the established threshold of 60 words per minute; almost 60 percent could not read 30 words per minute.

Table 4: Reading Fluency Thresholds

	Number of 3rd Grade Students Tested	Percentage of Students Reading X wpm
From 0 to 30 wpm	95	59%
From 31 to 60 wpm	44	27%
Over 60 wpm	22	14%
Total	161	100%

According to this analysis, the combination of school days lost and low average student attendance accounted for 55 percent of the variance in student performance. Results were further disaggregated to demonstrate regional variation: top performing schools provided a 26 percent greater opportunity to learn than the lowest performing schools. These results highlight the strong relationship between OTL measures and learning.

Strategies for achieving OTL

It is worth emphasizing that much of the efficiency loss in OTL can be addressed through relatively straightforward efforts to prioritize management attention to these fundamental issues. This is not to say that they are easy to address—as discussed, there are fundamental underlying causes of teacher absenteeism, student absenteeism, school closings, and effective time-on-task, among others. However, the biggest immediate obstacle is that the issues are not currently being systematically addressed.

The most significant finding, in some ways, was the lack of available data for any of these issues that are so central to the efficiency of the education system. The simple fact is that in most countries no one can answer the most basic questions: How many days are the schools open? How many days do teachers miss each year? What is the average student attendance? Are learning materials available for every class? How many actual hours of instruction in reading and basic academic subjects are received? Are students learning to read? How much classroom time is allocated for learning? Do teachers use the time efficiently? The answers to these basic questions are unknown because they are not being asked. They are not measured; they are not tracked. No one is held accountable for a failure to provide the basic opportunity to learn. One of the fundamental precepts of evaluation and management is that managers pay attention to what is tracked and reported. Since none of these elements is regularly tracked or reported, it is not surprising that managers do not focus on improving them.

Few if any donor programs have focused on these issues as a priority area. The Fundamental Quality Level (FQL) approach used in a number of African countries, such as Benin and Guinea, established general standards for provision of school inputs, but did not specifically address the management aspects of time-on-task. Two recent studies of the patterns of donor investment (World Bank, 2006; Chapman & Jester Quijada, In Press) identified the priority strategies used in major donor education projects over the past 15 years. While some aspects of the OTL issues may have been included under general rubrics such as “improved management”, teacher salaries and incentives, teacher deployment to underserved regions, and community participation, none of the documentation indicated that the core OTL issues were a priority. None of the projects included cumulative time-on-task as either a priority policy or operational issue. The cumulative investment for USAID alone over this 15 year period was over \$2 billion, with the primary focus on curriculum reform, materials development, teacher training, information systems, and policy. From the prism of this OTL analysis, it could be argued that over 80 percent of this investment was severely undermined by the failure to address the most foundational elements of education systems.

If OTL factors are being targeted and measured through school and community management, significant improvements are possible. It is important to recognize that problems such as teacher and student attendance that look insolvable at the national level can be reasonably managed at the school level, where human interaction is possible. The use of community and school information systems, such as school self assessment in Namibia (Gillies, 2004) and school report cards in Central America (AED, 2006) have mobilized the school community to identify and address basic issues such as teacher and student attendance and punctuality. Parent volunteers implementing school report cards reported each day on the school hours and teacher attendance. Volunteers at a local level identified the individual children with attendance problems and addressed them at the family level. In Namibia, school management committees diagnosed basic problems and set targets in the school improvement plan. Teachers in Namibia completed self assessments to identify their ability to use time effectively.

Some national systems have begun to track and report on many of the OTL factors. In El Salvador, a set of school planning and assessment tools, “la ruta que tomamos,” includes explicit measures of student and teacher attendance, materials, and student learning of basic skills. These data are directly incorporated into school improvement planning.

The key finding of this paper is not that there are simple answers to the complex challenge of addressing time-on-task, absenteeism, or other issues. It is that these issues need to be recognized



as critical constraints to learning outcomes and education system improvement. These OTL factors need to be given priority in terms of donor and country management systems, and then tracked as key system indicators. An important starting point will be the systematic inclusion of tracking systems and management tools in USAID projects, and the use of OTL indicators to inform decision making and analysis by ministries and donors in program and policy design.

There are three general strategies for addressing OTL issues in partner countries: 1) incorporate OTL issues and awareness in activities and assistance programs such as teacher and principal training, 2) incorporate OTL measures in management and information systems at the school level, and 3) raise awareness by tracking an OTL Index (ideally on a sub-national basis). This strategy involves developing explicit management tools and models that can be integrated into the regular professional development programs in the country and could include teacher training, principal training, supervisor training, and engagement of parents and community school boards.

Table 5: Illustrative OTL Index—Primary School

Factor	Target	Rating High	Rating Medium	Rating Low
Official instructional time	950 hours	950+	850-950	Below 850
Schools open	100% of official	90%+	80 -90%	Below 80
Teacher attendance and punctuality	90% of instructional hours	90-100%	80-90	Below 80
Student attendance and punctuality	Avg Daily on-time Attendance 95%	90%+	75-89%	Below 75%
Pupil-Teacher Ratio	40	30-40	40-49	50+
Learning materials	1:1, available and used, all year	Material for each student that they can take home	Materials generally available	Materials late, not available to all students, not used
Reading score	Country target: words per minute	Language specific	Language specific	Language specific
Time on Task	80% on academic purposes	70% +	60-70%	Below 60%
Score		5	3	1

The EQUIP2 project is currently expanding on the Haiti work described above to develop and pilot a methodology and instruments for measuring and tracking a comprehensive OTL index in a form that is not simply a data collection activity but rather is intended to directly inform programmatic and school management decisions. This work will be piloted in a number of countries in 2008. Determination will be made as to whether rubrics, such as that shown in Table 5, or an index is most useful. Ultimately, the intent is to have an index of effective instructional time.



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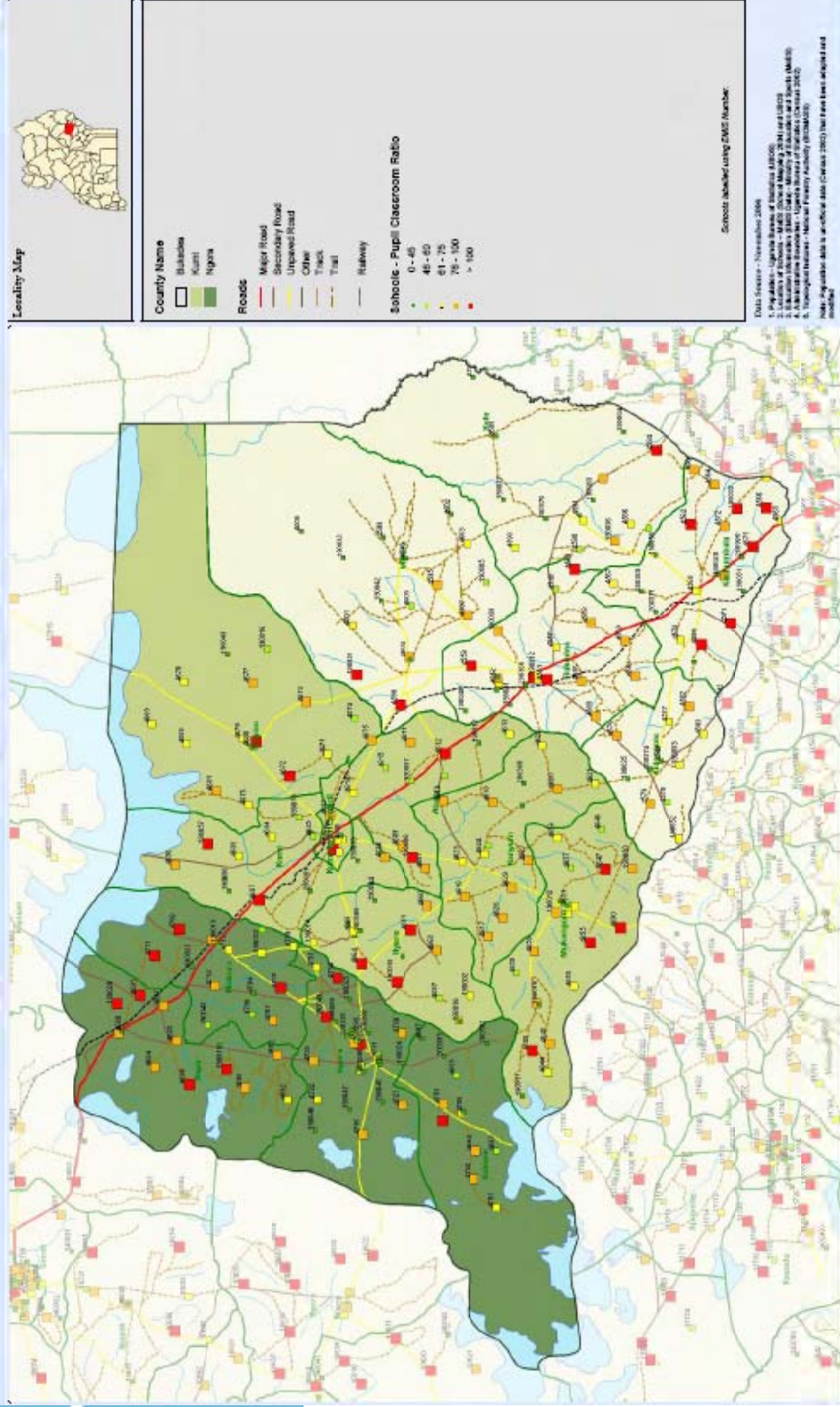
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Annex



BASE MAP LEGEND

- Uganda Boundary
- District Boundary
- County Boundary
- Water and Canals
- Rivers
- SubCounty

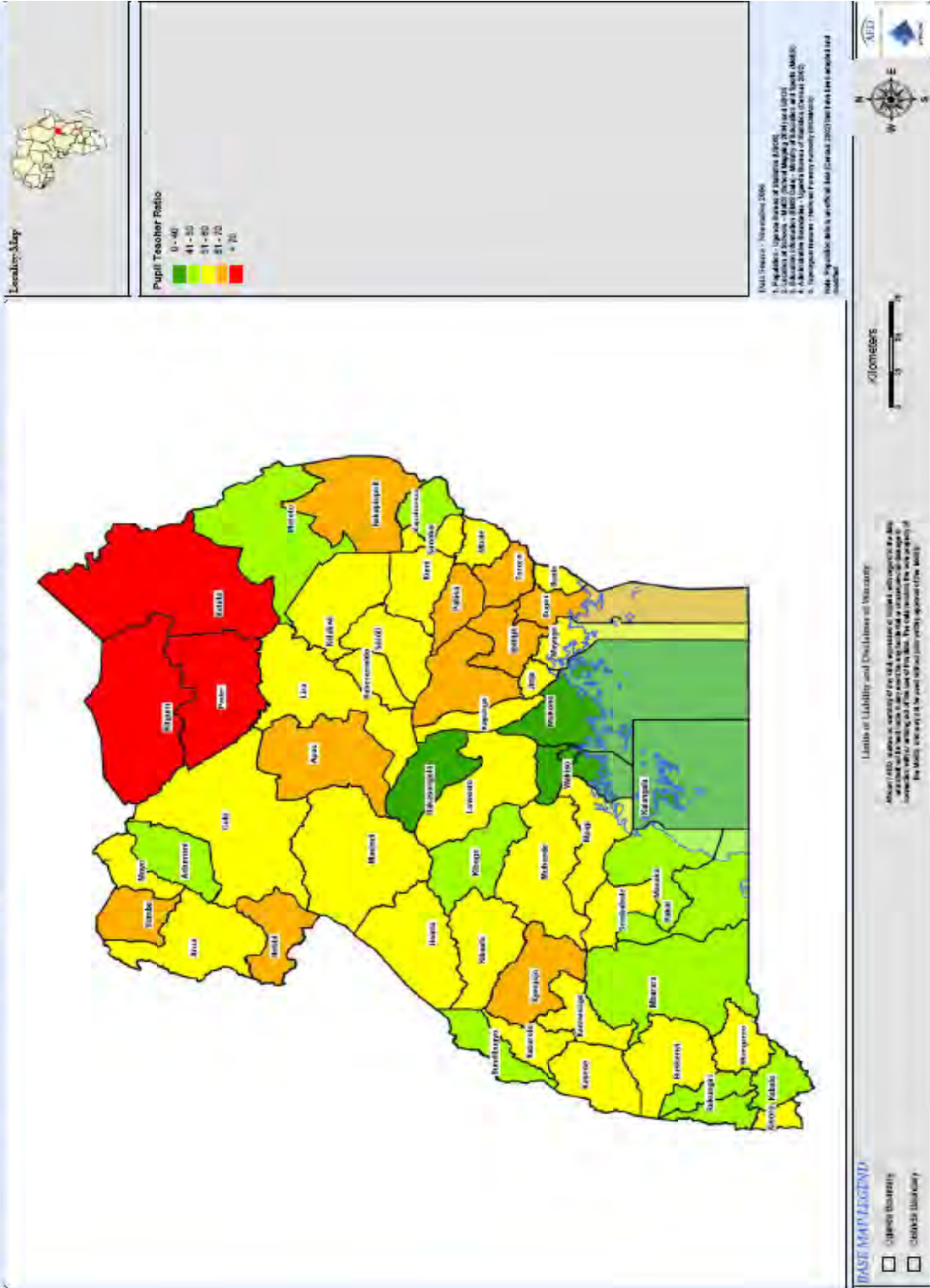
Scale: 100 Kilometers

North Arrow

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School Mapping
Primary Schools - Pupil Teacher Ratio





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