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Students' perceptions of teachers and teaching as determinants of primary school completion in Ethiopia

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Abstract

Purpose – This study analysed students' perceptions of teachers' behaviours, teachers' management practices and the use of inputs by teachers and whether these are associated with primary school progression and completion.

Design/methodology/approach – School-level fixed effect analysis is conducted using cross-sectional data collected from 4,000 randomly selected primary school-aged students and their schools.

Findings – Our findings reveal that students' perceptions of teachers' behaviours are associated with the probability of grade progression during primary school, and whether students complete primary school. Particularly important are positive behaviours, like students perceiving their teachers to be engaged and being praised by their teachers while in primary schools. It increased the likelihood of school progression by at least 15%. The use of inputs such as worksheets/written handouts and reading stories/books in the language of instruction were also found to have a statistically significant positive effect on students' primary school performance. These are important results which hold after accounting for school management, household and child-level factors and regional differences.

Originality/value – Our findings provide a deeper understanding of the teaching practices which pupils perceive as beneficial to retention. While we are unable to conclude that learning is taking place, our contention is that greater time in school could increase the opportunity to learn. In this respect, beyond its policy relevance in improving educational outcomes, the paper contributes to the limited literature on the student–teacher classroom relationships particularly when looking from the perspective of students' perception of their teachers' teaching behaviours in developing countries.

Keywords Ethiopia, Primary school completion, Quantitative analyses, Student's perceptions, Teacher's behaviour

Paper type Research paper

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1. Introduction

Ethiopia has achieved a drastic increase in primary school enrolment during the last two decades. In 1994, nearly 80% of primary-school-aged children were not in school, and by 2021, this had declined significantly to less than 10% (Ministry of Education (MOE, 2021)). This achievement puts Ethiopia as the country that managed to implement the fastest increase in primary enrolment rates in Africa between the 1990s and 2000s (Amanda, Andrew, Francesca, Tom, Mulu, & Weldesilassie, 2015). However, the benefits of the massive increase in primary school enrolment can only be translated into meaningful learning if there are regular learning opportunities taking place in schools, regular attendance by children (and teachers) and grade transition achieving the required competences which ultimately could lead to a meaningful completion of primary school.

While the completion of primary school has also increased significantly over the past two decades, from ~14–54%, there are still significant challenges to achieve universal completion. For instance, of all students enrolled in primary school in 2022, ~16% dropped out before reaching grade 8, a substantial increase from 8% in 2012 (MOE, 2023). The primary school completion rate for rural areas was only 31% whereas in the main urban areas, it was 76% (Weldesilassie, Woldehanna, & Adiam, 2015). Another area of concern is learning, as evidence from the National Learning Assessments indicates that student performance has been declining since 2000. For instance, the majority of students enrolled in the early grades in Ethiopia have difficulty reading texts written in the instructional language or their mother tongues. About 68 and 51% of grade two and three students were zero scorers or non-readers based on the Oral Reading Fluency test for 2021 EGRA (MOE, 2022). Similarly, results from the Early Grade Mathematics Assessment (EGMA) assessment indicated low levels among these students. In the Number Identification subtask, grade 2 and 3 students performed 20.17 and 25.67%, respectively (MOE, 2018a, b).

The impressive increase in enrolment rates, linked to significant improvements in completion rates but stagnant learning achievements suggests that not all children are benefitting from the greater educational access that Ethiopia has achieved in the last two decades. With respect to primary school completion, we argue that students who complete primary school have had greater opportunity to learn than those who drop out. The opportunity to learn for students who complete primary school is determined by regular attendance, learner motivation and quality of teaching practices (Ngware, Oketch, Maurice, & Benta, 2014; Oketch, Mutisya, Musyoka, & Ngware, 2012).

Teachers play a significant role in shaping both the learning and personal development of their students (Raufelder, Nitsche, Breitmeyer, Keßler, Herrmann, & Regner, 2016). Teachers are crucial in fostering interest, curiosity and motivation among the pupils they teach (Raufelder *et al.*, 2016; Reufelder, Drury, Jagenow, Hoferichter, & Bukowski, 2013). The quality of teaching practices includes how pupils themselves perceive the way their teachers teach them. Yet, in the context of Ethiopia, there is limited evidence on whether students' perceptions about the teaching quality, their perception of what teachers do and how teachers behave are associated with a higher likelihood of primary school completion. Do students' perceptions of their teachers' behaviour in the classroom differ between students who completed primary school and those who did not? Are students' perceptions of teachers' management practices and use of input different between those who completed primary school and those who did not complete? These are important questions which help to capture not just the experiences of students and their perceptions of teaching and learning but also the relation of these experiences to primary school completion. To date, there is limited quantitative empirical evidence on these important issues in Ethiopia, where there has been substantial progress in enrolment. However, completion rates remain a challenge, with only 54% of those enrolled successfully completing primary school.

Thus, the aim of this paper is to explore students' perceptions of their teachers' behaviours, management practices and use of inputs and to examine whether these are associated with the likelihood of progression and completion of primary school. To do this, we utilise a unique dataset generated from 4,000 primary school students and their schools collected from nine regional states and two city administrations. Using the data, we investigated which collected information about students' experiences of their primary school is more relevant from the perspective of their primary school performance. Using a combination of theory and the specific context of Ethiopia, we hypothesise that students' perceptions of teachers' behaviours, teachers' management practices and the use of inputs have a strong association with the likelihood of progression and completion of primary school in Ethiopia. As far as we are aware, this is the first paper to explore the association between students' perceptions of their teachers' teaching practices and the progression and completion of primary school at least in Ethiopia. Notably, we employ quantitative research methods within the context of Ethiopia. The paper also contributes to the limited literature in developing countries that focuses on understanding the effect of students' perception of their teachers' behaviour on their school performance, which has been given little attention despite the extent of the daily relationship between the two. Beyond its literature contribution, the paper may help policymakers and practitioners in the education sector to consider the relevance of such a relationship in improving primary school completion.

2. Conceptual framework and research question

In the literature, at least four factors have been considered as immediate causes for low learning among children. They include teachers' behaviour, unprepared learners, school inputs as well as school management practices (World Bank, 2018). Students' perception of the way their teachers conduct lessons as well as the behaviour shown by teachers during classroom interactions with students is important to consider (Jiying, Hongbiao, & Reviewing, 2016). Students may have varied perceptions about their teachers' teaching practices. In higher education, students often are asked to assess their learning experience in courses or modules, and this is used by the lecturers to improve the content of the material and instructional approach. This is uncommon in basic education where student feedback may be most needed.

Empirical research on school factors affecting student learning has shown that students with more effective teachers perform better on achievement tests (Boyd, Pamela, Hamilton, Susanna, & James, 2006; Carnoy, Ngwar, & Oketch, 2015; Hanushek, John, & Steven, 2005; Naylor & Sayed, 2014). Effective teachers are also the ones with the greatest teacher value added (Oketch, Rolleston, & Rossiter, 2020). These effective teachers are likely to support greater progression and completion of schooling for the students they teach.

Literature shows a strong association between teaching quality and student learning outcomes (Hattie, 2009; Goe, 2007; Darling-Hammond, 2000). Goe (2007) discussed the factors that constitute the concept of "teacher quality" that have an influence on student's school achievement. These include teacher education, teacher assessment/support to students, teacher development and teacher self-efficacy. Klassen and Tze (2014) distinguished classroom management, instruction and student engagement as major factors of teacher self-efficacy that influence students' learning outcomes. Marsh *et al.* (2012) indicated that instructional practices or instructional quality rely on students' reports of classroom activities. Teachers' assessment of students is also an important predictor of students' learning outcomes. Teachers need to provide feedback to students in the form of both formative and summative assessments (Hattie & Timperley, 2007).

The opportunities to learn (OTL) provided during the schooling period has also an influence on student learning achievement (Baumert *et al.*, 2010; Kersting, Givvin, Santagata,

& Stigler, 2012). Students who stay in school tend to value the time they spend both inside and outside of the classroom (Ngware *et al.*, 2014; Oketch *et al.*, 2012). These children are also more likely to have a positive perception of their opportunity to learn. Children with greater OTL are more likely to make progress and complete their schooling cycles (Baumert *et al.*, 2010). Time on task can determine whether learners perceive their schooling as valuable to them or as an opportunity cost of their schooling. The factors that constitute time on task include hours in the school year, the days the school is open, teacher attendance and punctuality, student attendance and punctuality, teacher–student ratio, instructional materials per student and time in the classroom on task (Carnoy *et al.*, 2015). This is not only a matter of students' perception, but parents too may be willing to invest their children's time in education if they believe they will gain something useful from it, but if they lose confidence in the system, they often pull children out (Avenstrup, Liang, & Nellemann, 2004).

In many low-income countries, instructional time is often wasted through informal school closures, teacher absenteeism, delays in lesson start time, early departures and poor use of classroom time (Abadzi, 2007; Gilles & Collins, 2008). Opportunity to learn, which influences progression and completion, is therefore determined by access to school (affected by the logistics and educational provision), learner motivation affected by school and home environments (Battistich, Solomon, Watson, & Schaps, 1997; Bryk & Schneider, 2002; Epstein & Sheldon, 2002), and quality of teaching practices (affected by teachers' access to professional development (Desimone, 2009; Hattie, 2009). Furthermore, the literature on pedagogy shows that the best use of instructional time would recognise the value of formative feedback and assessments (Black & Wiliam, 2009), experiential learning through practice (Kolb & Kolb, 2005), social learning (Palincsar, 2005), the role of self-efficacy (Linnenbrink & Pintrich, 2003) and peer assessment as a process of learning (Topping, 2005). All these aspects hinge on effective and motivated teachers. These factors are also associated with students' perceptions of their educational experiences and whether they had an opportunity to learn. In cases where there is little or no data on how teachers manage time on task or their use of instructional time, student perceptions of these processes may offer important insights, particularly when these perceptions are linked to the completion of a schooling cycle.

In Ethiopia, the opportunity to learn, among other things, can be conceived as being predominantly an issue of time on task. Poverty is often blamed for low access rates and poor achievement (Brown & Albert, 2002; Woldehanna, Nicola, & Bekele, 2005), but little systematic research has been undertaken in Ethiopia to understand how learners perceive how their teachers, within the context of increased government spending on education and improvements in access, manage time on task to produce or undermine students' progression and learning. The General Education Quality Improvement Program (GEQIP) of the MoE in Ethiopia is a flagship initiative that has contributed to the acceleration of enrolment in primary schools. GEQIP has emphasised teachers' good academic qualifications, motivational and moral qualities as important attributes (MOE, 2018a, b). It is important to assess whether students perceive these qualities as being demonstrated by their teachers in their teaching behaviour [1]. This paper answers the following research question: which students' perceptions of their teachers' classroom behaviours, management practices and use of inputs are associated with greater primary school progression and primary school completion?

3. Methodology

3.1 Data and sample selection

Data from the Primary School Completion Study (PSCS) collected in 2016 is used. The PSCS collected information from a nationally representative sample of around 4,000 children (47%

were female) who were enrolled in school between 2003/04 and 2006/07 academic years. These children had the potential to have completed primary school by the academic year 2014/15.

Detailed information on the child and the household, school and teacher characteristics and livelihood strategy of the child's household was collected using survey instruments prepared in two modules. The first module contained survey questionnaires to collect children's primary school status such as current enrolment, grade level, completion, students' perception of teacher's behaviour, input use and class management practice. Household and individual-level information including household head, student and caregiver characteristics were also collected. The second module contained structured questionnaires to collect school-level information including school facilities, principal and teacher characteristics among others.

The PSCS survey was administered to selected children from the nine regional states of Ethiopia and the two city administrations following a three-stage sampling procedure. During the first stage, schools were stratified into urban, semi-urban and rural. Schools in rural areas were further stratified according to distance to the main road (close, mid-distance and remote). During the second stage, schools were selected proportionally to the student population in primary and secondary schools during the 2013–2014 academic year. Finally, catchment villages of the selected schools were divided into grids. Kebeles (the smallest administrative structure in Ethiopia) within these grids were selected randomly and then households had to be visited to verify if they had children who started school between 2003/04 and 2006/07. Within selected kebeles, every third household in rural areas and every fifth household in urban areas were selected. If there was more than one child who qualified for the sample, only one was selected at random.

3.2 Description of key variables

(1) Outcome variables: Primary school completion and school progression

There are two outcomes of interest for this paper. The first is *primary school completion*, which, in the context of Ethiopia, is completed up to grade 8. From the total sample, our survey could collect information on primary school completion from 3,996 children. Of this, 57.5% (2,296) of the children completed primary school and 42.5% (1,700) did not (Table 1).

The second outcome variable is *grade progression/survival* until the students complete primary school. Patterns for school completion are more complex if one considers current enrolment in our sample. Out of those children who did not complete primary school, 54.1% (919) of children were still enrolled in primary school at the time of the PSCS survey whereas

Schooling status	Statistic	Dropped out	Still in school	Total
Not completed	*N*	781	919	1,700
	Row %	45.94	54.06	100.00
	Col %	67.21	32.43	42.54
Completed	*N*	381	1,915	2,296
	Row %	16.59	83.41	100.00
	Col %	32.79	67.57	57.46
Total	*N*	1,162	2,834	3,996
	Row %	29.08	70.92	100.00
	Col %	100.00	100.00	100.00

Source(s): Own survey. See footnote 1 for more clarification about this table

Table 1. Sample size by schooling status

45.9% (781) had dropped out before completing primary school (Table 1) [2]. In the context of Ethiopia, many children start school but do not complete the full cycle of primary education, yet they still remain enrolled in school, potentially by repeating the same grade several times. Such a pattern indicates that children who were still enrolled in primary school at the time of our survey may not progress until they complete primary school as they may drop out before completing primary school after our survey. It is, therefore, important to measure whether students' perceptions on the teacher quality and use of teaching inputs are associated with school progression/survival until they complete primary school. Figure 1 in the appendix shows the inverse relation between school dropout and progress through primary school.

Therefore, in this paper, we measure primary school completion for those who completed primary school or not (Outcome 1), which is a discrete dummy variable that takes 1 for those who completed and zero for those who did not complete primary school. In this regard, we estimate whether students' perceptions of the teacher quality and use of teaching inputs are associated with primary school completion. On the other hand, we measure primary school progression (Outcome 2) for those who dropped out before completing primary school, those who were still in primary school but not still completed, and those who completed. Unlike our outcome variable 1, school progression takes into account children's current grade level and estimates their chance of progression until they complete primary school. Thus, the outcome takes the value from 0 to 9. That is, it takes the value zero for those who dropped out before completing primary education, and the value for current grade level for those who are still in primary school (i.e. 1, 2 . . .8 for those who are in grade 1, 2, . . ., 8 during the PSCS survey, respectively) and 9 for those who completed primary school. Accordingly, we estimate whether students' perceptions of the teacher quality and use of teaching inputs are associated with their chance of survival until they will complete primary school (Outcome 2).

(2) Key explanatory variable: Students' perceptions of teacher behaviour, teaching inputs and managerial practices

Teacher behaviours, teaching inputs and teacher managerial practices are captured through students' perceptions of the experiences of the teacher and teaching during primary school. In terms of teacher behaviours, students were asked to recall the general behaviours of their teacher when they were in primary school. Specifically, students were asked firstly to recall whether they saw their teacher using a cane/stick/ruler during the lesson to intimidate the students. For example, whether they recall seeing the teacher hitting the desk or directly

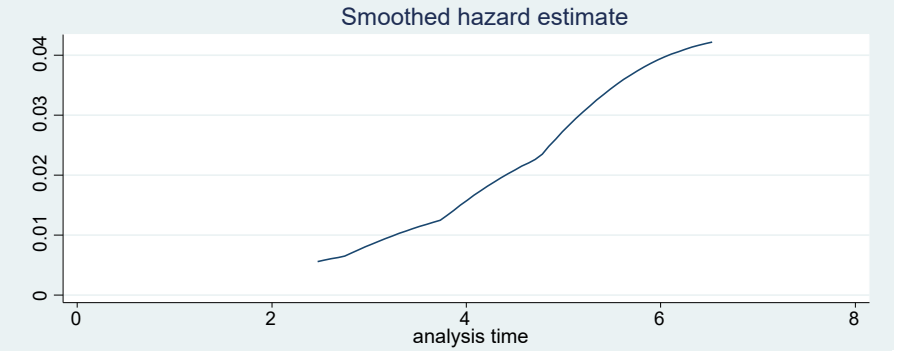

Figure 1.
Likelihood of school dropout throughout time

Note(s): Grade level in primary school

Source(s): Primary school completion survey (2016)

threatening students using a cane/stick/ruler. In this regard, 62% of the children reported that they have seen when their teacher hitting the desk or directly threatening students using a cane/stick/ruler (Table 2). Students were also asked if they saw their teachers physically punishing students, i.e. hitting students using sticks beyond just threatening. At least 71% of students responded that they had seen their teacher hitting students with a stick. The other factor to describe teacher behaviour was *teacher engagement*, which was recorded from students' responses on whether teachers were engaged and enthusiastic. The last indicator was captured from children's responses to how often the students saw the teacher praising them for correct answers or completing exercises. Table 2 shows the main descriptive statistics of these variables in the data.

With respect to teacher management, two perceptions were recorded from students. First, whether students perceived if lessons during primary school lasted the entire standard time or if teachers used to leave the class early (*teaching time*). The second aspect was the use of assessments by teachers such as quizzes, homework and midterm examinations during primary school. While 75% of students responded that their teachers used the entire standard time for teaching, 91% of students said that their teachers were continuously using various assessments (Table 2).

Teacher quality (T_i)	Variable name	Variable definition	Obs.	Mean
Teacher behaviours	Teacher intimidates student	Dummy variable 1 if yes; otherwise, 0	3,995	0.62
	Teacher physically punished student	Dummy variable 1 if yes; otherwise, 0	3,996	0.71
	Teacher engaged and enthusiastic	Dummy variable 1 if yes; otherwise, 0	3,994	0.40
	Teacher praising students	Dummy variable 1 if yes; otherwise, 0	3,995	0.50
Teacher management	Class last standard time	Dummy variable 1 if yes; otherwise, 0	3,992	0.75
	Teacher use of continuous assessment	Dummy variable 1 if yes; otherwise, 0	3,993	0.91
Use of inputs	Teacher's use of word/diagram	Dummy variable 1 if yes; otherwise, 0	3,991	0.96
	Teacher's use of picture/photo	Dummy variable 1 if yes; otherwise, 0	3,993	0.86
	Teacher's use of slogans/proverbs	Dummy variable 1 if yes; otherwise, 0	3,989	0.63
	Teacher's use of laboratory equipment	Dummy variable 1 if yes; otherwise, 0	3,986	0.29
	Teacher's use of worksheet/written handout	Dummy variable 1 if yes; otherwise, 0	3,953	0.41
	Teacher's use books for reading in English	Dummy variable 1 if yes; otherwise, 0	3,955	0.53
	Teacher's use of books for reading in language of instruction	Dummy variable 1 if yes; otherwise, 0	3,958	0.53
	Teacher's use materials produced by child	Dummy variable 1 if yes; otherwise, 0	3,988	0.60
	Teacher's use computer plasma, laptop	Dummy variable 1 if yes; otherwise, 0	3,994	0.12

Source(s): Own survey

Table 2. Descriptive statistics of student perceptions of teaching quality

Finally, students were asked questions regarding their perceptions of the use of inputs by teachers. In particular, students were asked to recall if teachers used different materials or had access to equipment during their time in primary schools, use of diagrams; pictures or photos; slogans or proverbs; laboratory equipment; provided worksheets or handouts; books for reading in the English language; books for reading in language of instruction; materials produced by children; computers/laptops or plasma. Table 2 shows the descriptive statistics for students' perception of the use of inputs by their teachers.

(3) Confounding factors at school, household and individual levels

Students' completion of primary school and their progression to complete primary school is not only influenced by their perceptions about their teachers' behaviour, class management and/or input use during their primary schooling period. It is also influenced by school management, personal and household circumstances (Woldehanna, Alemu, Nicola, *et al.*, 2005). In order to single out the effect of teachers' quality on students' primary school completion and progression, we controlled for these confounding factors. Accordingly, we capture indicators which reflect school management and other key characteristics of the school, as well as household characteristics and other relevant information about the children.

First, we differentiate the type of school, whether it is a government school from other types of providers, namely private, public-private partnership, NGOs or faith-based providers. Secondly, the level of participation of the community in school was obtained from head teachers reporting whether there was active participation or no participation from the community. Two variables that measure school leadership are used. The educational level of the head teacher was measured by the highest educational level achieved and whether the head teacher had training in educational planning and management. In order to account for school overcrowding, enumerators gathered information on the teacher-pupil ratio, which was obtained during visits to schools. Finally, enumerators also gathered information from the schools on whether the school received school grants, whether the school provides tutorial support, whether it provides other additional educational materials support for children, whether it provides school feeding and whether the school was a model school (see Table 3).

For household characteristics, which could influence both primary school progression and completion, we included the number of siblings, whether the parents are alive or the highest educational achievements of parents and/or siblings. We also include asset ownership of the household in which the child lives. For further characteristics of the children, we included their age, sex, whether they have any health problems, whether they are able to have three meals per day and whether they are enrolled at the right age. Finally, we included the child's vulnerability to various shocks including the child's exposure to labour exploitation, disability, early marriage and illness of the child's caregiver. The vulnerability variable is measured as a sum of the number of these vulnerability indicators that the child faced (see Table 3).

3.3 Model specification and estimation

We are interested in analysing the influence of students' perception of their teachers' behaviour, class management and teaching method on two students' school performance: *completion of primary school and the chance of progression until they complete primary school.* Accordingly, we will estimate the following model that is a function of students' school performance on teachers' quality

$$D_i = \beta_0 + \beta_1 T_i + \beta_5 U_i + e_i \tag{1}$$

Indicator	Variable name	Variable definition	Obs.	Mean
School management (Gi)	Model school	Dummy variable 1 if yes; otherwise, 0	3,980	0.52
	Active participation of community	Dummy variable 1 if yes; otherwise, 0	3,980	0.32
	School receives school grant	Dummy variable 1 if yes; otherwise, 0	3,980	0.9
	Teacher–student ratio	Ratio between 0 and 1	3,980	0.03
	Education level of head teacher	Categorical variable (1 if high school; 2 if diploma; 3 if university)	3,980	2.85
	Head teacher training	Categorical variable (1 if no training; 2 certificates; 3 diploma and above)	3,980	2.59
	School provides additional educational materials	Dummy variable 1 if yes; otherwise, 0	3,980	0.68
	School tutorial support	Dummy variable 1 if yes; otherwise, 0	3,980	0.79
	School feeding	Dummy variable 1 if yes; otherwise, 0	3,980	0.14
	Support for uniform purchase	Dummy variable 1 if yes; otherwise, 0	3,980	0.29
	Other supports	Dummy variable 1 if yes; otherwise, 0	3,980	0.16
	School facilities	Index constructed with number of facility (8 is highly equipped; 0 nothing)	3,980	6.12
	Government school	Dummy variable 1 if yes; otherwise, 0	3,980	0.92
Household characteristics (H)	# of older siblings	Number of older siblings	3,996	1.47
	#of younger siblings	Number of younger siblings	3,993	2
	Mother alive	Dummy variable 1 if yes; Otherwise, 0	3,996	0.88
	Father alive	Dummy variable 1 if yes; Otherwise, 0	3,996	0.77
	Mother's years of schooling	Number of years of formal schooling	3,549	3.23
	Father's years of schooling	Number of years of formal schooling	3,196	5.1
	Ownership of different assets (index)	Asse index	3,995	5.69
	Region where the parent lives	Region coded from 1 to 14	3,995	
Child Characteristics (*C*)	Sex (1 = male)	Dummy variable 1 if male; Otherwise, 0	3,996	0.53
	School starts at age 6 or 7 years old	Dummy variable 1 if yes; otherwise, 0	3,996	0.35
	Attend preschool	Dummy variable 1 if yes; otherwise 0	3,996	0.28
	Child with three times meal per day (1 = yes)	Dummy variable 1 if yes; otherwise, 0	3,996	0.93
	Child has health problems (1 = yes)	Dummy variable 1 if yes; otherwise, 0	3,996	0.16
	Child vulnerability (index)	Number of vulnerabilities	3,987	21.53

Source(s): Own survey

Table 3. Descriptive statistics of school, household and child-level factors

where D_i is student primary school performance, which is measured in two ways. First, we measured student performance using students' status of completion of primary school. This outcome variable is a dummy variable that takes the value of 1 if the student completed primary school, and zero if he/she did not complete it. Second, we used students' primary school progression until he/she completed primary school. It takes a value from zero to nine. That is, the value zero represents students who dropped out of school before completing primary school; the values 1, 2, 3, . . . and 8 represent students who did not complete primary school but still enrolled in school in grade 1, grade 2, grade 3 . . .. And grade 8, respectively, at the time of our survey.

The value 9 represents all students who completed primary school. The vector T_i represents the perception of students on their teachers' quality, which is defined above. That is, it represents the variables that measure teachers' behaviour, teachers' class management and teachers' use of input as defined in Table 2 above. β_1 is the estimated coefficient for variables that measure students' perception of their teachers' quality as defined above. U_i is a vector of regional variables and is included to control for the region's fixed effect. It represents the nine regional states and two city administrations of the country where sample students and schools are located. Finally, e represents the error term, which captures all right-hand side variables that the researchers couldn't control.

Equation (1) assumes that no factors other than students' perception of their teachers' teaching quality affect their primary school performance. However, as explained in the previous section, other factors such as school management factors can have an influence on students' primary school performance. The estimated coefficient may be biased. Thus, we estimated the following model specification to investigate the relative influence of students' perception on their teachers' teaching quality, controlling for the effect of school management factors.

$$D_i = \beta_0 + \beta_1 T_i + \beta_2 G_i + \beta_5 U_i + e_i \quad (2)$$

Where D_i, T_i *and* U_i are as defined above. G_i is a vector of school management factors that are defined in the previous subsection. See Table 2 for the variables included in a vector G to define school management (G).

We also extended Equation (2) and estimated the following Equation (3) by adding household and child-level variables on Equation (2) to control for their effect on students' primary school performance. Accordingly, Equation (3) examines the relative influence of students' perception of their teachers' teaching quality on their primary school performance by controlling for factors related to school management as well as household and child's characteristics.

$$D_i = \beta_0 + \beta_1 T_i + \beta_2 G_i + \beta_3 H_i + \beta_4 C_i + \beta_5 U_i + e_i \quad (3)$$

Where D_i, T_i, G_i and U_i are as defined in Equations (1 and 2) above. C is a vector of variables representing child-level factors as defined in Table 2, and H is a vector of variables representing household-level factors. e represents the error term.

3.4 Model estimation technique

In order to estimate the parameters of the variables associated with the likelihood of primary school completion, we used a logit-fixed model. That is, in order to examine the influence of students' perception of their teacher's quality on their chance of primary school completion, we used a school-level random effect logit model.

On the other hand, to estimate the parameters of the variables associated with primary school progression, the exponential distribution imposed on the Accelerated Failure Time Hazard (AFT) model is found to fit structure of the hazard function, as seen in Figure 1. The figure shows that the risk of dropout was found to be monotonically increasing [3]. Besides, using AFT models provides a way to estimate sequentially, based on a density function that is built from empirical information without the need to eliminate it (Lavado & Gallegos, 2005). When one has a reason to believe that the hazard function follows a certain shape, imposing a hazard function improves the efficiency of the estimates (Cleves, William, & Roberto, 2004). Thus, we estimated an AFT model that estimates the dropping out of school conditional upon current enrolment among children (Lavado & Gallegos, 2005). We used a school-level random effect grade survival model to estimate the three models specified from

Equations (1–3). The definition and descriptive statistics of variables included in the estimations of the models are shown in Tables 2 and 3. The results are presented in the following section.

4. Results

4.1 Grade progression during primary school

This section presents survival model estimation results on the conditional association between students' reports on their perception of teachers' behaviour, the use of teaching inputs and teacher management practices and the probability that children progress through primary school. Table 4 shows estimation results from school-level random effect survival model with robust standard error. The estimation results of Equation (1) are reported under the "Model 1" column in Table 4. Results indicate that students' perceptions of teacher engagement, teacher physically punishing and praising students were associated with grade survival and had the expected sign. For instance, students who reported being taught by teachers who were engaged and enthusiastic were 9% points more likely to progress through primary school relative to students who reported being taught by less engaged teachers. Similarly, students who reported that they saw teachers physically punishing other students are less likely to progress to complete primary school compared to their counterparts. However, these variables did not have a statistically significant association with students' progression through primary school at the conventional level. On the other hand, unlike our expectation, students who reported teachers using intimidating methods were 14 percentage points more likely to progress through primary school relative to students who did not report teachers using intimidating methods. The association is statistically significant at a 10% level. Perhaps, this could be due to the fact that students may become more attentive to the lesson, fearing not to be intimidated. However, given that the variable has a modest effect, the result may not be stable if we control other factors that have a potential effect on students' school performance (see result from model 3 below). In terms of teacher management practices, the use of assessment was positively and significantly associated with 23 percentage points in the likelihood of progression through primary school at least at a 5% level. Finally, the use of inputs by the teachers was associated with reductions in the likelihood of dropping out of primary school. That is, the use of pictures, laboratory equipment, written handouts, books in the language of instruction and the use of computers or Information and Communication Technology (ICT) had a statistically significant association with the probability of progressing through primary school. These variables were found to have statistically significant effects at least at 1% level, and, are more important for student's progression through primary education.

It is important to investigate the relative influence of students' perception of their teachers' teaching quality by accounting for the possibility of the joint effects of students' perceptions on teacher behaviour, teacher management practices and use of inputs as well as school management factors on grade survival, as specified in Equation (2) in previous section. Model 2 in Table 4 reports the results from estimating Equation (2), which estimates the conditional probability for grade survival as a function of students' perceptions of their teachers' quality (teacher behaviour, teacher use of inputs and their management practice changes) and school management factors. The result shows that none of the factors related to students' perceptions of teacher behaviour were found to have a significant association with the probability of progression through primary education. On the other hand, similar to the result from Equation (1), teacher use of continuous assessment had a statistically significant association with progression through primary school at least at 1% level. Its relative influence is higher when we control for school management factors. Its effect is statistically significant at a 1% level in Model 2. Similarly, as in Model 1, teachers' use of inputs had a

	Variable definition	Model 1 Coeff.	S.E.	Model 2 Coeff.	S.E.	Model 3 Coeff.	S.E.
Teacher behaviours	Teacher intimidates student	0.14*	0.07	0.11	0.07	0.08	0.09
	Teacher physically punished student	−0.07	0.08	−0.07	0.08	−0.09	0.09
	Teacher engaged and enthusiastic	0.09	0.06	0.09	0.06	0.15**	0.07
	Teacher praising students	0.06	0.06	0.07	0.06	0.06	0.07
Teacher management	Class last standard time	0.07	0.07	0.08	0.07	0.07	0.08
	Teacher's use of continuous assessment	0.23**	0.1	0.26***	0.1	0.22	0.13
Use of inputs	Teacher's use of word/diagram	−0.05	0.13	−0.07	0.13	−0.22	0.16
	Teacher's use of picture/photo	0.32***	0.08	0.33***	0.08	0.35***	0.09
	Teacher's use of slogans/proverbs	−0.05	0.06	−0.06	0.06	−0.09	0.07
	Teacher's use of laboratory equipment	0.41***	0.1	0.36***	0.1	0.32***	0.11
	Teacher's use of worksheet/written handout	0.28***	0.07	0.28***	0.07	0.29***	0.09
	Teacher's use books for reading in English	0.05	0.08	0.05	0.08	0.06	0.10
	Teacher's use of books for reading in language of instruction	0.21***	0.08	0.21***	0.08	0.17	0.10
	Teacher's use materials produced by child	0.04	0.07	0.03	0.07	0.09	0.08
	Teacher's use computer plasma, laptop	0.58***	0.16	0.46***	0.15	0.61***	0.19
School management	Model school			−0.14	0.12	−0.06	0.10
	Active participation of community			0.01	0.12	−0.11	0.11
	School receives school grant			−0.42	0.23	−0.27	0.21
	Teacher–student ratio			28.05***	7.36	18.66***	6.73
	Education level of head teacher			0.21	0.16	0.03	0.17
	Head teacher training			0.06	0.07	0.01	0.06
	School additional educational materials			−0.08	0.12	−0.08	0.11
	School tutorial support			0.08	0.15	0.23*	0.14
	School feeding			−0.39**	0.19	−0.27**	0.13
	Support for uniform purchase			0.12	0.13	0.09	0.11
	Other supports			−0.29	0.15	−0.13	0.13
	School facilities			0.004	0.04	−0.05	0.04
	Government school			−0.79**	0.34	−0.27	0.26
Constant term		−2.20***	0.22	−1.70***	0.73	1.51*	0.84
Controlling for individual child characteristics		No		No		Yes	
Controlling for household characteristics		No		No		Yes	
Regional controls		Yes		Yes		Yes	
sigma2_u		0.24***	0.06	0.13***	0.04	0.02	0.03
No. of observation		3,910		3,894		2,897	

Note(s): Coefficients are estimated using random effect AFT regression. Analysis time (Spell) takes values from 1 to 9. For all students that are in grade 9 and above, the value of the spell variable is 9 to indicate that they completed primary school. Failure (even) takes the value of 1 when a child has dropped out of school and 0 when he/she is still in school. Asterisks ***, ** and * indicate significant at 1, 5 and 10% level respectively. S.E. stands for robust standard error. See Table A1 in the appendix for model results including child and household characteristics
Robust St. Error estimation
Source(s): Own survey

Table 4.
Estimation of school-level random effect grade survival model

significant association (at least at 1% level) with progression through primary education. We found that teacher's use of pictures/photos, laboratory equipment, worksheets/written handouts, books for reading in the language of instruction and use computer plasma and

laptops had a statistically significant influence on students' primary school progression at least at 1% level.

Finally, Model 3 in Table 4 reports the result from Equation (3), which introduces both household and individual-level factors to control for their influence on the conditional probability of students' school progression to complete primary education to look at whether the effects of student's perception on teachers' quality changes. Controlling for all other factors, perceptions of students on teacher engagement and enthusiasm, which is an indicator for teachers' behaviour, is found to have a statistically significant effect (at 5% level) on students' progression to complete primary education. Similarly, teachers' use of inputs (pictures, laboratory equipment, written handouts and use of computers or ICT) continue to remain statistically associated with student's progression through primary education. These factors were found to have consistently significant effect on students' progression to complete primary education. The use of books for reading in the language of instruction is no longer statistically associated with progression through primary school in the model that includes school management factors, and child's individual and household-level factors. Likewise, the variable on students' perception of teacher's intimidating other students, which had a significant effect in the estimation of Equation (1), is no longer found to have a statistically significant association with primary school progression in this full model.

Other than students' perception of teachers' quality, the results from the full model (Equation (3)) indicated that among school management factors included in the model, only teacher–student ratio and tutorial support were significantly associated with more chance to stay in school or progress towards completing primary school. Starting school at the age of 6 or 7, attending preschool and the health status of the Child are important child-level factors for school progression to complete primary education in our study areas. Finally, a number of older siblings, the education level of both parents and the wealth status of the child's household are important household-level factors that have statistically significant effects on a child's school progression to complete primary education.

4.2 Completion of primary school

Table 5 shows the school-level random effect logit model estimation of the probability of students' completion of primary school. Model 1 in Table 5 shows the results from the estimation of Equation (1), which specifies the conditional association between students' reports on their perception of teachers' behaviour, use of teaching inputs and teacher management practices and the probability that children complete primary school. As shown in the table, students who perceived their teachers to be intimidating had a 24 percentage points higher likelihood of completing primary school relative to students who did not find teachers as intimidating. The variable has a statistically significant effect at least at a 5% level. The other factors that measure teachers' behaviour including students who reported being praised by their teachers, teachers physically punishing students and engaging and enthusiastic had no statistically significant association with the probability of primary school completion. With respect to teacher management practices, we did not find statistical evidence of differences in management practices associated with the likelihood of primary school completion. On the other hand, however, the use of inputs by teachers such as photos, laboratory equipment, handouts, books for reading in the local language and the use of computers were all significantly associated with a higher likelihood of primary school completion.

Model 2 in Table 5 presents the result from school-level random effect logit model estimation of the probability of students' completion of primary school on students' perceptions of teachers' behaviour, teachers' class management and use of inputs conditional on school management factors, which is Equation (2). Results show that all variables on

	Variable definition	Model 1 Coeff.	S.E.	Model 2 Coeff.	S.E	Model 3 Coeff.	S.E
Teacher behaviours	Teacher intimidates student	0.24**	0.1	0.23**	0.11	0.19	0.13
	Teacher physically punished student	−0.15	0.09	−0.16	0.09	−0.23**	0.10
	Teacher engaged and enthusiastic	−0.07	0.08	−0.08	0.08	−0.05	0.10
	Teacher praising students	0.1443	0.08	0.16**	0.08	0.16*	0.10
Teacher management	Class last standard time	−0.1464	0.09	−0.13	0.09	−0.15	0.11
	Teacher's use of continuous assessment	−0.01	0.14	−0.001	0.14	−0.12	0.18
Use of inputs	Teacher's use of word/ diagram	−0.17	0.18	−0.18	0.18	−0.40*	0.22
	Teacher's use of picture/ photo	0.51***	0.14	0.51***	0.14	0.57***	0.16
	Teacher's use of slogans/proverbs	0.08	0.09	0.11	0.09	0.06	0.10
	Teacher's use of laboratory equipment	0.22**	0.1	0.24**	0.11	0.14	0.12
	Teacher's use of worksheet/written handout	0.29***	0.09	0.29***	0.09	0.26**	0.11
	Teacher's use books for reading in English	0.09	0.1	0.07	0.1	0.05	0.12
	Teacher's use of books for reading in language of instruction	0.27**	0.11	0.27**	0.12	0.35***	0.13
	Teacher's use materials produced by child	0.02	0.08	−0.01	0.08	0.02	0.10
	Teacher's use computer plasma, laptop	0.44***	0.15	0.28**	0.14	0.23	0.15
School management	Model school			−0.03	0.07	0.11	0.10
	Active participation of community			0.09	0.08	−0.03	0.09
	School receives school grant			0.04	0.15	0.24	0.18
	Teacher–student ratio			2.25	3.32	−3.92	5.57
	Education level of head teacher			0.11	0.09	0.09	0.12
	Head teacher training			0.004	0.05	−0.02	0.07
	School additional educational materials			−0.02	0.08	0.01	0.11
	School tutorial support			−0.14	0.11	−0.04	0.14
	School feeding			−0.13	0.14	−0.13	0.14
	Support for uniform purchase			0.01	0.09	−0.03	0.10
	Other supports			−0.19**	0.08	−0.07	0.12
	School facilities			0.03	0.03	−0.04	0.04
	Government school			−0.88***	0.25	−0.62***	0.25
Constant term		−0.01	0.28	0.37	0.53	−0.90	0.82
Controlling for individual child characteristics		No		No		Yes	
Controlling for household characteristics		No		No		Yes	

Table 5.
Estimation for school-level random effect logit model for school completion

(*continued*)

Variable definition	Model 1 Coeff.	S.E.	Model 2 Coeff.	S.E	Model 3 Coeff.	S.E
Regional controls	Yes		Yes		Yes	
sigma2_u	−11.455	0.003	−12.979	0.001	−13.31	0.001
No. of observation	3,910		3,894		2,897	

Note(s): Asterisks ***, ** and * indicate significant at 1, 5 and 10% level respectively. S.E. stands for robust standard error

Source(s): PSCS Survey. See Table A2 in appendix for model results including child and household characteristics. Robust standard error

Table 5.

student's perception of teachers' behaviour, teacher management and use of input remain statistically associated with the likelihood of primary school completion (and results remain unchanged as those shown for Model 1 in Table 5). However, unlike the result from Model 1, students' perception of the teacher praising students is found to have a statistically significant association in the estimation of Equation (2). The result indicated that students who reported being praised by their teachers had a 16 percentage points higher probability of completing primary school relative to students who were not praised by their teachers. All school management factors but two are found to have no statistically significant association with the likelihood of primary school completion. In this case, students who attended government schools and schools that provided other support had a lower chance of primary school completion.

Finally, we estimated the full model specification (Equation (3)), which estimates the probability of students' completion of primary school on students' perceptions of teachers' behaviour, teachers' class management and use of inputs by controlling for school management factors, household and child-level factors. The results are reported under Model 3 in Table 5. It shows that students who perceived their teachers to physically punish students were less likely to complete primary school (by 23 percentage points). The variable had a statistically significant effect at a 5% level. Students who perceived their teachers to praise their work were 18 percentage points more likely to complete primary school. However, the variable was no longer to have a statistically significant effect. With the use of inputs, we found that the use of pictures or photos, handouts and use of books in a language of instruction was associated with a higher likelihood of primary school completion. They are found to have a statistically significant association with the probability of primary school completion.

All school-level management factors except the education level of the head teacher and government school had no statistically significant association with a chance of school completion. Students who attend their primary education in government schools are less likely to complete primary education relative to other types of schools. Students who attended their primary school managed by principals with higher levels of education are highly likely to complete primary education. The health status of the child, whether the mother is alive, the mother's education level and the household's wealth are important factors that have statistically significant association with the chance of primary school completion.

5. Discussion and conclusions

Teachers play a significant role in shaping both the learning and personal development of their students (Raufelder *et al.*, 2016) and this can affect primary school completion and progression to complete primary education, especially in contexts such as Ethiopia, which has experienced "big bang" surge in enrolment in the last two decades. The relationship

between students and their teachers operates on two levels: professionally, teachers are crucial in fostering interest, curiosity and motivation (Birch & Ladd, 1996, 1997), providing educational support (Pianta, Hamre, & Stuhlman, 2003; Raufelder *et al.*, 2016), and offering feedback on academic performance (Becker & Luthar, 2002; Pianta *et al.*, 2003; Radel, Sarrazin, Legrain, & Wild, 2010). These operate alongside teachers' use of classroom resources, which in this paper, we have referred to as inputs, as well as teachers' management capabilities, all be it, the way it is perceived by their students.

This study supports similar findings elsewhere in the literature about teachers' significant role in shaping both the learning and personal development of their students (Raufelder *et al.*, 2016). This is evident from the results of the estimation of the full specification model as reported in Model 3. It has revealed that in Ethiopia, students' perceptions of some teachers' behaviours were significantly associated with grade progression in primary school and primary school completion. In particuular, students who perceived their teachers to be engaged and enthusiastic have longer progression in primary school, which means they stayed enrolled in school longer, and this has the likelihood of supporting completion. Similarly, students who perceived teacher to praise their work have a higher likelihood of completing primary school, in agreement with findings elsewhere in the literature which show that offering feedback on academic performance (Becker & Luthar, 2002; Pianta *et al.*, 2003; Radel *et al.*, 2010) shaped students learning and personal development.

The framework that underpins the framing of this paper is the opportunity to learn. Our findings reveal that students who perceived teachers to physically punish students were less likely to complete primary school because this interfered with the opportunity to learn. Opportunity to learn influences progression and completion, partly through learner motivation (affected by school and home environments (Battistich *et al.*, 1997; Bryk & Schneider, 2002; Epstein & Sheldon, 2002), and quality of teaching practices (affected by teachers' access to professional development, (Desimone, 2009; Hattie, 2009). Here we see that an intimidating school or classroom environment has a negative effect on progression.

A fundamental implication of the findings of this study is that programmes and/or interventions that focus on improving teachers' behaviour as well as providing inputs should focus on how these are perceived by the different stakeholders and in particular by students. The teaching and learning process should not just focus on the teacher but on how to maximise the OTL by the students. Students have a voice and an important role to play when in school.

Finally, the findings and conclusions of the paper are subject to some limitations. Unfortunately, the dataset did not collect information on students' learning outcomes so we are unable to examine the association of students' perceptions with learning. The other shortcoming of the study is that our estimation result may be biased due to omitted variables. For instance, children with higher cognitive abilities, motivation, more time invested in studying and better scholastic achievement get praised by their teachers and receive more engagement from teachers, and at the same time are also more likely to complete primary school. Unfortunately, our data did not contain information that would allow us to address these problems in the estimation. We suggest the need to continue to investigate these issues as new data emerge.

Notes

1. As our paper specifically focuses on the effect of students' perception of their teachers' classroom behaviours, management practices, and use of school resources on primary school completion and progression, the conceptual section does not include a detailed review of these factors. There are many factors that affect primary school completion and progression both in Ethiopia and elsewhere in the world. Examples of empirical studies in the recent past include Sun and Yang (2010), Lincove (2009), Andinet and Degenet (2008), Woldehanna, Nicola, and Bekele (2005), Gunnarson, Orazem,

and Sanchez (2004), Brown and Alber (2002), and Glewwe, Grosh, Jacoby, and Lockheed (1995). Readers who would like to know more about other factors affecting primary school completion can refer to these authors.

2. Note that Table 1 shows the schooling status of sample children at the time of the PSCS survey. That is, whether or not the children completed primary education. The table also shows that children who completed primary school are still in school or dropped out of school after completing primary education. For instance, out of 57.5% (2,296) students who completed primary school, 83.4% are still in school (i.e. they are in high school (grade 9 or above) whereas the remaining 16.6% dropped out of school after completing primary school.
3. This means that the probability of a child dropping out of school increases as the grade of the child approaches 8, which is when primary education is completed.

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Appendix

Table A1. Estimation of school-level random effect grade survival model

	Variable definition	Model 1 Coeff.	Model 1 S.E	Model 2 Coeff.	Model 2 S.E	Model 3 Coeff.	Model 3 S.E
Teacher behaviours	Teacher intimidates student	0.14*	0.07	0.11	0.07	0.08	0.09
	Teacher physically punished student	−0.07	0.08	−0.07	0.08	−0.09	0.09
	Teacher engaged and enthusiastic	0.09	0.06	0.09	0.06	0.15**	0.07
	Teacher praising students	0.06	0.06	0.07	0.06	0.06	0.07
Teacher management	Class last standard time	0.07	0.07	0.08	0.07	0.07	0.08
	Teacher's use of continuous assessment	0.23**	0.1	0.26***	0.1	0.22	0.13
Use of inputs	Teacher's use of word/ diagram	−0.05	0.13	−0.07	0.13	−0.22	0.16
	Teacher's use of picture/photo	0.32***	0.08	0.33***	0.08	0.35***	0.09
	Teacher's use of slogans/ proverbs	−0.05	0.06	−0.06	0.06	−0.09	0.07
	Teacher's use of laboratory equipment	0.41***	0.1	0.36***	0.1	0.32***	0.11
	Teacher's use of worksheet/ written handout	0.28***	0.07	0.28***	0.07	0.29***	0.09
	Teacher's use books for reading in English	0.05	0.08	0.05	0.08	0.06	0.10
	Teacher's use of books for reading in language of instruction	0.21***	0.08	0.21***	0.08	0.17	0.10
	Teacher's use materials produced by child	0.04	0.07	0.03	0.07	0.09	0.08
	Teacher's use computer plasma, laptop	0.58***	0.16	0.46***	0.15	0.61***	0.19
School management	Model school			−0.14	0.12	−0.06	0.10
	Active participation of community			0.01	0.12	−0.11	0.11
	School receives school grant			−0.42	0.23	−0.27	0.21
	Teacher–student ratio			28.05***	7.36	18.66***	6.73
	Education level of head teacher			0.21	0.16	0.03	0.17
	Head teacher training			0.06	0.07	0.01	0.06
	School additional educational materials			−0.08	0.12	−0.08	0.11
	School tutorial support			0.08	0.15	0.23*	0.14
	School feeding			−0.39**	0.19	−0.27**	0.13
	Support for uniform purchase			0.12	0.13	0.09	0.11
	Other supports			−0.29	0.15	−0.13	0.13
	School facilities			0.004	0.04	−0.05	0.04
	Government school			−0.79**	0.34	0.27	0.26

(*continued*)

	Variable definition	Model 1 Coeff.	S.E	Model 2 Coeff.	S.E	Model 3 Coeff.	S.E
Individual child	Sex (1 = male)					0.018	0.07
	School starts age 6 or 7 years old					0.29***	0.09
	Dummy for child attend preschool					0.29***	0.10
	Child with three times meal per day					0.25**	0.12
	Child has health problems (1 = yes)					−0.28***	0.07
	Child vulnerability (index)					0.01	0.01
Household	# of older siblings					0.07***	0.02
	# of younger siblings					−0.03*	0.02
	Mother alive					−0.19	0.25
	Father alive					0.26*	0.15
	Mother's years of schooling					0.03*	0.01
	Father's years of schooling					0.04***	0.01
	Ownership of different assets (index)					0.06***	0.02
Regional	Regional controls	Yes		Yes		Yes	
Constant term		−2.20***	0.22	−1.70***	0.73	1.51*	0.84
sigma2_u		0.24***	0.06	0.13***	0.04	0.02	0.03
No. of observation		3,910		3,894		2,897	

Note(s): Coefficients are estimated using random effect AFT regression. Analysis time (Spell) takes values from 1 to 9. For all students that are in grade 9 and above, the value of the spell variable is 9 to indicate that they completed primary school. Failure (even) takes the value of 1 when a child has dropped out of school and 0 when he/she is still in school. Asterisks ***, ** and * indicate significant at 1, 5 and 10% level respectively. S.E. stands for robust standard error. See Table A1 in the appendix for model results including child and household characteristics

Robust St. Error estimation

Source(s): Table by authors'

Table A1.

Variable	Definition	Model 1 Coeff.	Model 1 S.E.	Model 2 Coeff.	Model 2 S.E.	Model 3 Coeff.	Model 3 S.E.
Teacher behaviours	Teacher intimidate student	0.24**	0.1	0.23**	0.11	0.19	0.13
	Teacher physically punished student	−0.15	0.09	−0.16	0.09	−0.23**	0.10
	Teacher engaged and enthusiastic	−0.07	0.08	−0.08	0.08	−0.05	0.10
	Teacher praising students	0.1443	0.08	0.16**	0.08	0.16*	0.10
Teacher management	Class last standard time	−0.1464	0.09	−0.13	0.09	−0.15	0.11
	Teacher use of continuous assessment	−0.01	0.14	−0.001	0.14	−0.12	0.18
Use of inputs	Teacher's use of word/ diagram	−0.17	0.18	−0.18	0.18	−0.40*	0.22
	Teacher's use of picture/photo	0.51***	0.14	0.51***	0.14	0.57***	0.16
	Teacher's use of slogans/proverbs	0.08	0.09	0.11	0.09	0.06	0.10
	Teacher's use of laboratory equipment	0.22**	0.1	0.24**	0.11	0.14	0.12
	Teacher's use of worksheet/written handout	0.29***	0.09	0.29***	0.09	0.26***	0.11
	Teacher's use books for reading in English	0.09	0.1	0.07	0.1	0.05	0.12
	Teacher's use books for reading in language of instruction	0.27**	0.11	0.27**	0.12	0.35***	0.13
	Teacher's use materials produced by children	0.02	0.08	−0.01	0.08	0.02	0.10
	Teacher's use computer plasma, laptop	0.44***	0.15	0.28**	0.14	0.23	0.15
School management	Model school			−0.03	0.07	0.11	0.10
	Active participation of community			0.09	0.08	−0.03	0.09
	School receives school grant			0.04	0.15	0.24	0.18
	Teacher–student ratio			2.25	3.32	−3.92	5.57
	Education level of head teacher			0.11	0.09	0.09	0.12
	Head teacher training			0.004	0.05	−0.02	0.07
	School additional educational materials			−0.02	0.08	0.01	0.11
	School tutorial support			−0.14	0.11	−0.04	0.14
	School feeding			−0.13	0.14	−0.13	0.14
	Support for uniform purchase			0.01	0.09	−0.03	0.10
	Other supports			−0.19**	0.08	−0.07	0.12
	School facilities			0.03	0.03	−0.04	0.04
	Government school			−0.88***	0.25	−0.62***	0.25

Table A2.
Estimation for school-level random effect logit model for school completion (robust standard error)

(*continued*)

Variable	Definition	Model 1 Coeff.	Model 1 S.E.	Model 2 Coeff.	Model 2 S.E.	Model 3 Coeff.	Model 3 S.E.
Individual	Sex (1 = male)					−0.01	0.09
	School starts age 6 or 7 years old					−0.03	0.10
	Dummy for child attend preschool					0.18	0.12
	Child with three times meal per day					0.12	0.19
	Child has health problems (1 = yes)					−0.37***	0.12
	Child vulnerability (index)					0.00	0.01
Household	# of older siblings					0.03	0.03
	# of younger siblings					0.01	0.03
	Mother alive					0.88***	0.28
	Father alive					0.22	0.24
	Mother's years of schooling					0.04**	0.02
	Father's years of schooling					0.02	0.01
	Ownership of different assets (index)					0.08***	0.02
Regional controls		yes		yes		yes	
Constant term		−0.01	0.28	0.37	0.53	−0.90	0.82
/lnsig2u		−11.455	0.003	−12.979	0.001	−13.31	0.001
No. of observation		3,910		3,894		2,897	

Note(s): Asterisks *** and ** indicate significant at 1 and 5% level respectively
Source(s): Table by authors'

Table A2.

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