Uganda Note

Note No. 10 – Education

SABER Equity & Inclusion Program

SCHOOL FACILITIES AND CHALLENGES IN CONSTRUCTION

Sriram Bhagut Mathe, Quentin Wodon, Omer Nasir, Clarence Tsimpo, Innocent Mulindwa, and Elizabeth Ninan

March 2016

KEY MESSAGES:

- School facilities are considered adequate at best by only a third of head teachers in primary and secondary schools. Investments to upgrade facilities, including classrooms, are needed.
- Challenges were encountered in school construction under the UPPET Adaptable Program Lending 1. Lessons learned are shared to improve school selection and design, procurement, and management in order to reduce the risk of cost overruns and delays in construction.

Introduction

As is the case in many other low income countries, Uganda suffers from substantial school infrastructure gaps, which need to be addressed to better serve the student population. Due to ambitious goals for the education system and rapid population growth, the number of children in primary and secondary school is expected to nearly double overall by 2025 versus the size of the education system a dozen years earlier. This dramatic expansion will require building new schools apart from improving/expanding existing ones.

This note focuses on two topics related to school infrastructure and construction. The first part of the note provides a rapid diagnostic of the state of school infrastructure today in Uganda. The second part of the note discusses implementation challenges in school construction by looking at the lessons that can be learned from the experience of the Universal Post Primary Education and Training (UPPET) Adaptable Program Lending 1 (APL 1) Project, in terms of the selection of the schools for investments and design as well as procurement challenges, costs and delays.

Box 1: Note and Series Primer

Why a series of notes on education in Uganda? The Ministry of Education, Science, Technology and Sports (MoE) is preparing a new education strategy. This note is part of a technical assistance task at the World Bank to help inform this new strategy and the country's efforts to ensure learning for all.

What are the topics discussed in the series? The series looks among others at the importance of education for Uganda's development, education sector priorities including options and trade-offs, the efficiency and effectiveness of education expenditure and financing modalities, and implementation challenges for education interventions. Additional topics, including the importance of early childhood development and gender gaps in education, are also considered.

What is the question asked in this note? The question is: What are the gaps in school infrastructure today in Uganda, and what are implementation challenges in school construction?

How is the question answered? Statistical analysis of various sources of data is used to assess school infrastructure gaps. In addition findings from a recent World Bank project help inform implementation challenges in school construction.

In Uganda, there are substantial school infrastructure gaps, which need to be addressed to better serve the student population.

Information on the characteristics of a representative sample of schools is available from the community module of the Uganda National Household Survey (UNHS) for 2012/13. Table 1 provides basic statistics on some of the characteristics of the school. The indicators include the number of classrooms in a school, the provision of housing for teachers, the availability of a library, the number of toilets or latrines, the pupil-classroom ratio, the pupil-latrine ratio, and an assessment by head teachers of whether facilities are adequate for classrooms, teacher housing, libraries, and toilets/latrines, plus laboratories for secondary schools. Apart from data by type of provider, location and region, communities are classified into three terciles of well-being from the poorest (T1) to the richest (T3).

- *School infrastructure in comparison to needs as proxied by the number of students:* In primary schools, the average pupil-classroom ratio is very high, especially in poorer and rural communities. The ratio is also higher in public than private and NGO/religious schools. At the secondary level, the pupil-classroom ratio is lower, and differences between types of schools or communities are also smaller. Similar findings tend to be observed for pupil-latrine ratios.

- *Adequacy of facilities:* Only about a third of head teachers consider classroom, library, and toilet facilities in their school as adequate. The proportion is much lower for teacher housing. There are again differences between public and private schools, with public schools faring worse.

School facilities are considered as adequate at best by only a third of head teachers in primary and secondary schools. For some facilities, the ratings are even lower.

Data are also available (although not shown in table 1) on whether schools have computers as well as connectivity, with connectivity measured in terms of connection to the internet, an official phone (landline or mobile), a public phone, and a television for staff. Two thirds of secondary schools have computers, versus only one in ten primary schools. Only a minority of schools have official or public phones, as well as a television for staff. Poorer and more remote areas are, as expected, much less well served, with the capital city of Kampala being much better served than other locations.

Table 1: Basic Statistics on School Facilities in Uganda, 2012/13

	Provider			Location			Region				Welfare Tercile			Total
	Public	Priv.	Faith	Kamp.	O. U.	Rural	C.	E.	N.	W.	T1	T2	T3	
Primary														
Classrooms	9.2	7.7	6.8	10.2	10.3	8.3	8.2	9.5	9.6	8.6	9.4	8.4	8.9	8.9
Teacher houses	5.2	5.6	4.8	8.4	5.3	5.1	5.3	4.0	7.2	3.7	5.7	4.9	5.1	5.3
Library	1.1	1.4	1.0	1.0	1.0	1.3	1.0	1.1	1.4	1.3	1.5	1.0	1.1	1.2
Latrines	8.6	5.9	6.8	12.6	7.7	7.9	6.1	8.7	7.4	10.4	8.9	7.5	7.9	8.0
Pupil per classroom	75.2	30.7	39.2	54.6	63.6	69.3	52.2	75.9	87.6	56.7	78.7	70.7	57.0	67.0
Pupil per latrine	80.7	39.9	39.5	43.8	85.3	73.1	70.1	82.9	112.9	46.8	82.5	79.4	64.4	73.9
Adequate facilities (%)														
Classrooms	25.6	56.4	44.8	31.8	38.9	29.6	38.4	27.9	28.7	30.4	32.0	26.2	35.8	31.9
Teachers' houses	12.8	16.9	27.0	13.3	9.4	14.8	10.7	12.9	21.9	6.0	21.3	13.6	7.6	13.5
Library	31.0	32.5	34.6	21.8	32.2	33.0	37.1	24.1	40.5	25.7	39.3	24.3	32.8	31.4
Toilets/Latrines	24.1	50.6	36.2	45.7	33.1	27.1	34.6	30.9	32.6	18.1	31.2	26.8	29.8	29.3
Secondary														
Classrooms	10.5	7.8	6.3	13.6	11.1	8.2	10.0	9.7	8.8	8.0	8.5	9.1	9.6	9.2
Teachers' houses	6.9	6.7	6.5	12.8	7.8	6.2	6.9	6.0	7.6	6.4	7.6	6.2	6.7	6.8
Library	1.1	2.0	1.0	1.0	2.4	1.1	1.1	2.6	1.2	1.0	1.2	2.5	1.1	1.4
Toilets/Latrines	9.9	9.0	8.4	15.7	9.8	8.8	8.6	8.2	8.6	12.3	8.9	8.5	10.3	9.4
Pupil per classroom	55.3	48.3	42.0	79.7	57.1	48.4	55.1	57.7	49.5	48.4	52.6	51.5	55.3	53.4
Pupil per latrine	59.1	41.9	31.5	68.9	65.1	45.0	63.9	68.0	50.4	31.3	50.3	55.2	51.7	52.2
Adequate facilities (%)														
Classrooms	26.2	53.4	39.4	59.9	38.2	35.0	42.1	31.0	45.1	30.3	38.2	30.9	40.6	37.1
Teachers' houses	13.0	19.7	24.2	4.1	8.0	18.8	8.4	20.0	27.0	12.4	26.8	17.8	8.7	15.8
Library	27.7	45.3	41.2	37.5	37.0	34.6	35.3	36.2	55.8	15.1	45.4	28.0	34.9	35.6
Toilets/Latrines	25.9	53.7	51.2	57.4	41.5	35.4	44.7	37.4	43.3	25.7	38.2	34.8	40.1	38.1
Laboratories	26.8	38.8	41.5	33.9	36.9	30.5	30.6	41.3	39.4	19.0	37.6	27.9	32.4	32.5

Source: Tsimpo and Wodon (2016a).
Note: O.U = other towns apart from Kampala.

Differences in adequacy of school infrastructure between types of schools as well as by location and region are confirmed through regression analysis.

Simple indices can be defined in order to summarize the adequacy of school facilities versus needs as proxied by the number of students in a school. As an example, Tsimpo and Wodon (2016) define a classroom availability index (CAI) and conduct an analysis of the correlates of that index. The results are shown in table 2. They confirm that after controlling forlocation, region, and community welfare level, private and NGO/religious schools still have a much higher CAI than public schools. This is the case for both primary and secondary schools. Schools in Kampala have advantages over rural schools among primary schools. The Central region tends to be better than the Eastern, Western, and Northern regions. Based on the location and region as well as the type of school, the welfare level of the community does not have a statistically significant effect on the CAI, suggesting that location drives the apparent correlation between community welfare and lack of classroom availability.

Table 2: Correlates of the Logarithm of the Classroom Availability Index, 2012.13

	National	Urban	Rural
	Primary Schools		
Type of school			
Private	0.8232***	0.7175***	0.9359***
NGO/Religious	0.5215***	0.7298***	0.3445**
Location			
Other towns	NS	NS	-
Rural	-0.1895***	-	-
Region			
Eastern	-0.2200***	-0.4310***	-0.1025
Northern	-0.1730***	-0.2619**	-0.0694
Western	0.2424***	NS	0.3810***
Welfare			
Tercile 2	NS	NS	NS
Tercile 3	NS	NS	NS
Constant	4.4546***	4.5034***	4.1518***
	Secondary Schools		
Type of school			
Private	0.4066***	0.5241***	0.3561***
NGO/Religious	0.5161***	0.5066***	0.5225***
Location			
Other towns	NS	NS	-
Rural	NS	-	-
Region			
Eastern	-0.2453***	-0.2620**	-0.2296**
Northern	NS	NS	NS
Western	-0.1893***	-0.2115*	-0.1658*
Welfare			
Tercile 2	NS	NS	NS
Tercile 3	NS	NS	NS
Constant	4.3433***	4.2791***	4.4049***

Source: Tsimpo and Wodon (2016a).
Note: Statistical significance: *** p<0.01, ** p<0.05, * p<0.1.
NS = not statistically significant. Reference categories are public schools, Kampala location, Central region, and bottom tercile.

Part of the gaps in infrastructure in some schools stem from the fact that the allocation of resources between schools does not necessarily match needs.

A separate note in this series discusses the issue of the allocation of resources between schools in some details. Here, the focus is on classrooms only with a rapid summary of key findings. Table 3 provides data on the quality of the allocation of classrooms to needs as proxied by the number of students in a school. The measure of "goodness of fit" used is the R-squared value for a (univariate ordinary least square) regression of the number of classrooms in a school as a function of the number of pupils. A higher R-squared value indicates a better fit between the two variables, hence a better allocation of resources[1]. The analysis is based on a representative sample of 876 primary schools and 898 secondary schools in the UNHS for 2012-13.

Resources (classrooms) are better matched to needs in private schools despite the fact that public schools are centrally managed. Allocations of new classrooms in public schools should aim to reduce disparities between schools in the availability of classrooms.

Table 3: Correspondence between the availability of classrooms and the student Population, 2012-13

	R^2 for Primary	R^2 for Secondary
Location		
Kampala	0.2438	0.5340
Other town	0.3728	0.5190
Rural	0.3124	0.5276
Region		
Central	0.3714	0.6671
Eastern	0.5039	0.6782
Northern	0.1840	0.5782
Western	0.4242	0.3723
Tercile		
T1	0.2368	0.4895
T2	0.4082	0.5566
T3	0.3672	0.5094
Provider		
Public	0.3182	0.4611
Private	0.4333	0.6174
NGO/Rel.	0.2757	0.5988
Total	0.3191	0.5249

Source: Tsimpo and Wodon (2016a).

There are major differences according to location as well as regions, with the best allocation (given the available stock of classrooms) observed in other towns for location and in the Eastern Region for regions. Allocations tend to be more equitable among communities in the middle of the distribution of welfare. In terms of types of schools, the best allocations are observed among private schools, suggesting that those schools may be more homogenous

[1] The R-squared value is the share of the variance in the number of classrooms between schools that is explained by differences in the number of students in the schools.

in terms of classroom availability than public schools even though public schools are centrally managed. This suggests that allocations of new classrooms through construction should aim to reduce some of the disparities between schools in the availability of classrooms versus the number of students in the schools. However, as will be discussed in the second part of this note, other criteria should also be taken into account apart from comparing classrooms to student enrollment in order to allocate resources in such a way that disadvantaged schools benefit from a fair allocation of resources.

Perceptions data also suggest that inadequate facilities are a major constraints for head teachers.

School infrastructure gaps are considered major constraints by head teachers when asked to identify the main problems they face in running their schools. As shown in Table 4, the most often cited "serious" or "most serious" problem identified by teachers was inadequate or lack of teacher accommodation[2]. Inadequate buildings were cited as the second most common issue – the focus of this note. While on some issues such as teacher absenteeism, improvements were mentioned by head teachers, few improvements over time were mentioned for teacher accommodation and the adequacy of buildings.

Inadequate buildings are cited by head teachers as the second most common serious issue they face in their school after lack of teacher accommodation.

Table 4: Share of Head Teachers Stating that a Problem is Serious or Most Serious (%), 2009-10

	Type of school		Total
	Public	Private	
Delayed remittance of funds	6.8	3.4	6.0
Inadequate buildings	37.3	27.6	30.9
Lack of staff	18.1	10.3	17.6
Lack of qualified teachers	3.6	3.4	3.9
Insufficiency of funds	15.3	34.5	18.0
Long distances covered by pupils	0.0	3.4	0.4
Pupils are hungry	8.8	3.4	7.7
Bad behavior/strikes by pupils	1.2	0.0	1.3
Irregular attendance by pupils	11.6	3.4	11.2
Lack of teachers accommodation	45.8	20.7	42.5
Teacher absenteeism	0.8	0.0	0.9
Bad behavior/strikes by teachers	-	-	-
Lack of parental interest	22.9	10.3	21.5
Insecurity	6.4	0.0	5.6
Other	32.9	48.3	37.3

Source: Tsimpo and Wodon (2016b).

[2] Teacher housing is a difficult issue because the provision of housing for teachers is expensive, and it is not always clear that such provision would have a large positive effect on education outcomes for children, even though head teachers do indicate that lack of teacher accommodation is a problem they face.

II. IMPLEMENTATION CHALLENGES

Substantial investments in school infrastructure were made under the Universal Post Primary Education and Training (UPPET) Adaptable Program Lending 1 (APL 1) Project financed by the World Bank.

The project, hereafter referred to as UPPET APL1, was implemented in 2009 in the context of the Government's USE policy. The MoES identified 758 Government USE schools, including 268 with unfinished infrastructure, spread over 648 sub-counties in 80 districts. The list of eligible USE schools was increased to 802 in January 2010. While not all eligible schools benefited from the project, most (659 beneficiary schools) did. A total of 464 rural schools (71 percent of the total), 119 schools in peri-urban areas (18 percent) and 66 schools in urban areas (10 percent) benefited from the project. The number of classrooms built in the three locations was 1,574 (62 percent), 528 (21 percent) and 453 (18 percent). Classroom construction took up more than 50 percent of the construction budget, but other facilities were also built. At the school level, the average number of new classrooms built in the schools was seven, nine and 13 in the three types of location, raising some concerns about the risk of over-provision of classrooms in many schools.

Launched in 2009, the UPPET APL1 project helped improve school facilities in 659 beneficiary schools. Lessons can be learned from the project in terms of implementation challenges for construction projects.

Box 2: Adapting Schools to Pedagogic Needs

This section focuses on issues in the implementation of civil works. Many other issues related to school facilities are not discussed here, but could be the topic of future work. For example, one issue relates to whether school construction is adapted the pedagogic needs of the students (including in terms of the availability of laboratories, libraries, multi-purpose rooms with reading corners and moveable furniture, multi-grade classrooms set up for use by peer groups, as a few examples). Another issue is the availability of latrines and water points, including the variable costs and environmental risks associated with them, and the impact that they could have on encouraging attendance, especially of adolescent girls. There are also on-going discussions in some countries of the idea of regrouping schools to offer better education to a critical mass of students, with student dorms and staff housing as part of the thinking. Finally, the issues of utilities and the possibility of integrating electricity, use of renewable energy, connectivity, and other aspects are also topics of interest, as are risks of vandalism. Again, these issues are not discussed and left for further work.

Overall, through the project and other interventions, the number of permanent secondary classrooms in the country increased from 9,243 in 2009 to 14,755 in 2013. The total number of classrooms including non-permanent classrooms increased from 10,731 to 16,228 over the same period resulting in an overall increase of S1-S3 students from an average of 260 to 330 per secondary

school (407 students in USE schools and 234 in non-USE schools on average in 2013). While this was a significant achievement, a number of issues were observed during the implementation of the project from which useful lessons can be drawn.

These issues relate to the choice of beneficiary schools, the mismatch between standard drawings and different site conditions resulting in contract variations, and large construction contracts that resulted in problems during construction due to incapability of local contractors and school management committees to administer the contracts. Some of these problems, which should have been solved expeditiously at the school level, or by the supervising consulting firms on site or at the Ministry level, were left unaddressed for long periods further complicating challenges on site and delaying construction. The efficacy of the technical supervising firms in ensuring both quality and timely completion was limited. In spite of firms getting lucrative contracts, their overall performance against quality and timely construction was also limited. In spite of these problems and construction delays, the project's achievements were substantial. Still, lessons can be drawn from the difficulties encountered in implementation (the following sections are based on the detailed assessment provided by Mathe, 2016).

More precise criteria should have been proposed for the selection of eligible/beneficiary schools to minimize subjective judgment and interference.

In accordance with the Government's USE policy, the selection criteria for eligibility were the following: (i) existing Government USE schools, (ii) double shift schools, (iii) qualifying rural/peri-urban schools, (iv) schools with temporary classrooms, (v) at least one school per sub-county, (vi) priority given to government schools versus private schools, (vii) potential for expansion in the school, and (vi) exceptions/affirmatives.

Based on an analysis of the schools which were selected, the criteria were not specific enough to prevent subjective judgment or interference from vested bureaucratic and political interests at the local, regional and national levels. The criteria could have been more specific in favor of disadvantaged rural and peri-urban schools in areas with low enrollment rates and inadequate facilities, so as to increase enrollment capacity and improve equity and accessibility in favor of disadvantaged regions as well as remote and hard-to-reach areas. Schools with low or very high enrollment among girls should also have been given higher priority to increase girls' enrollment or ease overcrowding.

The main criterion used in selecting the schools seems to have been enrollment as stated by the MoES in March 2010: *"The facilities have been allocated based on needs evidenced by the school enrolment and the available classroom stock. Consideration was also made in respect to the Student Classroom Ratio (SCR 60:1)"* This criterion made sense to some extent, as discussed above, but at the same time it ended up favoring the selection of larger and urban or peri-urban schools at the expense of the smaller rural schools in more disadvantaged areas. Furthermore, there should have been a ceiling on the number of new classrooms to be built and the number of incomplete classrooms to be completed in any one school so as to limit the size of the school contracts to better match the capacity of local contractors and school management committees responsible for implementing and administering the contracts.

Criteria for school eligibility could have been more specific in favor of disadvantaged rural and peri-urban schools in areas with low enrollment rates and inadequate facilities. Schools with low or very high enrollment among girls could also have be given higher priority to increase girls' enrollment or ease overcrowding.

Many schools were given the responsibility of managing large contracts of US$ 125,000 to US$167,000. More than 30 percent of the schools had to manage contracts of more than $200,000. Some had to manage contracts of more than $400,000. These contracts were beyond the contractual and technical capability of many schools. The size of the contracts was also problematic for many local contractors, resulting in cash flow problems, unnecessary delays in construction as well as stoppages and abandonment of sites. While many contractors seemed to be unscrupulous, some of the contractors, who appeared to be serious and genuine, did face serious cash flow problems.

In addition, in a number of schools, there were siting and soil problems, which resulted in contract variations that were not addressed in a timely manner. Due to the nature of the fixed-sum contracts, the contract variations could have been avoided through site visits during the school selection stage, formulating appropriate master plan and site plans of the facilities and calculating the exact bills of quantities taking into account the site and soil conditions.

Finally, the selection criteria should have been more clearly spelt out to minimize risks of influences in the selection of schools. Schools should have been thoroughly studied and surveyed, as well as shortlisted according to agreed and clear-cut and transparent criteria. To achieve a fair and acceptable regional distribution of resources, regional percentage distribution should have been specified at the beginning taking into account existing regional patterns and regional needs. Ideally, the targeting of schools should be finalized during the project preparation stage and tentative costing should be vetted and checked by an independent non-governmental entity, again to ensure fairness, transparency and cost-effectiveness.

Costing should be vetted and checked by an independent non-governmental entity to ensure fairness, transparency and cost-effectiveness.

In terms of the choice of works to be undertaken, incomplete classrooms should be avoided given issues of safety and stability of the structures as well as unforeseen costs. Completing incomplete classrooms is very complicated in comparison to building new classrooms. Foundations may be sub-standard, the superstructure may follow inadequate or insufficient architectural or engineering norms and standards, and time may have weakened the unfinished superstructure. Finally, completing an unfinished classroom may actually end up leading to higher unit cost and lower durability compared to rebuilding a new structure. Multi-storied structures should also not be included until they are designed properly taking into account architectural, structural, seismic and environmental considerations.

The performance of various projects is dependent on the procurement modality.

Three different procurement modalities have been used in different school projects with varied performance outcomes. The project relied on the SMC modality. Yet, the district modality has been shown to typically perform better, especially in the case of medium-size contracts and where medium-size local contractors are available within the districts.

- In the *District modality*, the procurement, financial management and construction supervision are the responsibilities of the districts in line with the constitution, local government Act and government policy of decentralization. Funds are released by the Ministry of Finance, Planning and Economic development (MoFPED) to the Districts upon advice by the MoES. The Chief Administrative Officer (CAO), district CC and PDU are responsible for the management and approval of the procurement processes, awards and contracts. Beneficiary schools participate in some critical decisions and in monitoring of construction, with responsibility for the day to day oversight. The District Engineer is the project manager on behalf of the District. The District modality performed well on quality, cost and time although there was room for improvement in contract management. Financial management aspects were satisfactory. But district procurement modality may lead to risks of undue political influence by district authorities. To reduce this risk, oversight and monitoring by central authorities needs to be incorporated in the construction guidelines to ensure good governance.

- In the *SMC modality*, contracting responsibilities are delegated to the schools. Unfortunately, SMCs have limited capacity for evaluating bids and awarding contracts, nor do they have technical expertise in civil works procurement, especially if packages are large. For this modality to work, technical training must be provided to SMCs. In principle, this risk factor in UPPET APL1 was minimized by the use of construction supervising firms to assist schools in the technical evaluation of bids as well as in construction supervision, but this did not work very well. The SMC modality performed better in payment timeliness and overall timely completion; this was however achieved in an environment of high risks due to absence of certification and payment control systems; furthermore, the SMC modality had a high risk of not adhering to procurement and financial management procedures.

- Finally, under the *Ministry modality*, most functions related to procurement and oversight are centralized. This modality performed better in compliance with established procurement and financial management procedures but there is a high risk of delays in delivering the facilities to schools due to delays in procurement; additionally, ministry projects have low ownership among the targeted beneficiaries. Therefore, this modality is appropriate mostly for very large contracts which can attract good and reputable national and international contractors, in which case, centralized procurement is appropriate.

The project relied on the SMC modality. Yet procurement modalities should be suited to the nature of the contracts in order to achieve quality of construction and timely completion while also ensuring value for money. In many aspects, the district modality tends to work best compared to the delegated SMC or centralized Ministry modalities.

Drawings, specifications, and bills of quantities should reflect site conditions and be harmonized to reduce mistakes and contract variations.

Drawings and bills of quantities should reflect actual site conditions, including any slope or gradient and weak soils, as those will affect the foundation drawings and the bills of quantities related to the foundations. The drawings, specifications and bills of quantities must also take into consideration environmental and seismic factors. Masterplans of the sites should be approved and included in the drawings section of the bidding documents. Finally, during some of the field visits, in a number of construction sites, many of the buildings, within the school compound, were found to be scattered in a haphazard fashion. There should also be adequate provision for water supply

through water harvesting, especially in those school sites, where there are no existing water supply sources.

Schools should have master plans of all existing and proposed structures. Construction management units (CMU) should ensure this is the case to avoid haphazard planning and inappropriate location of proposed buildings.

Delays were observed throughout the various stages of school construction. Such delays can be minimized through effective contract management.

Throughout various stages of construction contract awarding and implementation, delays were observed, leading to complications.

- The period between bid submission and contract award was often too long, resulting in complaints by contractors as the delays had cost implications due to inflation, because of which a number of contractors applied for contract variations.

- The period between contract signing and the initial release of funds (20 percent of the contract) was also generally too long, ranging from 18 to 116 days. Many contractors took possession of the sites soon after contract signing, but did not actually start breaking the ground until initial funds were released from the Ministry to schools as they were fearful of late payments, which would cause them cash flow problems.

- Measures need to be taken to ensure that contractors start work as soon as possible and no later than 14 days after contract signing. Penalties could be used for this purpose. Contractors also required extensions of 4-8 weeks and more beyond the stipulated completion period of 15 weeks to complete the construction. To avoid such delays, time-lines should also be given for completion of different stages of works within the 15 weeks of contract period so that SMC members are better able to assess progress and delays if any. Contractors should submit work plans at the start of construction and update these monthly. Supervision firms were hired to help SMCs with Clerks of Works (CoWs) in charge of weekly supervision. Therefore, updates involving changes in construction plans should be prepared with technical inputs from the supervising CoWs.

Contracts should be awarded within 4 weeks of bid submission and funds should be made available immediately so that construction can start within 14 working days of contract awarding. Progress must then be continuously monitored against work plans and agreed time-lines, with changes in work plans reviewed by CoWs and submitted to schools and the CMU. Penalties for non-compliance and delays could be incorporated in construction guidelines.

- The time period to release 50 percent of funds also caused delays. Contractors faced cash flow problems exacerbated by late payments as well as arithmetical errors in bids submission and some errors in the drawings, specifications and quantities of works. The cash flow situation was aggravated by escalation of construction costs due in part to inflation. A provision for the replenishment of the balance of 50 percent of the funds once 75 percent of the original 50 percent of the contract amount had been utilized helped to ensure that construction would be completed within 15 weeks, indirectly cushioning contractors from inflation. Still, cash flow problems caused delays due to work stoppage in many sites. Ultimately this led to delayed completion of Phases 1 and 2 of the project and resulted in the cancellation of the 3rd Phase of the project.

- The period between start of construction and submission of the first claim was also generally too long, from 32 to 81 days. The processing period for the claims ranged from 7 to 26 days, in part due to non-submission of adequate supporting documents. Contractors should inform Head Teachers in advance to fix the date and time of submission of claims so that the Head Teachers can invite all the SMC members to be present so that the contractors can explain the claims on site. CoWs should also be present in these SMC meetings to speed up claim processing by checking and certifying that the billed works had been completed.

The 50 percent advance of contract amounts to schools was appropriate, but delays in payment led to cash flow problems for contractors, work stoppage and higher costs due to inflation. Contractors should submit claims at least once a month, to avoid cash flow problems. Head Teachers and the CoWs should be informed in advance of claim submission so that SMC members and CoWs can be present when claims are submitted to accelerate processing.

- Other sources of delays included the fact that some contractors did not deploy enough workers and did not stockpile construction materials, leading to work interruptions. Contract variations were not quickly brought to CMUs by supervising consulting firms, and in some cases CMU decisions were postponed or taken late, resulting again in stoppage of construction work. Monthly reports by consulting firms were not always submitted immediately after the end of the month, leading to issues not being identified early on.

- In general, the nature of the fixed contracts and the need to complete construction rapidly should have been explained more forcefully to contractors and the supervising consulting firms at the very beginning of project implementation.

- Finally, as discussed in Box 3, schools should not be bypassed by contractors when processing and submitting claims. Empowering schools with better technical training and more delegated powers should result in better day to day supervision resulting in better quality of construction and timely completion.

Box 3: Schools Should Not Be Bypassed by Contractors

In many schools inspected during the 1st phase of construction, contractors bypassed SMCs and submitted claims directly to the consultants, who processed the claims, and forwarded the processed claims to the schools for payment. In this process, schools were sidelined, raising a question as to whether the contractors and consultants understood that the schools are the clients, who should receive the claims first. The right procedure is for contractors to submit the claims to schools, which will review and forward these claims to the consultants for evaluation and processing and for recommending payments. By adopting this process, schools will be treated as clients by the contractors. Where the school construction went well, there seemed to be a positive correlation between work progress and the involvement of the Head Teacher and the SMC members. In the same spirit, CoWs should process claims in the presence of the SMC members to promote ownership and build capacity among SMC members. Some Head Teachers complained that contractors ignored them and their concerns.

Quality issues in works performed were identified. Avoiding such issues requires training as well as stricter supervision, and when required, contracts should be terminated.

Involvement of the SMCs is essential for day-to-day supervision and the overall quality of the works. This requires SMC members to receive technical training before construction and on-site training during construction. Such training can be provided by CoWs and supervising engineers from consulting firms, and, when feasible by district and central engineers during site visits. Training of contractors' foremen is also beneficial to ensure technical competency. Poorly performing contractors must be identified as soon as possible and monitored tightly. At least three days of training should be devoted to technical supervision with another day devoted to quality of important construction materials (sand, aggregate, cement, steel, bricks, timber, metal roofing etc.) and the last day on ensuring quality[3]. Drawings should be properly explained, focusing on those critical to the strength of the structures. CoWs should attend these training sessions so that there is common understanding on the desired quality of construction and timelines. Daily site logs should be maintained and GPS tracking should be used for all site visits by supervising CoWs, engineers from consulting firms, and district or central engineers.

Training of SMC members, contractors' foremen and CoWs is critical for construction quality and must be provided before construction starts as well as during construction. In case of serious defaults, contracts should be terminated following due process, including a transparent, effective and responsive grievance system.

Five levels of supervision were integrated into the project: (1) daily supervision at the school level by the SMCs; (2) weekly supervision of construction through CoWs; (3) bi-monthly basis by the principal engineer/architect/quantity surveyor of the supervising firm; (4) monthly supervision by district engineers focusing on the problem sites and on a random basis; and (5) monthly supervision by the centrally-based CMU engineers also focusing on the problem sites, and also on a random basis.

Site supervision appears to have been sporadic and in some cases irregular. Some CoWs visited sites once a month instead of weekly (though reports indicating four visits per month). Some CoWs seemed to have prepared reports based on phone conversations with contractors instead of site visits. To ensure construction quality, site visits by CoWs should be regularized and technical site supervision reports must be filed and the site visits must be entered in the GPS tracking system during each of the visit. For cost-effective supervision, schools should be grouped together and contracts for the whole group of schools should be decided at the same time with funds also released at the same time. Supervision visits should also coincide with critical stages of construction. Finally, supervising engineers from consulting firms and district and central engineers should also visit sites using GPS tracking for reporting to ensure both quality of construction and timely construction.

[3] This could include training on tasks such as mixing of concrete, pouring and curing, compaction of hardcore and blinding, the placement of steel reinforcement main bars, stirrups, overlapping of bars, mixing of mortar, brickwork, steel doors and windows, the wooden wall plates and trusses, plastering, painting, daily site cleaning and site clearance, etc.

All five layers of supervision mechanism should function properly to ensure quality and timely construction. GPS tracking and reporting can help ensure this is the case.

A proactive role of the Construction Management Unit (CMU) of the Ministry of Education and Sports is critical to the success of any construction project because all bidding documents are prepared by this unit which is also responsible for technical backstopping, oversight and approval of payments submitted by supervising firms and engineers. The issue of CMU oversight, effectiveness and efficiency came up repeatedly in implementation, and additional personnel were recruited to strengthen the CMU. Clear-cut procedures in terms of expeditious decision-making were not always in place, leading to delays in contract execution and completion. While supervising engineers should be empowered to issue relevant instructions for works to be rectified when needed, issues with financial repercussions should be forwarded to CMU-MoES for verification and approval.

As mentioned earlier, bidding documents – working drawings, specifications and Bills of Quantities – should be harmonized to facilitate processing and reduce the likelihood of price changes. More oversight visits by the team leaders/project managers and CMU staff will help in reducing delays. Coordination among Ministry units that share responsibility for the management, supervision and execution of civil works is also essential. Better equipment for the CMU could also facilitate the CMU's work. Overall, strengthening the CMU can bring both immediate and long-term benefits to both government funded and project-funded construction undertaken by MoES.

The CMU needs to be sufficiently empowered in terms of human and physical resources to function effectively and efficiently. It should also be empowered to approve justifiable and extenuating contract variations.

The performance of technical supervising firms was poor and some of the contractors were unscrupulous.

Supervision contracts were signed with four technical consulting/supervision firms accountable for the quality of construction and site management. With one exception, the performance of the firms was poor. Most construction took much longer than the stipulated 15 weeks completion period, with some projects taking longer than one year. The quality of construction in many sites was not in compliance with specifications, probably in part because CoWs did not make mandatory weekly visits to sites, especially during critical construction stages, nor issued instructions in a timely and decisive manner.

The consulting firms submitted monthly reports late or not at all, so that problems could not be identified, discussed and addressed immediately. Dealing with the firms was found to be difficult, possibly in part because payments of services were not linked to completion of construction, leading to lack of incentives for performance. Supervision contracts were for the whole project duration, hence their terms and conditions could not be revised. The firms could underperform without fear of repercussions.

Another issue was the apparent role some of the personnel of supervising firms played in stoking the cost escalation debate and inciting contractors to submit requests for contract variations. The personnel of supervising firms should have at all times insisted on both quality and timely completion to avoid any cost escalation. This was not always the case. In some cases insurance papers and bank guarantees submitted for some of the problematic sites were found to be forged documents. Legal recourse to get back advance amounts (after deducting work completed) was difficult. Some CoWs personally carried these documents of the contractors and testified these as being genuine without verifying their authenticity by visiting the banks (instead of resorting to emails or phone calls). Non-compliance to specifications and low quality of works were also issues, particularly for internal finishes, and due in part to weak monitoring by CoWs and weak oversight by the senior management of the supervising firms. Finally, contracts, including performance and bank guarantees, expired in some sites and were not extended, which should not have happened.

In defense of the consulting firms, it must be stated that they complained of very late payments for their services due to inordinate delays in processing their invoices. This constrained their ability to supervise properly. Still, in future projects, better supervision alternatives need to be explored, such as recruitment of individual consultants based in the different regions and the mobilization of engineering assistants, who are available in most districts. This would strengthen existing in-house capability, result in accountability, ensure better quality of construction and result in better completion rates at cheaper cost. Under such an arrangement, all supervising staff would be directly accountable to CMU and MoES. Individual consultants can also be used for building capacity at the center and in districts. They can be terminated if performance is not satisfactory and are less likely than large firms to contest termination and seek legal redress.

The performance of supervising firms was poor. As an alternative, individual consultants could be recruited and located in the regions and the CMU. Engineering assistants would be mobilized in the districts to ensure accountability, construction quality, and timely completion.

Finally, sites abandoned by contractors were due less to issues of cost escalation than the intentions of the unscrupulous contractors to maximize profits by delaying construction so as to seek contract variations, as well as completing works which were profitable and abandoning works, which had low rates. The fact that some of the

poorly performing contractors in Phase 1 were awarded contracts for Phase 2 magnified the issue. A process should be created to identify good contractors and shortlist them for subsequent projects, while weeding out poorly performing contractors. Contractors that faced genuine problems due to extra works, for example due to sloping and weak sites, should not be penalized.

Good contractors completed their contracts with slight time over-runs. The quality of works was also generally good. The total cost was near the average or even below the average. These contractors must be identified and a roster compiled for participation in subsequent phases of bidding and/or future projects. Unscrupulous contractors must also be identified and blacklisted.

III. CONCLUSION

This note has provided an assessment of the adequacy of basic school infrastructure in both primary and secondary schools. Pupil-classroom ratios tend to be high, especially in government schools and poorer communities. The note also summarized key results from an evaluation of a World Bank supported project for school construction (the Universal Post Primary Education and Training Adaptable Program Lending 1 Project). While overall, the project was fairly successful in building much needed school infrastructure to support the new universal secondary education policy, a number of implementation challenges were identified. Concrete recommendations have been provided to avoid similar issues in future projects.

References

Mathe, S. B., 2016, School Construction in Uganda under UPPET APL1, mimeo, World Bank, Washington, DC.

Tsimpo, C., and Q. Wodon, 2016a, Equity in the Allocation of Classrooms to Schools, Background Paper for the Uganda Education Note Series, Washington, DC: The World Bank.

Tsimpo, C., and Q. Wodon, 2016b, Constraints Faced by Schools in Uganda: Perceptions of Head Teachers, Background Paper for the Uganda Education Note Series, Washington, DC: The World Bank.

Annex: Notes on Education in the Uganda Note Series (As of March 2016)

As mentioned in Box 1, this note is part of a series on Uganda. Cross-references are made in this note to some of the other notes in the series. The list of notes focusing on the education sector available in the series as of March 2016 is as follows:

Note 1: Education in Uganda: Summary Assessment.
Note 2: Importance of Investing in Education.
Note 3: Improving Education Attainment.
Note 4: Improving Education Achievement.
Note 5: Levels and Efficiency of Spending for Education.
Note 6: Benchmarking Public Spending for Education.
Note 7: Private Schools and Public-Private Partnerships.
Note 8: Future Needs for Teachers and Teacher Policies.
Note 9: School Facilities and Challenges in Construction.
Note 10: Investing in Early Childhood Development.
Note 11: Child Marriage and Education.

In addition to the above notes, edited volumes with more in-depth analysis as well as technical background papers are being prepared. For more information, please contact the authors at the World Bank. The edited volumes will be made available through the World Bank's Open Knowledge Repository at https://openknowledge.worldbank.org/.

Acknowledgment and disclaimer: This note was prepared by a World Bank team as an input into a technical assistance task for Uganda's Ministry of Education, Science, Technology, and Sports. The objective of the notes series is to convey research findings in a rapid and more accessible way than though technical papers. The series benefitted from funding from the Global Partnership for Education as part of a global research task on out of school children and disadvantaged groups. Support under the SABER (Systems Approach for Better Education Results) Equity and Inclusion work program is also gratefully acknowledged. The authors benefited from comments and suggestions among others from Melissa Ann Adelman, Juan Baron, Sajitha Bashir, Luis Benveniste, Andreas Blom, Christina Malmberg Calvo, Meskerem Mulatu, and Lianqin Wang. The opinions expressed in the notes and related background studies are those of the authors only and need not represent the views of the World Bank, its Executive Directors, or the countries they represent, nor do they represent the views of the Ministry of Education, Science, Technology, and Sports.