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How much and what kind of teaching is there in elementary education in India?

Evidence from three States

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Deepa Sankar and Toby Linden

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EXECUTIVE SUMMARY

During the last decade and a half, India's efforts in improving primary education have resulted in better provision of schooling facilities and increased enrolments, and have reduced the gender, social and economic gaps in education participation. However, low learning outcomes remain a concern. Understanding the core processes of teaching that result in better learning outcomes requires understanding the underlying dimensions: learner characteristics, context, enabling inputs; teaching and learning; and outcomes.

This study, carried out with concurrence from Ministry of Human Resource Development (MHRD), Government of India (GOI), is built upon the independent study commissioned by the MHRD to explore the teacher attendance rates in schools and its reasons. **This study ventures beyond the quantitative dimensions of teacher attendance (physical presence) to look at the 'time-on-task' and the nature of tasks taking place in classrooms – that is, both the quantity and quality of teacher presence and interaction with students which are essential conditions for learning.** Most specifically, it aims to provide insight into the work of teachers and suggest implications for both policy and program interventions to empower teachers and introduce more accountability into the system. The study also aims to find out the factors that facilitate improved quality of instructional time on the one hand, and what it means to the process of improving learning levels on the other.

Methodology

This study was carried out in 2006-07 in three states – Andhra Pradesh (AP), Madhya Pradesh (MP) and Uttar Pradesh (UP). A random sample of 100 government schools in each state. In addition, private schools, selected from each neighborhood of every 5th government school, were included in the study. Three primary grades in each school – Grades I, II and IV – were observed for Language and Math classes (for Grades I and II) and in addition for Environmental Sciences (for Grade IV).

All subject classes per grade were observed twice using, for the first time, a standardized method. In each state, 1,680 classrooms were observed, generating more than 75,000 observation snapshots.

Three dimensions of teachers' time were considered. First, the number of school days prescribed by the calendar and days the school actually functioned. Second, the amount of time teachers were physically present in school and its distribution across various functions within school; and, third, teachers' time in the classroom and the distribution of that time across various learning ('on task') and non-learning ('off task') activities. Time-on-learning tasks were of three types: (i) "student centric" (Category I activities); (ii) traditional teacher – centric, "chalk and talk" methods (Category II activities); and (iii) "rote learning" (Category III activities). **These different measures of teachers' time yield insight into the amount of productive learning time that children experience in Indian elementary schools.** The learning outcomes of students tested were correlated with the usual school characteristics and student characteristics, but also to classroom time and processes, and quality of tasks. This study examines the teachers' as well as students' time in both mono-grade and multi-grade classrooms.

Available school days

The average number of days of allocated time reported by schools was 231 days each in UP and MP and 223 days in AP.

In an academic year of 220-225 days, on an average, at least one seventh (14 percent) of the school calendar days went unutilized for instruction. There were three main reasons. **First, teachers reported that they were not in school, either because of training, attending meetings or performing functions outside of the education department for, on average, 25-30 days of teachers' duty days.** These lost days were particularly high in government schools, where teachers were absent 10 days more on average than private school teachers. Moreover, within government schools, regular (as against

para or ad hoc), more experienced, and better-trained teachers were absent more often.

Second, teachers' personal and sick leave reduces the teacher time available to school by at least an additional 12 days, especially in the case of regular teachers in government schools. These leave days can be used during the school year and are in addition to the 1-2 months of vacation in a year.

Third, around 3-4 days of each school's prescribed school calendar was lost on account of local festivals, events of national importance and campaigns even in an "uneventful" year (such as the year in which the study took place). The number of school days lost differed across States (for example, among the three states where the study was conducted, it varied from 4 days in AP to 11 days in UP) and, within states, across districts and schools.

Instructional time

Non-academic activities such as compilation and provision of data, maintenance of records, and supervision of mid-day meal distribution accounted for 20-25 percent of the weekly working hours (as reported by teachers). Government school teachers reported they worked more hours in school every week than teachers in private schools, but the non-academic activities "crowded out" the advantages of that extra time in school. Within academic activities, classroom teaching occupied the majority of time.

Time on task and nature of tasks

Some amount of classroom organization is a necessary part of teaching (for example, organizing activities also include taking attendance, distributing learning materials, etc.). However, **on average, for around one-fifth of the classroom time, teachers were not on any teaching learning tasks: they were either in organizational tasks or on tasks completely unrelated to teaching and learning.** From the students' perspective, it is not only the number of days of school or time a teacher is teaching that is important, but also how a teacher's time is used during lessons.

Teachers were engaging children in student-centric, higher order activities for around 24 percent of the classroom observation time on average. The prevalence of student-centered tasks increased in higher grades and in Math classes. **However, a fifth of the classrooms observed were devoid of any student-centered tasks of teaching-learning.**

Overall, the largest proportion of time was spent on activities that were teacher-centric. Traditional teaching activities accounted for over 40 percent of overall classroom time and more than 50 percent of all teaching time within the observed classrooms. Finally, teachers using rote learning activities (Category 3) were observed to occupy 15 percent of classroom time. The general distribution of activities between categories was similar across the three states. **There are no significant differences in the patterns of teaching practice between government and private schools. This is one of the most striking findings in the study.** Moreover, private schools in each state look much more like the government schools in that state, than they do like private schools in other states.

Multi-grade classrooms present a complex picture. On the one hand, taking the children in these classes as a whole, their learning experience is very similar to that of children in classrooms in which only one grade is being taught. On the other hand, in multi-grade classrooms, the grade being observed had much higher proportion of the time spent on Category 1 activities than the other grades in the same classroom. So the overall similarity of multi-grade classrooms to single-grade classrooms seems to be driven by the way teachers teach to one grade in the multi-grade classroom. **In other words, multi-grade <u>teaching</u> is practiced much less frequently than the presence of multi-grade <u>classrooms</u> would suggest.** Here is another urgent need for more effective training programs.

Teachers' perceptions, beliefs and understanding

How teachers teach in the classroom is influenced by what they perceive or believe as

the best ways to teach. On the whole, the majority of the teachers across both government and private schools, and across the three states, agreed with more "student-inclusive" statements regarding teaching and learning. However, most teachers are not able to translate these beliefs consistently into views about the ways children learn best. Sixty-two percent of teachers in government schools said that children need to be provided with all the answers, while, <u>at the same time</u>, 65 percent said that students were capable of learning on their own.

Availability of materials

One-third of teachers overall, and more than half of teachers in MP, reported that they did not possess teacher guides, and overall 15 percent did not possess their own text books. In AP and UP, around 70 percent teachers possessed a teacher guide; while in MP only 43 percent teachers had one. Less than half of the teachers in the private sector possessed teaching guides. There was considerable variation across states. For example, regular teachers were significantly better off with respect to teaching guides compared with para teachers in AP (77 percent as against 57 percent), somewhat better off in MP (44 percent versus 31 percent), but worse off in UP (68 percent as against 74 percent).

Teaching-learning materials were available in 87 percent of classrooms but much less in private than in government classrooms. However, around 52 percent of the classrooms had teaching-learning materials such as charts, maps or pictures displayed on the walls or elsewhere. While around 57 percent of government classrooms had some TLM displayed, less than a third of the classrooms in private schools did. This finding is consistent with the reported concerns of teachers in private schools that a significant hurdle to teaching is the lack of materials.

Teachers' training

About two-thirds of teachers received some in-service training in the previous twelve months, for an average of 15 days, but the type of training, focal area of training and duration of training varied across states. Across states, the average number of days teachers received

training ranged from 9 days in AP to 23 days in MP. Para teachers had very varied experiences across states with respect to training opportunities, seemingly driven by state policy. **Only around a third of the government teachers who received in-service training reported that the training benefited them.** Moreover, as noted above, when teachers are trained, they very often do so during school working days. So not only do students lose out by not having their regular teacher available to teach them, they also lose out because mostly this training does not improve the ability of teachers to teach.

Use of learning material in classrooms

Teacher-centric methods with no materials or only the blackboard were observed three-quarters of the time. It was observed that around 11 percent of academic learning time, teachers were on academic activities without any materials. This means that teachers were simply "lecturing". Such instruction without using any materials was observed mostly in MP (on an average, 17 percent of the classroom observation time) and least in classrooms in UP (3 percent).

Within student-centric activities, more observations using TLMs or innovative methods were found in classrooms in government schools (22 percent of Category I activities time as against 12 percent of classroom situations in private schools).

The availability of different types of teaching materials varied considerably, though the patterns of which materials were available across states were similar. **Almost all teachers, in both government and private schools and across all 3 states, reported that they had textbooks. The availability of textbooks did not however translate consistently into their use in the classroom.** This broad pattern, of heavy dominance of use of the blackboard and textbooks rather than other materials, is perhaps explained by the finding that teachers strongly believed that students learn by copying the teacher. Even when child-centric learning activities were taking place, teachers relied mostly on textbooks or the blackboard, even though other materials were available.

Students' time on learning

The average attendance rate of children was found to be 66 percent and lower in government schools. At the same time, the shares of repeaters among students were found to be quite high. For example, in government schools, the percentage of children in grade IV who were repeating the grade due to attendance shortage in the previous year was 18 percent. Attendance rates of children also varied by the time of the day. **Student attendance rate dropped after the lunch break; especially in government schools where the midday meal (MDM) was served.** Clearly, all enrolments did not get translated into regular school attendance.

More than 17 percent of government school children do not have an opportunity to learn outside of school (as they do not have space, time or assistance at home). In private schools only 6 percent of children reported no such opportunity. There was a similar pattern in each state, with government children significantly worse off. However, overall children in AP were much better off (11 percent of government school and 3 percent of private school children reported no opportunity to learn outside school) than in MP (24 percent and 11 percent respectively).

Students' learning outcomes

Across the three states students achieved on average only 54 percent in language and 52 percent in mathematics of the expected skills and knowledge at this age. **Not surprisingly, learning achievement scores were better for those children from better economic background.** In this study, the difference in language achievement between a child from the poorest and from the richest quintile was 18 percentage points in AP, 14 percentage points in MP and an astonishing 25 percentage points in UP. Students in a single grade class situation fared better than those studied in multi-grade classrooms. For example, in mathematics the average scores in single grade and multi-grade were 68 percent and 62 percent, respectively, in AP, 53 percent and 40 percent respectively in

MP, and 52 percent and 44 percent respectively in UP.

The student level factors contribute or take away from student outcomes in this study in many of the ways one would expect from the broader literature on learning outcomes. However, there are some surprises. Boys do better overall when compared to girls though with some important caveats, while children with better educated fathers but not better educated mothers do better, students belonging to the general category do not do significantly better than other social groups, and there is little advantage to urban schools over rural schools.

There are also some other important policy implications, including some counter-intuitive results, regarding grade repetition, teacher type, teacher qualifications, and government versus private schools. Children who repeated grades tend to do worse. This provides support for the no-retention policy introduced under RTE. It also indicates that additional efforts are needed to ensure children attend and to give sufficient support so that children can learn what they need to learn the first time through. While making children repeat a grade does not improve their performance significantly, neither does poor quality education in the age-appropriate grade.

Looked at in detail, teachers' qualifications and backgrounds do not have much impact on student performance. Considering the results overall, there are some correlations, though not all one might expect. For example, having a professionally qualified teacher did support better learning outcomes; but children taught by more experienced teachers did <u>worse</u> overall, as did children whose teachers had more than a Bachelor's degree.

However, these results hold true only when the results overall are considered; looking at the results in more detail reveals fewer correlations with performance, good or bad. In UP, the results follow the general picture in that children with professionally qualified teachers did better and those with teachers who had more experience did worse; but in AP and MP teachers' qualifications and experience made no difference in either direction. Similarly, as with

the overall results, teachers with more than a Bachelor's degree did worse in government schools, but there was no significant impact of more education of teachers in private schools or in any one state. The contractual status of teachers (regular versus contract) has no effect on performance.

Private schools have several advantages over government schools, both with respect to the students they teach and the endowments of the schools. **The mean scores of private schools were higher than those of government schools by about 23 percentage points.** Students from richer, educated families tend to choose private schools and such children are also better equipped with support from home and facilities and more opportunity to learn outside classrooms. **However, even when all these advantages of private schools are taking into account, they retain a performance advantage over government schools. Overall, the difference remains at 15 percentage points.**

Finally, teachers' pedagogical practices do have an impact on learning outcomes, thus confirming the initial rationale for this study to examine in detail how teachers teach in the classroom. Where more of teachers' time was used engaging in student-centric activities, performance was better. These results held true for all states and types of school, though the results were statistically significant only in AP and MP. Similarly, where more students were engaged in learning time with teachers, results were better; though, again, significantly so only overall and in MP. The conclusion that might be drawn from this evidence is that **teacher pedagogy makes a difference, but good practice is not yet sufficiently widespread to make a big difference for a large number of pupils.**

Reflections

First, State policy can make a difference. One of the most striking findings in the report is how similar private schools are to government schools <u>in the same state</u>, and how private schools in one state look more similar to their government school neighbors than to private schools in another state. Second, state governments can make a difference in teacher attendance through planning and implementing the official school calendar, as well as reviewing policy and practice for official leave.

Third, good teaching practice makes a difference to student learning outcomes. More student-centric activities would lead to better learning outcomes for children. In this respect, it is deeply worrying that only one-third of teachers said that they found the training they attended to be useful. Policy makers and training providers need to review urgently the training being offered and to develop methodologies for assessing the impact on the teaching-learning processes that take place in the classroom.

Fourth, students suffer from a lack of learning opportunities in multiple ways. They do not attend school even if they are enrolled. Children's learning opportunities outside school vary (and again the similar pattern across private and governments schools within states is more striking than the similarities across states). Moreover, as this study has shown in detail for the first time, students miss out of learning time because of the prevalence of off-task activities and, especially, rote learning and teacher-centric activities.

Fifth, the classroom observations reveal plenty of examples of good teaching practice even in the most difficult circumstances. More widespread presence <u>and especially use</u> of other learning materials would help spread good teaching practice more quickly.

CHAPTER 1: INTRODUCTION

Context and Objectives

India has made tremendous progress towards improving access to elementary education. The Government of India is committed to attain the Millennium Development Goal (MDG) of universal primary school completion by 2015. Continuing and consolidating the initiatives introduced under various primary education projects such as *Lok Jumbish* and the District Primary Education Projects (DPEP), the Government of India (GoI) launched its flagship program, *Sarva Shiksha Abhiyan* (SSA) in 2001 whose objective is universal primary education of satisfactory quality for the 200 million plus children in the age group of 6-14 years. More than 97 percent of the habitations in the country now have access to primary schools within a square kilometre distance. Around 192,000 primary schools and 106,000 upper primary schools were constructed, 1,604,000 additional classrooms were provided, 223,000 drinking water facilities and 584,000 toilets were built in schools under SSA (up to March 2012) (Planning Commission (Government of India), 2013). In addition, more than 1,965,000 teachers were appointed. Teachers are provided with in-service training and Teaching Learning Materials every year, and children are provided with free text books (in addition to other incentives like midday meals). Community mobilization and involvement of Village Education Committees (VECs) in education management is also encouraged to increase accountability in education service delivery.

Better provision, improved infrastructure and availability of more teachers have resulted in increased participation of children in elementary education. The analysis of enrolment figures at elementary level increased from around 160 million in 2002-03 to more than 199.7 million in 2007-08 (National University of Educational Planning and Administration, 2013). The gender and social gaps are narrowing, with more girls and children from marginalized groups like Schedule Caste (SC) and Scheduled Tribes (ST) increasingly coming to school. Gender and social parity are almost achieved in the case of primary education and improving at the upper primary level.

Yet, there are areas of major concerns, especially related to quality and learning outcomes. Concerns about low learning outcomes persist, especially in the context of the huge number of first generation learners coming to school. Though primary retention rates have improved from around 53 percent in early 2000s to 80 percent in 2012-13 (National University of Educational Planning and Administration, 2013), it still means that around one fifth of the cohort is not reaching the final grade of primary. Transition rates from primary to upper primary have improved (from less than 74 percent in early 2000s to 87 percent in 2012-13 (ibid), but more than 10 percent of primary completers still do not go to the upper primary grades. Average learning levels of children has continued to be low, with only marginal improvements between Baseline Assessment Surveys (BAS) and midterm Assessment Surveys (MAS). For example, in Grade III in 2004, the average score nationwide in Math was 58 percent and in Language, 63 percent; the mean scores improved marginally to 60 percent in Math and 67 percent in Language by 2007. In Grade V, over the same period, the average score for Math has improved only slightly from 46.5 percent to 48 percent and for Language, from 58.6 percent to 60 percent.[1] By the end of the elementary education (usually Grade VIII but Grade VII in some states), the average scores were around 38 percent (30 percent in Grade VII) for Math and 52 percent for Language.[2] By 2007 this had risen only to 41.5 percent (39 percent) and 56 percent (52 percent). National surveys conducted by Civil Society Organizations like PRATHAM show that there are still substantial proportions of children in

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[1] NCERT is now using an updated methodology for the national assessment surveys. The first cycle using this Item Response Theory (IRT) approach was Class V in 2009, and all future cycles will use this methodology. However, the results reported for the 2009 cycle are not comparable to the earlier rounds and so are not reported here.

[2] Remember also that by the end of elementary education more than 40 percent children who started in Class I had dropped out, and the learning outcomes of those who have dropped out is almost certainly significantly lower than those who remain in education.

grade V whose competency levels are lower than those expected of children at the end of Grade II (ASER Centre, 2013).

However, defining quality as a process in education or processes leading to good learning outcomes is complex. At the macro level, the concept of quality encompasses many aspects, including those related to inputs, outputs/outcomes and processes. Quality education as has been described as what students learn, how well they learn and what benefits they draw from their education (UNESCO, 2005). At the micro level, quality becomes specific interventions or actions. UNESCO (2005) looks at quality through 5 central dimensions that influence the core process of teaching and learning, such as: (a) learner characteristics, (b) context, (c) enabling inputs; (d) teaching and learning; and (e) outcomes. UNESCO's framework to understand and interpret the notions of quality places learners at the center of the teaching learning process in a policy framework aimed at improved quality (Box 1).[3]

Several aspects of quality have already been investigated beyond learning outcomes, which include teacher attendance and availability, governance and accountability. The study by Chaudhury et al. ((Chaudhury & et al., 2004)) found high teacher absenteeism rates – around 25 percent – among Indian teachers, and more than 30 percent in some states. The study further reported that among those who are present, only half of them were engaged in teaching learning activities. MHRD's study (Ed.CIL, 2007) shows improvement in teacher attendance rates, but student attendance rates are still a concern, and quite high at 30 percent at primary level. Completing elementary education of satisfactory quality means not only expansion of access and increase in enrolments, but also ensuring that children attend school regularly and internalize skills at appropriate ages. This in turn depends on how well students are taught. Other indicators related to quality that have been investigated are those related to teacher availability or teacher training related variables, for example, indicators such as PTR, number of schools and districts with PTR above certain norms, percentage of teachers trained and teacher education.

Box 1: UNESCO's Framework for defining and monitoring Quality

A framework for understanding, monitoring and improving education quality developed by EFA places learners at the center of teaching and learning process, emphasizing that, from the outset, policy must acknowledge their diverse characteristics, context and learning needs. Learner characteristics and enabling inputs (especially teaching and learning) together form a process that takes place within classrooms, aimed at imparting good education and learning experience.

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[3] This study was conducted before the World Bank regional study on the quality of education, which uses a different framework, based around learning outcomes (World Bank, Forthcoming).
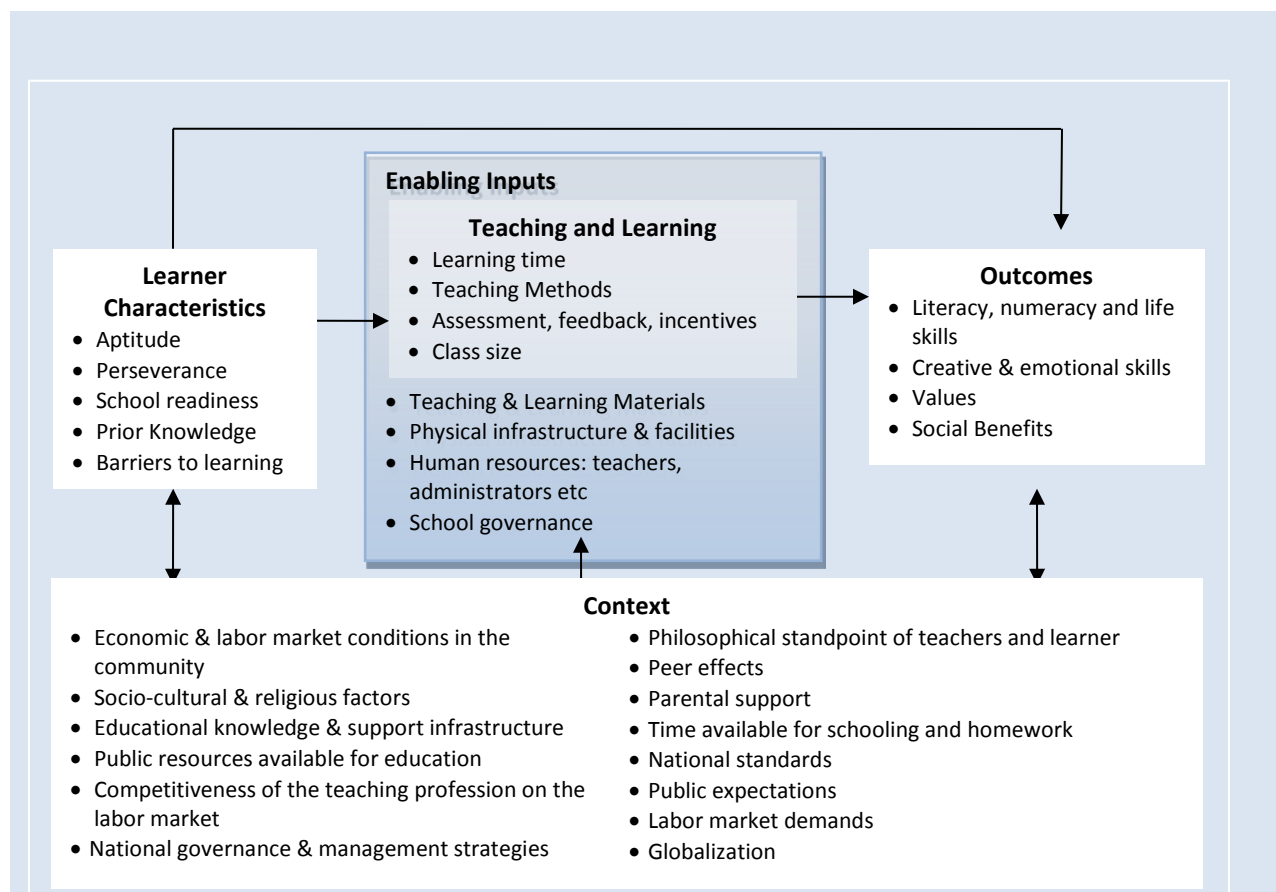
Source: (UNESCO, 2005)

This study is an effort to look at some of the "enabling inputs" or processes in Indian classrooms, especially those related to teacher availability, instructional time, and the nature of tasks. What happens in the school or classrooms determines the quality of processes in teaching and learning. Teaching (and learning) time, teaching methods, systems of assessments, feedback and incentives to improve are core to the process of teaching and learning.

School governance and accountability are linked to quality, hence there was a need to link these issues to processes related to teaching and learning. A third factor triggering this study is related to processes in the realm of school management, governance and accountability, issues of which were increasingly being linked to quality issues, especially after the World Development Report 2004 (World Bank, 2004). While there are positive signs of improvements in teacher and student attendance, there was a need to go beyond teacher attendance, to see whether teachers have sufficient time in school to devote to teaching learning activities and how they use time within classrooms. In short, it is not mere teacher presence time in school that matters, but whether that time is sufficient in providing students with optimum "opportunity to learn" higher order skills. These concerns also arise from the fact that the majority of schools in many educationally poorer states are organized into multi-grade classrooms, and children attending schools now come from more diversified backgrounds, and a large number are first generation learners.

This study focuses on the link between teachers' "time-on-task" (TOT) and the nature of tasks in classrooms. This study, carried out with concurrence from MHRD, is built upon the independent study commissioned by MHRD to explore teacher attendance rates in schools. This study ventures beyond the quantitative dimensions of teacher attendance (physical presence) to look at the 'time-on-task' (TOT) and

nature of tasks, that is, the quantity and quality of teacher presence and interaction. Most specifically, it will provide insight into the work environment of teachers who are the key to service delivery and suggest implications for both policy and program interventions to empower teachers and introduce more accountability into the system. The McKinsey & Company study (Barber & Mourshed, 2007) identified three things that matter most: (1) getting the right people to become teachers; (2) developing them into effective instructors; and, (3) ensuring that the system is able to deliver the best possible instruction for every child. In the present study, the attempt is to see whether the teachers are "effective instructors" and the system is delivering the best to its children.

Research Questions: The study aims to find out the factors that facilitate improved quality of instructional time on the one hand, and what it means to the whole process of improving learning levels on the other. In addition, there is an effort to understand the characteristics of various enabling inputs (Box 2).

Box 2: Specific issues addressed in this report

Since the specific focus of the study is to understand the "time-on-task" and the nature of instructional time, the specific questions addressed in this study are the following:

A. How many school days (in the academic year under reference):
- were prescribed (by the state/ districts/ local body authorities) for the primary schools /grades to *function*?
- did the school function in reality? What accounted for the loss of time between allocated days and *actual days available*?
- did the teachers attend schools during the school functioning days? What accounted for the leakage of time from school functioning days to *teacher physical presence days*?
- did the teachers devoted totally to *non-academic activities* within the total teacher presence days in school? What was nature of the non-academic activities that accounted for a few full school days?

B. How many hours/ share of time (within the total teacher presence days):
- Did teachers spent on non-academic activities during school functioning days within school in the academic year under reference? What were the non-academic activities they engaged in?

C. How much of the weekly working hours
- Did the teachers spent in school? How did they distribute the time between various academic activities and non-academic and administrative activities?
- Did the teachers devoted to classroom teaching?

D. Within each classroom period,
- What proportion of time was devoted to academic tasks, organizing activities and activities that is in the nature of off-(any academic) task?

E. All the above, analyzed by
- school characteristics such as: (a) type of school management, (b) location of schools; and (c) schools by levels of grades; and
- Teacher characteristics by (d) gender of teacher; (e) type of teacher appointments; (f) teacher education and training; and (g) teachers by experience in service.

F. Nature of tasks (within classroom and a period) by:
- Category I tasks, Category II tasks, Category III tasks, tasks in the nature of organizing classroom process and off tasks
- Nature of tasks by school characteristics, teacher characteristics, grades addressed, subjects taught, and mono-grade and multi-grade situations
- Use of materials in teaching learning process, and the type of materials used.

G. Classroom environment while teaching in terms of
- Teacher interaction with students, teacher movements within class, legibility of writing and clarity of speech,
- Classroom environment in terms of lighting, space, seating arrangements, number of students etc.

H. Students' time and involvement
- Students attendance rate in general
- Students involved in classroom teaching learning tasks with students and nature of tasks
- Students on their own within the classroom and the nature of tasks
- All the above by various school/teacher/grade/subject characteristics and mono-grade and multi-grades, and in multi-grades, when teacher is addressing the grade and other wise.

I. Learning levels of Grade IV students
- Average scores of students in Mathematics and language
- Learners' background characteristics

J. Teacher perceptions and views about:
- Hindrances to daily teaching
- Students' learning and approach towards teaching
- Usefulness of training
- Interactions with parents/ community

Instructional time use studies: Literature review

Instructional time use has been studied from broadly two different perspectives. Under the first approach, research has tried to understand, define and predict "time use" or "time loss" in schools or in classrooms. Here, measuring instruction time itself was the main objective. Focus was mainly on defining, understanding and measuring time on instructional activities either in school, or within classrooms, of either teachers or students or both.[4] Some of the studies explored the nature of task within instructional time while other studies looked at factors that led to instructional time loss.[5] This "school effectiveness" approach is to see how teachers manage instructional time in classroom. The assumption here is that student achievements increase in environments in which time-on-task activities predominate.

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[4] For example, Rossmiller (1983)'s analysis showed that in US, "during a typical school year of 1080 hours, students actually receive academic instruction for 364 hours or 34%". Prior to this, Fischer et al (1978) estimated that the academic learning time in US classrooms amounted to 2/3rds of the total engaged time of children. The recent study conducted by NICHD and the University of Virginia (2007) concluded that children in US classrooms have less than 20 percent chance of having a rich classroom experience. In another study in Peru (Amadio, 1997), it was found that students were being taught only 50-80 percent of the official class hours, which itself was as low as 720 hours per year. In rural areas with single-teacher schools and multi-grade classes, the estimated instructional time did not amount to 30 percent of the total official time. Abazi (2006) reported that the average instructional time in classrooms were more in the range of 70-85 percent - in Brazil – 72 percent, Ghana, 70 percent, Morocco 82 percent and in Tunisia 86 percent. Worldwide, yearly instructional hours are, on an average, lower in grades 1–3 and higher in grades 4–6. Indeed, there is a systematic increase of about 20–30 hours per grade level, with the global mean moving from 705 hours in grade 1 to 830 hours in grade 6 (Benavot, 2002, Abadzi 2007). However, that global annual intended instructional time has not increased since the mid-1980s and is often well below 1,000 hours (UNESCO, 2005, based on Benavot, 2004).

[5] Rossmiller's (1983) study arrived at instructional time by deducting time allocated to non-instructional activities (lunch, class passing and attendance taking), process activities (distributing materials, establishing order and disciplining the students). Dia (2003)'s study shows that substantial time was lost in writing lessons and problems on the board in Gambian and Burkina Faso classrooms, because students lacked text books. Benavot (2004), in his study of instructional time across countries concluded that meeting demand for increased access under resource constraints, particularly developing countries, may have resulted in reductions in instructional time (Benavot, 2004).

The second approach used instructional time as a factor in explaining learning outcomes. In this approach, instructional time and type of activities is treated as a process, and is a determinant of educational outcomes.[6] In the second set of studies – that takes the "opportunity to learn" approach – school based process variables like instructional time, which frame and delimit pupil's learning opportunities, are key factors in determining pupil achievement. As Millot and Lane (Millot & Lane, 2002) point out "while there is an intuitively appealing, and almost trivial, connection between time input and educational outcomes at the macro level, it is very difficult to isolate the contribution of time at the micro, or classroom level. Although the concept of time use at first seems straightforward, the actual measure is complex (210)".

The findings of the studies, however, vary. There is early research which did not show any consistent relationship between teachers and learning achievement of students.[7] Coleman (Coleman, 1990) further suggested that the most important impact on student achievement was the socioeconomic background of students rather than the schools themselves. There are others who found some linkages, but too weak to establish any significant relationship between length of schooling and learning outcomes.[8] Some of the later studies, especially those since 1980s, have shown the positive and consistent relationship between instructional time quality and learning achievements.[9] As later research focused on classroom observation of teacher behavior, more systematic links between some teacher characteristics (e.g., clarity, flexibility, enthusiasm, ordered preparation) and pupil performance were suggested (UNESCO, 2005).

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[6] Instructional time in various forms was among the few conditions that enhanced school effectiveness (Purkey and Smith, (1983) who identified role of instructional time in terms of time on task, reinforcement, streaming; Levine and Lezotte, (1990) who emphasized on effective instructional arrangement; Scheerens, (1992) whose focus was on Structured teaching, effective learning time, opportunity to learn; Cotton, (1995) focused on the role of Classroom management and organization, instruction; and Sammons, Hillman and Mortimore, (1995) who talked about instruction time and purposeful teaching time). Stallings (1985)' study points towards the role of effective learning time, class organization and management, teaching strategies and instruction, and assessments and teachers' expectations in improving student learning outcomes. These studies also have shown that making school day is not necessarily lead to better performance, if the effectiveness of the time spent does not improve. Stallings and Mohlman (1981)' study has shown that effective teachers spent some 15 percent of the school day on organization, management and lesson planning; 50% on interactive teaching and 35 percent on monitoring student's work (UNESCO, 2005).

[7] For example, research by Medley and Mitzel (1963), Rosenshine and Furst (1973), Smith (1979), Borg (1980) etc.

[8] (Anderson (1980, 1981); Blai (1986); Borg (1980); Brown and Saks (1986); Cotton and Savard (1981); Fisher and Berliner (1985); Fredrick and Walberg (1980); Honzay (1986-87); Karweit (1976, 1985); Leach and Tunnecliffe (1984); Levin and Tsang (1987); Lomax and Cooley (1979); Mazzarella (1984); O'Donnell (1978); Quartarola (1984); and Walberg (1988). Hanushek (1986)'s research also suggested that "Teachers and schools differ dramatically in their effectiveness". There are many studies that have established the positive correlation between the length of schooling and the learning outcomes (for example, Wiley and Harnischfeger 1974; Kidder, O'Reilly, and Keisling 1975). A review of research evidences by Wang, Haertel and Walberg (1993) ranked factors that have been found to influence student achievement from high to low thus: (a) student characteristics, (b) classroom practices, (c) home and community educational contexts, (d) design and delivery of curriculum and instruction; (e) school demographics, culture, climate, policies and practices; and (f) state and district governance and organization (UNESCO, 2005).

[9] School-based instructional time to be especially significant for poor children, whose out-of-school learning time was limited (Suryadi, Green and Windman (1981). A review carried out by Walberg and Fredrick (1991) found that around 88 percent of the studies showed positive influence of time on learning. Reimers (1993) showed that teaching time by itself was a poor predictor of student achievement; but effective use of time was a more accurate predictor. Another set of studies found that improved use of time devoted to learning, by facilitating more pupil-oriented teacher behavior have had significant impact on learning processes and in higher achievement levels (Tan, Lane and Coustère (1997)' study in Philippines, Verwimp (1999) study in Ethiopia). Fuller and Clarke (1994) also showed that instructional time is one of three major areas (in addition to teacher quality and textbook availability) in which consistent achievement effects obtain.

Studies looking at instructional time and learning outcomes in India are few, and even fewer in the public domain. The studies that have looked at various factors related to learning outcomes (such as, the various learning achievement studies under DPEP, (Shukla, 1994), (Kingdon, 1996), (Bashir, 1994)), or there are evaluations of specific interventions (for example, see Banerjee, Cole, Duflo and Lindon, 2003, IIM study by V. Sherry Chand and Chaudhury, 2006, ERU study for ILO, 2006, Pandey, S (2006) study on para teachers and its implications for quality). The NCERT (NCERT, 1993) study identified that of the 35 school level characteristics tested, only four – teacher attendance, instructional time spent on language, emphasis on instructional improvement and instructional supervision – were positively related to learning achievement in the few states surveyed. The study also indicated that students' learning achievement was also higher in schools with more and better overall instructional time (and more instructional time spent on the subjects tested such as Math and Language). The study also highlighted that time is important not only from the perspective of the teacher and school, but also from that of the student. Student achievements were correlated with student attendance and time spent at home for learning.[10]

Planning the study and methodology

The first task in carrying out this study was the formation of a Technical Committee. To initiate the study and advise the team, a Technical Committee was constituted in March 2006 comprising of education researchers and experts in classroom observation from various research institutes and resource centers. It was decided to explore the quantitative methods developed and used globally, thus going beyond the anthropological case studies.

The classroom snapshot observation method was identified as suitable for this study. The Stallings Snapshot Observation Schedule (SOS) tool was adapted for Indian classroom situations by the World Bank team with the help of the Technical Committee and master trainers. It was also decided that the adapted SOS tool will be complemented with other tools that collected information about school, teacher, classroom and student characteristics. Thus, there were 7 types of tools used in this study. The tools (except SOS) were subsequently translated into local languages (Hindi and Telugu) (Box 3). To test and validate the tools and methodology, a pilot study was carried out in December 2006. Subsequently, the tools were finalized and the methodology was standardized.

Identification of the right consultants or consulting firms and training was a major but crucial task. Since this was not a conventional survey and the administration of tools required a fair amount of understanding of educational issues, especially those related to pedagogy and curricular issues, identifying those carry out the work was a key task, especially ensuring that the field investigators had some knowledge and training in pedagogy and classroom teaching (for example, in UP and AP, the investigators possessed a Bachelors or Master's degree in Education). Training of these investigators was conducted by a team of two master trainers over 8 days in the three states. The field work took place during October 2006-April 2007.

Methodology and sample selection

In each state, 100 government schools and 20 private schools were selected. The government schools were selected on the basis of systematic random sample methodology - as a sub-sample of 100 government/private aided schools per state derived from the 400 schools selected per state by MHRD for a separate study which had drawn its sample representatively from the identified socio-cultural regions of the state (see Appendix 1). The private schools were selected on a random basis, in the neighborhood of every 5th government schools covered. In each school, three grades were observed – Classes I, II and IV. The schools and grades included both mono-grade and multi-grade classroom situations. The teachers covered included all the teachers who taught these grades in the school, and it covered both regular and para teachers. In each grade, two classes each of Language and Math were observed.

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[10] See, for example, (Jhingran, 2013).

Teams consisting of two trained investigators visited schools for 4-5 days. They recorded 14 classroom observations, collected information from schools, teachers, and students, tested Grade IV students, conducted focus group discussions with parents and students, and observed school daily activities in each of the schools. The first day of the visit to the school was unannounced. A profile of schools, classrooms, teachers and students surveyed is provided in Appendix 2.

Box 3: Tools used in the study

The following tools were developed or adapted for this study from some existing tools:

1.   Classroom Snapshots sheet
Stallings' Snapshot Observation Schedule adapted for Indian classroom situations (such as modifying certain activities observed and its definitions to incorporate the concerns and concepts suggested by National Curriculum Framework, observing different grades in multi-grade situation, increasing the number of snapshots, fixing the time gaps between the snapshots, etc)

2.   TOT – 1 : Schedule for School Profile
This included items on infrastructure and facilities in the sampled schools; school calendar; teacher absence or closure of school on working days and reasons thereof. It was to be filled for all sampled schools.

3.   TOT-2 : Schedule for Teacher's Profile :
This was meant for collecting data from teachers on their qualifications; years of teaching experience; classes taught; details of leave and absence from school due to other reasons; time spent on teaching and other activities in school; remedial teaching; TLM used while teaching; problems faced; interaction with parents; belief and perception of how children learn; in-service training support received from CRC, BRC etc. It was to be filled for all the teachers teaching classes I, II and IV.

4.   TOT – 3 : Classroom Information sheet :
This form was used for recording information on physical facilities in the class; seating arrangement for children; teacher behavior; his/her style of teaching, clarity of speech etc; use of TLM and project work in class by the teacher. This was to be filled by the investigator after completing classroom snapshots sheets on the basis of his/her own observations. In each school 14 such schedules were used since there was on schedule for each of the 14 classes observed in every school: two classes for each subject, Hindi and Mathematics grade I, II & IV and EVS also in the case of class IV.

5.   TOT – 4 : Student Profile
This form was meant for collecting information from students on physical facilities at home; mother's and father's educational level and occupation; socio-economic status as indicated by whether the home has electricity, TV, refrigerator, scooter/motorcycle, car, telephone etc; and help if any, received from family members in studies. This was to be filled for all the 20 to 25 students of class 4 who were administered Hindi and Mathematics tests in the sampled schools.

6.   Language and Mathematics tests for class IV.
Grade IV achievement tests for Language and Mathematics (adapted from NCERT tests with items from Third International Mathematics and Science Study (TIMSS). These tests were designed to assess the achievement level of students of class IV. The tests have only multiple choice type items.

7.   School Time
This schedule was meant for collecting information on what was happening in school during different half-hour intervals on the days of visit by the investigator.

8.   Apart from these structured tools, there were schedules for conducting Focus Group Discussions with (i) community/ parents; (ii) students

Structure of the report

Teachers' time and its quality is the focus of this report, with linkages to students' engaged time and correlations with learning outcomes. Hence, Chapter 2 of the report looks at teachers' time for instructional purposes and reasons for time loss and its determinants. The distribution of time on various tasks within classrooms and the quality of those tasks are taken up for discussion in Chapter 3. The analysis of which classrooms have better quality time on task is also discussed here. Chapter 4 looks at students' time on task from various dimensions. Teacher perceptions, practices and behavior are analyzed in Chapter 5. The materials used with various tasks are also discussed here. In Chapter 6, results of a multivariate analysis of students' learning outcomes and its correlates to time on task is discussed in detail to establish whether time on task and nature of tasks matters in learning outcomes.

CHAPTER 2: TRACKING TEACHERS' TEACHING TIME IN SCHOOLS

Availability of teachers ('physical presence)' at school and use of that time for academic purposes is critical to provide quality education. 'Teacher availability' means different things to different stakeholders. For administrators and managers of the education sector, it is an input, and teacher availability means having an adequate number of teacher positions created and filled with qualified people. From an accountability and governance perspective, teacher availability is a process which entails having people present in school and teaching. For educators, it is a quality issue and 'availability' means availability for 'quality time'. The focus of analysis here is teacher availability, in terms of teachers' physical presence, and its quality, in terms of the distribution of the time among various activities in school.

To begin with, teacher availability as an input is still an issue in many parts of India, especially at some district / sub-district /school levels. This is due to (a) shortage in the supply of qualified teacher candidates vis-à-vis the existing need for teachers; or (b) policies on teacher posting and rationalization, which have led to availability of teachers in schools in some areas (mostly urban) while other schools do not have enough teachers. Teacher availability is also an accountability issue, especially with teacher attendance or teachers' physical presence in schools was found to be low in many parts of the country (World Bank, 2002, MHRD 2007). Anecdotal evidence suggested that teachers were busy engaged in various non-teaching activities while in school.

This chapter deals mainly with issues related to teacher availability for instruction. At first, various concepts of instructional time are discussed in the context of teacher availability. Next, aspects related to functional time in the school context are discussed. Teachers' physical presence time and its distribution across various tasks within and outside schools are taken up, followed by an econometric analysis of the characteristics of teachers who are available for longer time. In the last section, a summary of issues is presented.

Instructional time

This study considers different aspects of instructional time at the system, school and classroom levels to understand the time available for instruction and learning. **Ultimately, the concern is to measure the amount of time children are being actively taught by the teacher.** At the macro level, instructional time deals with allocated and available time: allocated time means the prescribed number of days in the school calendar, while available time is that number of prescribed days when the school is actually open (and not closed due to local festivals, for example). At the school level, the study examines the number of days when teachers actually attend school ('physical presence'), and are not, for example, on personal leave, on training or attending meetings away from the school, or deputed to work on other activities for another government department (for election duty, for example). Even when a teacher is physically present in a school, he or she can be involved in non-teaching activities such as distribution of benefits or enrollment drives – which reduces the available teaching time. Finally, at the class level, even if the teacher is present and ready to teach, the way class time is used can also take away from children's opportunities to learn, if, for example, the teacher engages in non-teaching tasks (registration) or teaches only a portion of the children (particularly an issue in multi-grade classes) (See Box 4 and Table 1).

Box 4: Defining different concepts of time in the context of learning

In this study, the following definitions are used:

- Allocated time: Allocated time is the number of days the school should function as per the school calendar, and administratively, the time that the State/ district define as required to complete the curriculum constructed for a particular academic year. In India, the Education department at the State/ provincial level decides the number of days or hours the school should function in a given year, especially taking into account the state specific official holidays and other factors (such as whether the state government follows a five-day week or six day week for work). The National Curriculum Framework (NCF) of India also prescribes around 200 days as required to cover the curriculum.

- Available time: Time/days the schools actually run in the last academic year after deducting the number of school instructional days lost due to local events (such as festivals, polio campaigns, elections, natural calamities etc.) from the school calendar. This information is more *school specific* and hence could vary from school to school.

- Physical presence time: Even when the school is open, teachers are eligible for various personal leave and that reduces the number of days teachers are on duty. The total number of days a teacher is present in the school, which is the balance time after deducting the number of days the teacher was physically not present in school for various reasons – either due to availing stipulated leave, or away from school for training days or other assigned activities, or even unauthorized absence from school. This is more *teacher-specific*. In India, teachers are used for managing election duties, conducting national level campaigns, carrying out duties related to Census etc., in addition to activities of the education department, such as meetings related to education decisions and of course for training.

- Instructional Time: The total number of days/ time when a teacher is physically present in the school and spent time in the class or outside on activities related to teaching or other academic activities. This is again teacher specific, and *grade / class specific*. Even when teacher is present in the school, they are required to spent time on enrolment drives, distribution of benefits and incentives to children, meet parents and to maintain records. This reduces the time teachers to devote to academic activities.

- Academic learning time: Within instructional time, teachers can be engaged in activities which take away from learning time in two ways. First time is again spent on lesson planning, preparing teaching learning materials and preparing classroom regular evaluations and corrections. Teachers also spend time in class organizing activities or modifying student behavior. Second, even when teachers are actually teaching, the teaching process could be quite mechanical and rote and the actual time spent on tasks that require higher level mental stimulation reduced.

Source: Authors

Table 1: Instructional Time Flow model

State level school's Allocated Time (school calendar)					
School's Available Time					Time loss at this stage
Teacher's Duty time				Time loss at this stage	
Teacher's Physical Presence time in school			Time loss at this stage		
Teacher's Academic related Time		Time loss at this stage			
Teacher in classroom	Time loss at this stage				

Source: Adapted from (Millot & Lane, 2002) and (Abadzi, 2006).

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Days prescribed by the school calendar (allocated time)

It is estimated that 850 to 1000 effective hours of schooling per year within the official hours is required for optimal teaching (World Bank, 2004)**, which, if five hours per day are devoted to teaching-learning in school, translates to 170-200 instructional days**. The official days – or school calendar – could include more days to carry out non-curricular activities too. Since in India elementary education is a subject in the Concurrent list of the Constitution, the responsibility of delivering it – from education sector policies, including curriculum, syllabus and school calendar, to the actual teaching – lies with the State governments, who therefore decide the school calendar (and the number of days that schools are expected to function). However, some aspects in the school calendar, especially those with regard to the total functioning days, often get modified at the district level, in order to incorporate local factors (holidays/festivals, weather, etc.).

The survey for this study was carried out during October 2006 – April 2007. Since it was not possible to collect the information relevant for the whole year during 2006-07, the questions relating to school calendar and functioning days for schools and teachers were asked with reference to the prior academic year. It was expected that the number of school calendar days reported by schools within a state or district would be somewhat similar for the previous and current years. It was also assumed that teachers, or at least head teachers (or teachers-in-charge of the school), would know the number of days in the school calendar year.

The average number of days of allocated time reported by schools was around 231 days each in Uttar Pradesh (UP) and Madhya Pradesh (MP) and 223 days in Andhra Pradesh (AP) (Figure 1). However, there was considerable variation in the number of days reported by schools (even in the same district schools reported different figures). For example, in MP, 73 percent of the schools surveyed reported that the number of school calendar days were between 230 – 236 days. Similarly, around 54 percent of schools in UP reported that the school calendar days were in the range of 230-235 days. In all the three states, there were schools which reported that the school calendar prescribed around 300 days! This clearly shows the "gaps" in the availability of school academic calendars or in the understanding and interpretation of these school calendars by a few head teachers/teachers-in-charge.[11]

The gaps in the days between the allocated time and available time were on account of local events in the states under study and for the year for which data was collected. In general, more school calendar days are lost on account of elections (to national parliament, state assemblies, local bodies etc.) and due to natural calamities. The estimation of 'number of school calendar days lost' in this study could be an underestimation, since the States studied did not have such issues during the year of the study.

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[11] Schools also entered data into the District Information System for Education (DISE). DISE reports that the average number of instructional days in 2006-07 as reported by schools in AP, MP and UP were 216, 219 and 191 days respectively. This is again quite different from what is reported during the present survey.

Figure 1: Comparing "Allocated time" and "Available time" of schools, by state
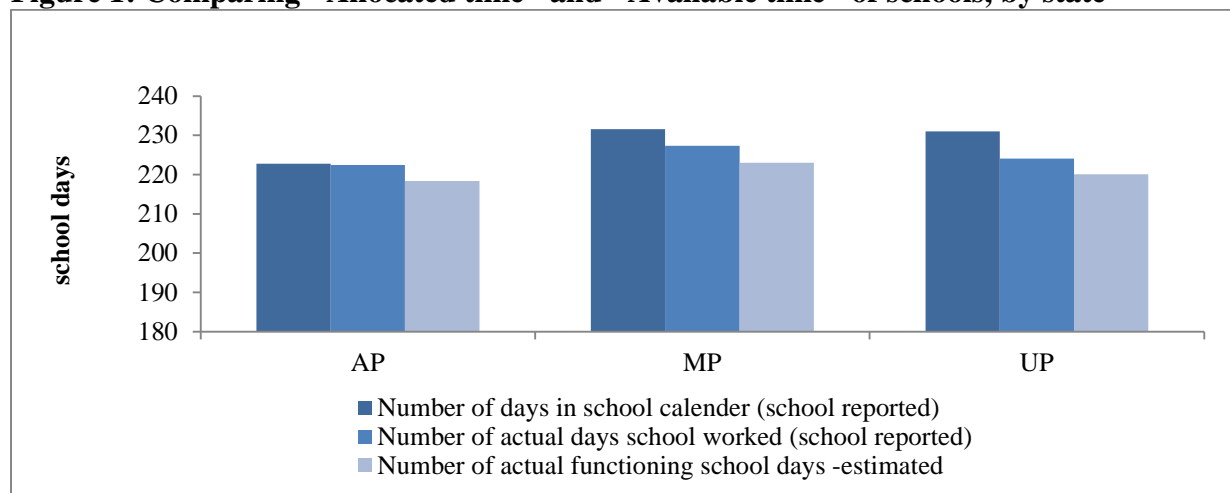
There are a number of possible explanations for these discrepancies in reporting. Many schools did not possess a school calendar (either for the current or previous academic year), and in many schools, head teachers showed an "Official holidays list" issued by the state and/or district education departments, which did not mention how curricula should be organized during an academic year. In many schools, there were no records of the number of days schools functioned (or attendance registers of teachers and students). In several schools, the teachers-in-charge calculated the school calendar days by deducting (from memory) the number of holidays from the total number of days in the calendar year. In general, where there were no records or calendars, there was under-reporting of time loss. The analysis of school calendar days here is based on what the school head teacher reported (regardless of the method of calculation).

It is evident that there is a gap in the availability, understanding and interpretation of school calendars (or school holidays list) and hence the school functioning days / school allocated time. In this context, it is worthwhile for the district education authorities to (a) ensure that the school calendar is prepared well in advance taking into account the need to cover both curricular and non-curricular activities; (b) ensure that the school calendar is distributed to all schools; and (c) to sensitize the head teachers and school management about the use and design of the school calendars, especially for planning weekly or monthly activities.

Teachers' available time in school

Previous studies have found teacher absenteeism in India rates up to 25 percent on any given day. The World Bank (2002) study of teacher absenteeism found that teacher absenteeism rates were around 75 percent, with average absenteeism rates in AP and UP close to the national average, while in MP it was less than 15 percent. The Annual Status of Education Report (ASER)–Rural, 2005 showed that on an average, 80 percent teachers were present in school on a working day (ASER Centre, 2005). The latest ASER results show that 85 percent of teachers were present in schools during the random visits in October–December in 2012, the same figure as for the previous year but slightly down on the 2011 and 2010 figures of 87 percent (ASER Centre, 2013). The MHRD study (2006) also showed that on an average, around 80 percent of the teachers are present in the schools.

The present study found that on the first day of the school visit (which was random and unannounced), more than 80 percent of the teachers were present in the school. While the figures emerging from some of these sources do not match with the results of the other, the broad trends emerging suggest improving teacher presence rates in schools in the states under study (Table 2).

Table 2: Teacher attendance rates in India

	India	**AP**	**MP**	**UP**
World Bank (2002)	75.0%	74.8%	83.5%	74.5%
ASER 2005 (PRATHAM)	80.2%	80.3%	84.2%	76.2%
Independent Study (2006) (Commissioned by MHRD)		79.0%	67.0%	78%
Teacher's Time-on-Task study (2006-07)		83.0%	82.0%	85%
ASER 2013 (PRATHAM)	85.5%	87.1%	84.1%	81.1%

Note: ASER figures are for primary schools.

Source: World Bank (2002); (ASER Centre, 2005); MHRD (2007); (ASER Centre, 2013)

In the present study, teachers in Andhra Pradesh, Madhya Pradesh and Uttar Pradesh, on an average, worked for less than 200 days in 2006, and there were significant differences across states. On average, teachers reported that they were not physically present in school for 25 days during 2005-06 on school functioning days in AP and 22.5 days in UP, and the number of such days were 28.5 in MP (Table 3). This means that on an average teachers reported that they were present for 199 days in AP, 187 days in MP and 206 days in UP.[12]

Table 3: Mean number of days teachers reported not being present in school

		AP	**MP**	**UP**
		24.9 (17.1)	28.5 (28.6)	22.4 (25.4)
Type of school	Private	10.9 (8.9)	14.2 (14.5)	7.1 (6.2)
	Government	28.6 (16.8)	32.3 (30.2)	26.1 (26.8)
By location	Urban	17.6 (14.2)	37.8 (39.6)	18.7 (18.9)
	Rural	26.5 (17.2)	25.4 (23.1)	23.5 (26.9)
Type of teacher	Para-teachers	16.7 (12.9)	20.4 (20.1)	15.6 (20.5)
	Regular teachers	26.7 (17.3)	31.6 (30.6)	27.3 (27.3)
Gender of teacher	Female teachers	21.8 (14.8)	27.8 (31.6)	17.8 (23.2)
	Male Teachers	27.6 (18.2)	29.0 (25.9)	28.5 (26.8)
By experience	< 2 years	14.2 (9.6)	13.7 (10.4)	12.2 (18.2)
	> 2 years	26.5 (17.3)	30.8 (29.7)	29.3 (27.2)

Note: figures in brackets are standard deviations.

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[12] That is, if we take the reported number of days schools functioned at its face value.

Teacher presence in school

Teachers in government schools in this study were not available for teaching for more than a tenth of the total school functioning time, similar to the results from MHRD study. As reported by the government school teachers, it is estimated that they were away from school an average of 29 days in AP, 26 days in UP and 32 days in MP.

Private school teachers were available for teaching on at least 10 more days at year than government school teachers, with significant variations across states. Private school teachers reported that they were away from schools for only 9 days in AP, 11 days in MP and 7 days in UP, and hence were in school 26 days more than government teachers in UP, 18 days more in MP, and 10 days more in MP.

Young teachers, female teachers and para teachers tend to be present in school more days than other teachers. In AP and UP, new teachers tended to be present in schools more than the teachers who have already been there more than two years. Female teachers were present in schools significantly more than the male teachers in AP and UP, by on average 6 and 11 days, respectively (there was no difference in MP). Para teachers' presence in schools was significantly higher than regular teachers' presence in AP (1% significance level) and marginally so in MP (5% significance level), though there was no difference in UP. The mean difference between rural and urban schools was significant only in UP and that too marginally (5% level).

Reasons for teachers' non-availability in schools

Teachers have leave entitlements for personal days and sick days, which differ across sectors and type of teachers. "Personal days" is a major factor. Most government job contracts in India allow for absence from duty on personal reasons. These can be used when the person is sick or when has to attend private matters that he/she treats as important; these days are meant to be a provision for an emergency rather than as an entitlement. In government schools in AP, 15 days of casual leave is permissible with another 7 days as of special leave. Women are allowed 5 more days of leave. In MP and UP, 13 and 14 days are permissible for casual leave. [13]

The leave provisions differed between government and private teachers and between regular and para teachers. Many private management schools did not allow their teachers personal leave, and when it was allowed, as often the salaries of the teachers are reduced accordingly. Within government schools, the personal leave provisions differed between regular and para-teachers. Para-teachers were appointed mostly at the local level, and hence the policies regarding personal leaves were often guided by local bodies or village education committees. The number of personal leave days that could be availed is also determined by the tenure of appointment; often, if the tenure is only for a few months (as in the case of para-teachers) then the number of personal days is reduced accordingly.

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[13] Some days as casual leave which is accumulated per month while there are other provisions too (including sick leave and maternity leave, in the case of female teachers). Note also that these provisions were those in place during the period of the study; some provisions might have subsequently changed.

Table 4: Reasons for teacher absence (percent), by day of visit

	Day 1			Day 2			Day 3		
	Total	Govt.	Pvt	Total	Govt.	Pvt	Total	Govt.	Pvt
ANDHRA PRADESH									
% of teachers absent	16	20	6	13	15	6	13	16	6
Of which:									
Personal Leave	60	56	100	66	63	88	60	57	88
Training /meeting / work of the Edu. Dept.	34	38	0	22	25	0	21	23	0
Being on duty for work unrelated to education	6	6	0	6	7	0	6	7	0
Absent without information	0	0	0	1	2	0	1	2	0
MADHYA PRADESH									
% of teachers absent	13	16	6	9	11	3	9	10	4
Of which:									
Personal Leave	78	80	67	67	63	100	64	68	40
Training /meeting / work of the Edu. Dept.	22	23	11	24	26	0	22	25	0
Being on duty for work unrelated to education	2	2	0	2	3	0	2	3	0
Absent without information	3	4	0	0	0	0	0	0	0
UTTAR PRADESH									
% of teachers absent	13	16	4	10	12	2	11	14	3
Of which:									
Personal Leave	57	57	60	37	37	33	27	25	50
Training /meeting / work of the Edu. Dept.	31	31	40	31	29	67	41	40	50
Being on duty for work unrelated to education	11	12	0	12	12	0	7	7	0
Absent without information	9	9	0	4	4	0	7	7	0

Note: Govt.=Government; Pvt=Private

Personal Leave was by far the most often reported reason for being absent and on average meant losses of 12-16 days in an academic year. AP had the highest average number of personal leaves taken by teachers – 16 days (Table 5). This is in contrast to 13 days availed by teachers in MP and 6 days in UP.[14] In AP and MP, government school teachers reported taking off more personal days (18 days and 14 days respectively) than private school teachers (9 and 12 days in that order) while in UP, there was not so much difference.[15] It is also noticeable that the

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[14] The difference between the leave provisions (14) and the number of reported days (6), suggests that personal leave in UP may be under-reported.

[15] These results can be compared with the independent study commissioned by MHRD (report prepared by Ed.CIL, 2008). That study found that out of the total number of days the teachers were not in (government) school, nearly 50% were spent on some work assigned away from school in AP and MP; percentage was still higher (61%) in UP. Rest of the time teachers were on leave for personal reasons. Some of the non-teaching days are spent by teachers outside school to attend to duty not related to education and necessary administrative work, but some days are taken off by them for personal reasons such as sickness of self or a member of the family, special occasions etc. In AP, teachers took off for 17.5 days, in MP for 13.5 days and only for 8.4 days in UP. Women teachers spent fewer days on duty away from school but took more leave for personal reasons. Women took more medical leave – almost double of that taken by male teachers. Teaching days lost differed maximum between regular and para teachers. In AP, 34 teaching days of regular teachers were lost compared to 16.4 days of para teachers. In UP, the figures were 21 and 11.9 days respectively. In MP, the differences were very marginal (22.6 days of regular teachers compared to 20.4 days of para teachers).

percentage of teachers absent, especially in government schools where overall rates were higher, fell during the course of the three-day study visit. This suggests that some teachers returned to school once notified about the study visit (since the first day of the visit was unannounced).

Table 5: Number of days that teachers availed as personal days (paid leave) in 2005-06

		AP	MP	UP
	Mean (SD)	16.1 (10.7)	13.2 (11.9)	6.3 (11.1)
Type of school management	Private school teachers	9.4 (6.0)	11.6 (8.7)	6.7 (6.1)
	Government school teachers	17.8 (11.0)	13.6 (12.6)	6.2 (12.0)
By location of school	Urban school teachers	13.6 (9.7)	17.6 (13.9)	10.1 (9.8)
	Rural school teachers	16.6 (11.0)	11.7 (10.8)	5.1 (11.3)
By type of teacher appointments	Para-teachers	13.3 (12.4)	10.9 (12.3)	0.985 (5.6)
	Regular teachers	16.4 (10.4)	14.01 (11.6)	10.1 (12.5)
By gender of the teacher	Female teachers	16.2 (10.9)	15.3 (13.4)	6.4 (12.5)
	Male teachers	15.98 (10.6)	11.5 (10.2)	6.1 (8.9)
By experience in the profession	Less than 2 years (new teacher)	11.6 (7.8)	13.6 (10.5)	1.8 (5.3)
	More than 2 years	16.7 (10.9)	13 (12.0)	6.4 (12.9)

Around half of the regular teachers in Government schools were on duty, but not in school, on average for 5-7 days as they were deputed to carry out the work of other departments. Teachers are used for tasks that are judged to be of national importance like election duties, censuses of various types, and information, education and campaigns (IEC) of programs. In 2005-06, more than 40 percent of government teachers in AP and UP reported that they were engaged in work not related to the education department during the academic year (in MP, the figure was 30 percent of teachers). Among regular government teachers, almost half of the teachers reported assignment to other departments. On an average, teachers were engaged in works related to other departments for at least for 2 days in AP and MP and almost for 3 days in UP. Since such engagements involve only government school teachers – and within these, mostly regular, experienced teachers – the average number of days teachers with at least a years' experience are deputed to work for other departments comes to almost 5 days in AP and 7 days in MP and 10 days in UP. Since there was no national, state or local body election in the year for which the data was collected, most of the engagements were for non-election purposes (and would likely be higher still in an election year).

On another 7-8 days teachers were on duty but not present in school, as they are attending training and meetings within the education sector: Under the *Sarva Shiksha Abhiyan* (SSA)'s quality improvement measures, teachers are expected to undergo 20 days of in-service training every year. Also, teachers are expected to attend certain meetings periodically – like the Cluster Resource Centre meetings (CRC) held every month or the Block Resource Centre (BRC)

meetings. Again, such engagements involve only government school teachers.[16] In this study, Government school teachers were on duty, but were not available in school, for almost 7 days in AP and 8 days each in MP and UP on account of training or meetings within the education department.

Training/meetings during school days also reduce the instructional days of government schools – on average 8 days in MP and UP. When actual days of days are counted, 70 percent of training happened during school days. Among the government school teachers, 75 percent in AP, 63 percent in MP and 55 percent in UP reported that they did spent at least a day for attending education department's meeting or in-service training programs away from school during the last two academic years. In AP, teachers reported that 88 percent of all training they had attended during the last two years took place during the school functioning days. On an average, when each of the training occurred, 4 days of teachers in school on working days were lost. In MP, most of the training occurred during the school vacation or holidays, and in UP, at least 40 percent of the training happened on non-functional days of schools. However, in spite of these, on average, 8 days of school functioning days were taken away by teachers attending training in both MP and UP.

Even when teachers were on duty, up to 7 days are spent outside school as non-academic activities related to education keep them busy. Again this was true mainly in government schools and disproportionately affected regular teachers, more experienced teachers and male teachers. The non-academic activities include those tasks related to the admission processes, collection and distribution of text books, house-to-house child surveys and updating, enrolment drives, preparation of sports and cultural activities, Parent-Teacher meetings, and parent/community regular contacts. In AP, on average, teachers reported 2 days while, in MP and UP, 7 school days were lost on account of these activities. Again, government school teachers reported spending more time on such activities; in MP, government school teachers spent 4 days and in UP, 6 days for such activities. In contrast, private school teachers reportedly spent less than a day on an average for such activities. In all three states, regular teachers engaged in such activities more than the para teachers; in MP, regular teachers reported that they were away from school for 4 days, compared to 2 days by para teachers. Similarly, male teachers were prone to be away from school more than female teachers, and experienced teachers more than less-experienced teachers.

Even when teachers are on duty and in school, some part of the school day is devoted to non-academic activities, as much as 9 percent of time in MP. As already discussed, teachers reported that on an average, they were present in school for 200 days in AP, 198 days in MP and 201 days in UP. This roughly translates into 1000 – 1200 hours. Within this physical presence time in school, around 5-10 percent of the time was spent on non-academic activities. In AP, such activities accounted for around 51 hours during the teacher presence days in the academic year; in MP, this amounted to 110 hours (9 percent of total physical presence time); and, in UP, 74 hours (6 percent of total hours during which teachers were physically present in school). Government school teachers in AP reportedly spent 59 hours in a year on such activities compared to only 17.4 hours by private school teachers. Same was the case in MP where these hours spent on non-academic activities were 121 hours and 64 hours respectively by government

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[16] As per the MHRD study, government school teachers reported spending less than 5 days in attending meetings in AP, but in MP, they were away and teaching days were lost for 12.4 days and in UP, 8 days for training and meeting purposes (Ed.CIL, 2008).

and private school teachers. But unlike in AP and MP, it was private school teachers who reported more time on non-academic activities within school (96 hours) compared to government school teachers (68 hours). Similarly, major differences were observed in the average time used for non-academic activities between regular and para teachers – regular teachers spent almost 4 times more time than para teachers in AP and 2.5 times more in UP.

Figure 2: Teacher days available at each stage from school functioning days to teacher physical presence days

- School functioning days
- Available teacher time
- Teacher time within Education sector
- Teacher days for school related activities
- Teacher's physical presence time in school
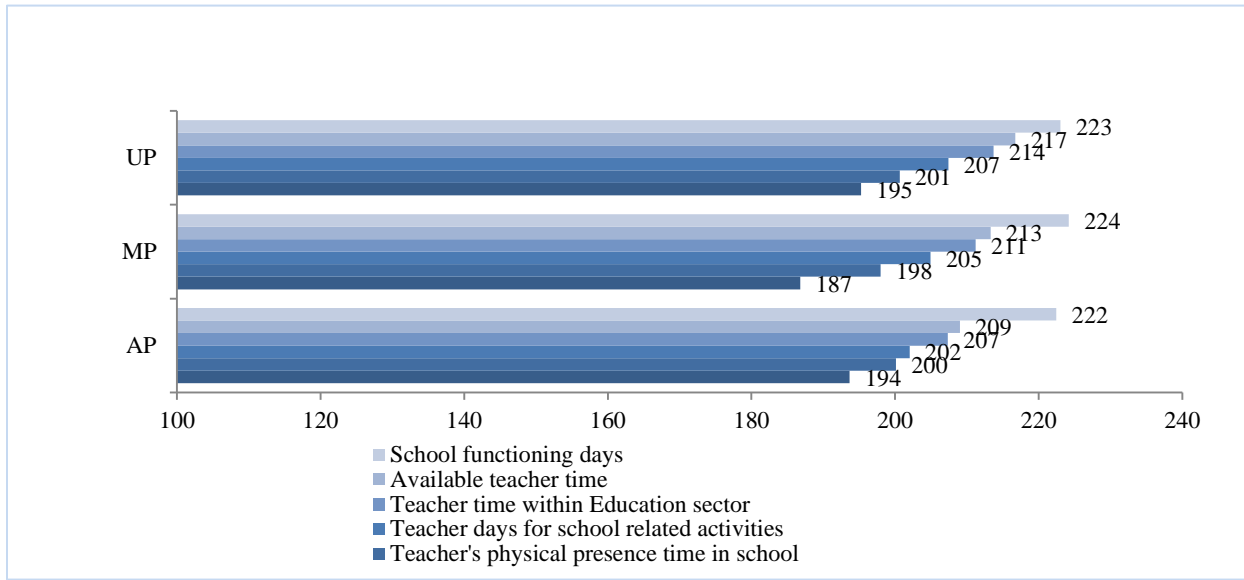
Figure 3: Mean days teachers were away from school during school functioning days: By reasons

- ON leave
- Official duty of other depts
- Training/meeting of edu dept
- education, but non academic duties
- Administrative duties
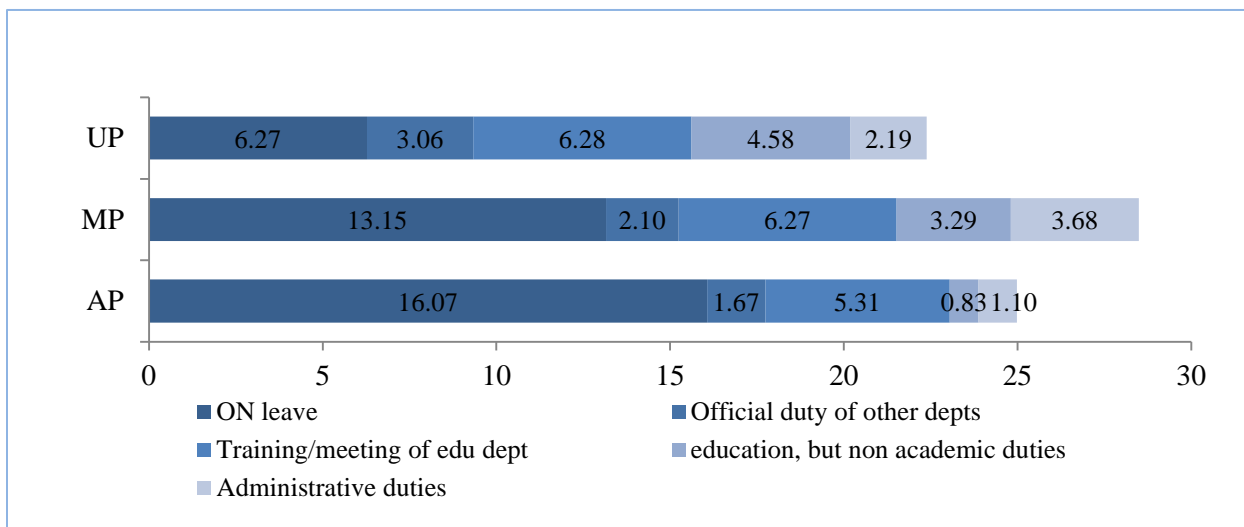
In summary, while the official calendar in the 3 states prescribed 222 to 224 school days per year, the number of days in which teachers were actually present and available for academic activities ranged from 195 days in UP, 194 in AP, and only 187 days in MP. This represents a loss of one in seven official days. The analysis of the number of days teachers

were not available in school show that teachers' paid leave ate away 4-5 percent of teachers' time during school functioning days. Teacher's personal leave and other engagements together kept teachers away from school for almost 10-12 percent of the school functioning days and 14-15 percent of total school calendar days. Non-academic work within and outside school also affects teacher's available time for instruction. Except "leave" factor, other reasons could be reasonably addressed using corrective policy measures.

Teachers' time for academic activities and classroom teaching

On an average, teachers in AP, MP and UP reported that they worked for 38, 39 and 35 hours a week respectively, with government teachers reporting more days than private school teachers. Even if it is assumed that the teachers attend schools on an average for 6 days a week (in many states, schools functions for 5 full days and half days on Saturdays), the time reported translates into more than 6 hours per day. However, the school functioning time prescribed in the states is only 5 hours, so it may be that teachers are over-estimating the amount of time they spend in school, even allowing for arrival a little before lessons start and departing a little after.[17] In all three states, the average hours reportedly spent in school per week by government school teachers was higher than their private counterparts. Teachers in rural areas spent more time compared to their urban colleagues in AP, but the story was the reverse in MP, while UP there was no marked difference. In both AP and MP, regular teachers reportedly spent more time in schools than para teachers, but in UP, it was the reverse.

Weekly, teachers spent around 4-5 hours in non-academic activities in AP and UP, but as much as 10 hours in MP. These activities include compilation and provision of data, maintenance of records, and supervision of mid-day meal distribution. In all three states, private school teachers spent much less time on non-academic activities, probably because there is no provision for mid-day meals and private school teachers do not have much of the administrative work that government school teachers have.

Overall, teachers reportedly spent around 30-32 hours per week on academic activities. Academic activities in schools consist of time spent on classroom teaching, lesson planning, preparation of teaching–learning materials, preparation of class tests /assessments, correction of test papers, and remedial teaching outside the classrooms. Academic activities constituted 87 percent of the teachers' time in schools in AP, 75 percent in MP and 87 percent in UP.

However, teachers were engaged in classroom activities for only about one-half of the time that they were in school. Within the academic time, classroom teaching accounted for the largest time - around 26 hours in AP, 20 hours in MP and 21 hours in UP. But this meant that teachers were in the classroom for only 58 percent of the time they were in school in AP, 54 percent of the time in UP, but not even half the time (44 percent) in MP.

Lesson planning and preparation of teaching-learning materials accounted for 2-3 hours per week, while preparation, conducting and correcting of tests, accounted for 2-4 hours per week in the primary grades. Teachers reported that they devoted 2-3 hours per week for remedial teaching (outside the classroom time). In all the three states, the hours teachers spent on academic activities was higher for government school teachers compared to private school

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[17] For example, UP's school calendar prescribes that teachers should be in school at least 15 minutes before the school starts and should leave only at least 5 minutes after the school closes.

teachers, though less in percentage terms. Para teachers reported spending more time on academic activities than regular teachers in UP, but the reverse was true in AP and MP. All the three states, new teachers reported spending relatively less time on academic activities compared to existing teachers.

Equity in availability of teachers' time

SC and ST children face some disadvantages in getting adequate teacher presence because of the characteristics of the schools they tend to go to. This of course is worrying since these groups of students need more teacher presence (and teaching time) than other groups given their generally weaker academic background and performance. This disadvantage comes from two main directions. First, in schools with proportionately higher shares of SC/ST students (or schools located in areas where the SC/ST population is concentrated), the teachers tended to be available for fewer days; teacher presence was reduced by around 6 percent. Second, in schools with worse infrastructure facilities and in government schools, teacher presence was lower – and these are schools which SC/ST populations attend in higher proportions than more advantaged groups. For example, in schools with better infrastructure, teacher attendance was higher by around 6-7 days per year; and in government school teachers were available for on average 13 days less.

On the other hand, SC and ST children tend to go to schools and are taught by teachers who have characteristics which tend to increase teacher presence. Teacher presence is higher in schools in rural areas, in schools with a higher proportion of para teachers and in schools with teachers who are more inexperienced (these three characteristics are of course linked). These are schools in which ST and SC children are over-represented. (We will discuss in a later chapter whether there is a link between teacher characteristics and student learning outcomes.) Finally, in larger schools the proportion of teachers who are absent is greater than in smaller schools – the latter of course tend to be in rural areas.

Summary

Overall, 75 percent of the variance in teacher presence was related to characteristics of teachers (such as experience, qualifications and employment status) rather than characteristics of schools (i.e., whether government or private). Moreover, the number of teaching days available of each teacher depends upon a variety of factors, both personal and professional; and the most important seems to be those related to professional aspects, and the number of teaching days lost due to various factors. **The analysis shows that teachers who have been in the profession for a longer time, regular teachers, trained teachers and teachers in government schools have relatively *fewer* instructional days in comparison to new teachers, para teachers and untrained teachers.** Specific analysis of time loss factors show that (a) official leave provisions, (b) deputation of experienced and trained teachers for duties of other department and for training and meeting during school functioning days; and (c) administrative duties account for a larger amount of time of teachers from school functioning days. Ways of reducing these "time loss" can help increase the days available for instruction.

CHAPTER 3: THE TEACHER IN THE CLASSROOM

The previous chapter showed how opportunities for students to learn were reduced by the fact that a significant proportion of the time teachers were not in school and, even if in school, not involved in academic activities. This chapter looks at another dimension of opportunity to learn – what happens inside the classroom when the teacher is meant to be teaching.

Among the various dimensions of quality, the process of teaching and learning and, within that, teaching time and teaching methods are of special importance. Teachers' instructional time and the nature of tasks taking place in the classroom are important measures in explaining the quantity of learning time and the quality of teaching-learning activities. Under SSA, improved physical conditions and more teaching learning materials (TLMs) have made many classrooms more purposeful and, together with reduced PTRs, they provide a more supportive and promising enabling environment for effective teaching and learning. The overarching concerns are about the perceived dominance of rote learning or recitation-based learning, without activities directed towards understanding or problem solving. In large classes as in many poor states in India with higher PTRs, alternatives to rote and recitation and providing individual attention were often difficult. But now, with reduced PTRs, there is an opportunity for more informed thinking about how better classroom interactions. Such an understanding would inform teaching practice as well as having implications for teacher training.

The focus of analysis in this chapter is on the nature of tasks that teachers perform within classroom periods (usually lasting for 40-45 minutes). This chapter is organized in the following way. In the next section, a description of the methodology of classroom observation is given. Following that, teacher's time devoted to "on-task" activities is juxtaposed against teacher's time "off-tasks", while the chapter finishes by looking at the nature of various "on-task" activities and the time devoted to these.

Methodology of classroom observation

This study used a robust method to measure qualitative processes in classrooms. Understanding how time is utilized by teachers and children in classrooms and a school is complex and challenging task. Teaching in classrooms could involve various types of activities, some of which are aimed at imparting lessons, while other activities are aimed at maintaining discipline or organizing the classroom, and another set of activities could be pure socializing. The Stallings Snapshot Observation Schedule (SOS) method was identified as the most suitable method for this study because: (a) it is more "standardized" and hence the definitions considered are same across classrooms in different places, especially in terms of classroom behavior; (b) it facilitates more objective measures of classroom behavior; (c) the snapshots are taken at regular intervals; and (d) more importantly, the observations of activities in the classroom are measured and quantified. The activities observed in classrooms were classified at different levels to analyze their characteristics.

In each state in the study, 1,680 classrooms each were observed, generating a total of more than 75,000 observation snapshots. The duration of class observed varied from 30 minutes to a little more than 45 minutes. In AP, almost all (99 percent) of the classrooms observed were of 45 minutes; the corresponding figures in MP were 72 percent and in UP, 58 percent.

Tasks in classrooms were classified into "off task" or "on task", and then, within "on task", into "organizing activities" or "teaching learning tasks (Box 5). The first level of classification was in terms of classroom time during which teachers were "on some task" (ONTASK) and when teachers were "not engaged in any tasks" (OFFTASK). At a second level of classification, the classification was in terms of teachers' time "on Teaching – Learning tasks" (ONTL) and the time "not on Teaching Learning tasks" (OFFTL). The difference between ONTASK and ONTL is basically in terms of the exclusion of activities that could be considered as organizing classroom activities (ORG). ORG are generally activities that do not qualify to be direct measures of any teaching activities, but are necessary to initiate and carry on the process of teaching and learning within classrooms (hence they were considered ONTASK). For example, giving feedback to children about their learning activities or giving assignments are not direct teaching learning activities, but are necessary complements to teaching learning process. On the other hand, during OFFTASK activities, teachers and students are socializing with each other or among one another, or are outside the classrooms, and when they are within, not really involved in any activities.

Box 5: Classification of classroom activities

Classification			Definition	Activity
Lev 1	Lev 2	Lev 3		
ON SOME TASK	TEACHING- LEARNING TASKS	Category 1 (Learner/ Student Centered)	Consists of teacher activities in classrooms that stimulate higher order thinking and learning activities of students- Student centric	1. Active learning 2. Classroom discussions 3. Projects/ creative activity 4. Remedial teaching
		Category 2 (Teacher Centered)	Consists of teacher activities in classrooms that does not require higher order thinking, at the same are also not "rote learning" methods, but involves *traditional teaching* activities that facilitates learning of students- teacher centric	5. Reading aloud/ recitation 6. Instruction / Demonstration 7. Seatwork
		Category 3 (Rote Learning)	Consists of teacher activities that make children follow rote learning methods – rote and passive	8. Copying (from blackboard/ text books etc) 9. Rote learning
	NO TEACHING ACTIVITY	Organize Classroom activities	These activities by teachers are aimed at ensuring classroom discipline as well as facilitate teaching-learning activities	10. Giving assignments 11. Positive feedback 12. Motivating 13. Disciplining 14. Classroom Management
OFF TASK		OFF TASK	Activities that do not involve any teaching learning activities or activities to facilitate classroom management	15. Teacher socialization with/ without students 16. Teachers uninvolved 17. Teachers out of classroom 18. Students uninvolved/ socializing

"On task teaching learning (ONTL) activities" could be either student-centered, or teacher driven, or just rote learning. ONTL activities were categorized into three types of learning activities: (1) child-centered, flexible and stimulating higher order thinking and learning among

children; (2) rigid, chalk-and-talk, teacher-centered, lecture-driven pedagogy; and (3) rote and passive learning.[18]

It is a key underlying hypothesis in this study that increasing the proportion of Category 1 activities would be beneficial to the learning outcomes for students. The next chapter will provide evidence that this is the case; in this chapter, the concern is to document the different types of activities and their frequency. As will be discussed below, the argument is not that all teaching activities should be in Category 1; and there is clearly a place for significant amounts of Category 2 activities. The argument (of the next chapter) is rather that the evidence shows that the balance in Indian classrooms is sub-optimal from the perspective of student learning, and in particular that there are far too many Category 3 (rote learning and copying) activities.

Time on different categories of activities

On an average, for around one-fifth of the classroom time, teachers were not on any teaching learning tasks: either in organizational tasks or on tasks completely unrelated to teaching and learning. More OFFTL tasks were observed in MP classrooms (24.4 percent) compared to AP (17.3 percent) and UP (18.5 percent). In AP and MP, teachers spent roughly equal amounts of time on ORG and OFFTASK activities. Teachers in UP were somewhat more productive, with only one third of non-teaching time being OFFTASK.

Student-centric activities (Category 1) occupied only 24 percent of classroom time. Moreover, in 18.4 percent of the classrooms, no single activity could be categorized as "student centric"; and this proportion was very similar across all grades. Around a tenth of the classrooms had rich a experience of student-centric activities, with more than half of the classroom time spent on activities that were more intellectually stimulating and full of cognitive experience. In private schools, the proportion of classrooms (13 percent) with no Category I activities were less than in government schools (20 percent). However, the proportion of classrooms with more than 60 percent time on "student-centric" activities was slightly higher (4.3 percent) in government schools compared to private schools (3.7 percent).

Overall, the largest proportion of time was spent on activities that were teacher-centric (Category 2). Traditional teaching activities accounted for over 40 percent of overall classroom time and more than 50 percent of all teaching time within the observed classrooms. Most time devoted to teacher-centric activities was found in Grade IV. Teachers in government as well as private schools spent around equal share of classroom time on such

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[18] The study had to address two main concerns about using "time-on-task" and nature of tasks: (a) learning outcomes are dynamic and cumulative, meaning past learning and time and nature of tasks in previous years has a bearing on the learning outcomes; and, (b) teachers might behave differently during a classroom observation situation and hence what was observed were perhaps the best possible scenarios in these classrooms. However, these concerns were addressed in this study because: (a) overall time and nature of tasks in a school in the different grades monitored takes care of the historical patterns in time and nature of tasks in school. Most children study at the one school for several years so their learning outcomes are the sum of the school experience; and, (b) though teachers might behave differently in an observed situation, the nature of tasks she/he can engage students in very much depend upon practice and behavior. Moreover, teachers were not informed about the categorization of tasks since the categorization was made post-survey. Even if teachers wanted to show they were "on task", that gets translated most often into Category II and III activities – that is lecturing them or making children do rote learning.

activities. Teachers resorted to more of such tasks while addressing all grades together in a multi-grade situation and in Language classes (compared to Math). Para teachers were resorting to Category II type activities more often than regular teachers.

Finally, teachers using rote learning activities (Category 3) were observed to occupy 15 percent of classroom time. These are activities that simply involve passive engagement by teachers and students and are mostly "rote" in nature such as copying and rote learning or practicing repeatedly. Rote learning activities were more common in lower grades, private schools, in mono-grade classrooms, multi-grade classrooms where teacher addresses all grades at a time, in classrooms where para teachers are taking class and in classrooms in MP.

The general distribution of activities between categories was similar across the three states. In all 3 states, teacher-centric (category 2) activities were the most prevalent by far, followed by Category 1 and the Category 3 teaching activities. UP and AP teachers devoted more time to Category II activities than in MP, which had the highest proportion of rote learning (Category 3) activities (Figure 4).

Figure 4: Distribution of classroom time across various types of activities, percent
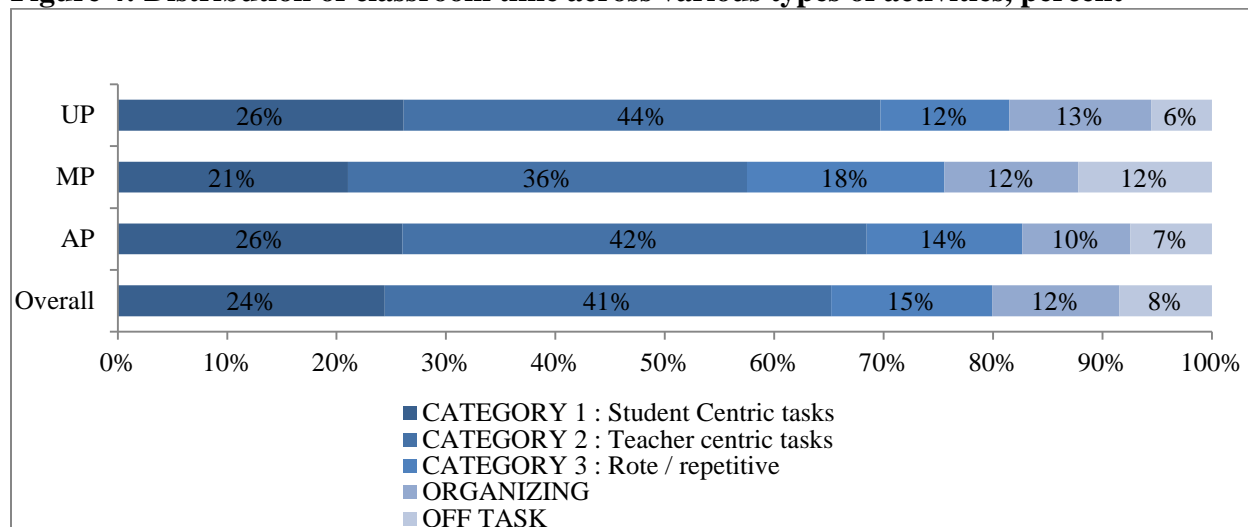
There are no significant differences in the patterns of teaching practice between government and private schools. This is one of the most striking findings in the study. **Moreover, private schools in each state look much more like the government schools in that state, than they do like private schools in other states** (Figure 5). A possible explanation for this finding is that teachers in all schools in a state are trained in the same institutions; though private schools tend to have fewer teachers with professional qualifications.

Figure 5: Distribution of classroom time, by school management and state, percent
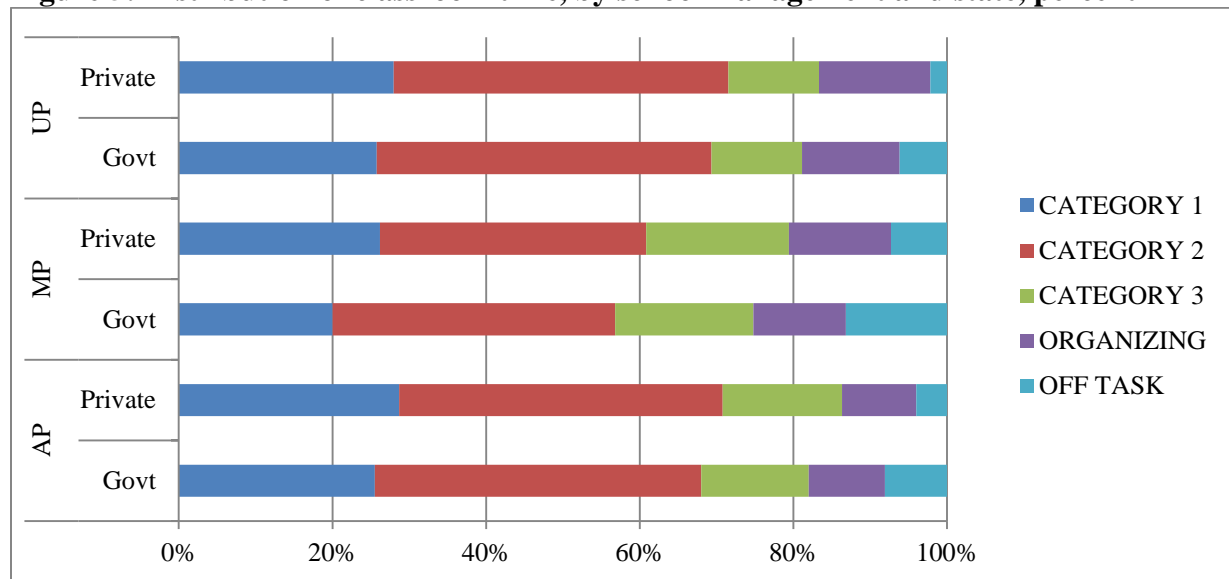
Moreover, the similarities between government and private schools were evident even at the level of individual activities within each overall category (not reported here). For both types of school, instruction/demonstration, reading aloud, active learning, copying and discussions were the five most common types of activity, albeit in slight different order in government as opposed to private schools. These five activities occupied more than 60 percent of classroom time in both types of school.

Multi-grade classrooms present a complex picture. **On the one hand, taking the children in these classes as a whole, their learning experience is very similar to that of children in classrooms in which only one grade is being taught.** That is, the time spent on each category of activity is very similar. For example, in all states, Category 2 type activities are the largest category (Figure 6). In AP, 42.6 percent of the time in mono-grade classrooms is spent on this type of activity, compared to 42.3 percent in multi-grade classrooms; the corresponding figures for MP are 37.7 percent and 35.4 percent (note again, how different types of classrooms in each state are more like each other than they are like similar classrooms in another state).

On the other hand, the experience of different students in multi-grade classrooms varies considerably. The grade being observed had much higher proportion of the time spent on Category 1 activities than the other grades in the same classroom. In AP, the proportion of higher level mental thinking activities was twice as much for the grade observed (15.38 percent as against 7.63 percent), in MP, three times as much (10.00 percent as against 3.24 percent) and in UP, *six* times as much (15.52 percent as against 2.60 percent).

So the overall similarity of multi-grade classrooms to single-grade classrooms seems to be driven by the way teachers teach to one grade in the multi-grade classroom. In other words, multi-grade teaching is practiced much less frequently than the presence of multi-grade classrooms would suggest. Here is another urgent need for more effective training programs.

Figure 6: Distribution of classroom time, multi-grade classrooms, percent
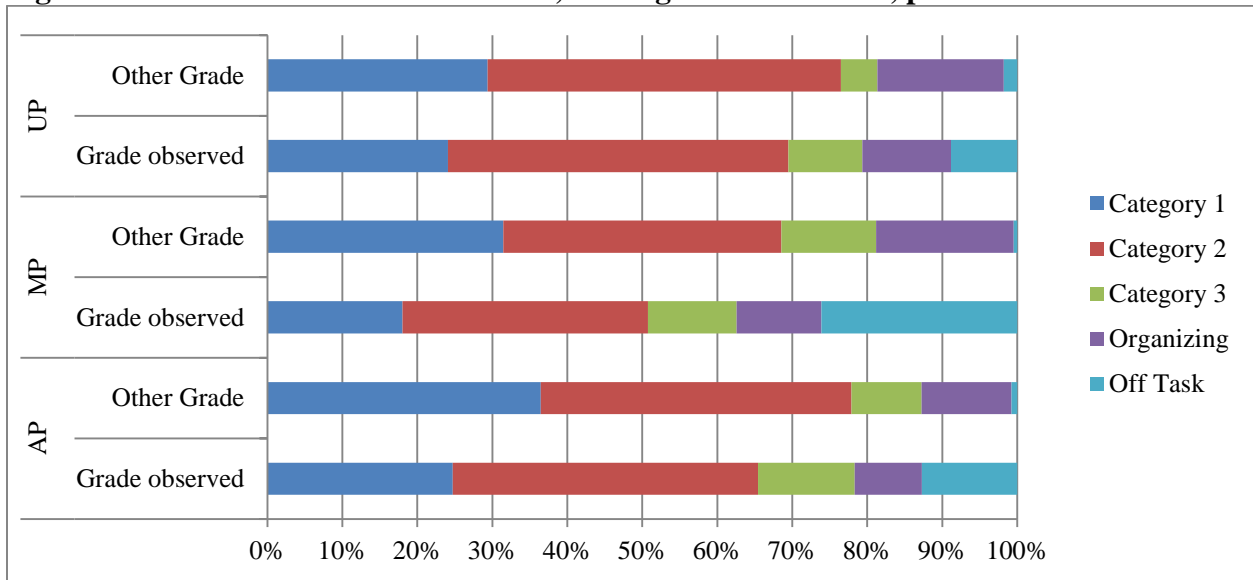
Summary

The study has found that a large part of teaching and learning in Indian classrooms happens in a very teacher-centric way. And, there is a concern that almost a tenth of the classroom time is "wasted" or "off task" and another 12 percent is devoted for classroom management. Among the major activities, instruction/ demonstration and reading aloud/ recitation dominates teacher's task in classrooms. Still, it is heartening that at least a fourth of the classroom activities are student-centric. Positive classroom environment and teacher behavior facilitates teachers to engage children in more student centric activities while in lower grades and for language teaching, traditional method still dominates.

Some of the most significant factors that influence the amount of child-centric activities can be changed by policy makers and school administrators. In particular, learning-rich classrooms were more child-centric. Clearly, promoting learning-rich classrooms is something policy makers can address – as is being done, for example, through SSA. The other key factor in creating child-centric activities, and particularly higher order ones, is teachers' behaviors – these are more difficult to influence, though again better designed and implemented teacher training programs should be a central part of the solution. Increased accountability should also help, particularly given the link between these activities and higher learning outcomes (see Chapter 4 below).

CHAPTER 4: STUDENTS' TIME ON TASK AND NATURE OF TASKS

The previous chapters looked at teachers and the amount of time they spend in school and the way they spend that time. This chapter focuses on the student experience of schools and classrooms.

At the student level, there are three different dimensions to opportunities to learn: school attendance, learning time in class, and opportunities to learn outside school. The first dimension is related to student attendance. It is important to ensure that students are not only enrolled on school registers, but also are attending schools regularly. Second, students' opportunity to learn is related to time use within school – that is, being involved in the classroom teaching and learning processes. The third dimension deals with students outside school – at home or elsewhere – and the time and space they have and attention they receive that enables them to learn in these settings. The three indicators considered are: (a) whether the student has a fixed place for study at home; (b) whether anyone helps him/ her for studies at home (any elder member of the family or through private tuitions[19]); and (c) whether the father/ mother asks the student about daily studies in school.

This chapter is organized as follows. In the next section, student attendance rates are discussed in the light of various studies, including what was observed during school visits. In the following sections, students' opportunity to learn is dealt with respect to those things they do with teachers and those wherein students are their own, the students' experience on their own within classrooms and the activities they do in such situations, and, finally, an analysis of opportunities for teaching and learning outside school (for students in Grade IV).

Student attendance

Though considerable progress has been made in enrolling children at the primary level in India, ensuring their regular attendance is still a matter of concern. This is especially important in the context of SSA's achievement in getting more than 90 percent children enrolled in school registers. MHRD commissioned a study in 2006-07 covering 20 major states to estimate the extent of student attendance and to find out reasons for their absence from schools (see Appendix 9 for a summary of results of the study). Pratham's ASER (2007) also looked at student attendance rates. Pratham study (using head count method) showed that around 74 percent of children in rural schools were present on the day of the visit. Average attendance rates in rural primary schools were 67 percent in UP, 68 percent in MP and 80 percent in AP (ASER Centre, 2007).

This study found very low student attendance rates, at 66 percent overall; and lower attendance rates in government schools. Though the general pattern was similar to that found in other studies, with UP having the highest attendance rate, the average attendance rate was only 66 percent for the three states taken together (Figure 7). The student attendance rate in MP was only around 60 percent. In all the three states, attendance in government schools was 14

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[19] The ASER 2007 study by PRATHAM found that around a fifth of the students in government primary schools and a fourth of the students in private schools attend private tuition. In grade 4, the figures overall were 21 percent of government school children and 26 percent of private school children. In UP, the figures were 5.8 percent and 17 percent, respectively; in MP, 5.6 percent and 20 percent respectively; and, in AP, 19 percent and 32 percent, respectively.

percentage points lower than that in private schools. This difference was again starker in MP (18 percentage points).

Figure 7: Students present in the class during school visits (percent)
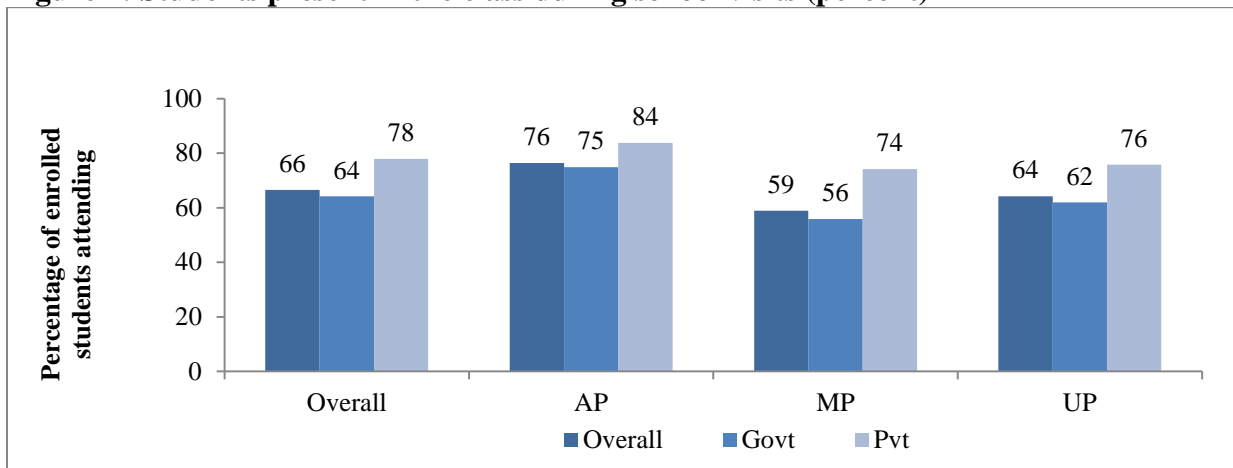
Attendance of children was also better by students during the first hour than the last hour of the school day. Similarly, in our study, it was found that the student attendance rate dropped after the lunch break; especially in government schools where mid-day meal was served (Figure 8). Clearly, all enrolments do not get translated into regular school attendance. (These findings are consistent with the findings in the MHRD study. In AP and MP, average attendance of students during first hour was 73 percent compared to 71-72 percent during the last hour of the day. In UP, during the first hour, 60 percent children were present, but by the time of last hour, the percentage of children present reduced to 55 percent.)

Figure 8: Student attendance before and after lunch hours (percent)
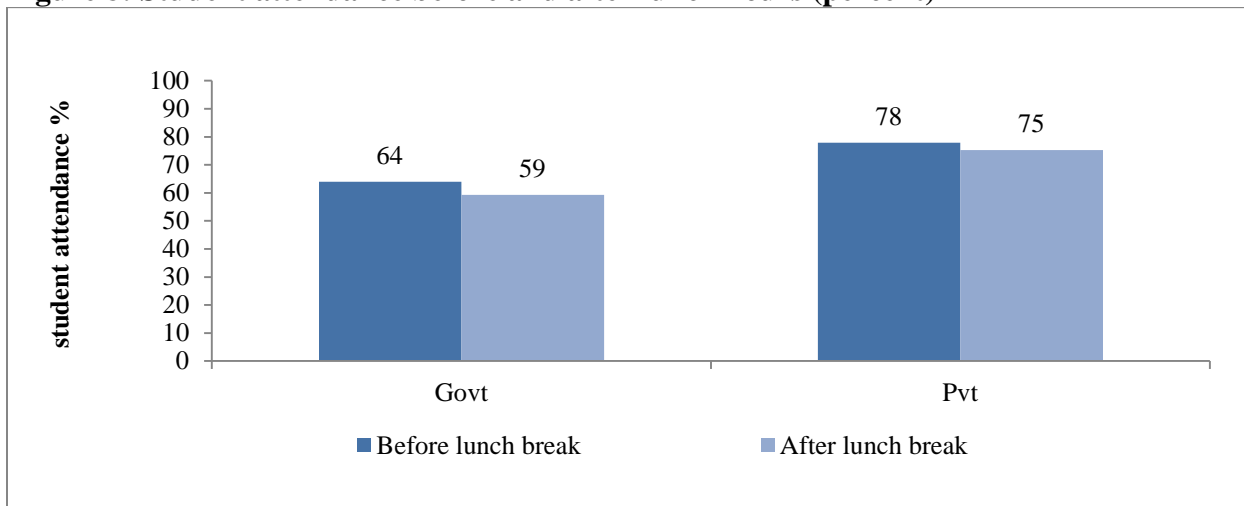
Students' opportunity to learn outside school

One in six children (17 percent) in government schools had no opportunity to learn outside school compared to just 6 percent in private schools. The percentage of grade 4 students who responded negatively to all the three questions about opportunities to learn outside school (i.e.,

that they had neither space, nor time, nor assistance at home for their studies) was three times higher in government schools, with large differences in each state between types of school (Figure 9). On quarter of fourth grade children in MP responded negatively. Reflecting a mirror image, the share of children who responded positively to all the three questions was proportionately higher in private schools and in AP and MP.

Figure 9: Percent of grade 4 children who reported that they neither get space, time nor assistance at home for studies
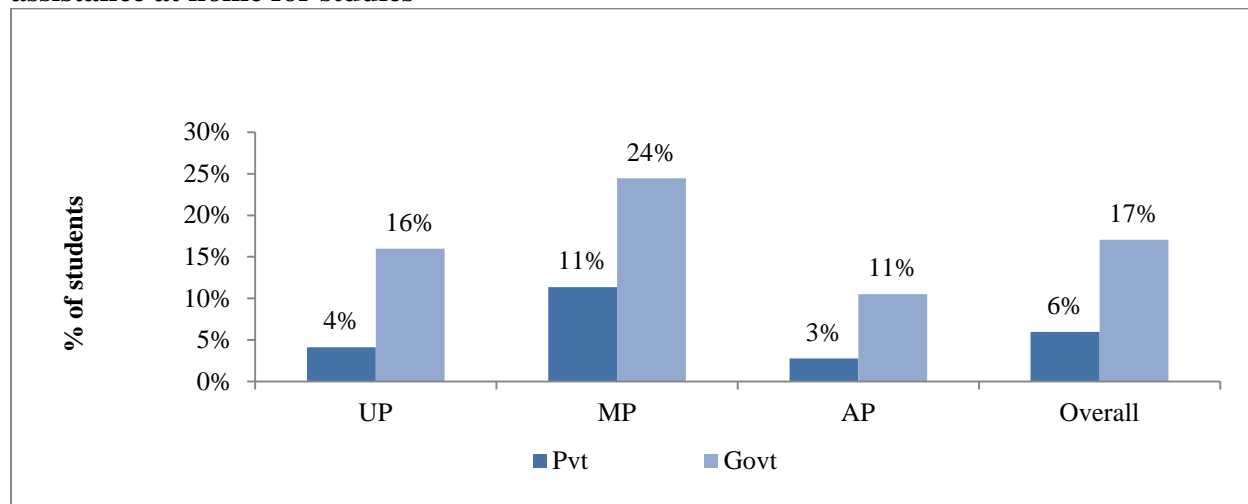
Students' time on task in classrooms

Students in classrooms engage in learning tasks either with teachers, or on their own. The characteristics of tasks when teachers are engaged with students and students on their own differ from task to task. Teachers could be involved with one student or small group of students, most of the children, or all the children. A sound pedagogy within classrooms should ensure that when a teacher is directly engaged with only some students, the other children should also be involved in learning tasks. Students' 'own' time and the nature of the tasks assigned gain importance in this context.

Teachers were engaging students 88 percent of the time on learning tasks, for 79 percent of classroom time. Teachers and some students were on teaching learning tasks for 81 percent of classroom time in UP, for 76 percent of classroom time in MP and 80 percent of classroom time in AP (i.e., 36 minutes per lesson).

Of the 36 minutes of each lesson when the teacher is engaged with students on learning activities, for around 15-16 minutes teachers are trying to teaching all students. For half of the learning engagement time in the class (or for 40 percent of total period, or roughly around 25 minutes) the teacher is engaging a large group of students with her/him. For around 14 percent of classroom time (or around 8-9 minutes on an average) teachers are either with a small group of students or with only one student). With slight variations, this pattern in terms of the share of students engaged with teachers was observed in all three states, across government as well as private schools and across regular and para teachers.

However, the number of students with which teachers engaged varied with the nature of tasks. For almost a third of time teachers were engaged in student-centric activities (Category I activities) they were with either one student or small group of students. On the other hand, for around 90 percent of the time teachers engaged in teacher-centric activities (Category II), the majority of students in the classroom were with the teachers (Figure 10). In organizing or off task activities, teachers were also observed to be engaged with small groups or individual students for more of the time.

Figure 10: Student groups teachers engage with while doing different tasks
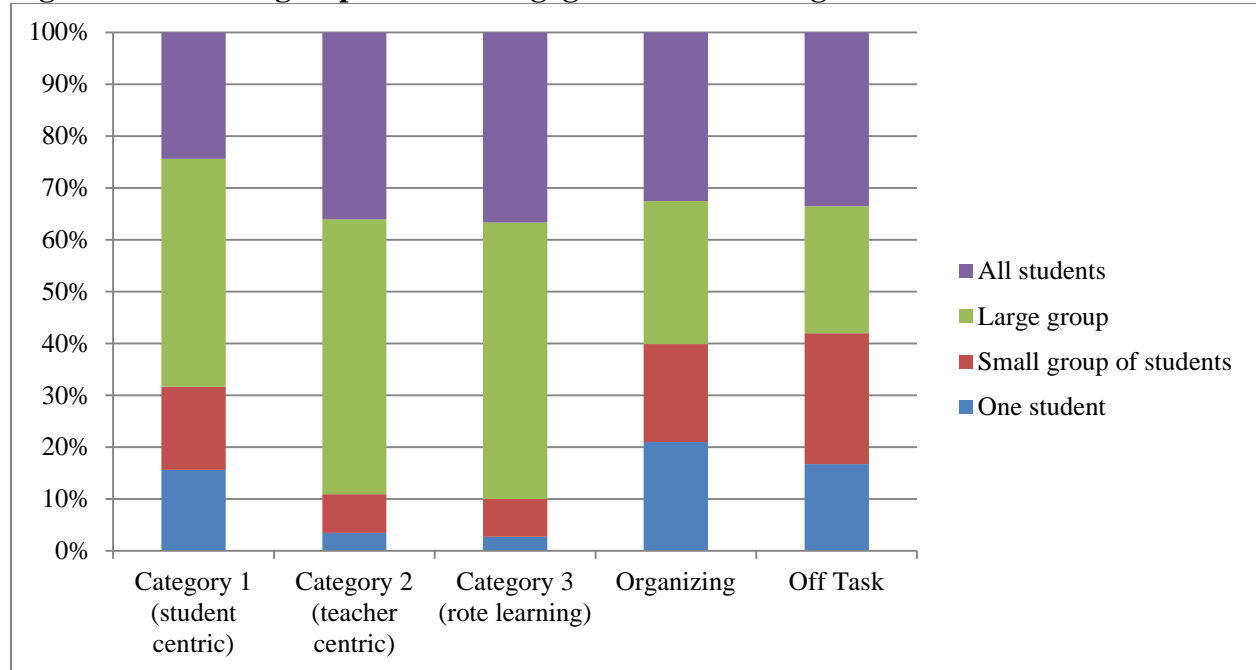
For more than half the time when teachers are with individual students (7.6 percent of all classroom time), they are able to engage these students in student-centric, higher order teaching learning tasks. Similarly, when teacher is engaging a small groups (10 percent of the observed classroom time), 40 percent of the time they are on Category 1 activities. When teacher was with one student, less than 20 percent of the time was devoted to teacher centric and rote learning activities – meaning that the majority of time teachers were engaging students in student-centric, higher-order tasks. Similarly, even with smaller groups of students, teachers were less on category II and III activities. **On the other hand, when teachers were trying to engage large number of or all students on some tasks, most of the tasks – more than 70 percent of the time – were in the nature of teacher-centric or rote, passive learning.** While it is obviously more difficult to engage all children in student-centric activities at the same time, the evidence shows that it is possible; and this good practice needs to be spread more widely.

The patterns were very similar in AP and MP. However, in UP, teachers were able to engage larger groups or all students a higher proportion of the time, for all types of activities. For example, considering student-centric activities, teachers in UP were able to

engage larger numbers of students 79 percent of the time which is significantly higher than teachers in AP (63 percent) and MP (64 percent).

However, when teacher is engaged with small groups of students or a student, 90 percent of the time, the remaining students were not on any learning task. Overall, more than 70 percent of classroom time witnessed some students working on their own – either on some learning tasks or off tasks (Figure 11). Students on their own were seen to be engaged in Category I type activities – either projects or problem solving or discussion – only in less than 5 percent of classroom situation. Around 30 percent of the time students on their own were on recitation or rote learning. In almost 90 percent classrooms, students were witnessed to be socializing in small groups or uninvolved.

Figure 11: Students on their own: What is the nature of tasks?
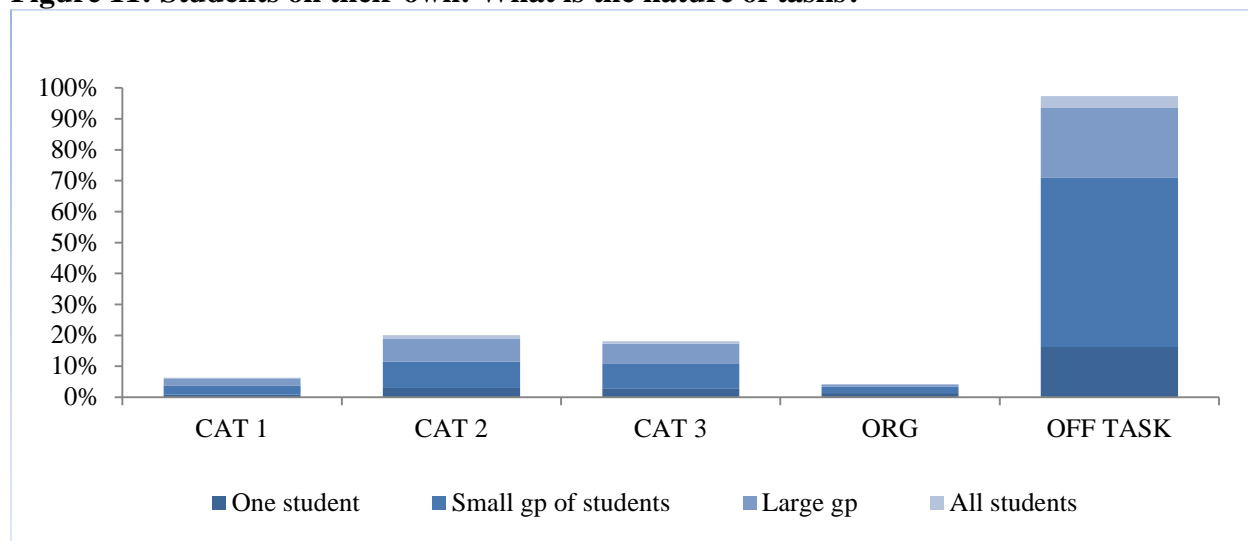
Multi-grade classrooms

In multi-grade classrooms, 70 percent of the time teachers are focusing their teaching on only one grade (Figure 12). Seventy-seven percent of government schools and 18 percent of private schools surveyed for this study had followed multi-grade teaching practice. When the classroom observations happened, more than half of the government schools and a fourth of the private school grades were in multi-grade situations. In a multi-grade classroom, as in any classroom, an ideal situation is one where teachers engage all students regardless of their grade in some learning activities either on their own or in small groups. This was because teachers cannot address all grades at a time given the differential needs of students. In our sample, of the total classroom time observed in multi-grade situations, it was observed that 55 percent of the time teacher was addressing the grade under observation, 16 percent time teacher was devoting to other grade in the classroom and only for around 29 percent of time teachers were found to be handling all grades together (Figure 12).

Figure 12: Grades teacher addresses in multi-grade situation
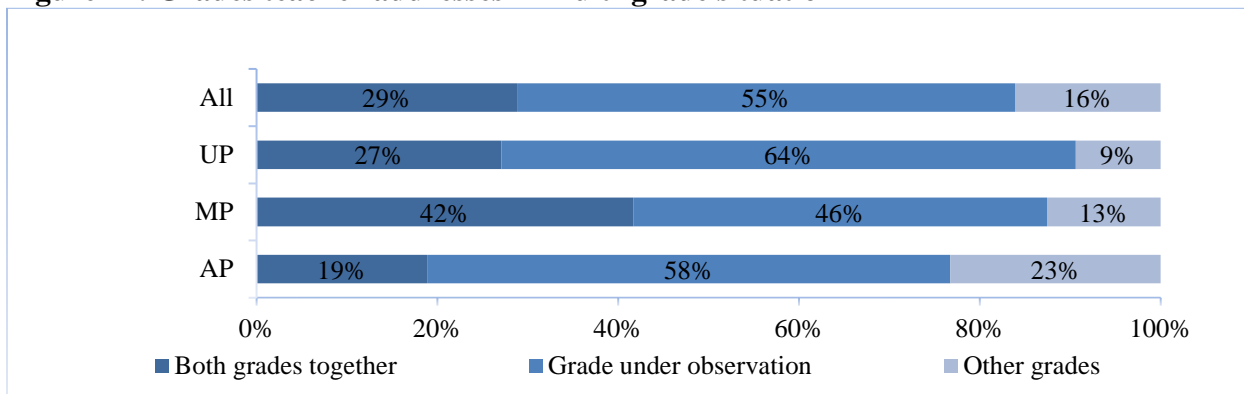
Teachers were trying to address all children from different grades at the same time for around 30 percent of the classroom time. However, in such situations, student-centric activities occurred rarely – in around 5 percent of classroom snapshots in all multi-grade classrooms. In around 17 percent of the time teachers were addressing both grades, teacher-centric or rote type of learning happened – either reciting from the text or black board or children in rote learning situation. The rest of the time when teachers were trying to address all students together was spent on classroom organization, disciplining and off task activities.

More than half of the time, teachers were found concentrating on one grade, and mostly, the primary grade assigned to them (and being observed for the study). When teachers were in the primarily assigned grades, a fourth of the time was spent on Category I activities. In such situations, students were also on their own in either small or large groups in primary grades of multi-grade classrooms.

However, in more than 98 percent of classroom time in other grades, students were not engaged in any Category I type activities (Figure 13). In the rest, two percent classroom time when Category I activities were witnessed it involved either an individual student or a small group of students. In around 40 percent of classrooms, children were engaged in tasks in the nature of Category II – recitation and seatwork. Another 20 percent time students in grades teachers is not primarily addressing in multi-grade classrooms were engaged in rote or passive learning. **But the most prominent feature of grades without teacher engagement in multi-grade situation was the pre-dominant occurrence of students' off task activities – either uninvolved or socializing** (Figure 14Figure 13). **This is of especial concern in government schools given the higher prevalence of multi-grade classrooms in such schools.**

Figure 13: Students and their activities in grades teacher is not primarily focused in multi-grade situations: All
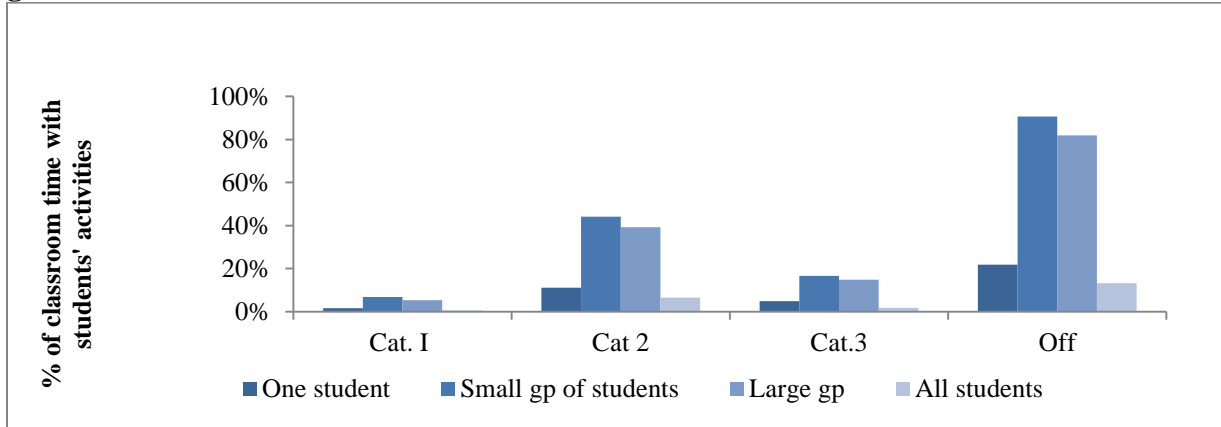
Figure 14: Percentage of multi-grade classrooms where students are "Off-task", when teacher is not attending to them
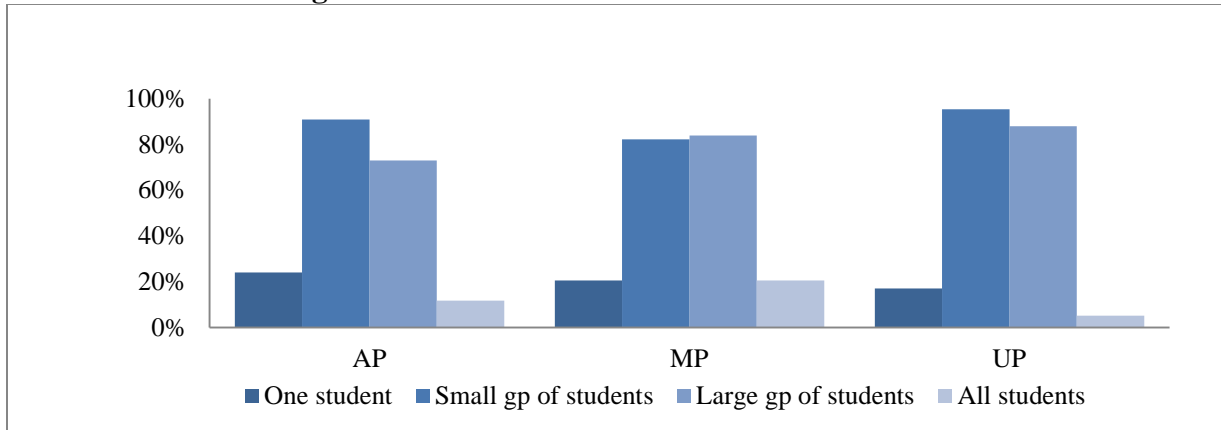
Summary

In this chapter, we looked at students' time on task using three concepts: (a) student attendance; (b) students' time on task in classrooms, either with teachers or on their own; and, (c) students' opportunity to learn outside schools and classrooms. Student attendance is a major concern since more than a third of the students on an average was found to be not regularly attending schools. Similarly, there is a concern about students' lack of opportunity to learn at home. This is due to the socio-economic conditions, especially parental awareness, time and financial constraints. However, when students attend school, the expectation is that students should be able to optimize their learning opportunities in classrooms.

There are two dimensions to the opportunities to learn in the classroom. First, the extent to which teachers are engaging students in any learning activities; second the nature of the tasks students are engaged in, and the intensity their learning. Here again, the study found lost opportunities since most of the time students were engaged in Category 2 or Category 3 activities.

CHAPTER 5: TEACHER PERCEPTIONS, ATTITUDES AND BEHAVIOR

Teachers' attitudes and perceptions about the way students learn and what they are capable of learning are discussed in the first part of this chapter. This provides an insight into what a teacher understands about the nature of his or her job. In the second part of this chapter, teacher behavior towards children is described and compared to their expressed beliefs about children's learning. In the final section, teachers' reported use of materials is compared to the actual use of materials found in classrooms as observed in the study.

Teachers' perceptions, beliefs and understanding

How teachers teach in the classroom can be expected to be influenced by what they perceive or believe as the best ways to teach. Teachers were asked to give their opinion about certain statements regarding qualities of a good teacher (Table 6). The first three questions were related to the importance of completing the syllabus, maintaining discipline in class, and whether learning was more a student's job than a teacher's. If teachers are more concerned about finishing the syllabus, his/her teaching methods may be more driven towards conventional teaching than taking time off for experiments or innovations in teaching and adjusting their teaching to ensure student understanding is secure. Maintaining discipline at the cost of students' interaction would also lead to more rote or passive learning. Teachers who believe they only need to provide a learning environment for students to learn, leads to teaching in "lecture" mode. The fourth statement is an attempt to see whether teachers think they should provide education in a "one size fit all" approach or a differentiated approach with more attention to those who need more. Here, the role of remedial teaching and assessments also are linked. A teacher who believes in and encourages children to ask questions could make classrooms more active and promote greater learning.

Table 6: Teachers' beliefs about good teaching

Statement: A good teacher is one who…………..	Government		Private	
	Fully agree	Disagree	Fully agree	Disagree
1. - makes sure she/he completes the syllabus /textbook as early as possible.	18%	52%	26%	48%
2. - maintains discipline in the class by not allowing children to talk or ask questions	13%	73%	14%	69%
3. - believes the teacher can provide a learning environment in the class, but children learn on their own	39%	18%	33%	30%
4. - believes every child has some strengths and learning capacity	78%	5%	73%	4%
5. - encourages children to ask questions and helps them find answers	92%	2%	89%	3%
6. - spends time on making sure every child learns, even if the syllabus is not completed	74%	6%	74%	6%

On the whole, the majority of the teachers across both government and private schools agreed with more "student-inclusive" statements regarding teaching and learning. The

majority of teachers fully agree with the statements that a good teacher is one who (i) believes that every child has some strengths to learn, (ii) encourages children to ask questions and helps them to find answers and (iii) spends time on making sure that every child learns even if the syllabus is not completed. Further, the majority of teachers did not agree to the statements related to early completion of syllabus and maintaining discipline in the class by not allowing children to talk or ask questions. There were no major differences between government and private schools.

In spite of this constructive view about teaching, most teachers are not able to translate these beliefs consistently into views about the ways children learn best. Teachers were asked to certain statements regarding how students of primary classes learn. The first statement is about whether the learning capacities of children vary across gender and social groups. The second statement is about the role of rote learning. The third statement is also more favorable towards teacher-centric methods. The other statements are about recognizing student capabilities and the need for student specific attention (Table 7).

Table 7: Teachers' beliefs about children's learning

Statement:	Government		Private	
	Fully agree	Disagree	Fully agree	Disagree
1. Students have differing capacities to learn, depending on whether they are boys or girls or from different socio economic strata.	58%	11%	57%	10%
2. Students learn best by memorizing whatever is written in the textbook or on the black board by the teacher	39%	9%	59%	8%
3. Children are too young to think on their own and need to be provided all the answers	62%	9%	74%	8%
4. Students are like a blotting paper and absorb/learn whatever the teacher teaches them	43%	6%	68%	4%
5. Students are capable of thinking and reasoning on their own and should be encouraged to solve simple problems	65%	5%	69%	7%
6. Students come to school with different experiences and backgrounds and each child learns and understands what the teacher teaches in his/her own way	73%	4%	72%	5%

Sixty-two percent of teachers in government schools said that children need to be provided with all the answers, while, <u>at the same time</u>, 65 percent said that students were capable of learning on their own. It is not known how many, but this means that at least some teachers (at least 27 percent) are holding two contradictory beliefs at the same time. The same pattern was found in private schools, with even more teachers holding both beliefs (either separately – 74 percent and 69 percent for the two statements, respectively – or simultaneously). It was found in the previous chapter, that teachers spent most of their time on teacher-centered activities, like writing on the blackboard or getting students to copy out material from a book; and yet, only a minority (albeit a substantial minority) believe that students learn best by memorizing from the book or board (39 percent in government schools) or by absorbing what the teacher is teaching (43 percent). In private schools, in fact a majority of teachers though the teacher-centric approach was how children learn best (59 percent believed in memorization and 68 percent in student absorption of teachers' knowledge).

Teacher's attitude towards teaching and learning

Overall, teachers' theoretical understanding and attitudes were positive in nature, with similar patterns across states and types of schools and teachers. Taking teachers' perceptions and beliefs towards how they should teach and how students should learn, a teacher attitude index was prepared, with affirmative answers towards more constructive attitudes taken as positive values and the adherence to cynical views about children's learning process getting negative values. This study found that the overwhelming majority of teachers in all three states had overall positive attitudes (Figure 15), the most frequent score being 5. Very similar distributions of average attitudes were found for both government and private school teachers and for regular and contract teachers (Figure 16).

Figure 15: Teachers' attitudes / perceptions towards teaching learning process, by state
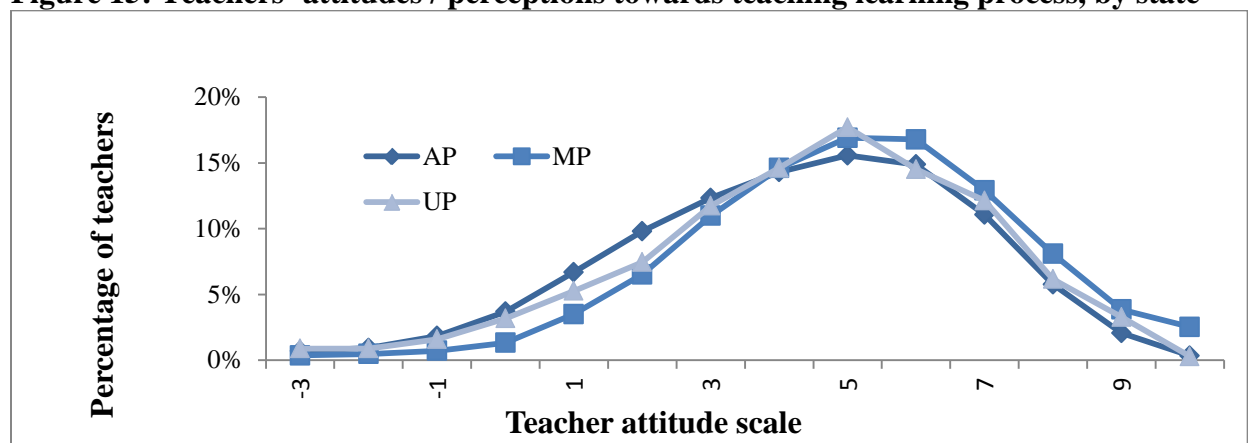
Figure 16: Teachers' attitudes / perceptions towards teaching learning process, by school type and contract type
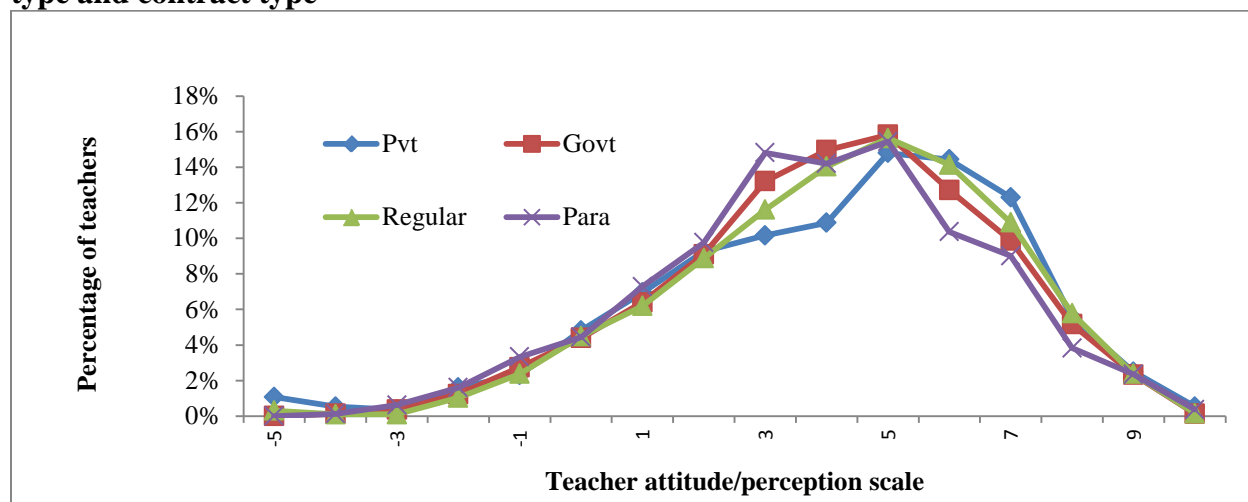
Teachers found a multi-grade situation, lack of parental interest and irregular attendance of students as the three most serious hurdles in their daily teaching job. More than half of all teachers identified these three hurdles as the most serious (Table 8). It is noticeable that two of

these reasons reflect a tendency to put the 'blame' on the parents for students' non-learning. (A slight exception was teachers in AP, who ranked insufficient classroom space above irregular student attendance.) Also interesting is to note that lack of interest in studies among students ranked (slightly) below the lack of motivation/interest among parents.

Teachers did not consider current posting of school as a hindrance. This could be because of the fact that more than 90 percent of the teachers belonged to the same district as the school is, and most of them had to travel less than half an hour to reach school (not reported here). Teachers were also not concerned about the grades assigned to them. Since many of the teachers were multi-grade teachers, they were getting more than a grade to teach. The differences within primary grades were very little for these teachers, and hence they did not report that this was a serious issue impeding their daily functioning. Interferences from the head teacher were not considered a major problem. While assignment of non-teaching work was considered to be among six major hindrances to teaching, training was ranked lower.

Table 8: Teacher perceptions about daily hurdles in teaching, by state

	All	AP	MP	UP
	Rank	Rank	Rank	Rank
Having to teach more than one class at a time	1	1	1	3
Lack of motivation/interest among parents	2	2	2	2
Irregular attendance of children	3	4	3	1
Insufficient space in the classroom	4	3	5	5
Lack of interest in studies among children	5	8	4	4
Assignment of non-teaching work	6	5	6	8
Non- availability of learning materials	7	6	7	7
Delay in receiving text books	8	7	9	6
Large classes	9	9	8	9
Too much in service training	10	10	10	10
Interference by Head teacher/ management	11	11	12	11
Not being satisfied with the classes assigned for teaching	12	12	11	13
Posting in the present school against your wishes	13	13	13	12

The major concerns of both government and private school teachers were similar, as were the concerns of regular and para teachers. Four out of the five top reasons were the same (Table 9). The only difference in the top five was that, for private school teachers, addressing multi-grade classrooms was a less severe hindrance, which is probably a reflection of the fact that far fewer private schools had multi-grade classrooms (18 percent compared to 77 percent in government schools). Unlike government school teachers, insufficient space was also considered less of a constraint to private school teachers. On the other hand, private school teachers ranked non-availability of learning materials as the third most important constraint; while government teachers ranked this as eighth most serious. Assignment of non-teaching work was a serious problem for teachers in government schools, but in private schools, teachers did not face these problems to the extent of considering it as a major hindrance to their routine activities. Irregular

attendance of students was considered by teachers as one of the three most serious problems in both the government and the private sector. Para teachers faced very similar problems to regular teachers, with four out of the five top reasons being the same, though as expected they faced fewer problems with non-teaching assignments compared to regular teachers. There were very similar rankings by teachers across the three states.

Table 9: Teacher perceptions about daily hurdles in teaching, by sector and type

	Govt.	Private	Regular	Para teachers
	Rank	Rank	Rank	Rank
Having to teach more than one class at a time	1	5	1	1
Lack of motivation/interest among parents	2	1	2	2
Irregular attendance of children	3	2	3	3
Insufficient space in the classroom	4	7	4	5
Lack of interest in studies among children	5	4	6	4
Assignment of non-teaching work	6	10	5	9
Delay in receiving text books	7	6	7	8
Non- availability of learning materials	8	3	8	7
Large classes	9	8	9	6
Too much in service training	10	11	10	11
Interference by Head teacher/ management	11	9	12	12
Not being satisfied with the classes assigned for teaching	12	12	13	13
Posting in the present school against your wishes	13	13	11	10

Teaching practices

This section considers the prevalence of various types of teacher practice as reported by teachers (the previous chapter discussed classroom observations of teacher practices): remedial teaching of various kinds (both in school and outside), availability of different types of teaching and learning materials, and the extent to which teachers give feedback to parents.

Teachers can engage in remedial teaching in various ways to compensate for the time "lost" in other activities or to address the specific issues of academically weak learners. This can happen in school itself, through paying extra attention in the classroom or finding extra time at school; or it could happen outside school either by the teacher going to the student's home or the student having a private tutor.

About three-quarters (76.5 percent) of teachers reported that they undertook remedial teaching of some kind. Taking the three states overall, this proportion was consistent across types of school management (government or private) and teacher characteristics (male/female). About 48 percent of the teachers reported that they took extra classes whenever required. More than two thirds (68 percent) of teachers reported that they paid extra attention within classrooms – though it is important to note that the classroom observations reported in Chapter 3 found very little evidence of remedial teaching. Around 31 percent teachers reported that they paid extra attention to students in school, but outside the classroom. Around 18 percent teachers reported that they provided help to students by either arranging private tuitions or by

helping them at home (in effect, this again means private tutoring but by the teachers themselves[20]).

Table 10: Teachers reporting different types of remedial teaching, percent

	% of teachers devoted time for remedial teaching	No. of teachers taken measures				
		Taking extra class	Paying extra attention in the class	Paying extra attention outside class	Arranging private tuitions	Helping children study at home
AP						
Govt.	75.1	58.5	67.2	27.5	7.9	12.2
Private	86.7	70.0	85.0	55.0	23.3	38.3
Regular teacher	78.3	62.5	72.1	32.5	10.4	15.8
Para teacher	73.5	53.1	65.3	36.7	14.3	26.5
Male	76.6	65.2	66.5	33.5	11.4	16.5
Female	78.6	55.7	76.3	32.8	10.7	19.1
Total	77.5	60.9	70.9	33.2	11.1	17.6
MP						
Govt.	73.0	40.4	60.0	25.7	3.0	10.0
Private	69.4	53.2	53.2	24.2	6.5	12.9
Regular teacher	74.5	43.4	58.5	26.9	4.7	10.8
Para teacher	65.4	43.6	57.7	21.8	1.3	10.3
Male	71.0	43.2	58.6	25.9	3.1	10.5
Female	73.8	43.1	58.5	24.6	4.6	10.8
Total	72.3	43.2	58.6	25.3	3.8	10.6
UP						
Govt.	81.9	37.0	77.4	34.8	3.7	7.4
Private	69.2	55.4	69.2	29.2	7.7	13.8
Regular teacher	74.7	42.3	72.7	32.5	4.1	8.8
Para teacher	85.8	38.3	80.1	35.5	5.0	8.5
Male	86.1	46.5	81.3	38.9	5.6	12.5
Female	74.3	36.1	71.7	29.8	3.7	5.8
Total	79.4	40.6	75.8	33.7	4.5	8.7
Overall						
Govt.	77.0	44.9	68.7	29.6	4.8	9.7
Private	74.9	59.4	69.0	35.8	12.3	21.4
Regular teacher	76.0	50.2	67.8	30.7	6.7	12.1
Para teacher	77.6	42.5	70.9	31.7	5.6	12.3
Male	77.6	51.7	68.3	32.5	6.7	13.1
Female	75.4	43.8	69.2	29.2	6.0	11.1
Total	76.5	47.8	68.8	30.9	6.3	12.1

There are some variations across states, types of teachers and types of school, but it is hard to understand these different patterns without further analysis. Interestingly, in both UP and MP, more government school teachers reported providing some sort of remedial teaching. And while around 33 percent of the private school teachers reported arranging tuitions or help at

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[20] The survey did not ask whether teachers were paid for this 'at home' support. It could also be that some teachers were paid additionally for taking extra classes.

home, only around 15 percent teachers in government sector reported that they do it. In AP, more than half of the teachers in private sector reported that they took tuitions or help at home, as against 20 percent of government teachers reporting so (Table 10 above). The patterns for para teachers differed considerably across states: in AP, para teachers were about as likely to offer remedial teaching, in MP they were much less likely, and in UP much more likely to do so.

Material used in classrooms

One-third of teachers overall, and more than half of teachers in MP, reported that they did not possess teacher guides, and overall 15 percent did not possess their own text books. Under SSA, teacher guides have been developed by NCERT for all subjects. In AP and UP, around 70 percent teachers possessed a teacher guide; while in MP only 43 percent teachers had one (Table 11). Less than half of the teachers in the private sector possessed teaching guides. Overall, slightly more male teachers and somewhat more regular teachers had teaching guides compared to female and para teachers, but there was considerable variation across states. For example, regular teachers were significantly better off compared with para teachers in AP (77 percent as against 57 percent), somewhat better off in MP (44 percent versus 31 percent), but worse off in UP (68 percent as against 74 percent). While the majority of teachers possessed text books, around 15 percent of teachers did not. It is not known whether children had textbooks if the teacher did not, and so whether a child could lend the teacher a book, but it is hard for a teacher to prepare properly without a textbook for themselves. There were no significant differences in textbook availability across states, different categories of teachers, or types of school.

Table 11: Teachers reporting having their own teacher guides or text books, percent

	Teachers having their own teacher guides				Teachers having their own text books			
	AP	MP	UP	Total	AP	MP	UP	Total
Total	73.7	43.2	70.4	62.8	92.4	78.1	89.0	86.6
Government	78.2	46.5	76.3	67.5	94.3	83.0	88.1	88.5
Private	56.7	30.6	46.2	44.4	85.0	59.7	92.3	79.1
Regular	77.1	44.3	68.0	63.6	94.2	78.3	89.7	87.6
Para	57.1	39.7	73.8	60.8	83.7	78.2	87.9	84.3
Male	74.7	51.9	78.5	67.9	91.1	82.1	87.5	86.9
Female	72.5	32.3	64.4	57.5	93.9	73.1	90.1	86.3

There was wide variation across states in the extent to which teachers reported providing feedback to the majority of parents. AP was by far and away the state with the most reported feedback, across a broad range of topics; a majority of teachers in the state reported they gave feedback to a majority of parents on children's progress, quality of learning, teachers not attending school on time, children's attendance, and school discipline (Figure 17). In neither MP nor UP did a majority of teachers say they gave feedback to a majority of parents on these issues. On the remaining two topics, children's sickness and other problems, there were significant minorities of teachers in both AP and UP who gave such feedback to a majority of parents. In MP, teachers discussing issues with most of the parents were quite limited, and the most discussed issue was school discipline (which a third of teachers did); on all other issues, less than one quarter, and usually less than 15 percent of MP teachers gave feedback to a majority of parents. These findings would suggest that state policy (and practice) is an important influence on whether teachers give feedback to parents and the community. In UP, children's attendance

was discussed most, perhaps not surprisingly given that they also reported (Chapter 3) that "irregular attendance" of children as the most serious hurdle in their day-to-day teaching.[21]

Figure 17: Government school teachers who discuss various issues with majority of parents/ community, percent
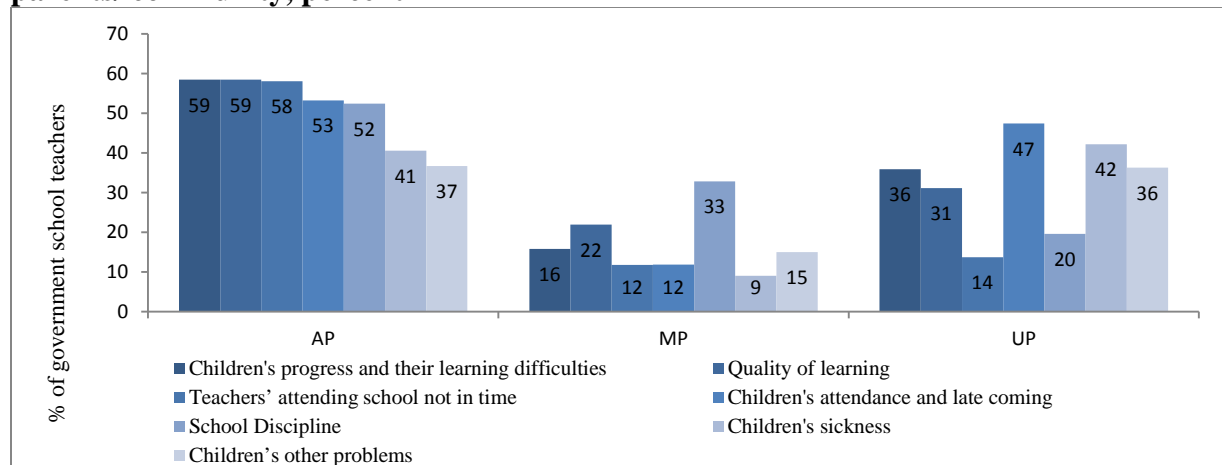
Teacher training

About two-thirds of teachers received some in-service training in the previous twelve months, for an average of 15 days, but the type of training, focus area of training and duration of training varied across states. Under SSA, there is provision for in-service training up to 20 days per year for every teacher. This training could be at Cluster or Block Resource Centres, or conducted by any other agency. On average, around 70-74 percent of government school teachers in AP and MP reported receiving CRC training in one form or other on issues such as (a) subject based; (b) teaching-learning materials; (c) multi-grade teaching; (d) inclusive education for Children with Special Needs; and, (e) other issues (Figure 18 and Figure 19). However in UP, the percentage of teachers who received training from CRC was much lower (only about 20 percent), and though many teachers in UP also received training from other agencies, this was not at rates significantly greater than in the other two states.

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[21] It should be noted that many teachers, particularly those in private schools, chose not respond to this question, and in systematic ways. More than 90 percent of private school teachers in AP did not respond to the question, compared to MP where around 12 percent private school teachers did not answer this question. In UP however, there was no non-response. Among the government school teachers, around 13 percent in AP did not respond to this question. In MP, non-response was less than 10 percent. In UP again, non-response was zero. In this scenario, we took into account the government school teacher's response only and analyzed it. It is not known why these patterns of response/non-response were found.

Figure 18: Government teachers who received in-service training during the previous year, percent
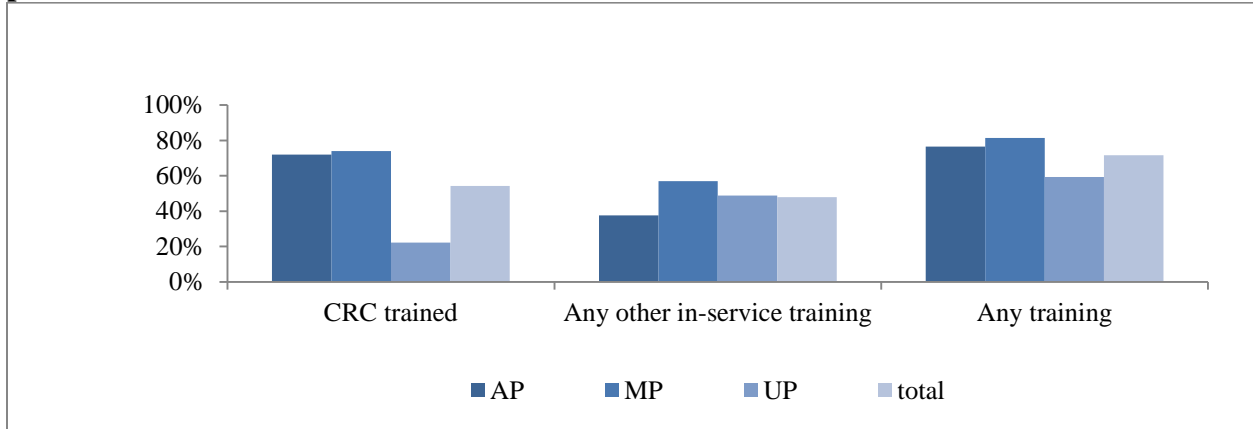
Figure 19: Average number of days of training of teachers who attended training either at CRC/other training
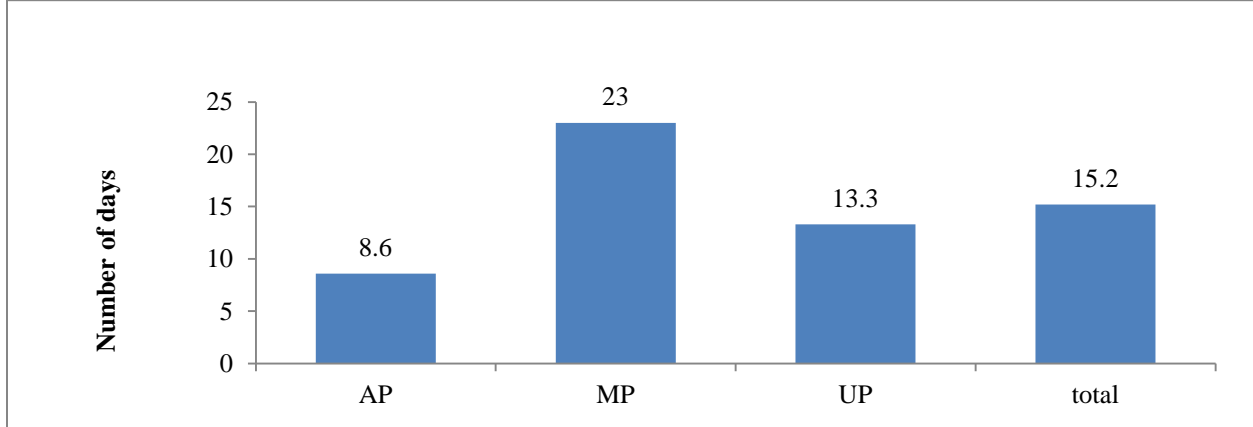
Across states, the average number of days teachers received training ranged from 9 days in AP to 23 days in MP. In MP, 57 percent teachers received training on courses that lasted more than a week (Table 12). Teachers in UP may be less likely to be trained than those in AP, but the duration of their training was 50 percent longer (13.3 days on average as against 8.6 days). Overall, UP had the highest rate of training which last for three or more days.

However, more than the duration, what is of grave concern is the number of days lost due to training that happened on instructional days. On an average, 17 working days are lost due to training in MP as against less than 10 days in UP and less than 5 days in AP.

Para teachers had very varied experiences across states with respect to training opportunities, seemingly driven by state policy. In MP, almost all had some training; and in UP more than two-thirds did, and all training was of at least 3 days' duration (Table 12). However, in AP barely 10 percent of para teachers received training and none more than 7 days. Again, it seems that state policy is driving the training practices in schools.

Table 12: Teachers receiving training, by type of teacher, duration of training and state, percent

	AP			MP			UP		
	1-2 days	3-7 days	>7 days	1-2 days	3-7 days	>7 days	1-2 days	3-7 days	>7 days
Regular teachers	28.0	59.7	7.5	17.8	15.3	59.9	8.5	74.6	12.3
Para teachers	4.7	7.0	0.0	19.4	20.8	52.8	0.0	23.6	45.7
Total	23.6	49.8	6.1	18.3	17.0	57.6	4.1	48.1	29.6

Only around a third of the government teachers who received in-service training reported that the training benefited them. On average, around 30-35 percent of teachers trained reported that the training helped them to: (a) use different methods of teaching; (b) use more TLM in the class; (c) prepare TLM more often; (d) handle multi-grade classes better; (e) handle large classes better; (f) teach in a more child-centered fashion; and, (g) increase their interest in the job (Figure 20). There was very little difference in the reported usefulness of the training depending on whether the training was carried out by CRCs or some other agency. Given the commitment, in both time and money, that has been made for training purposes, this low reported level of usefulness is worrying. **Moreover, as noted above, when teachers are trained, they very often do so during school working days. So not only do students lose out by not having their regular teacher available to teach, they also lose out because mostly this training does not improve the ability of teachers to teach.**

Figure 20: Proportion of government teachers reporting usefulness of CRC training and support
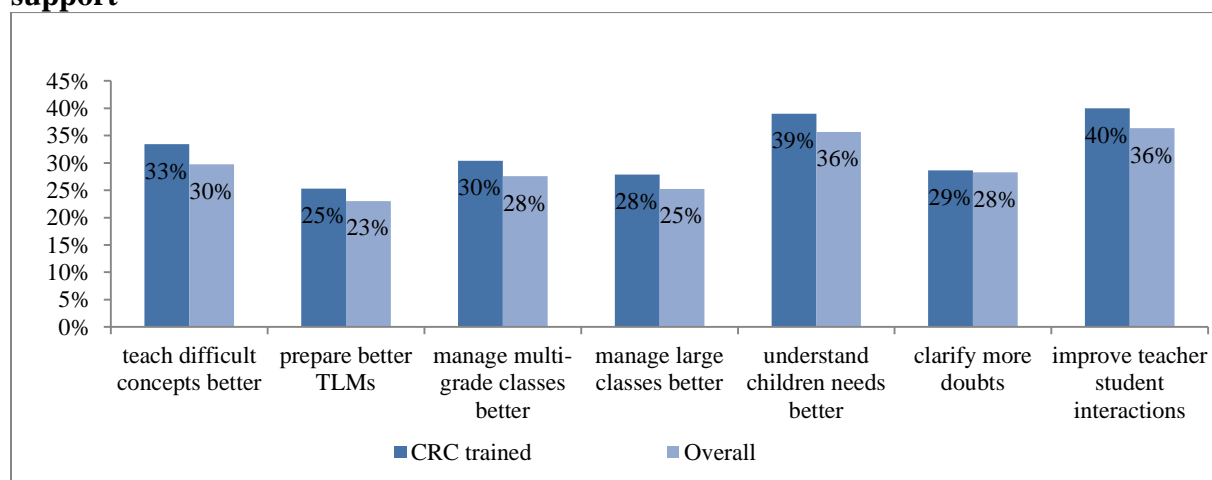
Notes: CRC=Cluster Resource Centre; TLM=Teacher Learning Materials

Teachers' behavior in the classroom

During the classroom observations conducted for this study, apart from observing the activities and number of students involved, teacher's overall behavior was also recorded. Four aspects in particular were observed: classroom organization; clarity of teachers' writing and speaking; teachers' interactions with children in the classroom; and reported and observed use of materials.

Classroom organization

The way the classroom was organized depended a lot on teachers' choices. For example, teachers could organize classroom seating, decide whether they mixed girls and boys, and what TLMs are available and displayed in classrooms.

In 83 percent of classrooms, children were seated in rows or columns. Almost 96 percent of private classrooms were organized in this way as against 80 percent in government schools. Sitting in rows or columns increased with the age of the children: in Grade I, around 24 percent of the classrooms were organized in groups or without any order, while this figure rose to almost 90 percent in grade IV (Figure 21). Clearly children who are sitting in rows or columns have a harder time to interact with each other and work together; they are also facing the front of the class and so encouraging (or responding to) teacher-centric activities at the blackboard.

There were significant variations on the extent to which boys and girls were mixed together in classroom seating arrangements. This happened in 53 percent of classrooms, boys and girls were mixed together, while in rest of the classrooms they sat separately. There were significant differences in private schools, where around 70 percent of the classrooms had boys and girls sitting separately, compared with only 40 percent such arrangements in government schools. In Grade I, in around two-thirds of the classrooms, boys and girls were seated mixed. On the other hand, in Grade IV, only 40 percent of the classrooms had boys and girls sitting together (Figure 21).

Figure 21: Seating arrangements, by groups and by gender
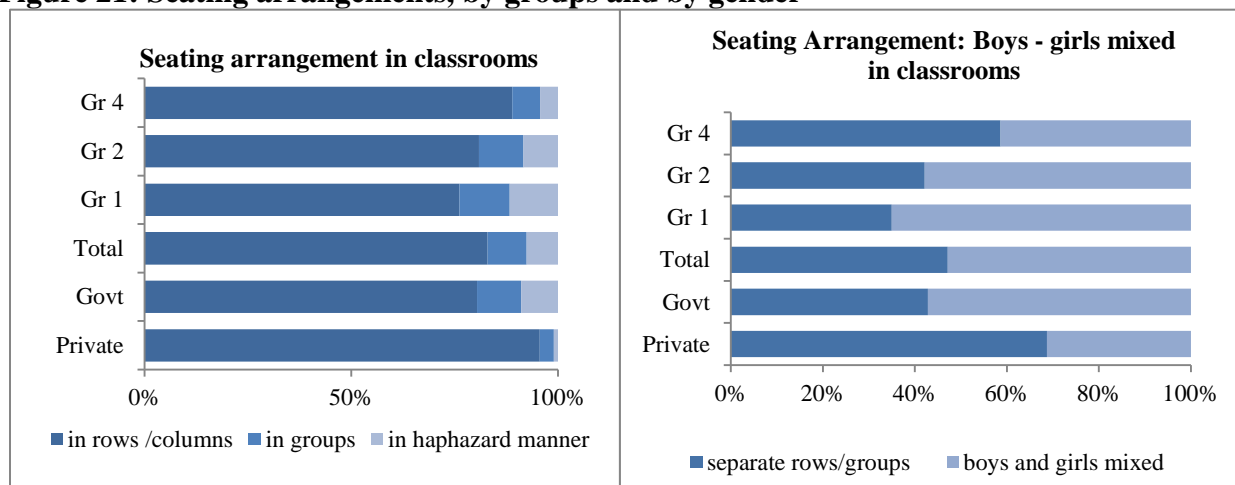
Teaching-learning materials were available in 87 percent of classrooms but much less in private than in government classrooms. However, around 52 percent of the classrooms had TLMs such as charts, maps or pictures displayed on the walls or elsewhere. While around 57 percent of government classrooms had some TLM displayed, less than a third of the classrooms in private schools had TLMs displayed. This finding is consistent with the reported concerns of teachers in private schools that a significant hurdle to teaching is the lack of materials (see Chapter 3). TLMs were found in around three-quarters of the government classrooms in AP.

Teachers' writing and clarity of speech

Good teaching requires, amongst other things, clarity of speech, good pronunciation and clear, legible handwriting, so that teachers can communicate effectively with students and demonstrate good practice to them.

Overall, more than 80 percent of teachers were found to have good word pronunciation, clarity of speech, and legible writing, with private school teachers doing significantly better. Generally, pronunciation was more prevalent than speech clarity and legible handwriting; and this pattern was found in all types of schools and across the three grades observed. However, the performance of private school teachers was significantly better than their counterparts in government schools; better by almost ten percent in each category. **Eighty percent of teachers' writing on the blackboard was legible for students to read**. The writing of teachers in private schools was more legible than in government schools (by 90 percent to 82 percent), that of regular teachers were better than that of para teachers and female teachers were better than that of male teachers (Figure 22).

In more than 80 percent of the classrooms, the observers found teachers speaking very clearly with reasonably good pronunciation of words. In MP, however, observers reported clarity of speech of teachers only in around 72 percent of the classrooms and good pronunciation even in fewer classrooms, especially in government schools. Overall, across the three states, regular teachers spoke more clearly and had better pronunciation compared than para teachers. Female teachers had clearer speech and pronunciation than male teachers (not reported here).

Eighty percent of teachers' writing on the blackboard was legible for students to read. The writing of teachers in private schools was more legible than in government schools (by 90 percent to 82 percent), that of regular teachers were better than that of para teachers and female teachers were better than that of male teachers (Figure 22).

Figure 22: Quality of teachers' speech and writing in class
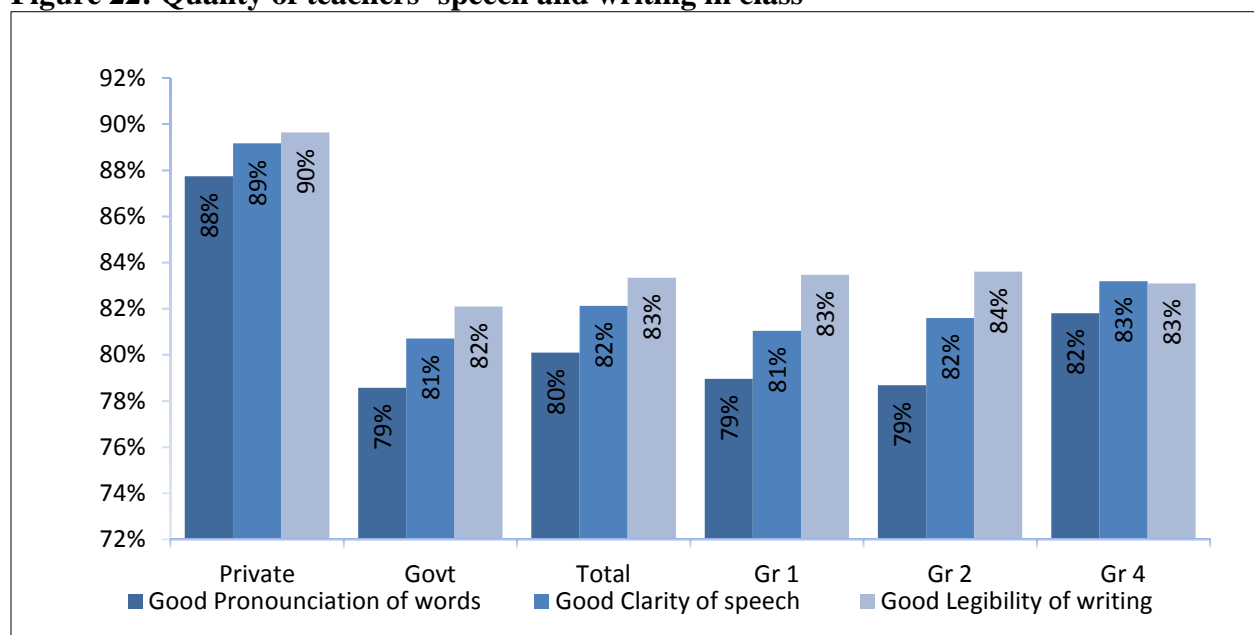
Teachers' interaction with children in classrooms

In around 10 percent classrooms, teachers were not found asking any questions to students in the course of teaching. Such classrooms mostly belonged to para teachers, and in government schools. In around 8 percent of classrooms, teachers were asking questions to a few students at a time. When teachers did ask questions, the vast majority of the time (87 percent) they asked them generally to the class, addressing all children (Figure 23).

Figure 23: To whom teachers address questions
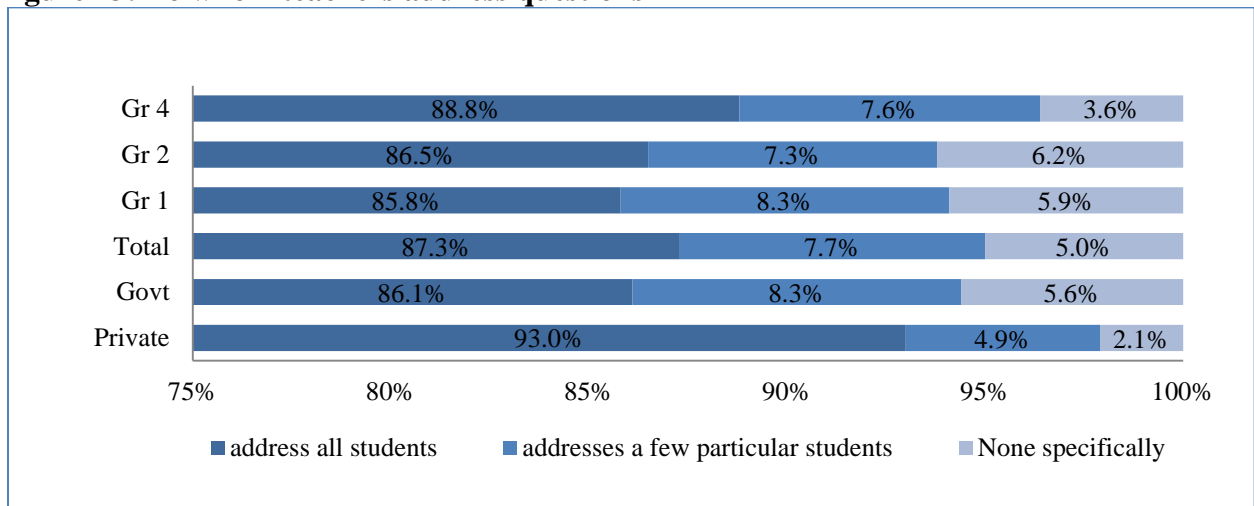
Overwhelmingly, teachers did a good job of paying attention to all students and equally to boys and girls. In less than 5 percent of classrooms, were teachers teaching without getting students involved and attending (Figure 24). In around 15 percent of classrooms, teachers were giving attention to only students in the front rows. The rest of the teachers were giving attention to children on all rows most of the time. In around 85 percent of classes, teachers ask questions to boys and girls equally and another 10 percent asked no one in particular.

Figure 24: To whom teacher pay attention while teaching, by grade, type of school, and student gender
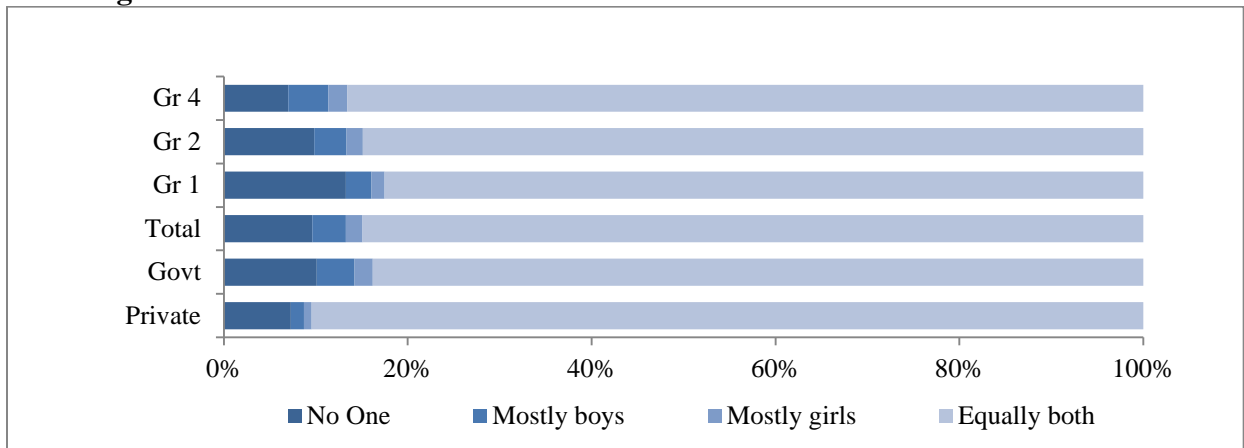
Figure 25: To whom teacher pay attention while teaching, by seating pattern
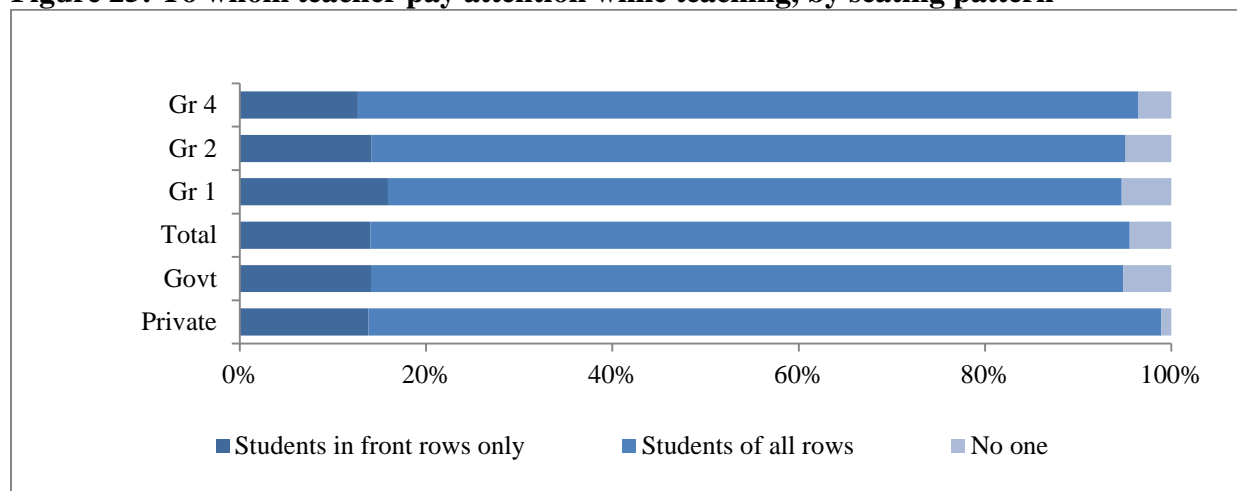
Teachers tend to offer praise or reprimands in fairly equal measure. In about 70 percent of classrooms examples of both kinds of behavior were found. This pattern was repeated across government and private schools, across all grades and equally to boys and girls. However, despite this high occurrence of praise, there is a small but significant minority of students – about ten percent – who appeared to be fearful of the teacher. In slightly more than half of the classrooms (52 percent), teachers were observed to be giving students some leadership opportunities – such as class monitoring role, or "reading" out from blackboard in the place of teachers. This was more prevalent in multi-grade classrooms, perhaps because teachers needed more help to manage the classes.

Use of Materials: Reported and Observed

While almost all teachers had textbooks, a majority of teachers reported that they did not have or do not use encyclopedia, newspapers and magazines and science kits. Moreover, around a third reported the unavailability of story books, mathematics kits, maps/atlas/globes, and TLMs (Figure 26). In contrast, the items and materials teachers reported that they used most frequently in classrooms were text books (almost 100 percent), charts (90 percent) and teacher guides (around 80 percent). There were few differences across states, though teachers in AP generally reported greater availability of resources. The availability of different types of material varied little between government and private schools (Figure 27). However, teachers in government school used teacher guides 95 percent of the time; while, private school teachers had much lower use (75 percent), which is not surprisingly given the finding (reported in Chapter 3) that private school teachers complained about the lack of such guides.

Figure 26: Non-availability of materials / rare use reported by teachers, by state

Legend: UP, MP, AP

Categories (top to bottom): Science kit, Newspapers/ Magazines, Encyclopedia, Story books, Mathematics kit, Maps/ Atlas / Globe, TLMs children can handle, Dictionaries, Charts, Teacher guides/ support materials, Text books

X-axis: 0% 10% 20% 30% 40% 50% 60% 70% 80% 90%
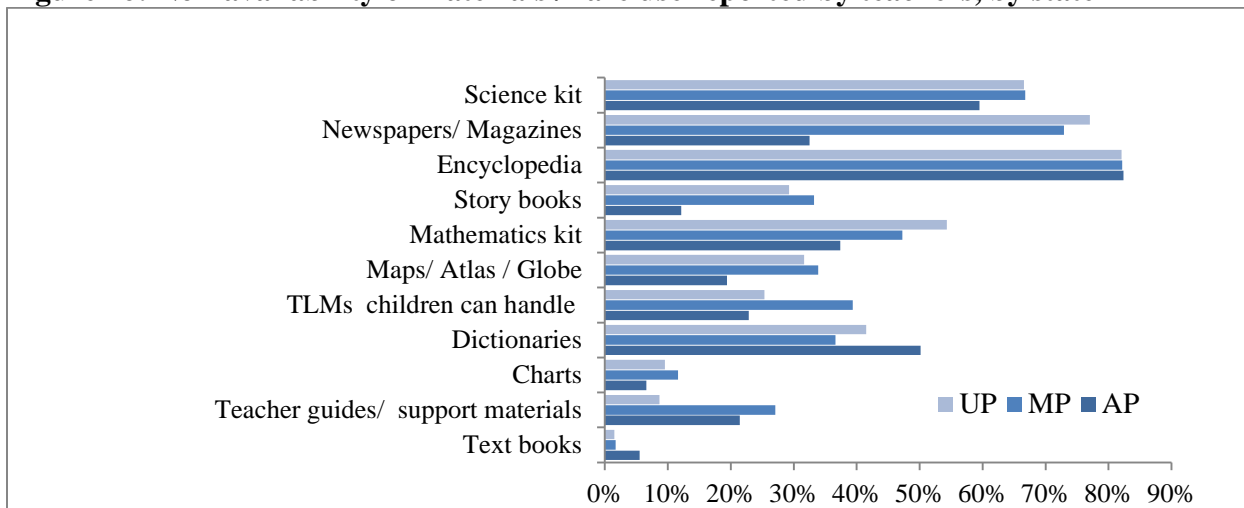
Figure 27: Non-availability of materials / rare use reported by teachers, by school type
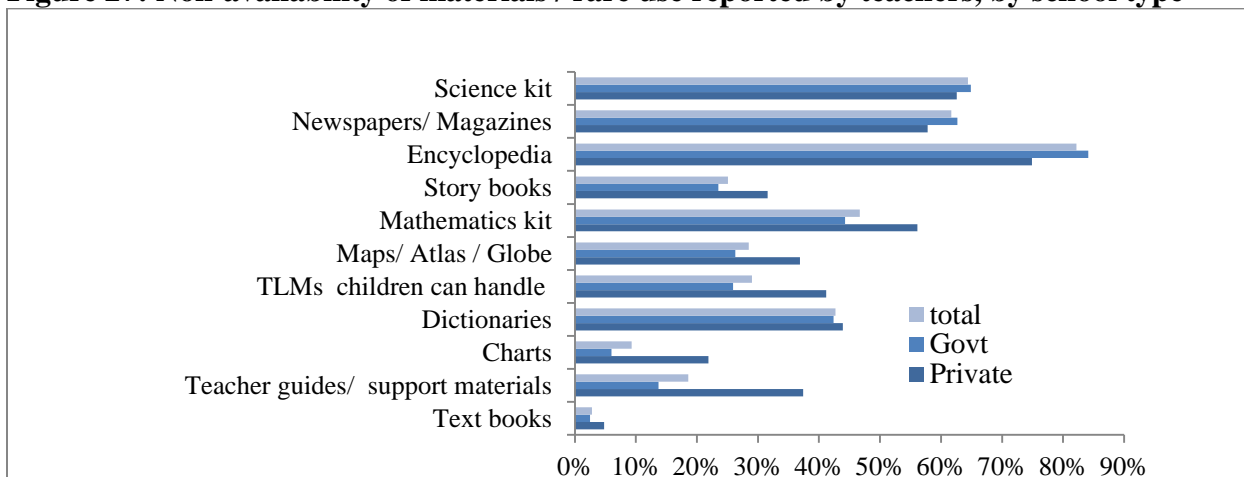
Legend: total, Govt, Private

Categories (top to bottom): Science kit, Newspapers/ Magazines, Encyclopedia, Story books, Mathematics kit, Maps/ Atlas / Globe, TLMs children can handle, Dictionaries, Charts, Teacher guides/ support materials, Text books

X-axis: 0% 10% 20% 30% 40% 50% 60% 70% 80% 90%

Teacher-centric methods with no materials or only the blackboard were observed three-quarters of the time. It was observed that around 11 percent of academic learning time, teachers were on academic activities without any materials (Figure 28). This means that teachers were simply "lecturing". Such instruction without using any materials was observed mostly in MP (on an average, 17 percent of the classroom observation time) and least in classrooms in UP (3 percent) (Figure 29). Around 41 percent of the time teachers were using text books / note books. Another 37 percent of the time teachers were on black board. So the "chalk and talk" method happened for almost 78 percent of the classroom time. Any material like manipulative or visual, or any innovative method (like children enacting a scene), was observed in around 11 percent of classroom observations. This was found most prevalent in UP (20 percent) as against 5 percent in MP. More classrooms in government schools witnessed instructions without any materials. In private schools, 47 percent of the time on an average, teachers were using text books / notebooks as against 39 percent of the time in government schools. Time teachers spent on using blackboard did not differ much between government and private schools. However, only in 5 percent of the classroom situations in private schools witnessed any activity using manipulative

or visual materials or innovative and cooperative learning methods. This compares with 12 percent of the classrooms in government schools.

Figure 28: Materials used by teachers while teaching in classrooms by school type

School	Text books/ Note books	Blackboard	Manipulative/ visual/ cooperative	No materials
Private	47%	38%	5%	10%
Govt	39%	37%	12%	12%
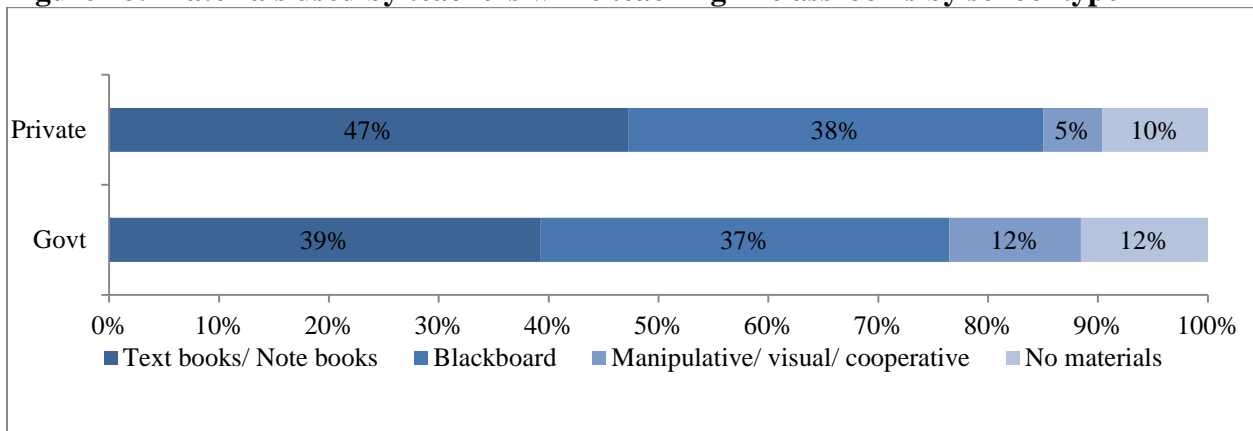
Figure 29: Materials used by teachers while teaching in classrooms by state

State	Text books/ Note books	Blackboard	Manipulative/ visual/ cooperative	No materials
UP	37%	40%	20%	3%
MP	42%	36%	5%	17%
AP	43%	36%	9%	13%
Overall	41%	37%	11%	11%
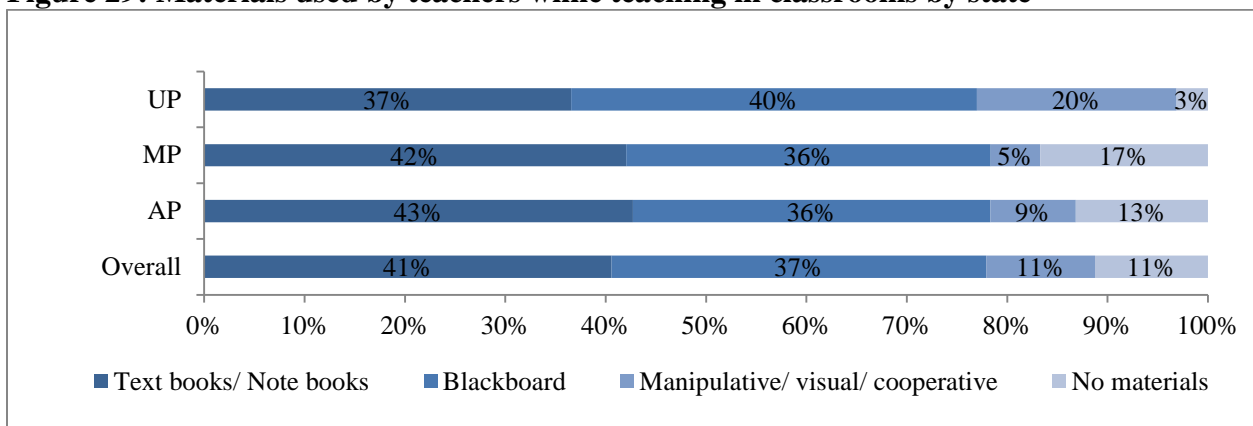
The analysis of the materials used by activities shows that visual/manipulative materials or innovation methods were used most for those activities which are in Category I (student-centric, higher order thinking activities) (Figure 30). Such TLMs were used least in rote or passive activities (that too again restricted to showing charts or pictures). For Category I and II activities, text books/note books were used most often (Figure 30 and Figure 31) while for Category III, blackboards were the most common tool (not reported here). Obviously, passive or rote learning involves teachers writing down on the board and students copying it or simply reading it out. Within student-centric (category I) activities, more observations using TLMs or innovative methods were found in classrooms in government schools (22 percent of Category I activities time as against 12 percent of classroom situations in private schools). Use of text books for instruction in both Category I and teacher-centric (Category II) activities were found increasing with higher grades. However, while use of text books were more common in Language classes, use of blackboard was more common in both categories I and II type of activities.

Figure 30: Use of materials for Category I activities in classrooms by teachers, by subject
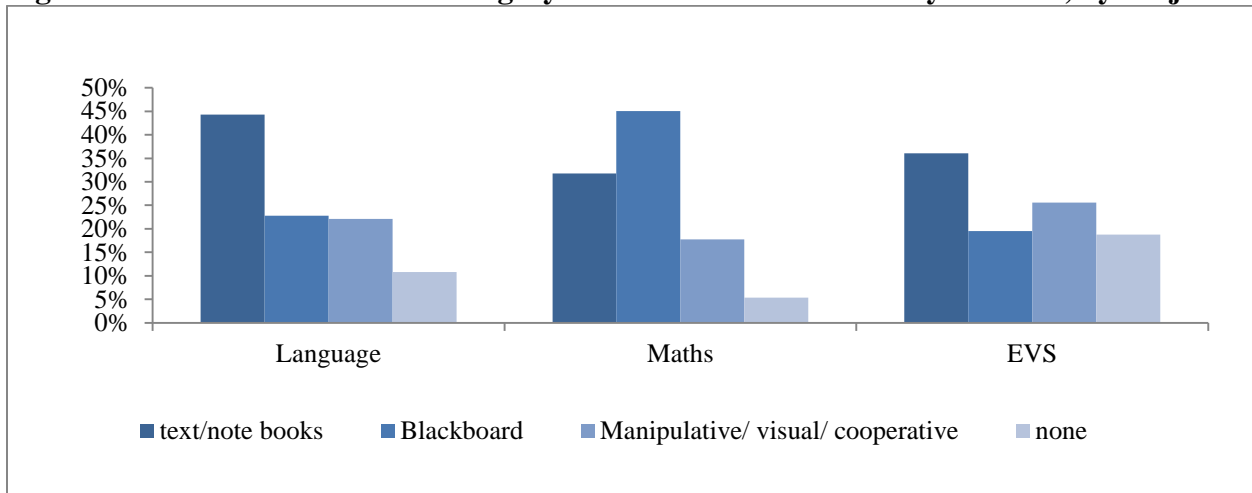
Figure 31: Use of materials for Category II activities by teachers in Classrooms, by subject
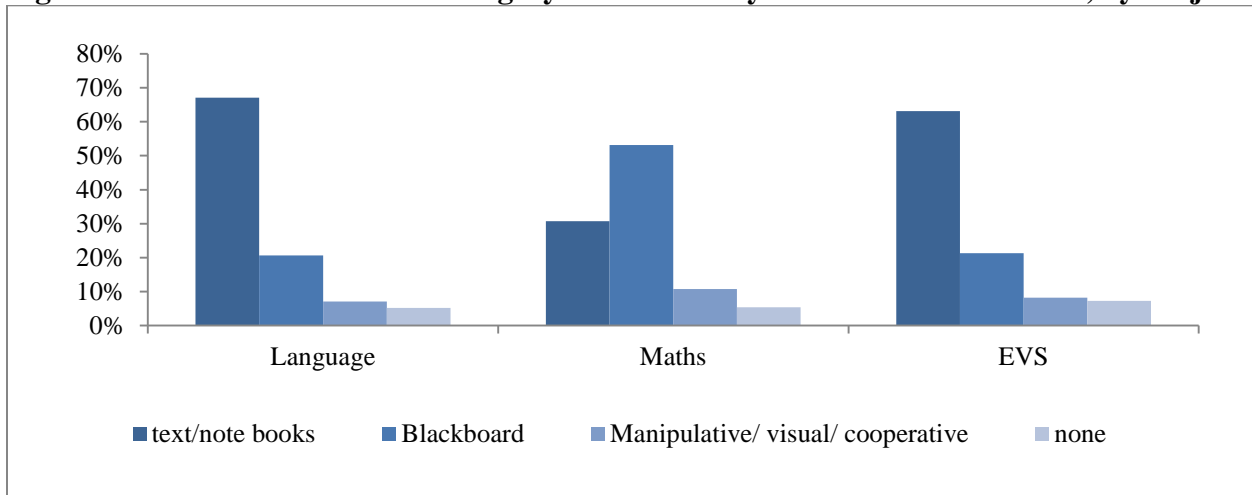
Conclusion

The overwhelming majority of the teachers surveyed evinced a positive attitude or theoretical understanding towards young children's teaching and learning, and yet most teachers still resorted to teacher-centric, passive, and rote learning techniques. Part of the reason is likely to be that they believed that this was most feasible in the classrooms they work in. Certainly, the majority of teachers in government schools found multi-grade situation as the most serious hurdle in their daily teaching job. However, this cannot be the whole answer to the lack of student-centric practice since the prevalence of multi-grade situation was lower in private schools and yet classroom practice there did not look much different than in government schools. **The availability of different types of teaching materials varied considerably, though the patterns of which materials were available across states were similar. Almost all teachers (close to 100 percent), in both government and private schools and across all 3 states, reported that they had textbooks.** They also reported the wide availability of teacher guides – though somewhat less in private schools (75 percent as against 95 percent in government

schools), and somewhat less in AP and MP as against UP where they were almost universal. The overwhelming majority of teachers also said that they had charts available. The availability of other items and materials varied considerably depending on the type of material. However, the respective availability was broadly consistent across government and private schools and across states. The items which were least available were science kits, newspapers/magazines and encyclopedias.

The availability of textbooks (and other types of material) did not however translate consistently into their use in the classroom. A significant minority (41 percent) of teachers did use textbooks. However, about 10 percent of teachers were observed not using any materials and a little more than one third (37 percent) used the blackboard. Moreover, manipulate/visual/cooperative materials were observed in use only 11 percent of the time – despite teachers reporting their much greater availability. This pattern of use of different types of material was broadly and surprisingly consistent across states, school type, grade and subject. Notable differences, though, included: much higher use of no materials in MP (17 percent) as against AP (just 3 percent); somewhat higher use of manipulate/visual/cooperative materials in government (12 percent) as against private (5 percent) schools, with a correspondingly greater use of textbooks in private schools (47 percent) as against in government schools (39 percent). **This broad pattern, of heavy dominance of use of the blackboard and textbooks rather than other materials, is perhaps explained by the finding that teachers strongly believed that students learn by copying the teacher.**

Teachers tend to use a narrow range of teaching materials regardless of the type of teaching-learning activities taking place. Even when child-centric learning activities were taking place, teachers relied mostly on textbooks or the blackboard, even though other materials were available. For example, when child-centric learning activities were taking place, textbooks were used most often (36 percent in grades 1 and 2 and 38 percent in grade 4). The blackboard was being used more than a third of the time in grades 1 (36 percent) and 2 (37 percent) with this falling to 29 percent in grade 4. It is encouraging that teachers are able to use traditional material for child-centric learning activities; this indicates that the availability of other types of learning material is not essential for teachers to engage in child-centric activities. However, these other types of learning material <u>are</u> available in many schools, and yet this availability is not translating into use in the classroom. This suggests a lack of confidence among teachers to utilize the available materials effectively. The evidence also suggests that the relative non-availability of other types of learning material will be eventually become a constraint on the ability of teachers to engage in category 1 learning activities - manipulate/visual/cooperative materials were used more frequently in these lessons (about 20 percent of the time) as against category 2 (only 14 percent in grade 1 and much less in grades 2 and 4).

Amongst the most consistent finding is that teaching practice is very similar in government and private schools in a given state. Private schools in a given state look much more like government schools in that state in terms of what happens in the classroom than they are similar to private schools in other states. This might partly be explained by teachers in a given state having similar pre-service training experiences. Whatever the explanation, **the greater degree of teacher accountability in private schools and the larger amount of in-service training available to government teachers has not shifted teaching patterns significantly to date**.

In many respects, gender equality was prevalent in the observed classrooms. Teachers were friendly towards children in classrooms and did not discriminate between boys and girls while asking questions, encouraging, reprimanding or giving leadership opportunities. This represents welcome progress in translating ideas about gender equality into the behavior of teachers in the classroom. However, the classroom organization was much more segregated, with children seated in rows or columns in most classes and girls and boys were seated separately too. It was notable that even across the two years of the observed grades – second and fourth – there was a shift towards more rigidly organized and segregated classrooms. This meant that young children had less opportunity to learn together and experience gender equality for themselves.[22]

In-service training is clearly an important tool in helping teachers match their conceptual understanding about how young children learn to their classroom practice. And many teachers reported receiving in-service training at Cluster Resource Centres (CRC) under the SSA program, for an average number of days ranging from 9 days in AP to 23 days in MP. The type of training, focal area of training and duration of training varied across states. However, further investigation of this training is needed since only around a third of the teachers who received in-service training reported that the training benefited them.

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[22] Though this was not investigated in this study, other studies have found that pre-service training usually takes place in a gender-segregated environment.

CHAPTER 6: LEARNING OUTCOMES

The rationale for examining instructional time and what happens in the classroom is because of their expected influence on the learning levels of students. Teachers, their availability in school and time in the classroom, the nature and quality of tasks performed in the classrooms and the materials used are important as they provide necessary – if not sufficient conditions – for raising the learning achievement of children. As the McKinsey & Company Report (Barber & Mourshed, 2007) puts it: "The quality of the outcomes for any school system is essentially the sum of the quality of the instruction that its teachers deliver….". Further it says "the top performing schools systems recognize that the only way to improve outcomes is to improve instruction: learning occurs when students and teachers interact, and thus to improve learning implies improving the quality of that interaction".

Many studies around the world that have looked at the correlates of learning achievement have focused on the socio-economic background of students or school's physical inputs rather than classroom processes. It is a well-established finding that the education of a child's parents and the family's socio-economic status are important factors in explaining student learning outcomes. These factors are however not amenable to change from school policies or programs. However, school inputs which are part of government programs, such as pupil teacher ratio (PTR), teacher qualifications, and school infrastructure, have rarely been found to have a consistent link with enhanced student learning.

The present study measured Language and Mathematics proficiency of children in Grade 4 so that the link between school and teacher level factors could be investigated. This study used a robust methodology to identify and measure classroom practice.[23] Grade 4 was chosen for the learning assessments because it represents the long term impact of the instructional time practices of teachers in the school.[24] Given the common pedagogical practices used across grades in schools, though the classroom observations were made only during a specific point of time in the academic year, it is reasonable to assume that they reflected the consistent experience of grade 4 children over time. In multi-grade classrooms, only children in 4th grade were tested.

How did children perform?

Across the three states students achieved on average only 54 percent in language and 52 percent in mathematics of the expected skills and knowledge at this age. The results in MP and UP had the same pattern of higher scores in language, and by a significant margin of 8 percent in UP (Figure 31). However, students in AP scored significantly better in mathematics (65 percent against 56 percent in language). Indeed, the results for both subjects in AP were the highest across the three states, with almost 20 percentage point difference in mathematics

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[23] In testing language, students were tested in the language of instruction.

[24] Measuring learning outcomes of younger children would have been difficult given the personal attention they would have required while testing the children. Besides, collecting information on their socio-economic background would have been even more difficult. From a pedagogical point of view, differentiating the impact of teacher-centric/ rote methods from student centric or higher mental order activities at younger ages and grades would also have been more difficult.

performance between AP and the other states, though there was only a very marginal difference in the case of language.

Figure 32: Grade IV students' mean scores by subject and state
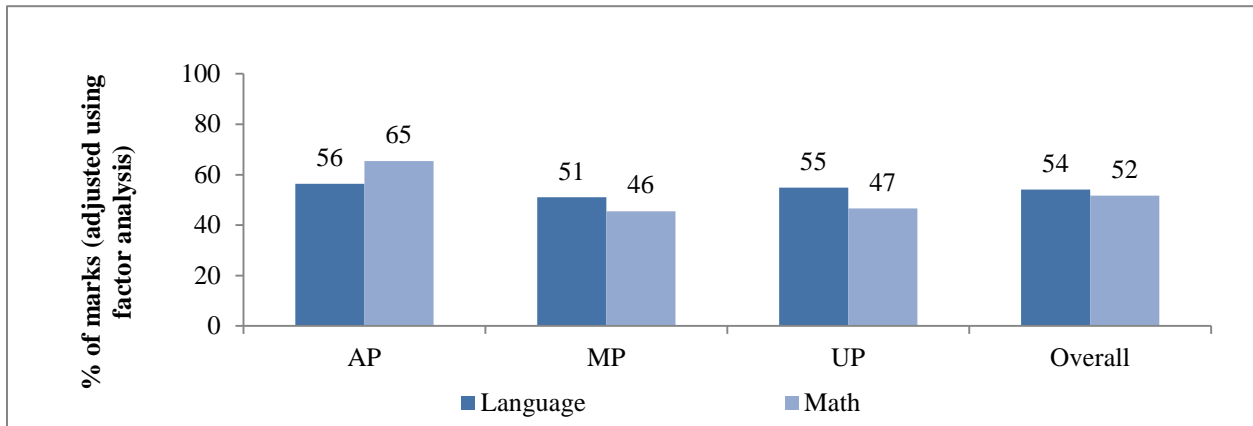
Not surprisingly, learning achievement scores were better for those children from better economic background, a result consistently found in all countries. In this study, the difference in language achievement between a child from the poorest and from the richest quintile was 18 percentage points in AP, 14 percentage points in MP and an astonishing 25 percentage points in UP (Figure 33). Moreover, the significantly better overall scores in AP meant that the lowest quintile in that state on average scored higher than all but the richest quintile in the other two states for both mathematics and language (though only the top 3 quintiles in mathematics in MP).

Figure 33: Grade IV students' mean scores by asset quintiles
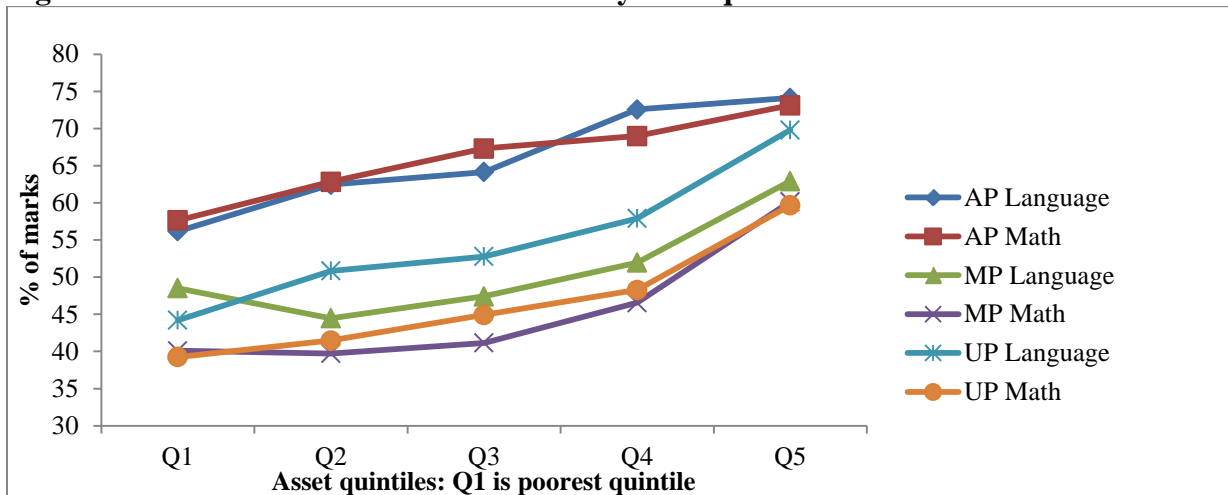
The mean scores of private schools were higher than those of government schools by about 23 percentage points (Figure 34). Interestingly, the gap between public and private schools was lowest in AP, the states with the highest overall scores; though even government schools in AP score significantly below private schools in other states in mathematics. The relative performance of government and private schools is discussed further below.

Figure 34: Grade IV students' mean scores, by type of school management and by state
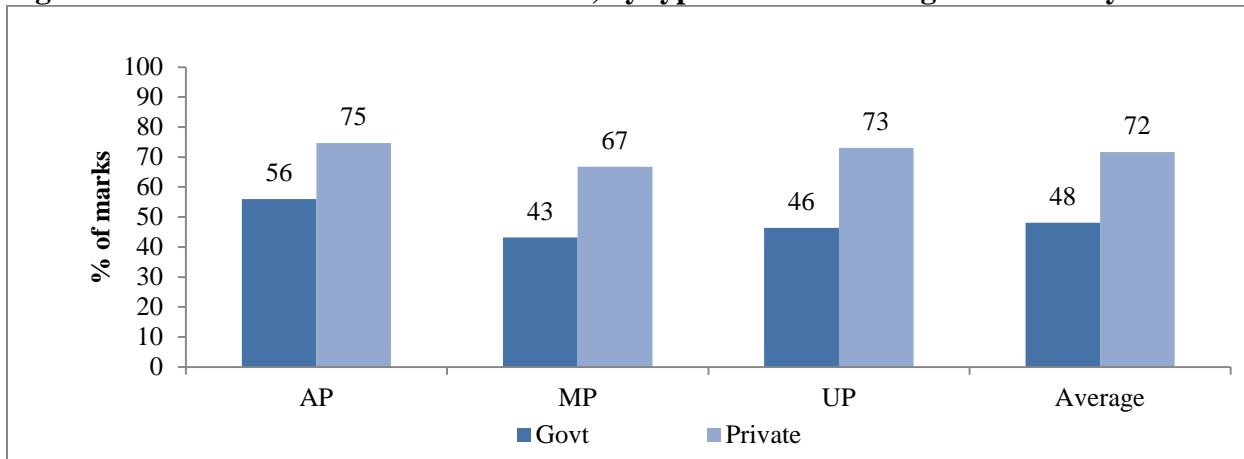
Students in a single grade class situation fared better than those studied in multi-grade classrooms (Figure 35). For example, in mathematics the average scores in single grade and multi-grade were 68 percent and 62 percent, respectively, in AP, 53 percent and 40 percent respectively in MP, and 52 percent and 44 percent respectively in UP. The fact that children in single grade classrooms fared better is not surprising, given that teachers reported that teaching in multi-grade classrooms was particularly difficult for them. However, it should also be noted that in the multi-grade classrooms observed, teaching was mainly focused on the grade in question, so this perhaps explains why the differences in learning outcomes were not greater.

Figure 35: Grade IV students' mean scores by type of classrooms
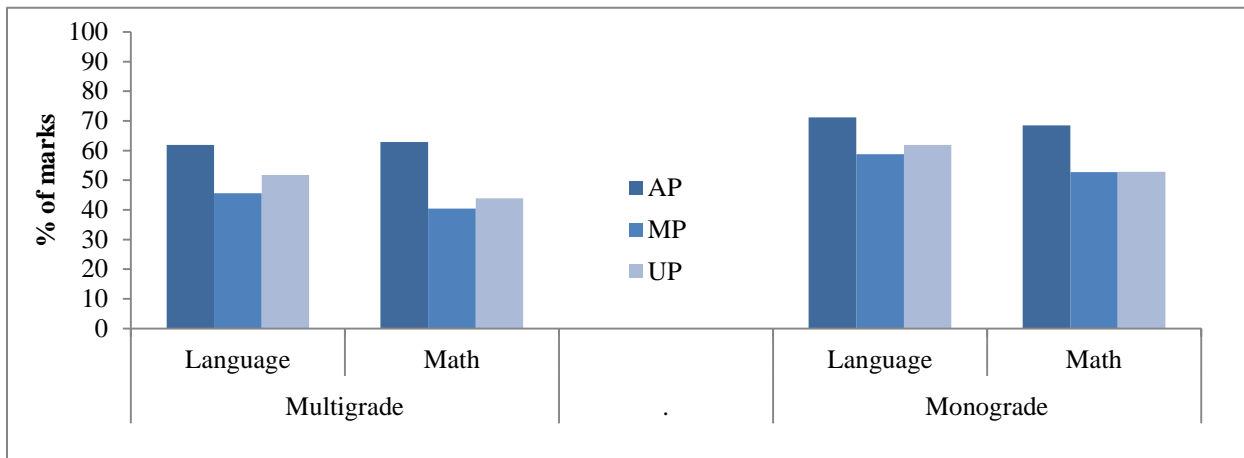
Results

Some the characteristics of students, teachers and schools interact with each other; for example, private schools tend to have higher proportions of richer parents which is part of the explanation for the overall better performance of private schools. So we next analyze Grade IV students' learning levels in Math and Language in more detail to understand these connections.

There are many characteristics that affect the performance of students (Table 13). Some of these are at the school level – such as whether students are taught in multi-grade classrooms or the qualifications of the teachers – and some of these characteristics are at the individual student

level – such as whether the student is a boy or a girl. Many of the school-level characteristics can be affected by policy and program choices; while typically the student-level characteristics are not. Overall, in this study, the influence of student characteristics was greater than school level characteristics; the former accounting for 55 percent of variances in student performance.[25]

Table 13: Factors influencing learning outcomes

	Overall	AP	MP	UP	Govt.	Private
School level						
School management (Government)	- - -	- -		- -	n/a	n/a
Urban location						
Primary only schools (not Upper pry)						
Share of SC/ST children in total enrolment			- - -			
Pupil – Teacher Ratio	- - -	- - -				
School Infrastructure	+++	+++	+++		+++	
Male teacher	- -	-	- - -	- - -	- - -	
Teacher type (regular; not para teacher)						
Teachers with Bachelor's degree +	- - -				- - -	
Professionally qualified teacher	+++			+++		
Teachers experience in the profession	- - -			- - -		
Teacher presence days						
Multi-grade classrooms						
Average student attendance rate	+++	+++	+++	+++	+++	
Class room environment Index						
Teacher's Lenient, but Positive Behavior & conduct	-	+++	- - -			
More of teacher's Teaching time on Category I activities		++	++			
Proportionately more students engaged in more learning time with teachers	+++		++			
Student level factors						
Boy student	+++		++	+++	+++	
Students belonging to general community (other belong to SC/ST/OBC)						
Number of sibling (number of children family need to take care off)	- -	- - -	- -		- - -	
Parental education -father	++		++	++	++	
Parental education -mother						
Household Asset level (Index)	+++	++	+++	+++	+++	
Household conducive environment & support (space, attention, tuition, time)	+++	+++		+++	+++	
Student has repeated grades	- -		- -		- -	

Notes: (1) Only statistically significant results are shown, either positively significant at the p<.01 level, show by '+++' or p<.05, shown by '++'. Similarly for negatively significant variables (shown by '- - -' and '- -', respectively). (2) A blank cell indicates no effects in any regression. (3) n/a = not applicable.

The student level factors contribute to or take away from student outcomes in this study in many of the ways one would expect from the broader literature on learning outcomes.

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[25] Another factor which should be explored is the effect of remedial teaching, given its prevalence.

Children tend to do better if they are from richer families, from households with a more conducive learning environment, have fewer siblings and have more educated parents. It is important to note that each of these variables, independently of the others, is significantly correlated with improved learning outcomes; and some children therefore have multiple advantages (or, conversely, face multiple disadvantages). Schools of course cannot affect these variables.

However, there are some surprises. Boys do better overall when compared to girls though with some important caveats, while children with better educated fathers but not better educated mothers do better, students belonging to the general category do not do significantly better than other social groups, and there is little advantage to urban schools over rural schools. With respect to the relative performance of boys over girls, this is the reverse of international patterns; interestingly, in AP and in private schools, there is no significant difference in performance between boys and girls. This shows that, even though schools can do nothing about the gender of the children they teach, they can make sure that both boys and girls have equal opportunities to learn. Moreover, both AP and private schools have overall average higher performance, so this equity in gender outcomes is not achieved at the expense of overall lower average performance. Further evidence of the equitable nature of schools in AP and of private schools is that, in these schools, the gender of the teachers does not affect student performance; unlike other schools where having a male teacher has a negative effect on performance.

With respect to parental education, in many other studies both in India and elsewhere, children of better educated mothers tend to do better. This was not found to be the case in this study, though, as noted, the education of fathers is important (and the education level of mothers does not exert a negative influence, perhaps because evidence from other sources suggests that the vast majority of Indian mothers have very low educational attainment).

Students in schools in urban locations and belonging to the general category (as opposed to SC, ST or OBC) do not do significantly better. (Though the signs are positive, there are not statistically significant in the regression analysis.) Consistent with these results, it is also noticeable that having a high share of SC/ST children in total enrolment does not affect performance, except in Madhya Pradesh, where it is has a negative impact.

Finally, children who have a constructive atmosphere at home for learning fared better. The conducive home environment was defined as a household that provided attention to the child at home, by providing a specific space for his/her learning needs, attending to the child while he/she learned at home, or provided private tuitions to help the child, which roughly translates into better opportunity to learn outside school and classrooms. Clearly, the results show that it is not enough to look at learning time and facilities at school, but also at home.

There are also some other important policy implications, including some counter-intuitive results, regarding school infrastructure, grade repetition, teacher type, teacher qualifications, and government versus private schools. Not surprisingly, students who go to schools with better school infrastructure do better. This result reinforces the need to continue with the commitments governments have given, for example, through the SSA Programme, to

improving school infrastructure. Multi-grade classrooms did as well as mono-grade classrooms, perhaps because, as was found earlier, teachers tend to teach to one particular grade even in a multi-grade setting. A higher pupil-teacher ratio does, overall, result in lower performance as expected, but only in AP, not in other states and the PTR does not affect performance across government or private schools.

Children who repeated grades tend to do worse. This result is consistent with international evidence. Children who repeat are typically those children who have had low levels of attendance in the previous year or years. Clearly, experiencing the same material again, but this time without one's age peers and without special attention from teachers, means that no greater learning takes place for the student. This provides support for the no-retention policy introduced under RTE. However, a key element of making the no-retention policy a success is to ensure that children learn what they are meant to the first time around – overall results in this study (as well as many others) indicate that overall learning levels are low. It also indicates that additional efforts are needed to ensure children attend school and to give sufficient support so that children can learn what they need to learn the first time through. While making children repeat a grade does not improve their performance significantly, neither does poor quality education in the age-appropriate grade.

Looked at in detail, teachers' qualifications and backgrounds do not have much impact on student performance. Considering the results overall, there are some correlations, though not all one might expect. On the one hand, having a professionally qualified teacher did support better learning outcomes; but, on the other hand, children taught by more experienced teachers did <u>worse</u> overall, as did children whose teachers had more than a Bachelor's degree. However, these results hold true for only when the results overall are considered; looking at the results in more detail reveals fewer correlations with performance, good or bad. In UP, the results follow the general picture in that children with professionally qualified teachers did better and those with teachers who had more experience did worse; but in AP and MP teachers qualifications and experience made no difference in either direction. Similarly, as with the overall results, teachers with more than a Bachelor's degree did worse in government schools, but there was no significant impact of more education of teachers in private schools or in any one state. Finally, the contractual status of teachers (regular versus contract) has no effect on performance. **In summary, these results suggest that considerable efforts are needed to improve the performance of teachers, but there is no simple link between teacher qualifications and experience and better learning outcomes.**[26] Evidence from other studies suggests that stronger teacher accountability and incentives can make a difference.

Finally, teachers' pedagogical practices do have an impact on learning outcomes, thus confirming the initial rationale for this study to examine in detail how teachers teach in the classroom. Where more of teachers' time was used engaging in student-centric activities,

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[26] There are two results of potential policy significance, which can perhaps be explained in isolation but not, unfortunately, together. The first result is that children who attend school more do better. This might not be surprising, and could be explained by students having more teaching by attending more school. However, a second result is that greater <u>teacher</u> attendance did not improve performance of students. An explanation for the latter would be that teachers do not teach well enough to make a difference, but then it is surprising that children who attend more (i.e., get more teacher time) are able to do better.

performance was better. These results held true for all states and types of school, though were statistically significant only in AP and MP. Similarly, where more students were engaged in learning time with teachers, results were better; though, again, significantly so only overall and in MP. The conclusion that might be drawn from this evidence is that teacher pedagogy makes a difference, but, as shown earlier, good practice is not yet sufficiently widespread to make a big difference for a large number of pupils.

Along with student attendance rate, the percentage of students and share of student time on learning tasks within classrooms (either with teacher or on their own) also was found to be significantly correlated with better learning outcomes. This is very important in the sense that teacher's time alone is not important if that does not reach out to the child, and that too the last child in the class. If proportionately more time is spent on learning by children in a class, it improves learning of children. But if these learning activities include more children, the overall learning level of children in the classroom improves. The task for teacher then is to make teaching more interesting and inclusive.

The instructional time of teachers was found to be significant predictor for learning outcomes of students. However, it was not the overall time of teachers in the classroom that mattered. Rather, teacher's time on those instructional tasks that were child-centric, and evoked thinking and reasoning among children (Category I tasks) that was foretelling the variations in learning outcomes on account of quantity and quality of classroom time and process.

Private versus public school performance

Private schools have several advantages over government schools, both with respect to the students they teach and the endowments of the schools (summarized in Table 14). Students from richer, better-educated families tend to choose private schools and such children are also better equipped with support from home and facilities and more opportunity to learn outside classrooms. Since the current study do not get into such issues in detail, the issue of selection bias is highlighted through the differences in government and private schools in terms of student / teacher /classroom indictors.

Not only is the average score better for private schools, but also the endowments of these schools are greater. The share of SC and ST in the total enrolment of government schools was far higher – more than double of that of private schools (though overall the difference in performance between SC/ST children and those in the general category was not significant). The mean PTR of private schools was only 30, while in government schools there were on average 49 students per teacher. More than 70 percent of government schools where the study conducted followed a multi-grade system compared to less than 20 percent in private schools. But most importantly, the shares of children attending school regularly and were on tasks in classrooms were higher in private schools compared to government schools. Added to that, more time on student centered activities in classrooms were observed in private schools.

Among the student characteristics, boys are over represented in private schools. Proportionately, children from private schools came from relatively better off background compared to students in government schools – proportionately more children from non-SC/ST background, smaller families, relatively educated parents, better economic situation at home, and facilitating better

opportunity to learn outside classrooms. Around 18 percent of children tested in government schools were repeating their grades – mostly an indication of accumulated deficits in learning, compared to only 9 percent repeaters in private schools.[27]

Table 14: Difference between private and government schools in terms of school / teacher / classroom and students endowments

	Private	Government	difference	t stat
Overall score	71.74	48.36	23.4	32.4***
Score in Language test	72.74	49.66	23.1	28.27***
Score in Math test	70.74	47.06	23.7	27.89***
Proportion of schools with only primary sections)	0.33	0.81	-0.5	-32.6***
Share of SC/ST in total enrolment)	14.02	33.61	-19.6	-22.4***
PTR (Pupil Teacher Ratio)	30.00	49.90	-19.9	-15.98***
School infrastructure index)	0.82	0.67	0.2	18.9***
Fraction of male teachers	0.44	0.57	-0.1	-7.2***
Fraction of graduate teachers	0.70	0.56	0.1	8.09***
Fraction of teachers with professional qualification	0.38	0.58	-0.2	-11.5***
Fraction of schools that are multi-grade	0.18	0.71	-0.5	-33.8***
Percentage of students enrolled attending the class	82.82	67.32	15.5	25.6***
Percentage of students present are engaged in learning tasks	65.2	60.8	4.4	9.22***
Classroom facilities and environment index	0.82	0.69	0.1	20.1***
Teacher behavior index	0.86	0.78	0.1	17.5***
Mean percentage of classroom time on student-centric tasks	27.62	23.74	3.9	8.9***
Proportion of boys among the students tested	0.58	0.51	0.1	4.3***
Proportion of children from general category – not from SC/ST/OBC communities	0.27	0.10	0.2	13.5***
Mean number of sibling of the students	2.72	3.72	-1.0	-13.7***
Average years of education of father of children	7.35	4.58	2.8	16.2***
Average years of education of mother	5.16	2.42	2.7	19.6***
Household Asset index of children	0.55	0.31	0.2	32.06***
Index of support at home, and opportunity to learn outside classrooms	0.73	0.58	0.1	12.09***
Fraction of children who are repeaters of the grade	0.09	0.18	-0.1	-6.6***

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[27] On the other hand, governments schools have some, though less, advantages; Proportionately more female teachers are teaching in private schools and while the share of graduate teachers are more in private, the share of more professionally trained teachers were found in government schools.

However, even when all these advantages of private schools are taking into account, they retain a performance advantage over government schools. Overall, the difference remains 15 percentage points (Figure 36).

Figure 36: Predicted differences between mean achievement levels of government and private schools, before and after controlling for student and school level factors
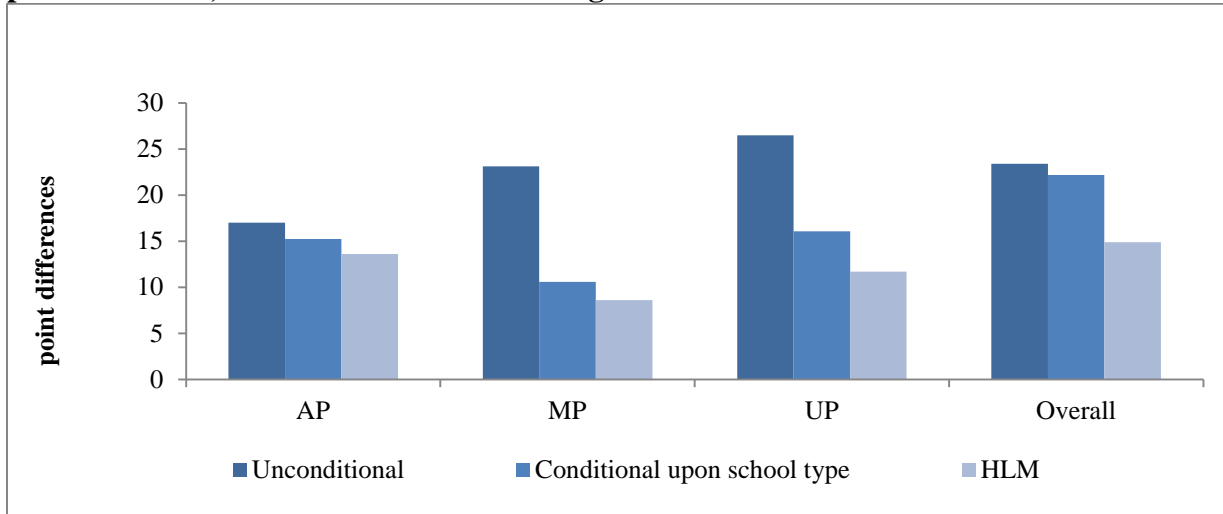
CHAPTER 7: SOME FINAL REFLECTIONS

The present study endeavored to unpack the factors that are broadly considered as related to education quality, especially those related to teacher efficacy in the context of India's primary education system. With the emphasis of elementary education system in the country now clearly on issues of quality, the task is now to transform the school and classroom buildings created under SSA into learning spaces. Enabling factors for this transformation include a learning friendly environment, better infrastructure, qualified teachers available and teaching students in a manner that enable children to learn themselves. The study also delved into the perceptions and practices of teachers.

The major contribution of this study is to provide a detailed picture of what is happening inside Indian schools and classrooms, and what the amount and quality of the learning opportunities that children have in school and outside. This study explored the time and nature of teacher activities and classroom practices in 360 government and private schools in three States of India – AP, MP and UP. In the context of the study, relatively little time and effort was devoted to examining, including through a dialogue with stakeholders, the policy implications of the study findings. This short chapter, therefore, highlights a small number of issues which emerge from an initial exploration of the findings and which might be examined further in other contexts.

First, there appears to be a pervasive influence of state policy. This is encouraging in demonstrating that state policy can make a difference. One of the most striking findings in the report is how similar private schools are to government schools in the same state, and how private schools in one state look more similar to their government school neighbors than to private schools in another state. Understanding this phenomenon is obviously important and we could no more than hint at possible explanations in this study (for example, the similarity in a given state of the pre-service training that teachers in both types of schools receive). What is clear is that the institutional structures, such as greater accountability and delegated authority in private schools, have not shifted teaching practice significantly away from that exhibited by government schools. So while this study overall found that students in private schools perform somewhat better, even when taking into account the background, the average performance of government schools in AP was higher than that of private schools in other states in the study. Moreover, the overall quality in private schools still leaves plenty of room for improvement.

In other areas too, state policy (or perhaps state practice since in some areas there may not be explicit policies) has a positive influence – such as the access that contract or para teachers have to training opportunities, or the length of in-service training that teachers undertake.

Second, state governments can make a difference in teacher attendance through planning and implementing the official school calendar, as well reviewing policy and practice for official leave. The number of official school days during which schools were closed or teachers were away from the school is high for schools in this study. In all cases

discussed in this report, these teacher absences were legitimate; but from the students' perspective these absences mean less continuity of the teaching and learning experience.

Third, good teaching practice makes a difference to student learning outcomes. General government policy, as embodied in the National Curriculum Framework 2005, is therefore fundamental to improving the quality of elementary education. This study looked at the balance of teaching of different types of activities. It is worth reiterating that there was no attempt in this study to define the right balance between these different types of activities and clearly teachers need to use a judicious mix for the different situations they find themselves in and the different subject matter they are trying to teach. However, this study did find that a shift from the present balance to one in which more student-centric activities take place would lead to better learning outcomes for children. The study found that examples of good teaching practice are currently not very widespread. As such, good teaching practice is not yet having a significant impact on improved learning outcomes for the system as a whole.

In this respect, it is deeply worrying that only one-third of teachers said that they found the training they attended to be useful. Policy makers and training providers need to review urgently the training being offered and to develop methodologies for assessing the impact on the teaching-learning processes that take place in the classroom.

Fourth, students suffer from a lack of learning opportunities in multiple ways. They do not attend school even if they are enrolled. Understanding the reasons behind these absences is important; for example, the finding that student attendance at the end of the day (after the midday meal is served) is lower than earlier in the day suggests that children and their parents do not see coming to school purely for academic reasons. Children's learning opportunities outside school need to be considered (and again the similar pattern across private and governments schools within states is more striking than the similarities across states). Moreover, as this study has shown in detail for the first time, students miss out of learning time because of the prevalence of off-task activities and, especially, rote learning and teacher-centric activities.

Fifth, the classroom observations reveal plenty of examples of good teaching practice even in the most difficult circumstances. Perhaps just one example can illustrate: there were a significant minority of teachers that are able to teach in a student-centric way, even though they were only using textbooks for the lessons. Given the lack of availability of learning materials other than textbooks, these examples of good practice teaching should be more widely spread. But it is also clear that the more widespread presence and especially use of other learning materials will help spread good teaching practice more quickly.

Sixth, elementary schools in India are remarkably equitable with respect to gender across multiple dimensions. The overall enrollment rates are a well-known (and fundamentally important) story. But this study has also revealed, at a fine level of detail, the ways in which school practices are also very often equitable – for example, teachers address boys and girls equally in asking questions and directing their teacher. These examples of gender equality are in striking contrast to many other patterns of male-female interaction

outside of the school setting, and augur well for the way future generations of adults may engage with each other.

Seventh, there are no simple conclusions to draw about school or classroom structures. Teachers certainly reported finding difficulty in multi-grade classrooms, and there has been a long-running discussion in India about these schools. This study has added further important nuances to that debate. Teachers exhibit higher than average levels of child-centric activities in multi-grade classrooms, but this appears to be because they are teaching only for a single grade in the multi-grade setting. From the perspective of ST and SC children, they are more often found in rural schools which in general have fewer resources (higher pupil-teacher ratios, fewer books and other materials, etc.) and have higher prevalence of multi-grade classrooms; these dampen overall performance. On the other hand, schools which ST and SC children attend are more likely to be government schools and hence have more learning resources, and have younger, female and para teachers who are less likely to be absent from school on various other duties.

An invitation

This study gathered a large amount of data through multiple tools about a wide diversity of schools in three states of India. This report provides an overview of the main findings. However, the richness of the datasets enables deeper analyses to be conducted. The World Bank invites others, with or without the collaboration of the World Bank's education team, to interrogate these datasets, which will be made available on the World Bank's open data website. Such interrogations open up the possibility to improve the learning outcomes of India's children in elementary education.

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APPENDICES

Appendix 1. Sample Selection process and Profile of schools, teachers, classrooms and students

The sample that was drawn for this study was actually a 25% sub-sample of 400 schools selected for the study of Teacher Absence conducted by MHRD through the Technical Support Group for SSA under Ed.CIL in 2005-06. The sample of 400 schools was drawn in the following manner.

(i)   First, for selecting schools in rural areas of the state, a sample of 15 sub-districts (tehsils) was selected in such a way that in each socio-cultural region the number of sub-districts was approximately proportional to the total number of sub-districts in the region. Selection of sub-districts within each SCR was done by Probability Proportional to Size (PPS) sampling method, where the size was the number of rural primary schools in the SCR.

(ii) Next, 18 primary schools and 5 upper primary schools were selected by following simple circular system sampling method from each sub-district to represent the rural schools. The total rural schools so selected were 345.

(iii) To select urban schools, the urban areas of the state were divided into two strata:

Urban – 1: All metropolitan cities having population exceeding 10 lakhs.

Urban – 2 : All other urban areas

The sample of 55 urban schools was allocated proportionately to the two urban strata: Urban 1 and Urban 2 categories. There were in 9 primary and 8 upper primary schools in the sample from Urban stratum. All primary and upper primary schools of these Urban 1 cities were separately arranged in increasing order of the number of teachers and then 9 primary and 8 upper primary schools were selected by simple circular systematic sampling.

(iv) In the case of Urban 2 stratum, 25 primary schools and 13 upper primary schools were allocated proportionately to the seven socio-cultural regions. It was ensured that at least one primary and one upper primary school were drawn from each SCR. The sampling frame for primary and upper primary schools comprised all such urban schools of those districts which included at least one of the sampled sub districts. Selection of schools was done by the same circular systematic sampling procedure that was followed for rural schools.

(v)   Selection of 100 schools for the present study was done by drawing simple circular systematic sample from the list of 400 sampled schools.

(vi) In addition, a sample 20 private primary schools was selected to represent private schools of the state. This sample was drawn by choosing one private school in the vicinity of one of the schools of the original sample in every SCR. Thus the total number of schools in the sample was 120.

In school, one section was selected at random out of the total sections in grades 1, 2 and 4 in case the number of classes in any of these grades was more than one. Two different investigators observed teaching of teach subject in those classes on two different occasions. Thus in each school teaching in 14 classes was observed. Teachers teaching

these sections constituted the sample of teachers. The students studying in the section of grade 4 selected for classroom observation constituted the sample of students who were tested. If their number exceeded 25, 20 students were selected at random for testing and collecting other data for student profile schedule.

Profile of schools, teachers, classrooms and students surveyed

A brief description of the schools, teachers, classrooms and students are given here.

Profile of schools studied: For this study a sample of 100 government schools each were selected from three states of AP, MP and UP using systematic sampling procedure from the list of 400 schools each sampled for the GOI study on Teacher Absence in the three states. In addition, a sample of 20 private schools was also selected for providing a comparative picture on Time on Task in these two types of schools. Thus, a total of 360 schools were covered. The study was confined to grades I, II and IV in every school. In these grades both language (Hindi in Uttar Pradesh) and Mathematics classes were observed while Environmental studies (EVS) classes were also observed in grade IV. In each grade, each subject was observed twice. Thus, there were a total of 5040 classroom observations.

Some of the salient features of the schools studied are given below:

- More than 2/3rds of the schools studied have multi-grade classrooms. 77% of government schools and 18% of private schools have multi-grade classrooms. An overwhelming proportion of government primary schools in the sample are "primary only" schools (82%) whereas in private sector, 2/3rds are composite schools (primary with upper primary).

- In terms of various facilities such as drinking water facility, separate toilets for girls and teachers, most of the private schools are endowed with these facilities whereas more than half of the government schools did not have such facilities. More than 4/5th of the government and private schools have tables and chairs for teachers.

- In terms of availability of Teaching – Learning materials (TLM), many TLMs were not available in at least in a fourth of the schools. The most common TLM available were charts, maps and story books. Science and mathematics kits were available in less than half of the schools, and these were available mostly in upper primary schools. TLMs prepared by teachers were less available in private schools, and in schools in MP. Around 69% of schools reported having library books. Out of this, 62% reported that children are allowed to read the books, which means that in less than half of schools students were able to read library books.

- The mean PTR (for government schools in the three states together) was 40.7, with PTR exceeding beyond the norm of 40 in government schools but was only 24 in private schools. However, there are significant differences across states. The PTR in AP was less than half that in MP and UP. In fact, the PTR in government schools in AP was slightly lower than that in private schools in the state. Around 44% of teachers in government schools were para teachers, and para teachers accounted for almost 2/3rd of the total teachers in UP (Appendix Table 1)

Appendix Table 1.1 Teacher availability (teacher positions filled) in schools under study

	AP		MP		UP		Total	
	Govt.	Pvt	Govt.	Pvt	Govt.	Pvt	Govt.	Pvt
Avg no of teachers	3.86	7.1	3.47	7.25	3.9	7.0	3.76	7.1
Avg no of reg. teachers	3.06	6.2	2.42	5.35	2.4	6.2	2.6	5.9
Avg no of para teachers	0.8	0.9	1.10	0.70	1.6	0.4	1.2	0.7
PTR	21.5	23.8	51.6	26.4	59	22	44	24

- In AP, government schools had less than 100 children on an average enrolled in the schools, whereas the average enrolments in private schools were double than that. However, in both MP and UP, government schools were comparatively over crowded than private schools. This explains the lower PTRs in AP.

- The share of SC students in total students enrolled varied from 23 percent in MP to 29 percent in UP. However, government schools had a higher share of SC and ST students than the private schools. In AP and MP, SC/ST students accounted for 67 percent and 71 percent of all students enrolled. Compared to this, in private schools, such students accounted for around 20-21 percent of total enrolled students. In UP, there are not many ST students, the share of SC and OBC students together in total enrolments in government schools was 88 percent compared to 65 percent in private schools.

- Similarly, gender parity was also in favor of girls in government schools surveyed compared to private schools. The share of girls in government school enrolments were 49%-51% in the three states, and compared to this, the share of girls were in the range of 40%-44%.

Appendix Table 1.2 Enrolment profile of schools

	AP		MP		UP		Total	
	Govt.	Pvt	Govt.	Pvt	Govt.	Pvt	Govt.	Pvt
Avg. enrolment in school	78	157	151	131	214	159	148	**149**
Share in enrolment								
SC	32.1%	10.4%	25.6%	11.7%	31.5%	15.2%	29.7%	**12.4%**
ST	34.7%	10.8%	45.8%	9.3%			26.8%	**9.3%**
OBC	58.3%	58.6%	45.1%	69.0%	56.5%	49.9%	53.3%	**59.3%**
Girls	51.2%	44.1%	49.4%	40.1%	51.1%	41.5%	50.6%	**41.9%**
teachers present on first day of visit	**17.9%**	**11.2%**	**20.8%**	**5.6%**	**16.6%**	**3.7%**	**18.4%**	**6.8%**

Appendix Figure 1.1 Distribution of students (in Grade IV) in government and private schools by asset quintiles
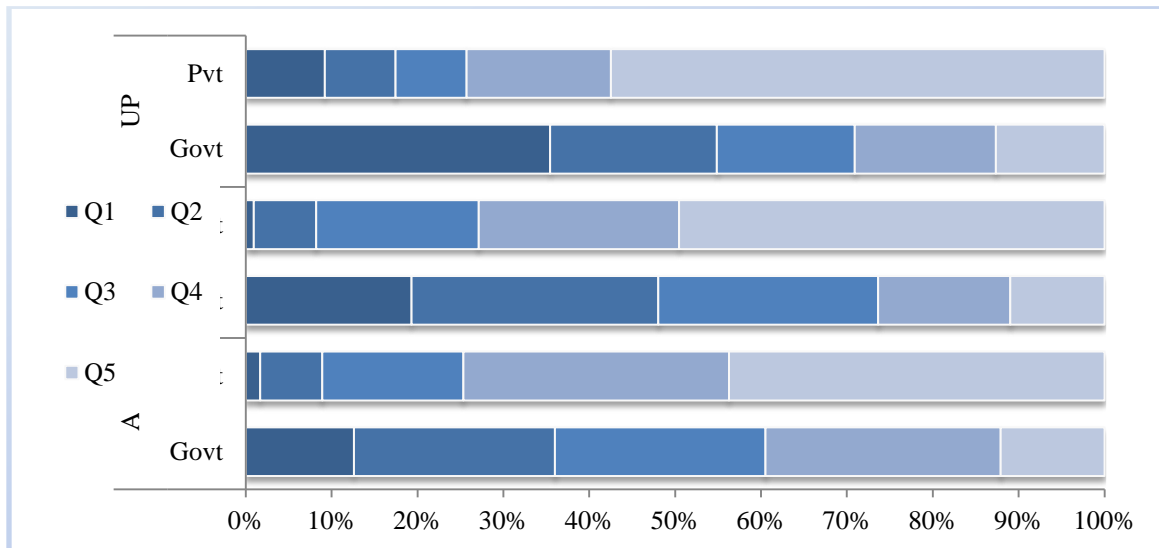
***Profile of Teachers surveyed*:** In total, the study covered 916 teachers, almost 80 percent of the sample from government schools. 70 percent of teachers covered (and 65 percent of government and 93 percent of private school teachers) were regular teachers, and the rest, para and *ad hoc* teachers. 50 percent of the teachers were females in the sample. In all the three states, in private schools, more than 60 percent of the teachers in the sample were females whereas in government schools, the proportion of females were 40 percent each in AP and MP and around 55 percent in UP. Approximately 59 percent of the teachers in the sample had at least a Bachelor's degree. In AP and MP, there was no difference between government school and private school teachers' sample in terms of the proportion of teachers with bachelor's plus qualification, while the private school teachers were more educationally qualified in UP. More than half of the teachers in the sample were not professionally qualified with a teacher training degree, certificate or diploma. AP had the maximum number of professionally trained teachers – 70 percent. Proportionally, lesser percentage of teachers in private schools possessed a professional qualification in both AP and MP. In all the three states, majority of teachers – more than 90 percent - were local teachers – means they belonged to the same district. On an average, government school teachers had more than ten years of experience compared to around 6 years of the private school teachers.

Profile of classrooms observed: 5040 classrooms were observed during the study. The majority of classrooms were mostly arranged with students sitting in rows and columns – 83 percent Of the rest, in half of the class, students were sitting in groups while in the other half (8 percent of total classrooms) children were seated without any order or grouping. In slight more than half of the classrooms (53 percent) boys and girls were seated separately. In 65 percent of Grade 1 classrooms, boys and girls were sitting mixed, but in older classes there was increasing separation of girls and boys. Benches and chairs for children were available only in 16 percent classrooms – most of which were in private schools. In government schools, in 28 percent of classrooms, children sat on bare floors and in another 58% classrooms, children had some mats to sit on the floor. Around 2

percent of classrooms did not have any blackboard and these were mainly classes which were taken in open spaces. In 85 percent of classrooms, blackboards were on the walls. In around 12% classrooms, the blackboards were of poor quality, mostly located in government schools. In the rest of the class, blackboards were of reasonability good quality, with visibility to the child sitting at the last row. 85% classrooms had sufficient light and good ventilation. However, in around 40% classrooms, windows could not be shut. In 53% classrooms, TLMs were displayed in the classrooms. In government classrooms 57% classrooms had some TLMs displayed on the walls or hanging in the classrooms.

Profile of students observed and surveyed: In more than two-thirds of the government school classrooms children were in uniforms, though mostly only a few children were in uniforms. In only around 11 percent of the government classrooms were the majority of children in uniforms. Government schools had a proportionately higher share of children from marginalized groups. On the other hand, private schools, even in rural areas were mostly catering to children from relatively higher social status groups. An analysis of the profile of Grade IV students (who were tested for Math and Language tests) shows that children from the poorer asset quintiles were attending government schools (see graph 1.1); or government schools were primary attended by children from lower economic quintiles.

Appendix 2. Details on the construction of Indices using Principal Component analysis

The status of various dimensions of the above indicators of each school / class/ household in relative terms - that of relative performance of the each school / classroom / household in question with respect to the best and the worst-performing school / classroom/ households. It allows us to normalise the selected indicators where the normalised values range between 0 and 1. The variable is transformed as:

$$NVij = \left\{ 1 - \left[\frac{BestXi - ObservedXij}{BestXi - WorstXi} \right] \right\} \qquad \dots\dots (1)$$

NV_{ij} – normalised index of 'i'[th] indicator of 'j'[th] districts; X_i - orginal value of 'i'[th] indicator; $i = 1,2 \dots$n. The best X_{ij} is decided subject to the concerned indicator's lower or higher value corresponding to the best situation. Here the lower value represents lower status in relation to a higher value of the index. A simple computation of the index is made by transforming each of the indicator values as a ratio of the difference between each value and the available best value to the entire range of variation in each of these indicators It indicates the relative position of the entities with respect to each of the selected indicators in a range of value between 0 and 1.

Another task is constructing a composite index of all defined aspects of the above mentioned aspects. There are different methods that could be adopted in the construction of these composite indices, the difference being the system of weighing each individual indicator while summarising them into a composite index. Principal Component Analysis[28] (PCA) is one of methods commonly adopted for this purpose. The method of PCA, in fact, seeks to reduce large number of variables into few categories known as Principal Components, which explains maximum amount of variance among a set of variable[29]. PCA brings out a few non-correlated linear combinations of the original variables that accounts for the most of the variation in original variables[30].

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[28] As a matter of fact, PCA may be used for two different purposes: i). When there are large number of variables/indicators, to simplify the analysis and bringing out the underlying dimension out of those indicators it useful to reduce the large number of indicators in a few without losing their importance (for instance see Yadav and Srivastava, IAMR, 2005); and ii). In situation of constructing a composite index and when it is necessary to give weight to each indicator, the PCA helps us in weighing each indicator according to their statistical significance (e.g see Filmer and Pritchett, 1998). When there are too many indicators related to particular phenomenon, one has to reduce them to few for simplifying the analysis.

[29] In situation of large set of information related to a phenomenon like educational development and the existence of clusters of large correlation between subsets of variables informs that these correlated variables may be measuring aspects of the same underlying dimension. These underlying dimensions are known as factors (or latent variables). Here the analysis could be simplified when one can reduce the data set from a group of correlated variables into a smaller set of uncorrelated factors. In the PCA, factors are conceived based on the statistical property (i.e. variability) where the individual indicators are combined with that of similar variability.

[30] PCA decomposes the original data into a set of linear variates

In the present context, one can reduce whole set of selected indicators into few factors (seen as dimension) and see the relationship between the factors. At the same time, by running PCA, one may construct dimension index using factor-loading values of the variable as the weight of that particular variable. In the present exercise we have followed an approach in which a set of dimensions are predefined and the indicators related to each dimension is brought to PCA to determine underlying sub-dimensions within the particular dimension. On the basis of this PCA, we could obtain the dimension index (DI) in the following manner.

$$DIx = \frac{\left(\sum_{i=1}^{n} Xi \left(\sum_{j=1}^{n} Lij.Ej \right) \right)}{\left(\sum_{j=1}^{n} Lij.Ej \right)} \qquad \qquad \ldots\ldots (2)$$

Where X_i – 'i'[th] variable/indicators of Dimension X; L_{ij} - Factor loading value of 'i'[th] variable on the 'j'[th] factor for the dimension X; Ej – Eigen value of 'j'[th] factor

In the above equation dimension index is weighted average of the individual variables of the dimension. The weight of the variable in a dimension is determined by the sum of the products of factor loading of the variable multiplied by the *eigen* value of the factor[31]. In this method, all the principal components are considered in the analysis.

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[31] This method is used in a study on educational development across Indian States by Institute of Applied Manpower Resources, New Delhi (see Yadav and Srivastava, IAMR, 2005).

Appendix 3. Differences in reporting school calendar days: An illustration

In UP, schools reported an "allocated time" of 231 days – as the number of days prescribed for the schools to function as per school calendar. More than half of the schools reported more than 230 working days. However, an examination of the list of holidays issues by the Basic Education Council, Goutambudh Nagar in UP gives some interesting insights. First, a list of directions from the notice:

(a) summer vacation is from May 21 to June 30
(b) Primary schools will work from 7.30 am – 12.30 pm during the period April 1 – September 30 and from 10.00 am – 4.00 pm during October 1 – March 31st.
(c) All schools will function in single shifts.
(d) Female teachers will get holidays on specific festival days such as *Karva chauth*, *theej- sawan* and *Sankat Chaturthi*.
(e) Schools will be closed on those days of local festivals in the specific regions/ blocks (like *Baldev Chhat mela*, *somvati amavasya* etc)
(f) Schools which are located in areas where there are Jain temples, the day of the chariot festival will be a holiday.

How does it translate into school functioning days prescribed? First of all, the summer vacation accounts for 41 days (including Sundays). There are 44 Sundays during the school functioning months. There are 61 holidays which is notified by the government (national and state level official holidays, national and state level festivals etc). Thus, there are 146 non-functioning days as prescribed by the state. This leaves the schools to function only for around 219 days. On the top, provisions for additional holidays during local festivals translate roughly into another 5-8 days. On the whole, there is hardly any chance that the number of working days as per school calendar could go beyond 210 days.

Appendix 4. Pattern of activities in school at different hours – Uttar Pradesh

The opening time in the government primary school in Uttar Pradesh was 10.00am and closing time 4.00 pm during the months in which this study was conducted.

Information was collected on what goes on in school at different hours of the day. It was of interest to see whether students are in their classes during the hours of normal teaching and whether they are outside their classes busy in some outdoor activity. The information is based on what the investigators observed in the sampled schools. The following table shows the distribution of schools according to the activity in school during different hour periods starting from 9.00am.

Appendix Table 4.1 Enrolment profile of schools

Time	Activity	% of observed
9.00 – 9.30 am	• Schools were found closed	34%
	• Student start arriving	37%
	• Schools open and teachers arrive; cleaning and sweeping of floor and school premises	29%
9.30 -10.00 am	• School was found closed	3%
	• Students start arriving	27%
	• Teachers arrive; cleaning and sweeping of floors	39%
	• School assembly – prayer, national anthem/moral education	23%
	• Physical training, health check up	7%
	• Teaching starts	1%
10.00 -10.30 am	• Students continue arriving	3%
	• Teachers continue arriving	14%
	• Cleaning/ sweeping of floors	29%
	• School assembly – prayer, national anthem etc	5%
	• Classes start	49%
10.30 –11.00 am	•Teachers arrive	13%
	•School assembly – prayer, national anthem etc	3%
	•Classes start/ normal teaching	77%
	•Mid-Day Meal served / early lunch	5%
	•Teachers gossip/ no teaching	2%
11.00 -11.30	•Classes start, normal teaching in all classes	100%
11.30 -12.00 noon	•Normal teaching	94%
	•Teacher present but no teaching	6%
12.00 -12.30 pm	•Normal teaching	92%
	•Teachers busy completing school records	3%
	•Teacher present; no teaching	5%
12.30 -1.00 pm	•Classes start after recess	48.6%
	•Normal teaching	54%
	•Mid Day Meal being served/ lunch break	35%

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	•Teacher present; doing administrative work; students loiter/ return to class	11%
1.00 -1.30 pm	• Mid Day Meal being served/ lunch break	94%
	• Students re-enter class; normal teaching begins	3%
	• Students leave	3%
1.30 -2.00 pm	• Normal teaching	19%
	• Students re-enter class; normal teaching begins	20%
	• Mid Day Meal being served/ lunch break	58%
	• Teacher present; doing administrative work; students loiter/ return to class	3%
2.00 -2.30 pm	• Normal teaching	57%
	• Students re-enter class; normal teaching begins	30%
	• Mid Day Meal being served/ lunch break	10%
	• Teacher present; doing administrative work; students loiter/ return to class	3%
2.30 -3.00 pm	• Normal teaching	78%
	• Mid Day Meal/ Lunch Break	3%
	• Students re-enter class; normal teaching begins	8%
	• Students start leaving the school	8%
	• Teachers doing administrative work	3%
3.00 -3.30 pm	• Normal Teaching	79%
	• Games	9%
	• Teachers doing administrative work	9%
	• Students start leaving	3%
3.30 -4.00 pm	• Normal teaching	35%
	• Administrative work	3%
	• Students start leaving	38%
	• Games	12%
	• Teachers leave	12%
4.00 -4.30 pm	• Teachers do administrative work	8%
	• Cleaning /sweeping the premises	6%
	• Remaining students and teachers leave	86%

Appendix 5: Correlation matrix of variables used in the regressions on teacher available days

	TAC_new	Govt.	rural	total_~r	total_~l	infra_~x	pry_only	multi_gr	sct_in~h	girl_i~l	male	non_SC~C	edu_gr~n	ttc_bed	para	q15exp	tch_exp2	w_day	duty_d~s	p_leave
TAC_new	1																			
Govt.	-0.282	1																		
rural	0.017	0.234	1																	
total_tcr	0.077	-0.427	-0.259	1																
total_enrol	-0.078	0.018	-0.033	0.347	1															
infra_indx	0.110	-0.280	-0.201	0.213	0.064	1														
pry_only	-0.105	0.404	0.189	-0.492	0.082	-0.130	1													
multi_gr	-0.029	0.416	0.336	-0.532	-0.246	-0.133	0.364	1												
sct_in_sch	-0.126	0.070	0.155	-0.032	-0.277	-0.126	-0.152	0.013	1											
girl_in_enrl	-0.034	0.305	0.067	-0.133	-0.018	-0.073	0.153	0.161	0.062	1										
male	-0.146	0.148	0.249	-0.172	-0.149	-0.120	0.017	0.226	0.141	0.028	1									
non_SCSTOBC	-0.025	-0.076	-0.151	0.093	0.073	0.134	-0.062	-0.104	-0.109	-0.028	-0.112	1								
edu_gradn	0.066	-0.062	-0.056	0.068	0.035	0.046	0.020	-0.059	-0.066	0.002	-0.055	0.094	1							
ttc_bed	-0.236	0.186	0.030	-0.090	-0.114	-0.059	0.051	0.016	0.307	0.107	0.129	-0.024	0.186	1						
para	0.167	0.243	0.261	-0.144	0.126	-0.081	0.173	0.154	-0.135	0.038	-0.066	-0.083	-0.089	-0.330	1					
q15exp	-0.329	0.205	-0.167	-0.127	-0.022	-0.101	0.115	0.068	0.092	0.096	0.195	0.094	-0.166	0.200	-0.386	1				
tch_exp2	-0.288	0.025	-0.089	-0.003	-0.047	-0.027	-0.013	-0.038	0.115	0.012	0.093	0.008	-0.030	0.227	-0.356	0.413	1			
w_day	0.345	-0.195	-0.035	0.093	0.016	0.048	-0.065	-0.054	-0.091	-0.116	0.025	-0.029	0.065	-0.040	-0.082	-0.037	0.038	1		
duty_days	-0.787	0.205	0.037	-0.112	0.099	-0.050	0.132	0.075	0.018	-0.008	0.211	-0.007	-0.049	0.159	-0.090	0.264	0.256	-0.004	1	
p_leave	-0.325	0.131	0.071	-0.079	0.048	-0.068	0.044	0.050	0.004	0.050	0.160	0.048	-0.056	0.030	-0.066	0.201	0.110	-0.030	0.411	1

Appendix 6. Multivariant analysis

The mixed (or hierarchical linear) models allows for random intercepts and coefficients, and the effects are easily disaggregated by individual and school types. The model is specified as:

$$Y_{ij} = (\alpha + \zeta_{1j}) + (\beta + \zeta_{2j})\, X_{ij} + \varepsilon_{ij} \qquad \text{where } \varepsilon_{ij} \sim N(0, \sigma^2) \qquad (3)$$

Where ζ_1 (zeta-1) is a random intercept component and ζ_2 (Zeta-2) is a random **slope** component.

Variables used:

(a) *Teacher characteristics***:** Teacher characteristics were considered at two levels: (i) personal attributes and professional characteristics; (ii) leave entitlement use and non-teaching duty days; and,

(b) *School Characteristics*: School characteristics that was taken into account included: school management type, school location, school level, multi-grade teaching practice in school, number of teachers, number of students, infrastructure index and shares of SC, ST and OBC children in total enrolments in the school. The variables are specified in Appendix Table 6.1 and the results in Appendix Table 6.2.

Appendix Table 6.1 Description of variables used in the regression analysis

Variable name	Description
Dependent Variable	
TAc	**Number of days teachers were present in school and were on academic duty**
Independent variables	
School characteristics	
Govt.	Dummy variable that shows the school management type. If the school is a government school, Govt.=1; 0 other wise (private management). This variable is most relevant from the policy point of view, since this will explain whether teacher availability is significantly a problem of government school, and within government schools, whether teacher availability differs by other characteristics.
Rural	This is a dummy variable to specify the location. If the teacher teaches in a school in rural area, 1 is assigned, and if the teacher is in an urban school, it is "0".
Pry_only	Dummy variable where the value is 1 if the school is primary only and 0 if the school is primary with upper primary school
Mult_gr	Dummy variable; 1 if the school has multi-grade teaching and 0 other wise
Total_tcr	This is a discrete variable showing the number teachers in the school
Total_enrol	Number of students enrolled in the school
Infra_indx	Index of school infrastructure; estimated using principal component analysis
SCT_in_sch	Share of SC and ST students in total enrolments in the school (pre-dominance of these groups in the area/ school)
Girls_in_tot	Share of girls in total enrolments in school

	Teacher characteristics
Male	This is a dummy variable which connote 1 if the teacher is a male, 0 other wise (if the teacher is a female). This variable was used since the gender of the teacher is an important determinant of teacher presence. In some states, females are allowed to take extra paid leave on account of various reasons. At the same time, culturally in India, men tend to be assigned for jobs that are not routine.
Para_tcr	Dummy to show the type of appointment/ tenure of teacher. 1 denotes a "para" teacher; a teacher whose appointment is *ad hoc*, and 0 if the teacher is a regular teacher.
Edu_gradn	Dummy variable indicating 1 if teacher is a graduate or above education; 0 if the teacher is studied only upto secondary or lower secondary (there are a few cases of teachers who were even below secondary educated. Since their number is so low, they are included along with secondary educated teachers.
Ttc_bed	Dummy variable to indicate those teachers who had undergone a pre-service course (professional training) before joining the job. These could be a diploma or a certificate or a degree.
Gen_com	Dummy variable indicating a teacher who does not belong to Scheduled Caste (SC), Scheduled Tribe (ST) or Other Backward Caste (OBC) community. If they belonged, they were assigned 0.
Exp	Number of years of experience of teachers
W_day	Total number of days schools functioned
P_leave	Number of days teachers were away from school on personal leave or sick leave
Duty_days	Number of days teachers were on duty; but were away from school on duties related to education or otherwise.

Appendix Table 6.2: Covariates of teacher physical presence time for academic activities

Dependent variable: No. of days teachers were physically present in the school for academic purposes

covariates	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5	Equation 6
_cons	189.02	207.77	-2.32	222.49	11.98	11.49
	(121.07)***	(67.841)***	(-0.21)	(28.09)***	(1.01)	(0.96)
Government		-22.89		-22.29	-9.37	-9.34
		(-6.74)***		(-5.46)***	(-4.4)***	(-4.38)***
rural				4.63	2.67	2.68
				(1.63)	(1.73)*	(1.73)*
total_tcr				- 0.36	-0.65	-0.66
				(-0.74)	(-2.47)**	(-2.47)*
total_enrol				-0.04	-0.005	-0.005
				(-3.76)***	(-0.76)	(-0.83)
infra_indx				5.45	7.37	7.5
				1.24	(3.11)**	(3.14)**
pry_only				- 2.14	-0.10	-0.29
				(-0.78)	(-0.07)	(-0.19)
multi_gr				1.19	1.98	1.93
				(0.44)	(1.37)	(1.32)
sct_in_sch				-0.084	-0.05	-0.05
				(-2.83)**	(-3.32)***	(-2.21)*
Girl_in_tot				21.02	7.97	7.84
				(2.34)*	(1.63)	(1.59)
Male				-5.11	1.71	1.72
				(-2.48)*	(1.50)	(1.51)
non_SCSTOBC				-2.38	-1.05	-1.10
				(-0.23)	(-0.97)	(-1.00)
edu_gradn				2.88	0.53	0.49
				(1.42)	(0.48)	(0.45)
ttc_bed				-5.89	-2.11	1.99
				(-2.64)**	(-1.73)*	(-1.60)
Para				6.49	6.6	6.58
				(2.42)*	(4.53)***	(4.43)***
q15exp				-0.39	-0.13	-0.13
				(-3.18)***	(-1.96)*	(-1.89)*
tch_exp2				-14.34	-4.15	-4.04
				(-5.03)***	(-2.63)**	(-2.54)*
School working days			0.96		0.92	0.92
			(19.2)***		(19.06)***	(18.55)***
Duty days away			-1.07		-1.01	-1.01
			(-42.4)***		(-40.16)***	(-39.54)***
p_leave			-0.61		0.098	0.09
			(0.70)		(1.20)	(1.13)
MP						0.087
						(0.06)
UP						.956
						(0.45)
Random-effects Parameters (school_cd)						
sd(_cons)	13.19	9.5899	4.81	10.51	4.97	4.96
sd(Residual)	29.82	29.859	16.04	26.83	14.74	14.75

* p<0.05; ** p<0.01; *** p<0.001

Appendix Table 6.3 : Overall Teacher's time in classroom and nature of tasks: Multi-Grade / Mono-Grade classes

	AP			MP			UP		
	Mono-Grade	Multi-Grade	Over all	Mono-Grade	Multi-Grade	Over all	Mono-Grade	Multi-Grade	Over all
Category I (involving higher level mental thinking)									
Active Learning	8.4%	5.9%	7.0%	12.3%	11.0%	11.6%	10.7%	8.8%	10.1%
Discussions	8.8%	9.7%	9.3%	3.8%	4.0%	3.9%	11.6%	12.2%	11.8%
Projects/ Creative activity	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%
Remedial work/corrective feedback	8.3%	10.4%	9.4%	5.6%	5.1%	5.3%	4.3%	3.9%	4.2%
CATEGORY 1 TOTAL	**25.7%**	**26.2%**	**26.0%**	**21.9%**	**20.3%**	**21.0%**	**26.7%**	**25.1%**	**26.1%**
Category II (Lesser mental thinking)									
Reading Aloud	9.1%	7.5%	8.2%	20.7%	19.6%	20.1%	21.1%	21.8%	21.4%
Instruction/ Demonstration	26.7%	29.5%	28.3%	9.8%	10.5%	10.2%	13.8%	13.1%	13.6%
Written Assignment/ Seat work	6.7%	5.3%	5.9%	7.2%	5.2%	6.1%	7.7%	10.3%	8.6%
CATEGORY 2 TOTAL	**42.6%**	**42.3%**	**42.4%**	**37.7%**	**35.4%**	**36.5%**	**42.7%**	**45.3%**	**43.6%**
Category III (ROTE)									
Copying	8.1%	5.4%	6.6%	14.3%	11.3%	12.7%	8.6%	7.3%	8.1%
Rote learning/ Practicing	7.3%	8.0%	7.6%	4.7%	6.0%	5.4%	3.9%	3.1%	3.6%
CATEGORY 3 TOTAL	**15.4%**	**13.3%**	**14.2%**	**18.9%**	**17.3%**	**18.1%**	**12.5%**	**10.3%**	**11.8%**
ORGANIZING CLASSROOM									
Giving Assignments	2.1%	1.9%	2.0%	2.5%	2.6%	2.6%	1.3%	1.3%	1.3%
Organizing Classroom Activities	0.6%	1.0%	0.9%	2.2%	2.1%	2.2%	4.7%	5.3%	4.9%
Motivating	1.0%	0.7%	0.8%	0.6%	0.4%	0.5%	0.8%	0.4%	0.7%
Positive feedback / disciplining	3.3%	3.8%	3.6%	3.2%	3.5%	3.4%	2.8%	3.7%	3.1%
Teacher Management	3.0%	2.6%	2.7%	3.8%	3.5%	3.6%	3.3%	2.4%	3.0%
ORGANIZING TOTAL	**9.9%**	**9.9%**	**9.9%**	**12.4%**	**12.1%**	**12.2%**	**12.9%**	**13.2%**	**13.0%**
OFF TASK ACTIVITIES									
socialization with students	0.7%	0.7%	0.7%	0.4%	0.4%	0.4%	0.4%	0.2%	0.3%
socialization with outsiders	2.2%	2.4%	2.3%	1.7%	2.3%	2.0%	1.1%	0.9%	1.1%
Teacher uninvolved	0.9%	1.0%	0.9%	1.9%	2.4%	2.2%	1.7%	1.7%	1.7%
Teacher out of classroom	2.7%	4.2%	3.6%	5.1%	9.8%	7.6%	2.1%	3.3%	2.5%
OFF TASK TOTAL	**6.4%**	**8.2%**	**7.4%**	**9.1%**	**14.9%**	**12.2%**	**5.2%**	**6.1%**	**5.5%**

Appendix Table 6.4: Overall Teacher's time in multi-grade classroom situation and nature of tasks: By grade addressed

	AP			MP			UP		
	Grade observed	Other Grade	Both	Grade observed	Other Grade	Both	Grade observed	Other Grade	Both
Category I (involving higher level mental thinking)									
Active Learning	4.41%	0.61%	0.85%	5.65%	0.85%	4.52%	5.83%	0.51%	2.45%
Discussions	5.72%	2.20%	1.83%	1.85%	0.48%	1.66%	7.16%	0.97%	4.06%
Projects/ Creative activity	0.18%	0.02%	0.07%	0.04%	0.02%	0.18%	0.04%	0.00%	0.02%
Remedial work/corrective feedback	5.06%	4.80%	0.50%	2.46%	1.89%	0.80%	2.50%	1.12%	0.30%
CATEGORY 1 TOTAL	**15.38%**	**7.63%**	**3.25%**	**10.00%**	**3.24%**	**7.16%**	**15.52%**	**2.60%**	**6.83%**
Category II (Lesser mental thinking)									
Reading Aloud	5.43%	1.05%	1.03%	10.53%	1.50%	7.67%	16.65%	0.77%	4.31%
Instruction/ Demonstration	17.12%	6.09%	6.28%	5.33%	1.52%	3.70%	6.82%	2.41%	3.83%
Written Assignment/ Seat work	2.76%	1.53%	1.00%	2.27%	0.81%	2.15%	5.80%	0.99%	3.50%
CATEGORY 2 TOTAL	**25.31%**	**8.67%**	**8.30%**	**18.14%**	**3.82%**	**13.52%**	**29.27%**	**4.17%**	**11.64%**
Category III (ROTE)									
Copying	3.32%	0.99%	1.05%	4.88%	1.03%	5.42%	4.75%	0.37%	2.11%
Rote learning/ Practicing	4.67%	0.96%	2.32%	1.68%	0.27%	4.10%	1.60%	0.06%	1.40%
CATEGORY 3 TOTAL	8.00%	1.95%	3.37%	6.56%	1.30%	9.51%	6.35%	0.43%	3.52%
ORGANIZING CLASSROOM									
Giving Assignments	1.10%	0.64%	0.11%	1.16%	0.45%	1.01%	0.67%	0.16%	0.46%
Organizing Class Activities	0.42%	0.10%	0.50%	0.72%	0.15%	1.24%	2.94%	0.52%	1.81%
Motivating	0.36%	0.11%	0.13%	0.26%	0.08%	0.07%	0.20%	0.05%	0.20%
Positive feedback / disciplining	1.13%	1.66%	1.06%	0.86%	1.21%	1.45%	1.67%	0.62%	1.38%
Teacher Management	2.56%	0.00%	0.01%	3.26%	0.01%	0.20%	2.14%	0.14%	0.14%
ORGANIZING TOTAL	5.57%	2.51%	1.81%	6.26%	1.89%	3.97%	7.62%	1.49%	3.99%
OFF TASK ACTIVITIES									
socialization with students	0.33%	0.15%	0.18%	0.27%	0.04%	0.14%	0.11%	0.01%	0.09%
socialization with outsiders	2.36%	0.00%	0.00%	2.20%	0.00%	0.08%	0.86%	0.05%	0.00%
Teacher uninvolved	0.99%	0.00%	0.00%	2.39%	0.01%	0.04%	1.57%	0.00%	0.09%
Teacher out of classroom	4.22%	0.01%	0.01%	9.62%	0.00%	0.18%	3.17%	0.10%	0.06%
OFF TASK TOTAL	**7.90%**	**0.16%**	**0.19%**	**14.48%**	**0.05%**	**0.44%**	**5.70%**	**0.16%**	**0.24%**

Appendix Table 6.4: Overall Teacher's time distribution in classroom and nature of tasks:

	AP			MP			UP		
	Govt.	Pvt	Overall	Govt.	Pvt	Overall	Govt.	Pvt	Overall
Category I (involving higher level mental thinking)									
Active Learning	7.2%	5.6%	7.0%	11.2%	13.8%	11.6%	10.2%	9.4%	10.1%
Discussions	8.9%	11.4%	9.3%	3.9%	4.1%	3.9%	11.7%	12.4%	11.8%
Projects/ Creative activity	0.3%	0.2%	0.3%	0.2%	0.2%	0.2%	0.1%	0.0%	0.1%
Remedial work/ corrective feedback	9.0%	11.5%	9.4%	4.8%	8.2%	5.3%	3.8%	6.2%	4.2%
CATEGORY 1 TOTAL	**25.5%**	**28.7%**	**26.0%**	**20.0%**	**26.2%**	**21.0%**	**25.8%**	**28.0%**	**26.1%**
Category II (Lesser mental thinking)									
Reading Aloud	7.7%	10.6%	8.2%	20.3%	19.5%	20.1%	21.4%	21.1%	21.4%
Instruction/ Demonstration	28.8%	25.5%	28.3%	10.6%	8.1%	10.2%	13.9%	12.1%	13.6%
Written Assignment/ Seat work	5.9%	6.0%	5.9%	5.9%	7.2%	6.1%	8.3%	10.4%	8.6%
CATEGORY 2 TOTAL	**42.5%**	**42.1%**	**42.4%**	**36.8%**	**34.7%**	**36.5%**	**43.6%**	**43.6%**	**43.6%**
Category III (ROTE)									
Copying	6.1%	9.1%	6.6%	12.3%	14.5%	12.7%	8.1%	8.2%	8.1%
Rote learning/ Practicing	7.9%	6.5%	7.7%	5.7%	4.0%	5.4%	3.6%	3.6%	3.6%
CATEGORY 3 TOTAL	**14.0%**	**15.5%**	**14.2%**	**18.0%**	**18.6%**	**18.1%**	**11.8%**	**11.8%**	**11.8%**
ORGANIZING CLASSROOM									
Giving Assignments	1.7%	3.2%	2.0%	2.5%	2.9%	2.6%	1.2%	1.6%	1.3%
Organizing Classroom Activities	0.9%	0.4%	0.9%	2.2%	2.1%	2.2%	4.7%	5.7%	4.9%
Motivating	0.7%	0.6%	0.7%	0.5%	0.8%	0.5%	0.6%	1.1%	0.7%
Positive feedback / disciplining	3.7%	3.3%	3.6%	3.4%	3.4%	3.4%	3.3%	2.3%	3.1%
Teacher Management	2.9%	2.2%	2.7%	3.5%	4.2%	3.6%	2.9%	3.7%	3.0%
ORGANIZING TOTAL	**9.9%**	**9.7%**	**9.9%**	**12.0%**	**13.3%**	**12.2%**	**12.7%**	**14.5%**	**13.0%**
OFF TASK activities									
socialization with students	0.7%	0.7%	0.7%	0.5%	0.3%	0.4%	0.4%	0.1%	0.3%
socialization with outsiders	2.5%	1.1%	2.3%	2.1%	1.5%	2.0%	1.1%	0.8%	1.1%
Teacher uninvolved	1.0%	0.9%	0.9%	2.3%	1.7%	2.2%	1.8%	0.8%	1.7%
Teacher out of classroom	4.0%	1.3%	3.6%	8.4%	3.8%	7.6%	2.9%	0.5%	2.5%
OFF TASK TOTAL	**8.1%**	**4.0%**	**7.5%**	**13.2%**	**7.3%**	**12.2%**	**6.2%**	**2.2%**	**5.5%**

Appendix 7. Time on Task Study Classroom Snapshot Observation Coding Manual

Introduction

The Classroom Snapshot records the environment and the participants in the classroom as if they were being photographed at one instant. It records every person in the classroom in the activity in which they are engaged and shows with whom they are engaged.

The distribution of teachers and students among the activities that are occurring simultaneously are recorded as the observer places them on the grid going clockwise around the room. Essentially, the Snapshot provides data to assess the activities occurring, the materials being used, grouping patterns, teacher activities, and students in activities independent of teachers. The directions that follow are for the pencil and paper-based version of the instrument.

Procedures

There are sections of the form where the observer records sequence number of snapshots, the teacher identification number, the number of students in the classroom, the subject being observed, the duration and time of the class observed, grade level (including combination of grades in the room if multi-grade), the school. The observer also records the percentage of students who have textbooks. The observer may need to obtain some of this information in advance of the observation.

For the classroom observation, the observer sits at the back of the classroom from where he / she can have a good view of the happenings within the classroom. After making oneself comfortable, the observer should start his begin his first observation - "snapshot" at the third minute. Then subsequent observations are made at every third minute interval – for example, 3rd minute, 6th minute, 9th minute and so on….

To record the data for the snapshot, the observer scans the classroom going clockwise around the room and forms a "snapshot" picture of the activities and materials. Each letter in the letter set, *T, I and OG*, indicates the category of participants in the classroom, depending on the composition of the classroom, i.e, whether it is mono-grade or multi-grade situation:

Appendix Table 7.1: Groups to be observed in Multi-Grade classroom situations

Mono-grade	Only T & I lines	T → Teacher; I → Independent student -working without a teacher;
Multi-Grade	T, I & OG lines	T → Teacher; I → Independent student in the classroom directly under observation – working without a teacher; OG → Students in the other grades which is not under our direct observation.

Each category (T, I and OG) comprises a line or row on the form for each activity. The 1, S, L, and E located to the right of the activity under each material column represent the number of students who are in the group that is being recorded, which may vary on the basis of class size. The following table can be used for reference to decide the category.

Appendix Table 7.2: Definition of Group Size

Class strength/ group size	N= 10 or <10	N= 11- 15 students	N=16-20 students	N=20 + students
1	1 student	1 student	1 student	1 student
S	2-4 students	2-5 students	2-7 students	2-10 students
L	5-9 students	6-14 students	8-19 students	11 students to the whole group less 1
E	10 or less (Whole group)	11- 15students (Whole group)	N = 16- 20 (Whole group)	N =20+ (Whole group)

Steps to Record the "Snapshot" Picture

The following steps should be implemented using the classroom snapshot during classroom observations (See Table 1).

a. Determine which activity row and material column to place the participants. Classroom activities are listed down the left side of the screen. Materials are listed across the top of the screen. (Following are operational definitions to specify these coding events).

b. Determine which participant category (T, or I) the students are working with (if the students are with the teacher, the T line will be used, if the students are independent, the I line will be used, etc.)

c. Circle the symbol which indicates the number of students being recorded – one student (1), small group (S), large group (L), or everyone (E). Note if you code an E you do not mark any other code. E= everyone.

d. Continue till all the activities in the class have been recorded.

Appendix Table 7.3: Classroom Snapshot Format Example

ACTIVITY		MATERIALS							
		Books	Note book	Chalk board	Comput. / Calc.	Manip- ulative	Visual Aids	Co- operative	None
Reading aloud/ Oral reading	T	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E
	I	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E
	OG	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E
Assignments	T	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E
	I	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E
	OG	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E	1 S L E

Definition		
Code Items	**Descriptions**	**Coding / use of log page**
1. Reading aloud / Oral Reading/ recitation (Category II)	**Teacher or Students are reading aloud.** One or more students are reading connected text from a textbook, trade book, periodical, their own writing, or reproduced material. When reading aloud, generally students take turns reading sections from the material. The teacher or student may also read aloud while the rest of the class follows along in their own texts. **Although one person reads at a time, all students are coded as engaged in the oral reading activity with the teacher.**	• Code this over the T line using the 1, S, L, or E code. • Use Books in conjunction with Reading Aloud. • If students are reading a play aloud and are working together in order to make a presentation, code Reading Aloud in conjunction with Cooperative Groups (i.e.: students rehearsing for a Readers' Theatre presentation). • Reading in unison is also coded here.
2. Copying (Category III)	Students are copying work or exercises from the blackboard. The primary purpose of the activity is to transfer the text on the board verbatim to the students' paper or copybooks.	• When the teacher is copying on the blackboard and the students are copying at their seats, code the teacher in the Classroom Management Alone • When the teacher is monitoring while the students are copying, code the teacher with students under Copying.
3. Assignments / Procedures (Organizing Activities)	The teacher is explaining an activity, the procedures to be followed, the amount of work to be finished, or rewards for completing the assignment. The discussion is not focusing on the academic content, but on the information that students need to carry out the assignment.	• Discussion of grades and clarification of behavior expectations is coded here.
4.Active learning (Category I)	Students are individually or in groups involved in any activity which requires them to analyze information, ask questions, think out answers on their own, orally and /or in writing.	• Any activity involving creative thinking would also be coded here; for example creating a story, a poem, new words etc. • The Active learning category may often be coded with Cooperative Groups when two or more students are involved in a joint activity. Please describe any such activity in the Log.
5. Instruction / demonstration (Category II)	The teacher or some form of media is informing a student or a group of students about a subject.	• Code this category also if a teacher models a procedure or shows students how to do something (e.g., science experiment, math problem, use of materials).
6.Discussion (Category I)	Academic discussion, verbal exchange, or slow paced question/answer session takes place regarding the lecture material, assignments or problems.	• This code may be used in conjunction with Cooperative Groups, to show that a cooperative group is discussing an assignment.
7.Rote learning/ Practice / drill (Category III)	One or more students are <u>verbally</u> involved in reinforcing, repetitive, or rote work.	• Learning definitions or answers to given questions, or any text, Verbal and manipulative games which give further practice in using a learned concept are coded here.
8.Written Assignments/ Teacher monitoring/	One or more students are writing papers, doing computation, or are involved in any other silent written work at their seats. If students are interacting with the material to learn or	• If a student is writing and reading, use the Written Assignment activity. • If the teacher is monitoring, code this activity in the T line using 1, S, L, or E.

Seat work	practice concepts or procedures or to apply knowledge (work math problems, conjugate verbs), then code under "Written Assignments/ Seatwork".	• Written test taking is coded here. Please note in the Log when test-taking occurs. • Whenever the teacher is actively monitoring or listening, the activity should be coded on the T line.
9.Projects/ creative activity (Category I)	Hands-on activities that result in a product and can extend over one or more class sessions. The Projects category may often be coded with Cooperative Groups when two or more people are involved in a joint project.	• Art and craft activities eg. Constructing a bird house, painting a mural, making puppets, making a pottery bowl, or creating a book. • Doing science experiments, agriculture, or shop also would be coded as a type of project. • Pl. describe any project in the Log.
10.Remedial work/ Corrective Feedback (Category I)	The teacher is giving corrective feedback to the student/s on their performance and helping them understand their difficulties.	• Please note in the log what the form of feedback is.
11.Positive Feedback (Organizing Activities)	Teacher is verbally or physically (e.g., a pat on the back) encouraging or appreciating a child's performance.	• Please code in the "None" category under materials.

Off Task Activities

12. Social Interaction	Two or more students are interacting about work or subjects other than class-related activities.	• This would include physical or negative interaction between or among students that disrupts the class.
13. Uninvolved / No activity	This category is recorded when one or more students are not involved in instructional activities, for example, staring out the window, head on desk, sleeping.	• If the teacher has not specified an instructional activity and the children are waiting, then record place an E (Everyone) in the I line under the column "None" Code students who are arriving or departing as uninvolved. • Code students who are waiting for the teacher in order to begin an assignment or take an exam as uninvolved.
14. Being Disciplined	One or more students are being reprimanded for their behavior or are being sent out of the room for disciplinary reasons.	• This may include corporal punishment. When corporal punishment occurs please record the incident in the snapshot log.
15. Classroom Management with students	Teachers and students are involved in classroom management: passing out papers, changing activities, putting away materials, preparing to leave.	• Mark No Materials. Even though materials are being handled, they are not being used.
16. Teacher Social Interaction	The teacher and an adult (parents/ visitor / community members – any one other than the students) are interacting about subjects other than class-related activities.	• Circle the T to indicate they are not working with the students.
17. Teacher Management	The teacher is alone (without students) performing duties related to the classroom but not directly related to students who may be doing seatwork.	• Teacher correcting papers at his/her desk, copying material onto the board, setting up materials, or arranging books on a shelf. • Circle the T for the teacher on the right hand side of the form to indicate they are not working with students.
18. Teacher out of the	This code should be marked if the teacher	• Describe what happened in the log

Room.	is late, or the teacher leaves the room for any reason.	
19. Teacher Uninvolved	Teacher in the class; but not involved in any activity	• Teacher sitting in the classroom without any other adult, not interacting with children.

NOTE: The first eleven activities reflect academic activities. The last eight activities indicate students who are not involved in an academic activity.

When completing the Snapshot, first record the teacher, and then the students involved in academic activities. Then record the students who are off-task or are involved in doing management activities.

Appendix 8. Regression analysis

In order to understand the factors that facilitate more creative and student centric activities, an analysis of the correlates were carried out using a typical hierarchical linear (mixed) model. School, teacher and classroom characteristics were included in the model. Using similar variables, an analysis of the correlates of classroom time on "off-tasks" and other "non-teaching" time was also carried out. In the first stage, a null model (without using any variables) was tested and school effects and within school (classroom and teacher variates) were estimated. In the second equation, the variable "Govt." denoting the type of school (government or private) was included to extract the variations on account of school type only. The third equation includes all the possible variables for which information was available, and the fourth equation controls for variations on account of the States under study, by using two dummy variables for States MP and UP. The description of variables is provided in Appendix Table 8.1 and the results in Appendix Table 8.2.

Appendix Table 8.1 : Description of variables used in the regression analysis

Variable name	Description
Dependent Variable	
CAT1	Number of Classroom observations with student –centric tasks (Category I) of teaching and learning
Off_org	Number of classroom observations with either off task or organizing activities
Independent variables	
School /classroom characteristics	
Govt.	Dummy variable that shows the school management type. If the school is a government school, Govt.=1; 0 other wise (private management).
Urban	This is a dummy variable to specify the location. If the teacher teaches in a school in urban area, 1 is assigned, "0" otherwise.
Pry_only	Dummy variable where the value is 1 if the school is primary only and 0 if the school is primary with upper primary school
Total_present	Total students present in the classroom
Girl_share	Share of girls in total enrolment in schools
Sc_st_enrol	Share of SC/ST in total enrolment in schools
Math	Subject taught in the class
Cr_env_indx	Index of school environment; estimated using principal component analysis
Tch_beh_indx	Index of teacher behavior in classrooms (for details see table 1.1 in chapter 1)
Multi_gr	Whether the classroom has more than one grade or not
Gr2	Grade observed is Grade 2
Gr4	Grade observed is Grade 4 (higher grade within primary classes)
Teacher characteristics	
Male	This is a dummy variable which connote 1 if the teacher is a male, 0 other wise (if the teacher is a female).
Regular_tcr	Dummy to show the type of appointment/ tenure of teacher. 1 denotes regular teacher; 0 other wise ("para" teacher; a teacher whose appointment is *ad hoc).*
edu_gradn	Dummy variable indicating 1 if teacher is a graduate or above education; 0 if the teacher

	is studied only upto secondary or lower secondary (there are a few cases of teachers who were even below secondary educated.
ttc_bed	Dummy variable to indicate those teachers who had undergone a pre-service course (professional training) before joining the job. These could be a diploma or a certificate or a degree.
gen_com	Dummy variable indicating a teacher who does not belong to Scheduled Caste (SC), Scheduled Tribe (ST) or Other Backward Caste (OBC) community. If they belonged, they were assigned 0.
exp	Number of years of experience of teachers
Teacher Attitude	An index for teachers' own perception about better teaching pedagogy (see chapter 5 for details)

Appendix Table 8.2: Covariates of student centric tasks and non-teaching tasks in classrooms

	STUDENT CENTRIC TASKS				NON-TEACHING ACTIVIITES IN CLASSROOMS			
	Equation 1	Equation 2	Equation 3	Equation 4	Equation 1	Equation 2	Equation 3	Equation 4
_cons	3.54	3.94	2.06	2.17	2.46	1.933	3.69	3.58
	(39.02)***	(17.8)***	(4.69)***	(4.86)***	(30.8)***	(9.98)***	(10.2)***	(9.77)***
Govt.		-0.48	-0.32	-0.34		0.64	0.40	0.42
		(-1.98)*	(-1.16)	(-1.2)		(3.0)***	(1.69)*	(1.77)*
urban			-0.18	-0.20			-0.09	-0.08
			(-0.78)	(-0.86)			(-0.47)	(-0.42)
Pry_only			-0.26	-0.43			-0.20	-0.07
			(-1.12)	(-1.84)*			(-1.05)	(-0.33)
Girls_share			-0.01	-0.01			0.009	0.008
			(-2.02)*	(-1.1)			(2.73)***	(1.15)
SC_STshare			0.00	0.002			0.002	0.001
			(0.19)	(0.64)			(0.83)	(0.37)
Gr2			0.08	0.072			-0.03	-0.03
			(0.84)	(0.79)			(-0.39)	(-0.35)
Gr4			0.23	0.22			-0.44	-0.38
			(2.53)*	(2.47)*			(-6.07)***	(-6.01)***
math			0.99	0.99			0.15	0.15
			(14.07)***	(14.08)***			(2.67)**	(2.66)**
Mult_gr			0.21	0.27			-0.02	-0.07
			(1.65)*	(2.14)*			(-0.2)	(-0.65)
Cr_env_indx			0.90	0.92			-0.36	-0.38
			(3.65)***	(3.76)***			(-1.8)*	(-1.9)*
Tcr_beh_indx			0.93	0.88			-1.21	-1.18
			(3.61)***	(3.42)***			(-5.89)***	(-5.7)***
Total_st_prst			0.00	-0.004			-0.003	-0.001
			(-0.13)	(-0.82)			(-0.96)	(-0.28)
Tcr_attitude			0.00	-0.003			-0.04	-0.04
			(0.06)	(-0.20)			(-2.59)**	(-2.34)*
male			-0.05	-0.04			-0.06	-0.07
			(-0.47)	(-0.43)			(-0.78)	(-0.9)
Edu_grdn			0.00	-0.012			-0.03	-0.03
			(-0.03)	(-0.12)			(-0.4)	(-0.31)
Ttc_bed			0.06	0.11			0.18	0.15
			(0.52)	(0.94)			(2.01)*	(1.59)
Gen_com			0.10	0.09			-0.09	-0.08
			(0.95)	(0.86)			(-1.09)	(-1.0)
Exp			0.01	0.01			0.01	0.01
			(1.06)	(1.42)			(1.42)	(1.05)
Regular_tcr			0.11	0.09			-0.01	-0.001
			(0.84)	(0.72)			(-0.13)	(0.02)
MP				-0.24				0.32
				(-0.51)				(0.82)
UP				0.59				-0.38
				(1.21)				(-0.93)
Random-effects Parameters								
sd(_cons)	1.585	1.58	1.54	1.51	1.422	1.41		1.298
sd(Residual)	2.495	2.495	2.44	2.44	1.97	1.97		1.948

* p<0.05; ** p<0.01; *** p<0.001

Appendix Table 8.3. Correlation Matrix of variables used in the HLM

	CAT1	CAT2	CAT3	ORG	OFF TASK	Govt.	rural	pry_ only	mult _gr	girl_ share	SC_ST _share	total_ enrol	male	Regular _tcr	edu_ grad	ttc_ bed	gen_ com	Exp 2yr	tcr_ attide	cr_env _index	tch_ beh _in~x	gr4	gr2	math
CAT1	1.00																							
CAT2	-0.40	1.00																						
CAT3	-0.23	-0.41	1.00																					
ORG	-0.11	-0.23	-0.07	1.00																				
OFFTASK	-0.25	-0.27	-0.07	-0.04	1.00																			
Govt.	-0.06	0.03	-0.01	-0.01	0.13	1.00																		
rural	-0.01	0.00	-0.01	-0.01	0.05	0.25	1.00																	
pry_only	-0.07	0.07	-0.06	0.00	0.04	0.41	0.18	1.00																
mult_gr	0.04	-0.02	0.00	-0.03	0.10	0.19	0.11	0.10	1.00															
girl_share	-0.10	-0.08	-0.02	0.08	0.06	0.11	-0.05	0.26	-0.25	1.00														
SC_ST_share	0.00	0.00	0.04	-0.07	0.11	0.27	0.16	0.15	0.17	-0.04	1.00													
total_enrol	-0.04	-0.05	0.02	0.09	-0.07	0.00	-0.05	0.06	-0.39	0.37	-0.10	1.00												
male	-0.03	0.05	-0.04	-0.04	0.05	0.16	0.24	0.03	0.06	-0.02	0.08	-0.15	1.00											
regular_tcr	0.07	-0.01	-0.05	-0.02	0.00	-0.21	-0.23	-0.12	0.07	-0.18	-0.07	-0.13	0.08	1.00										
edu_grad	0.05	-0.01	-0.01	0.02	-0.07	-0.05	-0.06	0.04	0.00	0.00	-0.05	0.01	-0.04	0.14	1.00									
ttc_bed	0.01	0.03	-0.02	-0.02	0.04	0.18	0.02	0.06	0.14	-0.22	0.07	-0.13	0.10	0.34	0.25	1.00								
gen_com	0.05	-0.06	0.03	0.00	-0.05	-0.08	-0.13	-0.06	-0.09	0.07	-0.06	0.05	-0.08	0.10	0.09	-0.01	1.00							
exp2yr	0.01	0.02	0.01	-0.05	0.08	0.10	-0.09	-0.03	0.11	-0.13	0.09	-0.13	0.13	0.41	-0.05	0.28	0.02	1.00						
tcr_attitude	0.03	0.04	-0.02	-0.04	-0.08	0.02	-0.07	0.03	-0.04	-0.04	0.01	0.02	-0.15	0.06	0.09	0.12	0.08	-0.01	1.00					
cr_env_index	0.08	0.00	0.01	-0.02	-0.11	-0.04	-0.11	0.01	0.03	-0.03	0.04	0.03	-0.12	0.03	0.08	0.03	0.05	0.01	0.07	1.00				
tch_beh_in~x	0.12	0.12	-0.03	-0.03	-0.26	-0.16	-0.12	-0.06	-0.04	-0.17	-0.07	-0.05	-0.07	0.12	0.10	0.05	0.02	0.01	0.16	0.19	1.00			
gr4	0.01	0.16	-0.15	-0.09	-0.05	0.00	0.00	0.00	-0.18	0.00	0.00	0.00	0.10	0.15	-0.03	0.10	-0.07	0.12	0.02	0.03	0.09	1.00		
gr2	0.00	-0.06	0.04	0.04	0.02	0.00	0.00	0.00	0.11	0.00	0.00	0.00	-0.01	-0.09	0.03	-0.06	0.05	-0.03	-0.01	-0.03	-0.03	-0.55	1.00	
math	0.16	-0.22	0.07	0.08	-0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	-0.02	0.01	-0.03	0.01	-0.03	-0.01	0.00	0.00	-0.17	0.09	1.00

Appendix 9. MHRD's study on Student attendance Rate (Ed.CIL, 2008)

MHRD commissioned a study to assess student attendance on the basis of head count of students present in the school in all major states in 2006-07, including the three states of AP, MP and UP. The study looked at student attendance in government schools.

Average attendance rate was calculated by dividing the number of students who were found present in their classes during the three visits to schools by the enrolment in the relevant class or level of education. The study found an overall attendance rate of 68.5% at primary level. The student attendance rates in UP was estimated to be lower than the national average (57.4 percent). However, the student attendance rates in AP (72.7 percent) and MP (72.1 percent) were way below the student attendance rates of the better performing states like HP (95 percent) or Kerala (91.4 percent).

Interestingly, in AP, attendance rates in rural areas were better, but attendance of minority children was poorer than that of SC and ST. In MP, student attendance rates did not differ much between rural and urban schools, here the ST children's attendance was below that of other category children. In UP, similar to AP, attendance in rural schools was slightly better than that in urban schools. Girls attended schools more regularly than boys in UP.

The reasons for student absence were discussed with head teachers, teachers and VEC members. The results for the three states under our study are analyzed here. In states where student attendance rates were very high, head teachers/ teachers/ VEC members cited reasons such as illness of the child for that small minority of students who did not turn up. However, in the three states investigated under the present study, the absence rates were high, other reasons were cited. In UP, the reasons cited included child helps in household work/ sibling care, child needed to help parents in occupational work or due to poverty; and parental indifference or lack of interest. In MP, the first two categories of reasons were cited as the main ones by teachers as well as VEC members. In AP, child labor (outside home) and temporary migration were the important reasons for students' absence from school.

Parents were also asked and the reasons they cited were similar. In AP, parents cited mainly two reasons for student absence: temporary migration and learning difficulty (10-20 percent parents reported these reasons). In MP, the reasons provided by parents included issues such as (a) lack of school facilities, (b) children's not interested in going to school, (c) temporary migration, and (d) learning difficulties. The community at large thought that children were not coming to school regularly because of poor teaching (AP, MP and UP), shortage of teachers (AP and UP), poor accessibility/ transport (AP, MP and UP), poverty (again, in all three states), poor facility in schools (AP and UP), parental indifference (MP and UP), and household work and sibling care (MP).

Appendix 10. Time on Task: Maths test

Question number	TIMSS Unique ID or NCERT	Competency tested
1	NCERT	Single digit addition (with digits given in words)
2	NCERT	Single digit subtraction
3	NCERT	Number concepts
4	NCERT	Addition using concepts
5	NCERT	Number concepts
6	M011018	Using concepts (in numbers)
7	M011018	Using concepts (in places)
8	M031306	3 digit addition (Knowing facts and procedures)
9	NCERT	3 digit addition (Using concepts)
10	NCERT	3 digit subtraction (with carry over)
11	NCERT	3 digit subtraction (with carry over)
12	NCERT	Using concepts (3 digit subtraction, with carry over)
13	M031305	Knowing facts and procedures
14	M031108	Solving routine problems
15	NCERT	Division
16	NCERT	Division
17	M011028	Knowing facts and procedures
18	M011001	Using concepts
19	M011018	Using concepts (in places)
20	M011007	Knowing facts and procedures
21	M031011	Solving routine problems
22	M031310	Solving routine problems
23	M031216	Solving routine problems
24	M031178	Solving routine problems
25	NCERT	Knowing facts and procedures

Appendix 11. Conceptual Model for Analyzing School Effectiveness

What are the factors that are correlated with students' learning outcomes? Presented below (Chart) is the broad framework of classification of factors that are expected to have either positive or negative correlation with learning outcomes (adapted from Hua, 2004). Individual and household factors like gender, socio-economic background, opportunity to learn and parental education and school and classroom factors like school type, classroom organization, teacher qualification and teachers' time and nature of tasks are factors that count among the expected determinants.

Appendix Chart 11.1
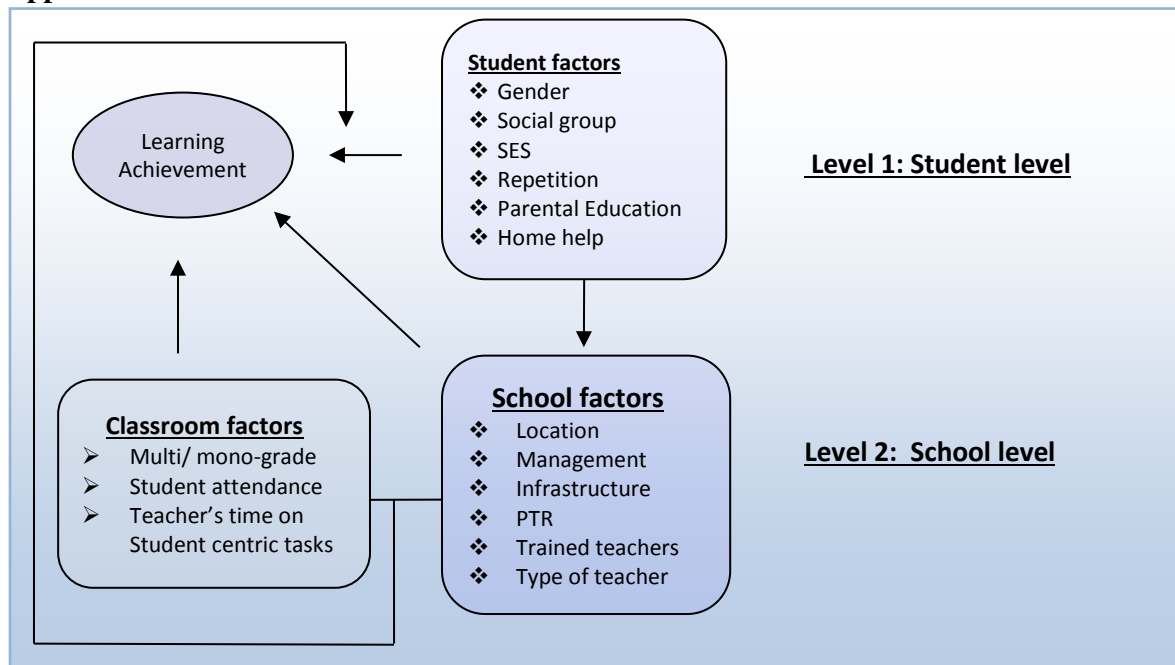
Analytical Framework

The main purpose of this study is to explore the extent to which the classroom teaching time and quality affect students' learning outcomes, and this is to be done after factoring in the correlations of various student level, teacher level and school level determinants, in a multi-level framework (student and school level). This is required because education sector (learning) outcomes are characterized by hierarchical or multi-level structure, wherein students are 'nested' in classrooms which is further 'nested' within schools (See Raudenbush and Bryk, 2002), with unequal sampling probabilities[32]. This is because students are not necessarily randomly assigned to schools or parents do not randomly make choice about the schools their wards attend.

Traditional regressions models treat all the variables at one level and do not identify group effects on individual behavior. This leads to measurement of variations only at either individual or group level. This has generated concerns about aggregation bias, misestimated precision and

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[32] In this study, since we are only taking one grade per school, with mostly one teacher in charge, there is no nesting of classrooms or teachers within school, but only nesting of students within schools/ classrooms.

the 'unit of analysis' problem (Byrk and Raudenbush, 1992). This is not desirable when the goal of the research is to assess the effects of policies implemented in classrooms or schools on individual student learning outcomes (Cronbach, 1976). In a panel approach, the unbiased estimates of individual and family characteristics could be measured using random effects model, while school fixed effects need to be measured separately. While the school fixed effects take account of most sorting going on between schools, the school fixed effects and the observable school characteristics in the same equation are not possible in a panel approach as school observable characteristics get dropped from regression due to the likelihood of a perfect co-linearity. Also, the panel approach using school fixed effects does not address the potential endogeneity. The hierarchical linear models provide average coefficients in which a combined coefficient is estimated by averaging the coefficients from OLS regressions.

In this section, the determinants of learning outcomes are analyzed using both panel approach and hierarchical linear model approach. In the panel approach, the achievement of student i in school j Y_{ij} is modeled as a function of individual and household characteristics X_{ij}, a school fixed effect term z_j and a random error term ε_{ij}.

$$Y_{ij} = \alpha + \beta X_{ij} + z_j + \varepsilon_{ij} \text{ where } \varepsilon_{ij} \sim N(0, \sigma^2) \dots\dots\dots\dots\dots\dots\dots(1)$$

This is expected to provide unbiased and consistent estimates for individual and household determinants. In the second stage, the correlation between school/teacher/classroom characteristics and students' learning scores is examined and this is done by regressing learning outcomes on observed student characteristics and observed school characteristics. The achievement of student i in school j Y_{ij} is modeled as a function of individual and household characteristics X_{ij}, a vector of school resources S_j which is constant across students from the same school /classrooms and a random error term ε_{ij}.

$$Y_{ij} = \alpha + \beta X_{ij} + z_j + \lambda S_j + \varepsilon_{ij} \text{ where } \varepsilon_{ij} \sim N(0, \sigma^2) \dots\dots\dots\dots\dots\dots\dots(2)$$

Then we do analyze learning outcomes in a multi-level / hierarchical linear model. The advantage of Multi-level or Hierarchical Linear Methodology (HLM) is that it provides for examining multiple interactive relationships in *nested* organizational structure. Variations in nested data emerges from two sources, namely, within group variation (e.g. individual differences among students within the same school) and between group variation (e.g. between school differences) and hence student achievement models typically specifies these two distinct sub-components. Mixed /multi-level models partitions out the effects of student characteristics and the effect of group behavior (organizational - such as classroom or school) on the relationships at the individual level.

Following Braun, Jenkins and Grigg (2006), the model is specified here. In the multi-level model, the level 1 is specified as follows:

Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j} X_{1ij} + \dots\dots + \beta_{1j} X_{1ij} + \varepsilon_{ij} \dots\dots\dots\dots\dots(3)$

Level 2: $\beta_{0j} = \gamma_{00} + \gamma_{01} W_{1j} + u_{0j} \dots\dots\dots\dots\dots\dots\dots\dots(4)$

$\beta_{1j} = \gamma_{10} \dots \beta_{pj} = \gamma_{p0}$

where i indexes students within schools, j indexes schools; Y_{ij} is the outcome for student i in school j ;

$X_1, \dots, X_p$ are p student characteristics, centered at their grand means (i.e., the means over all students), and indexed by i and j as above;

β_{0j} is the mean for school j, adjusted for the covariates $X_1, \ldots, X_p$;

$\beta_{1j} \ldots, \beta_{pj}$ are the regression coefficients for school j, associated with the covariates $X_1, \ldots, X_p$;

ε_{ij} is the random error (i.e., residual term) in the level 1 equation, assumed to be independently and normally distributed with mean zero and a common variance $\sigma 2$ for all students;

W_{1j} is an indicator of the school type for school j, taking the value 1 for government schools and 0 for private schools;

γ_{00} is the intercept for the regression of the adjusted school mean on school type;

γ_{01} is the regression coefficient associated with school type;

u_{0j} is the random error in the level 2 equation, assumed to be independently and normally distributed across schools with mean zero and variance $\tau 2$; and

$\gamma_{10}, \ldots, \gamma_{p0}$ are constants denoting the common values of the p regression coefficients across schools. For example, γ_{10} is the common regression coefficient associated with the first covariate in the level 1 model for each school.

In the HLM regressions, a variance component model was performed first, and then, a means-as-outcomes model, followed by a random coefficient model. The variables used in the analysis are described below.

Dependent variable: The regressions were carried out for overall test score (Language scores plus mathematics score) arrived through principal component analysis (PCA). The regressions were carried out for all sampled schools pooled together as well as separately for the three States (AP, MP and UP) where the study was carried out as well as for government schools and private schools.

School level variables: Type of school management was considered as an important variable. Since the study included classroom observations and student testing both in public and private schools, a binary (dummy) variable was used to distinguish the type of school (government school=1; 0 otherwise). Location of the school also encompassed location of the students/ households; and hence a dummy variable to identify urban (urban=1; 0 otherwise) is used. Likewise to denote the level of school (1=primary only school; 0=upper primary school). Multi-grade and mono-grade classroom situations were specified using a dummy variable. The pupil teacher ratio (PTR) was used as a discrete variable.

Schools, even within government sector and private sector, are not uniform in terms of the facilities available. Schools differed in terms of the number of rooms available, availability of drinking water facility, toilet facilities, tables, chairs, library etc. A composite index (using principal component analysis to assign different factor loadings and hence weights) was developed to sum up the level of infrastructure facilities available at schools. Similarly, a composite index to sum up the Teaching Learning Materials (TLM) available and prepared in the school was also constructed.

Teacher level variables: A few teacher specific variables were used within the school level variants. Binary variables such as teacher gender (1=male; 0=female), teacher type (1 =regular teacher; 0=para teacher), teacher qualification (1=graduate; 0 otherwise); and professional qualification (1=having a pre-service teaching qualification; 0 otherwise) were used at teacher level. A teacher's classroom behavior index was constructed (again using weights derived from a

principal component analysis) based on a series of behavioral indicators that captured factors such as clarity of speech, movement within class, the manner in which children were managed/addressed etc.

Teaching time on task and nature of tasks and student time: Teachers' time available in school for academic activities (total number of days teachers were present in the school in the previous year multiplied by the number of hours teachers reported that they were engaged in teaching activities expressed in total number of hours) was an important variable used in the analysis. Classroom characteristics – percentage of students present in the class and percentage of classroom time teachers were on student centric, higher order tasks (tasks that stimulate thinking and reasoning during the teaching learning process), were used as explanatory variables. An index of classroom environment was constructed, which was a summation of indicators related to classroom light, blackboard visibility, windows, seating arrangement, etc.

Student level variables: Apart from student age, gender, social group, asset quintiles, parental education and number of siblings, the analysis included variables specific to the learning environment at home. An index of an environment conducive for learning at home was constructed using indicators such as support at home for studies such as private tuitions, separate space for study at home, and parental enquiry and interest. The child who received incentive was also used as a separate variable. A dummy variable was used to distinguish a child who had repeated any grade; either due to failure in learning achievement tests conducted by school annually (in spite of the no-retention policy) or because of long absenteeism from school.

The summary of all these indicators for the three states under study are given in the follwing table.

Appendix Table 11.1: Summary Statistics

Variable (*variable name specification in the regression*)	Overall		AP		MP		UP	
	Mean	*Std. Dev.*	Mean	*Std. Dev.*	Mean	*Std. Dev.*	Mean	*Std. Dev.*
No of observations	4768		1385		1462		1921	
Dependent Variable								
Mean learning levels (*over_scor*)	53.21	*22.32*	60.86	*21.54*	48.92	*21.28*	50.97	*22.30*
School Level factors								
School factors								
Government school (*Govt.*)	0.79	*0.41*	0.74	*0.44*	0.78	*0.41*	0.84	*0.37*
Urban school (*urban*)	0.20	*0.40*	0.20	*0.40*	0.21	*0.41*	0.20	*0.40*
School /classroom Infrastructure index (*infra_indx*)	0.70	*0.24*	0.69	*0.26*	0.71	*0.20*	0.70	*0.26*
Share of SC/ST in total enrolment in the school	29.53	*25.76*	25.1	*17.5*	33.6	*30.2*	31.4	*29.16*
PTR (*PTR*)	45.76	*35.79*	25.50	*21.10*	48.88	*40.24*	57.98	*34.27*
School level [1=primary only] (*pry_only*)	0.71	*0.45*	0.48	*0.50*	0.68	*0.47*	1.11	*0.31*
Teacher factors								
Teacher qualification [1=graduate] (*grad_tcr*)	0.59	*0.49*	0.49	*0.50*	0.54	*0.50*	0.69	*0.46*
Teacher's professional qualification [1= teaching degree/diploma] (*ttc_bed*)	0.54	*0.50*	0.66	*0.47*	0.60	*0.49*	0.41	*0.49*
Teacher gender [1=male] (*male*)	0.54	*0.50*	0.52	*0.50*	0.61	*0.49*	1.49	*0.50*
Teacher type [1=regular teacher] (*regular_tcr*)	0.76	*0.43*	0.81	*0.39*	0.74	*0.44*	0.73	*0.44*
Classroom/ teaching factors								
Multi-grade schools [1= multi-grade] (*mult_gr*)	0.60	*0.49*	0.50	*0.50*	0.59	*0.49*	0.69	*0.46*
Student attendance rate in the class (*student_attend*)	70.54	*18.10*	81.73	*12.70*	64.93	*18.79*	66.74	*17.31*
Class environmental Index (*cr_env_indx*)	0.71	*0.18*	0.72	*0.20*	0.72	*0.18*	0.70	*0.18*
Teacher Behavior Index (*tcr_beh_indx*)	0.80	*0.13*	0.81	*0.10*	0.75	*0.15*	0.83	*0.11*
Percentage of students involved in classroom tasks	61.71	*13.52*	66.85	*11.72*	59.26	*15.05*	59.88	*12.46*
Teacher's time on Category I tasks	24.56	*12.31*	25.83	*12.48*	14.47	*10.05*	22.81	*13.89*
Student / Household factors								
SC/ST	74.77	*22.23*	0.31	*0.46*	0.43	*0.49*	0.26	*0.44*
OBC	0.33	*0.47*	0.54	*0.50*	0.45	*0.50*	0.42	*0.49*
boys	0.46	*0.50*	0.50	*0.50*	0.55	*0.50*	0.51	*0.50*
Father's education (number of years)	0.52	*0.50*	4.78	*4.72*	4.95	*4.87*	5.57	*5.09*
Mother's education (number of years)	5.15	*4.93*	3.10	*4.01*	3.18	*4.08*	2.78	*4.10*
Household asset Index	2.99	*4.07*	0.41	*0.20*	0.36	*0.22*	0.33	*0.26*
Repeater (1= repeating the grade)	0.36	*0.23*	0.14	*0.35*	0.25	*0.43*	0.11	*0.32*
Household Conducive learning environment Index	0.16	*0.37*	0.64	*0.29*	0.54	*0.35*	0.64	*0.34*
Number of siblings	3.51	2.09	1.88	*1.22*	3.63	*1.68*	4.61	*2.12*

Appendix Table 11.2 Panel regression analysis for understanding the covariates of learning levels in grade IV in AP, MP and UP: Panel Models

	Overall		UP		MP		AP		Govt.		Pvt	
School fixed effects	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
School level factors												
Govt.		-12.16 (-4.62***)		-12.17 (-2.73**)		-8.10 (-1.54)		-13.24 (-2.32**)				
urban		3.09 (1.5)		4.78 (1.4)		-2.45 (-0.59)		1.31 (0.3)		5.42 (2.11*)		0.27 (0.08)
pry_only		0.39 (0.2)		-5.86 (-1.38)		0.45 (0.12)		3.63 (1.08)		1.16 (0.49)		-2.66 (-0.82)
SCSTenrl		0.01 (0.19)		-0.05 (-0.67)		-0.02 (-0.36)		0.04 (0.89)		0.02 (0.55)		-0.08 (-0.65)
PTR		-0.02 (-0.96)		-0.03 (-0.6)		-0.01 (-0.24)		-0.02 (-0.2)		-0.04 (-1.45)		0.06 (1.08)
infra_indx		6.46 (1.99*)		5.26 (1.13)		13.67 (1.97*)		2.81 (0.42)		9.08 (2.57**)		-9.67 (-1)
Teacher level factors												
male		-2.96 (-2.48*)		-2.73 (-1.8*)		-5.37 (-1.67*)		-0.83 (-0.28)		-2.96 (-2.14*)		-2.16 (-0.88)
regular_tcr		-0.41 (-0.26)		-4.29 (-2.04*)		2.64 (0.74)		6.08 (1.04)		0.04 (0.03)		8.24 (1.18)
grad_tcr		-1.87 (-1.53)		0.64 (0.37)		-2.13 (-0.78)		-4.41 (-1.59)		-1.31 (-0.95)		-5.15 (-1.84*)
ttc_bed		3.54 (2.73**)		4.61 (2.64**)		-1.32 (-0.44)		0.86 (0.2)		2.39 (1.55)		5.20 (2.13*)
lnexp		-1.43 (-2.26*)		0.27 (0.31)		-2.16 (-1.16)		3.08 (0.45)		-1.70 (-2.33**)		-0.09 (-0.07)
Tac		0.00 (-0.09)		-0.01 (-0.12)		-0.04 (-0.7)		0.04 (0.5)		-0.01 (-0.29)		0.09 (0.84)
Classroom level factors												
mult_gr		-0.78 (-0.42)		-1.99 (-0.67)		-3.76 (-1.04)		2.43 (0.63)		0.31 (0.14)		-3.90 (-1.01)
st_attend		0.19 (4.37***)		0.17 (2.27*)		0.09 (1.18)		0.19 (1.77*)		0.20 (4.2***)		0.06 (0.46)
cr_env_indx		1.44 (0.34)		2.65 (0.4)		2.21 (0.27)		-0.24 (-0.03)		2.65 (0.58)		11.15 (0.95)
tcr_beh_indx		-4.65		-12.65		-9.82		32.95		-9.09		19.02

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		(-0.74)		(-1.03)		(-1.03)		(1.99*)		(-1.34)		(0.84)
tch_tsk_1_pr		0.14 (2.35*)		-0.04 (-0.34)		0.20 (1.58)		0.30 (2.59**)		0.11 (1.66*)		0.33 (2.11*)
percnt_st_task		0.10 (1.7*)		0.11 (1.12)		0.13 (1.37)		-0.12 (-0.85)		0.12 (1.78*)		0.05 (0.44)
Student level factors												
boys	2.3 (4.74***)	2.35 (4.91***)	3.31 (4.23***)	3.35 (4.31***)	2.36 (2.67**)	2.34 (2.68**)	0.79 (0.91)	0.92 (1.07)	2.85 (4.98***)	2.86 (5.07***)	0.34 (0.4)	0.57 (0.67)
other_com	1.69 (2.2*)	1.77 (2.32*)	2.31 (1.97*)	2.16 (1.87*)	2.66 (1.86*)	3.21 (2.28*)	-0.93 (-0.6)	-0.96 (-0.64)	1.75 (1.73*)	1.78 (1.8*)	1.63 (1.54)	1.91 (1.82*)
noof_sibling	-0.38 (-2.7***)	-0.37 (-2.73**)	-0.40 (-2.1*)	-0.39 (-2.11*)	0.04 (0.15)	0.13 (0.49)	-0.96 (-2.57*)	-0.98 (-2.65**)	-0.40 (-2.52*)	-0.40 (-2.61**)	-0.20 (-0.65)	-0.13 (-0.45)
f_edu_yrs	0.17 (2.9***)	0.18 (3.09***)	0.14 (1.6)	0.14 (1.53)	0.22 (2.05*)	0.21 (2*)	0.16 (1.42)	0.18 (1.64)	0.20 (2.85***)	0.20 (2.9**)	0.07 (0.81)	0.09 (1.02)
m_edu_yrs	0.04 (0.07)	0.04 (0.56)	0.11 (1.0)	0.10 (0.92)	-0.12 (-0.96)	-0.10 (-0.81)	0.07 (0.51)	0.06 (0.47)	-0.03 (-0.37)	-0.04 (-0.42)	0.20 (1.89*)	0.20 (1.9*)
asset_index	9.26 (6.4***)	9.10 (6.42***)	8.25 (3.76***)	7.96 (3.7***)	12.34 (4.68***)	11.43 (4.43***)	7.96 (2.79**)	8.41 (2.99***)	10.73 (6.36***)	10.40 (6.3***)	3.84 (1.45)	3.72 (1.42)
support_home	3.88 (4.46***)	4.07 (4.78***)	6.00 (4.37***)	6.42 (4.76***)	0.09 (0.06)	-0.10 (-0.07)	4.97 (2.68**)	5.42 (3***)	4.09 (4.12***)	4.35 (4.5***)	2.16 (1.2)	2.30 (1.3)
repeater	-2.01 (-2.88***)	-2.02 (-2.95***)	-1.10 (-0.89)	-1.02 (-0.84)	-2.18 (-2.11*)	-2.33 (-2.28*)	-3.19 (-2.27*)	-2.98 (-2.17*)	-2.45 (-3.12***)	-2.45 (-3.18***)	0.78 (0.52)	0.73 (0.49)
_cons	46.68 (52.19***)	36.45 (3.53***)	43.12 (30.08***)	52.11 (2.76**)	42.48 (25.68***)	47.71 (2.85**)	55.42 (32.47***)	3.51 (0.14)	42.06 (42.13***)	24.01 (2.36*)	66.31 (33.97***)	6.43 (0.23)
sigma_u	16.05	12.59	14.65	11.39	15.62	12.67	15.69	13.0	15.21	12.82	11.75	10.2
sigma_e	15.12	15.10	15.82	15.78	14.25	14.25	14.93	14.93	15.76	15.75	12.35	12.33
rho	0.53	0.41	0.46	0.34	0.55	0.44	0.52	0.43	0.48	0.40	0.48	0.41

* p<0.05; ** p<0.01; *** p<0.001

Appendix Table 11.3 Panel regression analysis for understanding the covariates of learning levels in grade IV in AP, MP and UP: multi-level mixed /hlm models

	Overall		UP		MP		AP		Govt.		Pvt
	xtmixed	gllamm	xtmixed	gllamm	xtmixed	gllamm	xtmixed	gllamm	xtmixed	gllamm	xtmixed
School Level Factors											
Govt.	-12.16 *(-4.7***)*	-13.21 *(-9.53***)*	-12.16 *(-2.81**)*	-10.94 *(-5.78***)*	-8.06 *(-1.51)*	-15.21 *(-7.26***)*	-13.23 *(-2.35*)*	-13.77 *(-5.56***)*			
urban	3.10 *(1.53)*	2.98 *(2.82**)*	4.78 *(1.44)*	4.49 *(2.9**)*	-2.45 *(-0.58)*	1.08 *(0.7)*	1.31 *(0.31)*	-2.09 *(-1.47)*	5.44 *(2.16*)*	4.33 *(2.85**)*	0.27 *(0.07)*
pry_only	0.39 *(0.21)*	1.38 *(1.46)*	-5.89 *(-1.44)*	-6.87 *(-3.63***)*	0.46 *(0.12)*	-1.73 *(-1.31)*	3.63 *(1.1)*	1.40 *(1.09)*	1.16 *(0.51)*	0.48 *(0.26)*	-2.66 *(-0.81)*
SCSTenrl	0.01 *(0.2)*	-0.01 *(-0.42)*	-0.05 *(-0.69)*	-0.01 *(-0.27)*	-0.02 *(-0.35)*	-0.07 *(-3.5***)*	0.04 *(0.9)*	0.04 *(1.99*)*	0.02 *(0.57)*	0.02 *(0.96)*	-0.08 *(-0.64)*
PTR	-0.02 *(-0.97)*	-0.03 *(-3.23***)*	-0.03 *(-0.62)*	-0.03 *(-1.59)*	-0.01 *(-0.24)*	-0.02 *(-1.54)*	-0.02 *(-0.2)*	-0.09 *(-3.13***)*	-0.04 *(-1.47)*	0.01 *(0.48)*	0.06 *(1.06)*
infra_indx	6.44 *(2.02*)*	5.99 *(3.31***)*	5.24 *(1.16)*	1.97 *(0.96)*	13.68 *(1.94*)*	15.13 *(5.67***)*	2.82 *(0.42)*	10.85 *(3.9***)*	9.07 *(2.61**)*	9.54 *(4.48***)*	-9.74 *(-0.99)*
Teacher level factors											
male	-2.94 *(-2.49*)*	-1.74 *(-2.19*)*	-2.68 *(-1.77*)*	-3.56 *(-3.32***)*	-5.35 *(-1.64)*	-4.26 *(-3.8***)*	-0.83 *(-0.28)*	2.56 *(1.67*)*	-2.94 *(-2.15*)*	-3.77 *(-3.7***)*	-2.19 *(-0.89)*
regular_tcr	-0.35 *(-0.23)*	1.35 *(1.4)*	-4.28 *(-2.05*)*	-6.38 *(-3.2***)*	2.63 *(0.73)*	-3.44 *(-2.43*)*	6.09 *(1.05)*	7.05 *(2.54*)*	0.12 *(0.07)*	1.74 *(1.52)*	8.34 *(1.18)*
grad_tcr	-1.90 *(-1.57)*	-3.51 *(-3.74***)*	0.64 *(0.38)*	0.91 *(0.71)*	-2.14 *(-0.77)*	-0.49 *(-0.46)*	-4.42 *(-1.61)*	-0.96 *(-0.71)*	-1.34 *(-0.98)*	-3.98 *(-3.6***)*	-5.12 *(-1.82*)*
ttc_bed	3.54 *(2.75**)*	3.83 *(5.04***)*	4.62 *(2.67**)*	4.48 *(3.79***)*	-1.33 *(-0.43)*	-1.16 *(-0.97)*	0.86 *(0.2)*	1.54 *(0.91)*	2.37 *(1.55)*	1.67 *(1.42)*	5.20 *(2.12*)*
lnexp	-1.46 *(-2.32*)*	-1.62 *(-3.75***)*	0.26 *(0.3)*	0.99 *(1.68*)*	-2.16 *(-1.15)*	-0.71 *(-1.09)*	3.04 *(0.45)*	0.85 *(0.28)*	-1.73 *(-2.41*)*	-2.94 *(-5.49***)*	-0.08 *(-0.06)*
Tac	0.00 *(-0.09)*	0.01 *(0.32)*	-0.01 *(-0.13)*	0.01 *(0.37)*	-0.04 *(-0.69)*	-0.13 *(-4.95***)*	0.04 *(0.51)*	0.04 *(1.12)*	-0.01 *(-0.29)*	0.03 *(1.35)*	0.09 *(0.82)*
Classroom level factors											
mult_gr	-0.78 *(-0.43)*	1.02 *(1.18)*	-1.99 *(-0.69)*	-0.78 *(-0.62)*	-3.77 *(-1.03)*	0.30 *(0.22)*	2.42 *(0.64)*	0.83 *(0.59)*	0.30 *(0.14)*	0.05 *(0.04)*	-3.88 *(-0.99)*
st_attend	0.19 *(4.43***)*	0.16 *(6.86***)*	0.17 *(2.34*)*	0.26 *(6.26***)*	0.09 *(1.17)*	0.18 *(5.92***)*	0.19 *(1.79*)*	0.21 *(3.69***)*	0.20 *(4.27***)*	0.21 *(6.11***)*	0.06 *(0.46)*
cr_env_indx	1.45 *(0.35)*	2.51 *(1.04)*	2.65 *(0.42)*	5.90 *(1.88*)*	2.21 *(0.27)*	-1.92 *(-0.63)*	-0.26 *(-0.03)*	2.08 *(0.45)*	2.67 *(0.59)*	-6.64 *(-2.51*)*	11.20 *(0.94)*
tcr_beh_indx	-4.67 *(-0.75)*	0.06 *(0.02)*	-12.66 *(-1.06)*	-7.04 *(-1.22)*	-9.81 *(-1.01)*	-23.89 *(-6.61***)*	32.96 *(2.02*)*	39.77 *(6.16***)*	-9.14 *(-1.37)*	-9.25 *(-2.3*)*	19.01 *(0.83)*
tch_tsk_1_pr	0.14 *(2.39*)*	0.07 *(2.19*)*	-0.04 *(-0.35)*	0.11 *(2.4*)*	0.20 *(1.55)*	0.33 *(6.34***)*	0.30 *(2.63**)*	0.33 *(5.72***)*	0.11 *(1.69*)*	0.05 *(1.1)*	0.33 *(2.08*)*
percnt_st_task	0.10	0.18	0.11	-0.09	0.13	0.09	-0.12	-0.16	0.12	0.11	0.05

	(1.73*)	(5.21***)	(1.16)	(-1.86*)	(1.35)	(2.33**)	(-0.86)	(-2.24*)	(1.81*)	(2.41*)	(0.44)
Student level factors											
boys	2.35 (4.91***)	2.18 (4.67***)	3.34 (4.3***)	3.47 (4.56***)	2.34 (2.69**)	2.33 (2.84**)	0.92 (1.07)	0.85 (1.03)	2.86 (5.06***)	2.85 (5.07***)	0.57 (0.67)
other_com	1.77 (2.32*)	1.81 (2.43*)	2.16 (1.86*)	1.92 (1.73*)	3.20 (2.27*)	3.78 (2.81**)	-0.97 (-0.64)	-1.18 (-0.84)	1.79 (1.8*)	1.79 (1.8*)	1.90 (1.82*)
noof_sibling	-0.37 (-2.73**)	-0.37 (-2.91**)	-0.39 (-2.1*)	-0.40 (-2.22*)	0.12 (0.48)	0.09 (0.35)	-0.98 (-2.65**)	-1.01 (-2.85**)	-0.40 (-2.61**)	-0.36 (-2.39*)	-0.13 (-0.45)
f_edu_yrs	0.18 (3.09**)	0.18 (3.06**)	0.14 (1.52)	0.16 (1.81*)	0.21 (2*)	0.21 (2.1*)	0.18 (1.65)	0.17 (1.63)	0.20 (2.9**)	0.23 (3.21***)	0.09 (1.01)
m_edu_yrs	0.04 (0.56)	0.04 (0.52)	0.10 (0.92)	0.12 (1.11)	-0.10 (-0.81)	-0.08 (-0.7)	0.06 (0.47)	0.07 (0.54)	-0.04 (-0.41)	-0.06 (-0.64)	0.20 (1.89*)
asset_index	9.09 (6.42***)	9.90 (7.18***)	7.95 (3.69***)	7.29 (3.57***)	11.45 (4.44***)	11.57 (4.8***)	8.42 (2.99**)	7.72 (2.9**)	10.38 (6.29***)	10.80 (6.74***)	3.72 (1.42)
support_home	4.08 (4.79***)	4.07 (4.72***)	6.44 (4.78***)	6.64 (5.07***)	-0.09 (-0.07)	0.42 (0.32)	5.43 (3.01**)	4.41 (2.69**)	4.36 (4.5***)	4.25 (4.44***)	2.30 (1.3)
repeater	-2.02 (-2.94**)	-1.78 (-2.65**)	-1.00 (-0.82)	-0.89 (-0.75)	-2.33 (-2.28*)	-2.57 (-2.7**)	-2.98 (-2.16*)	-3.21 (-2.5*)	-2.45 (-3.17**)	-2.36 (-3.1**)	0.73 (0.49)
_cons	36.50 (3.59***)	28.26 (4.31***)	52.19 (2.85**)	46.85 (5.43***)	47.63 (2.81*)	78.45 (9.41***)	3.49 (0.14)	-3.87 (-0.33)	24.08 (2.41*)	25.43 (3.57***)	6.43 (0.22)
school_cd: Identity											
sd(_cons)	12.34	11.61	10.96	11.61	12.91	12.77	12.81	12.16	12.54	12.03	10.37
sd(Residual)	15.12	15.12	15.78	15.12	14.26	14.07	14.94	14.72	15.76	15.75	12.32

*p<0.05; ** p<0.01; *** p<0.001*