WHAT IS HAPPENING INSIDE CLASSROOMS IN INDIAN SECONDARY SCHOOLS?

A Time on Task Study in Madhya Pradesh and Tamil Nadu

WORLD BANK GROUP
educational initiatives
UKaid from the British people

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This report was prepared by Educational Initiatives for the World Bank, with Pranav Kothari, Raghav Rohatgi, Deepak Agarwal, Nischal Shukla and Archana Dwivedi as the key authors. It was supervised by Sangeeta Dey, Toby Linden and Namrata Raman Tognatta (all World Bank). We hope this report will be useful to policy makers, education administrators, teacher educators and schools.

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Note: A large number of people were involved in the preparation of this study. The authors apologise if someone has been inadvertently omitted from the list above.

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List of Abbreviations

ADPC	Additional District Project Coordinator
B.Ed	Bachelor of Education
CEO	Chief Education Officer
CTE	College of Teacher Education
DEO	District Education Officer
UDISE	Unified District Information System for Education
DIET	District Institute of Education and Training
EI	Educational Initiatives Private Limited
GoI	Government of India
HDI	Human Development Index
IASE	Institute of Advanced Studies in Education
ICT/IT	Information and Communication Technology/Information Technology
MCQ	Multiple Choice Question
M.Ed	Master of Education
MHRD	Ministry of Human Resource Development
MP	Madhya Pradesh
NCERT	National Council of Educational Research and Training
RMSA	Rashtriya Madhyamik Shiksha Abhiyan
SCERT	State Council of Educational Research and Training
SOS log	Stallings Observation System log
SSA	Sarva Shiksha Abhiyan
TN	Tamil Nadu
ToT	Time on Task
TUSK	Teacher Understanding of Student Knowledge
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Emergency Fund

Executive Summary

The Government of India launched *Rashtriya Madhyamik Shiksha Abhiyan* (RMSA) in March, 2009 which is along the lines of *Sarva Shiksha Abhiyan* but with the focus on secondary education. The key objectives of the scheme are to enhance access to secondary education and to improve its quality. It envisages achieving universal access to secondary level education by 2017, and improving quality of education imparted at the secondary level by making all secondary schools conform to prescribed norms.

The objective of this study is to document and analyse the current use of classroom time and identify good practices to improve classroom teaching in Mathematics and Language in secondary education in support of the implementation of the RMSA scheme. This study has been carried out as part of the World Bank's initiative with concurrence from Ministry of Human Resource Development (MHRD), Government of India (GoI).

This study builds upon an earlier study on time-on-task which was carried out by the World Bank for elementary schools in the states of Andhra Pradesh, Madhya Pradesh and Uttar Pradesh in 2006-2007. That study was instrumental in providing valuable insight on time spent and the nature of teaching in elementary classrooms. The current study aims to achieve the same in secondary schools.

Scope and Design

This study looks at the available learning time, teaching methods and learning materials available in the classroom along with the characteristics of students, teachers and schools to document how effectively instructional time is used in the class. The study also video records teaching practices of a smaller subset of teachers in order to create a corpus of real-life examples of teaching practice that can serve as an effective learning tool in teacher training programs and generate discussion among educators and teachers on effective teaching practices to increase student engagement in the class. This is the first time such a study has been conducted in secondary education in India and therefore this report goes into some of the technical issues addressed during the implementation, so that others can repeat and extend the study in other places.

The present study covered 150 secondary schools spread across 3 districts each in Madhya Pradesh and Tamil Nadu. Language and Mathematics subject classes were observed in class 10 in each school. In case it was not possible to survey class 10, class 9 was observed in that school. The following instruments were administered in each school: A) Stallings tool; B) SOS Log; C) Student Questionnaire; D) School & Teacher Questionnaire; and, E) Teacher Understanding of Student Knowledge Questionnaire. All these tools are discussed in detail in subsequent chapters.

Key Findings

Overall, classes were held for 179 days in Madhya Pradesh (Figure 1) **and 182 days in Tamil Nadu in the academic year 2014-2015** (Figure 2: Expected vs actual days on which classes held, Tamil Nadu (2014-2015)Figure 2). Even though schools operate for 6 days a week in Madhya Pradesh the actual number of days on which classes were held was very slightly less than in Tamil Nadu because of a longer summer break (45 days in Madhya Pradesh as against one month in Tamil Nadu), more exam days

(44 days against 27 days) and unscheduled closings. Discussion with state officials revealed that the number of unscheduled closings was as per their expectations and could be due to various reasons such as local festivals, state/district events or heavy rains.

Figure 1: Expected vs actual days on which classes held, Madhya Pradesh (2014-2015)

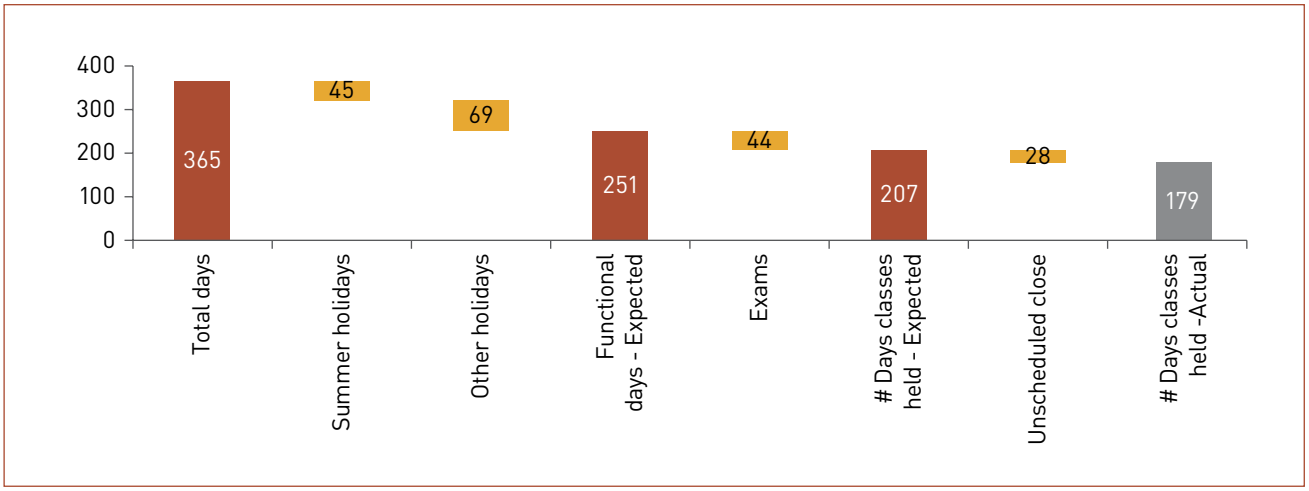
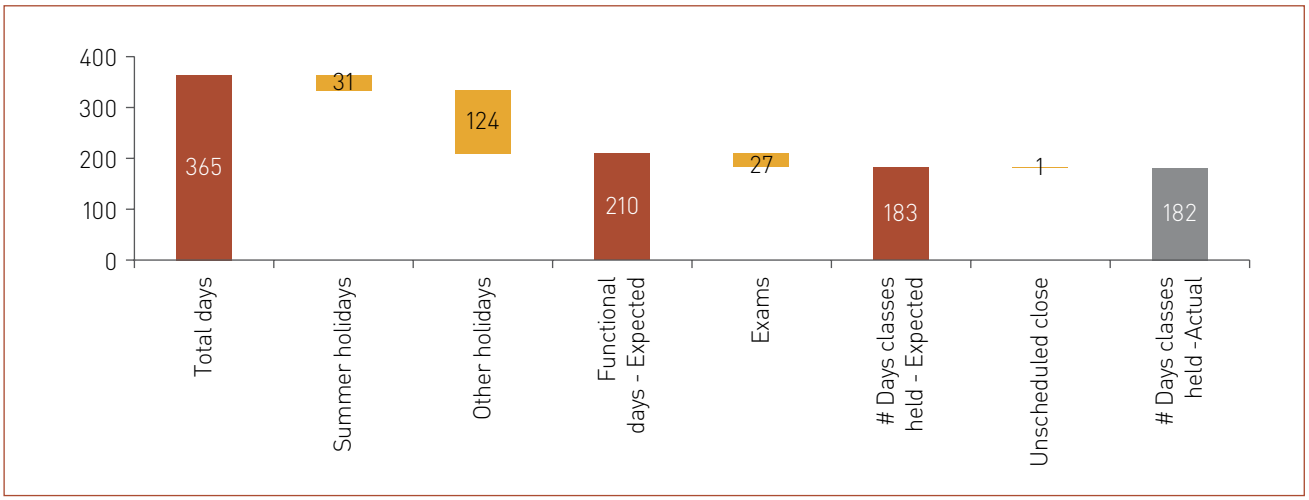


Figure 2: Expected vs actual days on which classes held, Tamil Nadu (2014-2015)



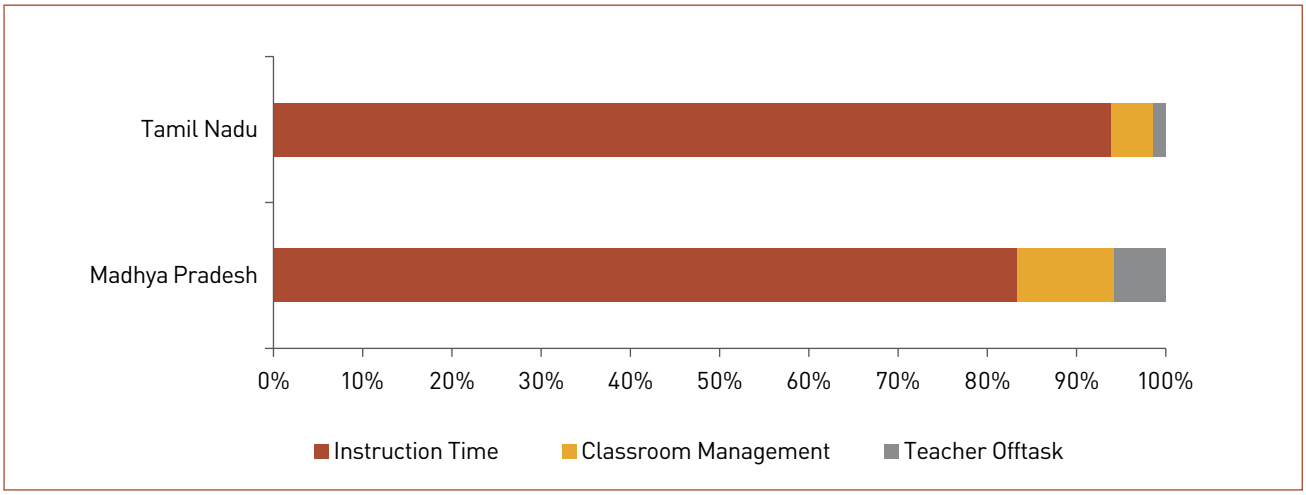
On an average, teachers were away from schools for 17.8 days in Madhya Pradesh and 20.6 days in Tamil Nadu. Out of these, the number of days for personal leave was the highest across all 6 districts. Teachers were not in school mainly due to personal leave, training and other official duties. The number of days spent in training is very less especially in Madhya Pradesh where teachers were in training for 3.7 days in 2014-15 in comparison to 6.3 days in Tamil Nadu. Also, an analysis of teacher availability data by gender, age and experience shows that:

- Male teachers were in training and on official duties for significantly more days than female teachers in Madhya Pradesh. No such differences were found in Tamil Nadu.
- In Madhya Pradesh young teachers in the age group of 21 to 30 years have taken far less leave and also went on training or official duty for fewer days which results in them being away from school for 10 days in comparison to approximately 19 days among other age groups.

Classroom observations noted how much time teachers were spending on various activities. Activities were further classified into – 1) Instructional activities: activities where teacher and students are involved in productive teaching and learning, and 2) Classroom management and other off-task activities: where the teacher is spending his/her time in managing the classroom or on other activities not associated with student learning. The average class time in both states is 45 minutes.

Overall, almost 89 percent of teachers' time was spent on instructional activities (Figure 3)**. However, there is significant difference in Madhya Pradesh and Tamil Nadu on how time is being spent in the classroom.** In Madhya Pradesh, 83 percent of the time is spent on instructional activities whereas this number is 94 percent for Tamil Nadu. In Madhya Pradesh, time being spent on classroom management and off-task activities is high at 11 percent and 6 percent, respectively, and is lower in Tamil Nadu at 5 percent and 1 percent respectively.

Figure 3: Break up of teachers' time in classroom across different activities



There are important differences in the way instructional time is used across subjects. Teachers are spending more time on 'Discussion' and 'Reading Aloud' in Language than in Mathematics classrooms. 'Assignment/class work' and 'Copying' activities are take up a higher proportion of class time in Mathematics classrooms than in Language classrooms. The observers found that most Mathematics teachers solve examples on the blackboard and ask students to copy it down which may explain more time in class work and copying in Mathematics classrooms. 'Instruction, demonstration or lecture' and 'Assignment/class work' dominate and take up almost 50 percent of class time across subjects. It is also noteworthy that 17 percent (approximately 7-8 minutes per lesson) of the class time is devoted for discussions in both the subjects.

There are also differences in the teaching and learning materials used, though the range of such materials was very limited. In Mathematics classes in both states, teachers are using the blackboard for more than 50 percent of class time (Figure 4). In contrast to this, in Language classes, use of textbooks dominates and takes up 40 percent of class time (Figure 5). In both subjects and states, use of other learning aids is limited and co-operative learning and use of ICT is almost non-existent in the classroom. (It should be noted that ICT tools may be used in computer labs which were not part of this survey.) Along with the materials available in the classroom, observers also noted if students have textbooks and notebooks of their own in the class. All students in both states had textbooks and notebooks in more than 90 percent of the classes observed.

There is a stark difference between the two states in terms of availability of learning resources. Whereas Tamil Nadu reported more than 95 percent schools having 7 out of 9 learning resources on the survey questionnaire, this percentage was 38 percent in Madhya Pradesh. In Madhya Pradesh,

Figure 4: Frequency of use of different learning materials, Mathematics

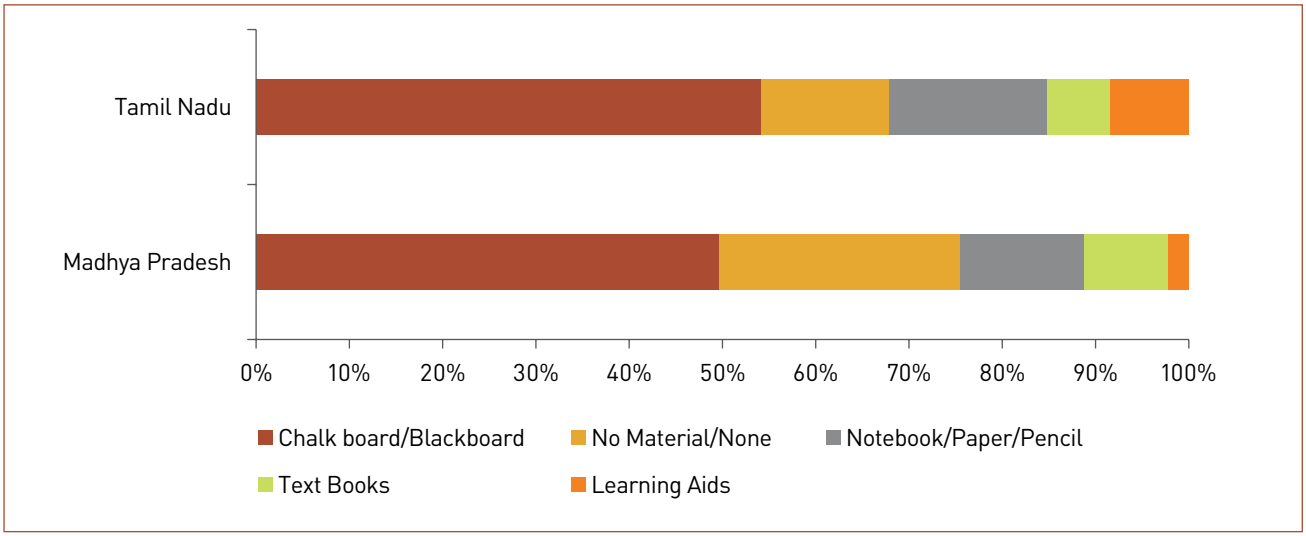
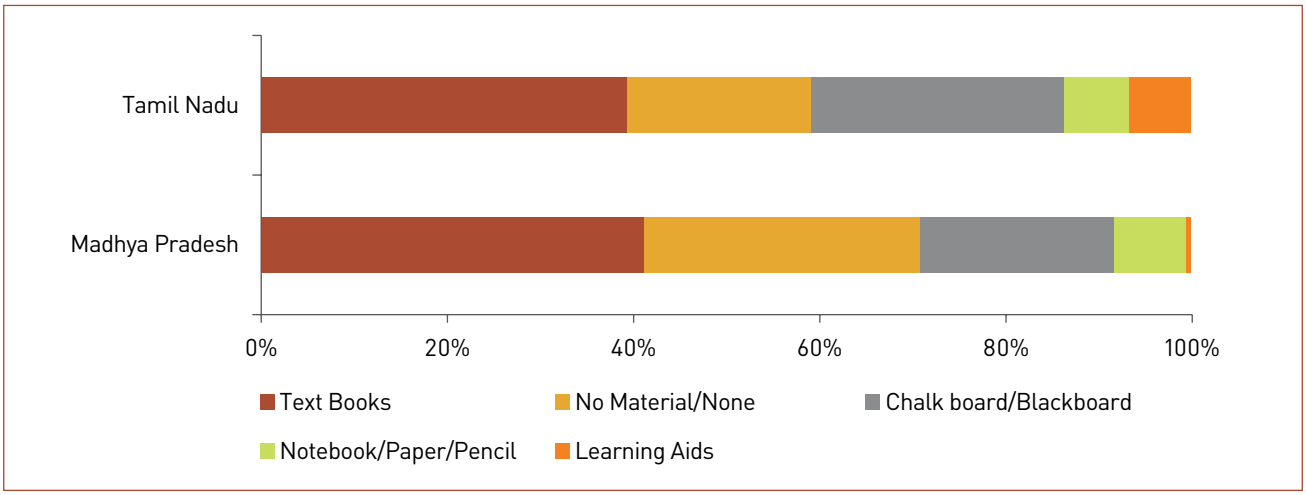


Figure 5: Frequency of use of different learning materials, Language



learning resources are especially lacking in Balaghat schools. Only 11 percent schools in Madhya Pradesh reported having computers in comparison to 85 percent schools in Tamil Nadu.

The engagement level of students in Tamil Nadu was high as all the students were doing the activity carried out by the teacher for 73 percent of the classroom time (Figure 6). It was significantly lower in Madhya Pradesh where the entire class was engaged for 41 percent of the classroom time.[1] However, it should be noted that when all students were engaged this almost always meant that all students were doing the same activity, regardless of whether they were able to understand what was being taught or, indeed, their understanding had already gone significantly beyond the material being discussed.

In Madhya Pradesh, a student attendance rate of 70 percent was recorded on the day of observation in comparison to 88 percent in Tamil Nadu schools. There is no significant difference in enrolment or attendance rates for boys and girls across rural and urban schools (Figure 7).

1 The Stallings Manual identifies 4 categories of student participation to be used during the class observations: 'Entire Class' – All the students are involved in the activity, 'Large Group' – 6 or more students are involved in the activity but not the entire class, 'Small Group' – 2 to 6 students are involved in the activity, '1 student' – 1 student is involved in the activity independently.

Figure 6: Student involvement

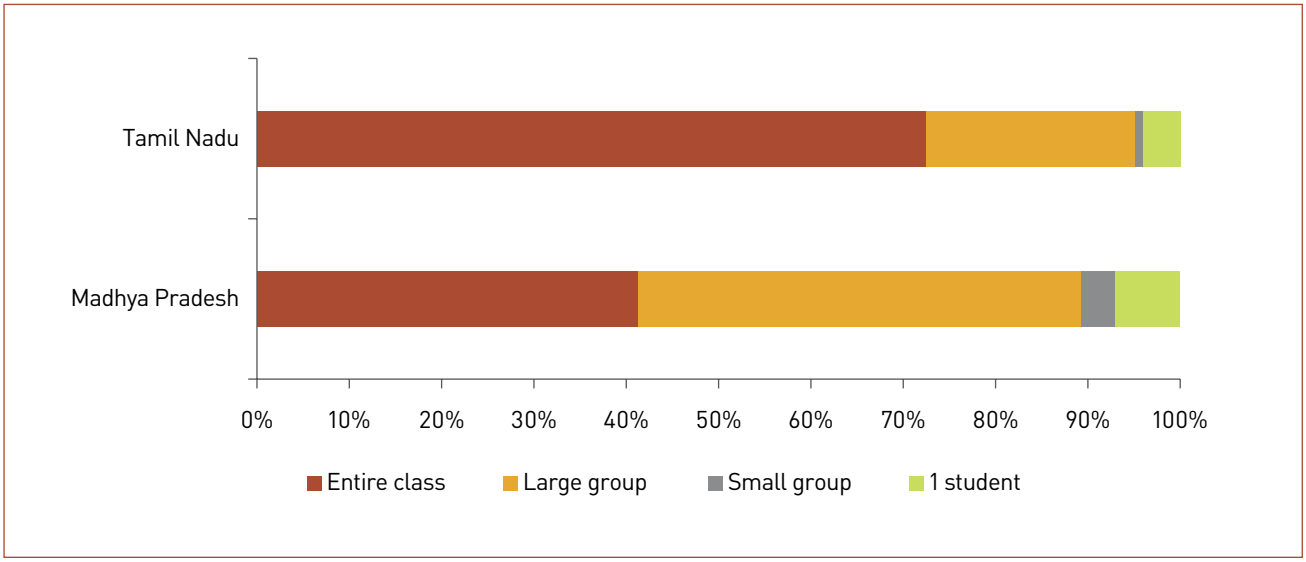
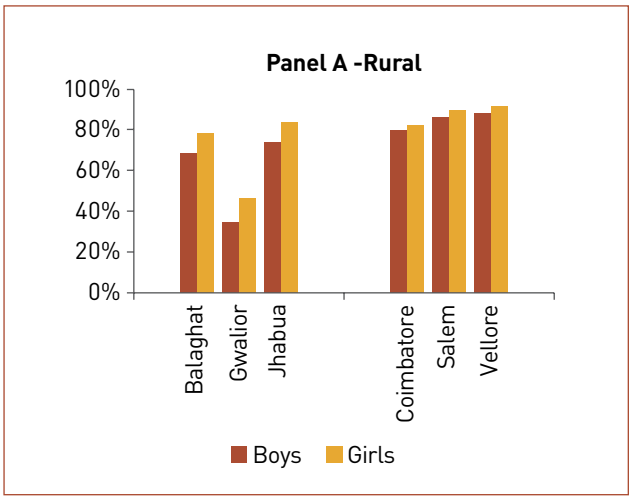
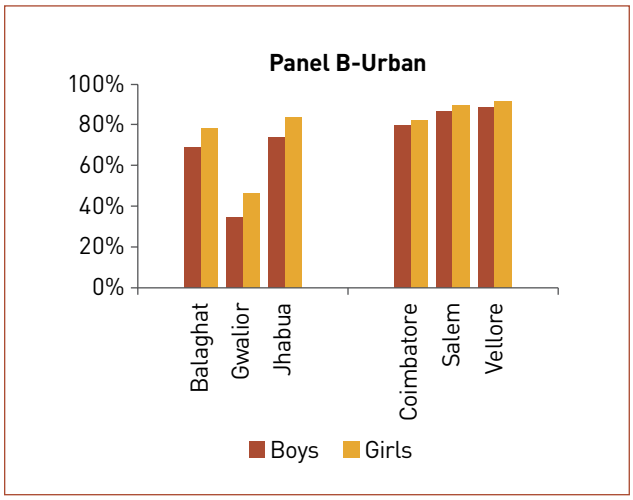


Figure 7: Attendance of boys and girls across rural and urban schools



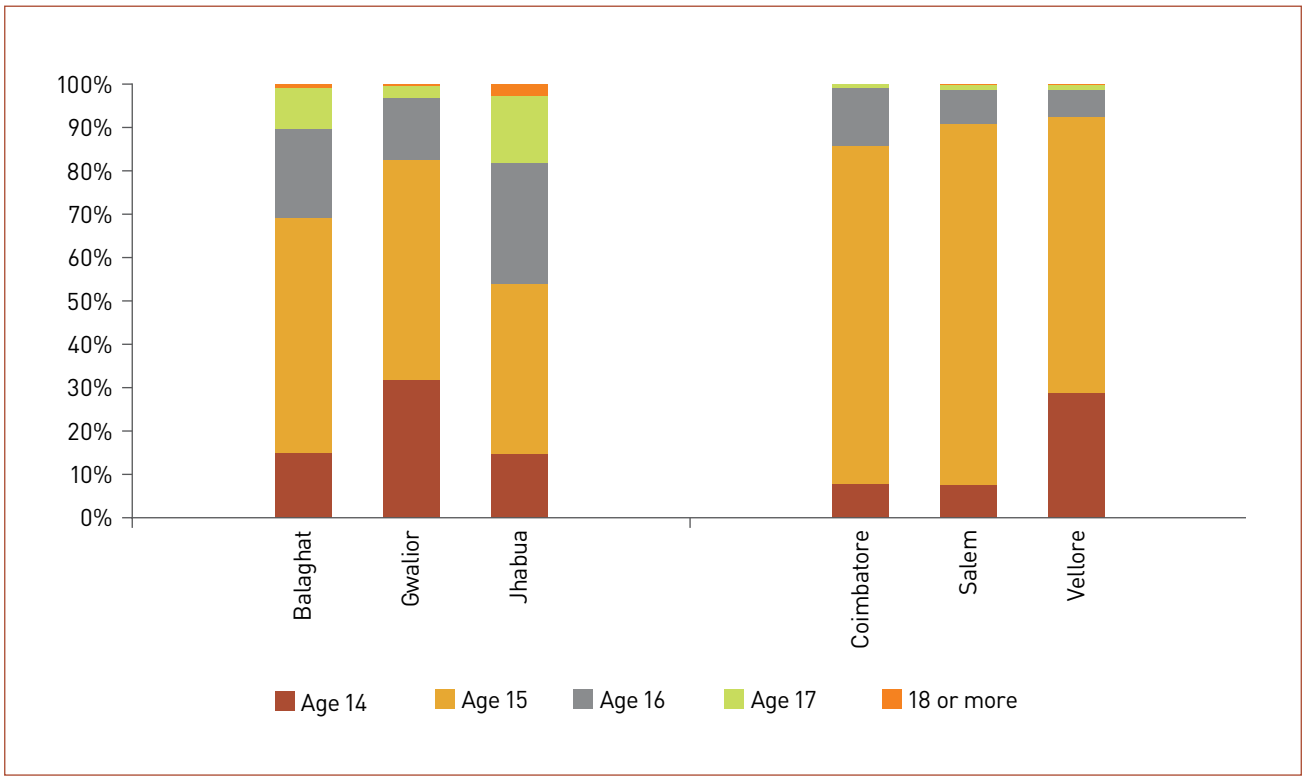


More than 95 percent students in both states responded positively when asked if they like to come to school and feel that education is important. Approximately the same number of boys and girls responding yes. The survey also looked at the gender neutrality of classroom practices or if they favoured any one gender. The survey checked gender neutrality by checking if teachers were asking questions, praising, scolding or offering to do classroom management predominantly for one gender group in the class. Data shows that there was no significant gender bias in either state.

Around 50 percent of students in Madhya Pradesh and 74 percent of students in Tamil Nadu are 15 years old (i.e., the expected age for class 10) (Figure 8). In Madhya Pradesh, schools have diverse groups in terms of age as at least 18 percent students are younger than 15 years and more than 30 percent students are older than 15 years. This diversity of student ages poses an additional challenge to teachers in responding effectively to the different educational needs of students.

Principals and students generally perceive effective teachers and teaching in the same way as the expert observations in this study. Principals' rating of teachers are moderately positively correlated with time spent on instruction in the classroom and student engagement level. Effective teaching practice as perceived by students is also moderately positively correlated to engagement levels of students.

Figure 8: Distribution of student's age, by district



In order to understand if teachers are able to point out errors made by students, a test of 10 questions was given to each of 28 language and Mathematics teachers who were observed. The test was voluntary with no time limit.

On an average, in each state, language teachers were able to identify student errors 50 percent of the time and Mathematics teachers got 40 percent of the questions correct (Table 1). The performance of Madhya Pradesh teachers was found to be slightly higher than that of Tamil Nadu teachers in Mathematics as well as Language. Across all the districts, performance of teachers in the district of Gwalior was the highest (with the language teachers getting 53 percent of the questions right and Mathematics teachers getting 47 percent of the questions right).

Table 1: Teacher understanding of student knowledge

Language	
District	**Overall % correct**
Gwalior (MP)	52.7
Salem (TN)	50.0
Balaghat (MP)	49.2
Jhabua (MP)	48.0
Coimbatore (TN)	47.1
Vellore (TN)	43.9

Mathematics	
District	**Overall % correct**
Gwalior (MP)	47.4
Coimbatore (TN)	38.9
Vellore (TN)	38.3
Jhabua (MP)	37.7
Balaghat (MP)	35.0
Salem (TN)	34.8

While teachers were able to identify errors made by students correctly for some of the questions of lower class levels, there were cases where most teachers missed fundamental conceptual errors made by students. Also, responses on some of the questions of higher class levels (classes 8, 9 and 10) seem to indicate that the teachers probably have the same wrong notions as their students.

The study also created separate videos that capture teaching-learning practices in Language and Mathematics in each state. The purpose of this video compilation is to serve as a starting point for a discussion among teachers, teacher trainers, principals and other key stakeholders on classroom practices that can best support student engagement and student learning to suit their specific learning environments.

Conclusion

This study highlights the need for further examination on the link between classroom practices and student outcomes. Teachers are spending substantial class time on instructional activities but results from the National Achievement Survey (NAS) indicate this is not leading to good enough student learning outcomes. Most of the time all students are engaged in what is happening in the classroom; but this is because they are all doing exactly the same thing. Further, re-examining the content of teacher preparation and training programs to ensure content mastery among teachers will be crucial for teacher effectiveness and student learning. Finally, there were small but notable differences across districts in instructional practices; these differences could be the result of district-level processes for teacher recruitment and pre- and in-service training.

All the material from the study, including the questionnaires and the edited video material, is available for use by governments and researchers.

1. Study Overview

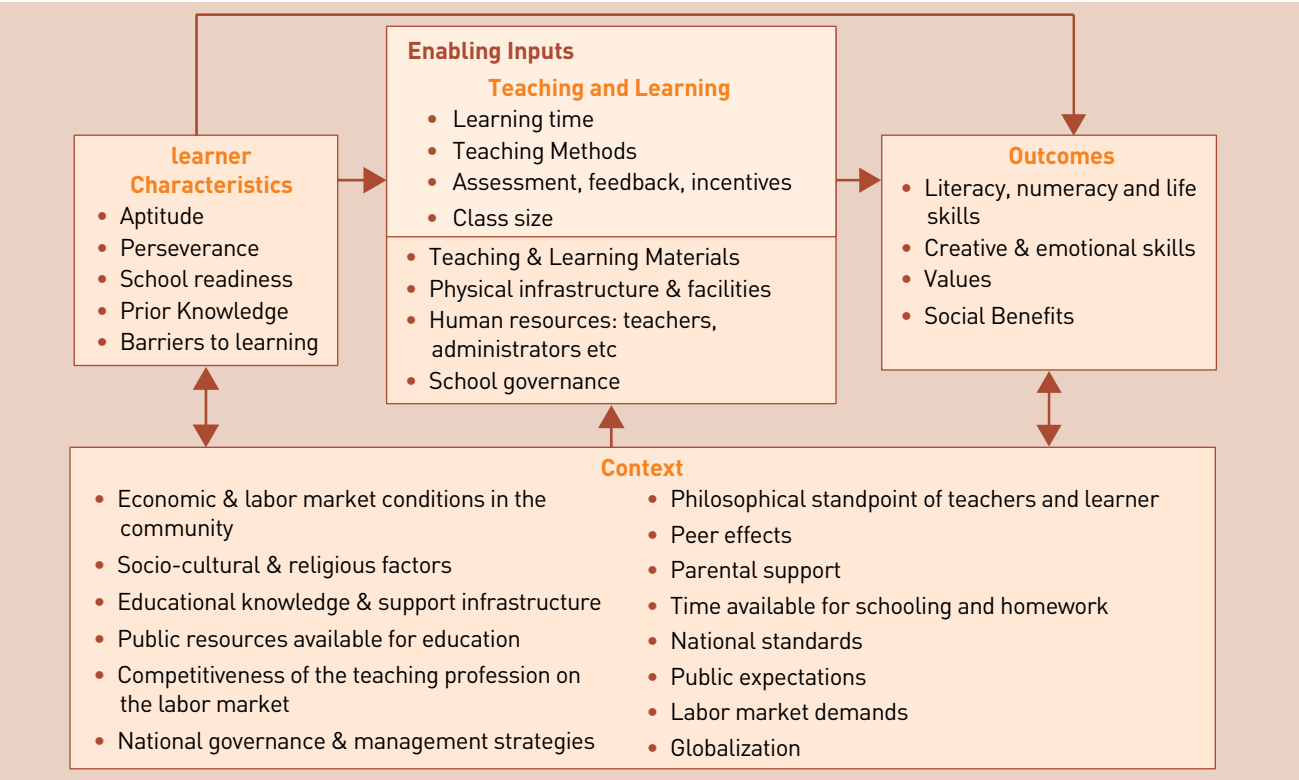
1.1 About the Study

How effectively instructional time is used is a core determinant of the quality of education a child receives. Every element of the education system, from curriculum design to school construction, book procurement and teacher salaries, comes together at the moment when a teacher interacts with students in the classroom. The information about classroom practices in this study is expected to support the development of more effective teacher training programs that leverage skills of well-performing teachers (good practices) and provide a range of solutions for challenges faced by teachers in classrooms.

Effective learning is an output of many factors which interact together in a complex manner. Among these, primarily, learner characteristics, teacher characteristics, classroom environment and context define the teaching and learning activities which take place in a class and which are critical to learning outcomes. UNESCO has proposed a model outlining the relationship between different factors and learning outcomes (Figure 9).

As very few studies on time on task in secondary education have been completed internationally, this is an opportunity for India to demonstrate how to do it, what is possible and what can be learnt from such studies. A prior Time on Task Study (2006-07) by the World Bank conducted in 3 states (Andhra Pradesh, Madhya Pradesh and Uttar Pradesh) in government and private elementary schools provided valuable insights on time spent and the nature of teaching in classrooms. With similar objectives, this study has been conducted in secondary schools of Tamil Nadu and Madhya Pradesh.

Figure 9: Factors that affect teaching and learning process



1.2 Scope and Objectives

The study aimed to observe the time spent by teachers in different activities in the classroom. The study was conducted in 3 districts each of Tamil Nadu and Madhya Pradesh. The districts selected were Coimbatore, Salem and Vellore in Tamil Nadu, and Balaghat, Gwalior and Jhabua in Madhya Pradesh. A total of 150 schools were covered for classroom observations and 32 classrooms were video recorded.

In the study, one Language and one Mathematics classroom were observed mostly in class 10 by field observers (trained by EI) in each school. Apart from observing Language and Mathematics classes, 2 questionnaires were administered in each school to capture: (i) background information about the school and teachers; and, (ii) perceptions of the students about the teaching practices in their classrooms. Teachers of the classes observed also completed the Teacher Understanding of Student Knowledge (TUSK) tool in Mathematics and Language (Hindi/Tamil).

In both states, some classes were video recorded to capture a variety of teaching practices for dissemination and discussion among teachers on effective teaching practices. The RMSA offices in both states were requested to suggest names of teachers whose classroom could be selected for this purpose. In each state 8 classrooms were chosen for the video recording for both Language and Mathematics.

The study had the following objectives:

- To document and analyse the current use of classroom time and identify good practices to improve classroom teaching in Mathematics and Indian Languages in secondary classrooms in India.
- To collect data on the various background factors of interest which may have direct or indirect influence on the classroom practices of the respective schools, teachers and students surveyed.
- To collect information on students' perceptions of classroom practices and whether they found the teaching useful.
- To analyse functional days in schools, teacher absence and time spent on academic and non-academic activities.
- To develop videos on teaching practices followed in schools, which can be used to generate discussion on effective teaching practices during training activities.
- To understand if teachers are able to identify conceptual mistakes or the root cause of errors made by students while solving problems.

1.3 Key Stages and Timelines

The study was initiated with meeting and discussing the idea of a ToT study with senior officials of Tamil Nadu and Madhya Pradesh (Table 2). This was followed up with getting permission and field work for data collection. Regular progress reports were shared with the World Bank, RMSA Madhya Pradesh and RMSA Tamil Nadu. The field operation process was completed with data entry of survey tools. Once the preliminary analysis was completed, the findings were shared with both Madhya Pradesh and Tamil Nadu state governments and RMSA offices by holding state level meetings. Based on the comments received the report and videos were finalised.

Table 2: Key milestones with timelines 2015-2016

Key Stages	October				November				December				January				February			
Weeks	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Meeting state top officials																				
Pre-survey work																				
Training and Recruitment																				
Pilot survey																				

Key Stages	October				November				December				January				February			
Weeks	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Planning for field survey			■	■																
Field survey and spot checks							■	■	■		■									
Progress report to World Bank				■				■				■				■				
Data entry of survey formats											■	■								
Video shooting								■	■	■	■									
Analysis													■	■	■	■	■			
Video editing and finalization													■	■	■	■	■	■		
Meeting with state top officials for sharing analysis																	■		■	
Submission of final reports and videos																		■	■	■

1.4 Limitations

Since schools were told about the survey beforehand due to logistical reasons, though the exact date of survey was not communicated to them, a complete surprise visit was not possible to ensure that observers capture the typical scenario in the school. Even if a surprise visit would have been possible, the presence of the surveyor in the classroom itself can cause the teachers to alter their behavior in the class. To measure the extent to which classroom behavior got affected due to the survey, a series of questions were asked to students who were present in the classroom observed (Table 3).

Table 3: Student responses

A: Did the teacher teach a new topic or revise an old lesson?				
	Topic taught	Same Topic	New Topic	Total responses
Madhya Pradesh	Jhabua	15%	85%	53
	Gwalior	16%	84%	55
	Balaghat	18%	82%	51
Tamil Nadu	Vellore	58%	42%	53
	Salem	33%	67%	49
	Coimbatore	7%	93%	44

B: Did the teacher teach in a different way or same way as usual?				
	Style of teaching	As usual	New	Total responses
Madhya Pradesh	Jhabua	85%	15%	52
	Gwalior	74%	26%	50
	Balaghat	83%	17%	54
Tamil Nadu	Vellore	57%	43%	47
	Salem	47%	53%	43
	Coimbatore	13%	88%	48

In Tamil Nadu, the trend was different than expected especially in Salem and Vellore. The data presented here is as reported by students in the questionnaire. During the survey no specific trend was reported by observers in the state.

2. Test Design and Development

2.1 Instruments

The following tools were used for the study:

i. **Student questionnaire:** The primary objective of the student questionnaire for the ToT Study was to collect background information about the students, which could then be used to study various things with respect to the type of schools they go to, infrastructure available in those schools, teachers in those schools, and the classroom practices observed in their classrooms. It also tried to capture the 'student recall' factor, which could provide some information about how students perceived their classroom in general and the particular classroom which was observed by the evaluator.

   This was administered to 25 percent of the students present in the classroom. Students were randomly selected and completed the questionnaire in a separate room.

ii. **School questionnaire:** The primary objective of the school questionnaire was to collect information about school infrastructure, resources available, and background of the headmaster and the teacher, which could then be used to understand the type of schools covered, the educational and professional background of the headmaster and the teachers surveyed and also provide information about the amount of time spent by the teacher on academic and non-academic activities, number of days she had to go for trainings and other work and leave taken.

   Primarily the school principal filled this questionnaire. In case some information about the teacher was not known, the teacher was consulted.

iii. **Teacher Understanding of Student Knowledge (TUSK):** The primary objective of the TUSK tool was to capture how well teachers understand errors made by students. Based on sample responses given by the students on previous assessments conducted by EI, the teacher was asked to identify the different errors being made so that the information could then be used to plan appropriate remediation to handle those errors. Hence understanding students' errors is an important skill that a teacher is expected to possess. This was attempted by the Language and Mathematics teachers whose classrooms were observed. Teachers whose classrooms were observed were asked to complete the TUSK tool, but it was not made mandatory.

2.2 Design of the Tools

In order to understand the relevant parameters that should be included in the questionnaires, various national as well as international questionnaires were reviewed. Based on this, a broad framework for each tool was designed.

The Student questionnaire covered 6 parameters, with majority of the focus on students' perception about studies, teachers and their school, and student recall parameters (Table 4).

Table 4: Number of questions for each parameter in student questionnaire

Sl. No.	Parameter	No. of questions
1	Basic details	4
2	Economic background	3
3	Academic likes/dislikes/attitudes/studying patterns	4
4	Parent/Guardian's education and profession	2
5	Student perception about studies, teachers & schools activities	1 (17 sub-questions)
6	Student recall	7

The school questionnaire covered seven parameters (Table 5).

Table 5: Number of questions for each parameter in school questionnaire

Sl. No.	Parameter	No. of questions
1	Infrastructure	11
2	Materials and Resources	14
3	Finance	1
4	Headmaster's background, educational qualification and experience	10
5	Teacher's background, educational qualification and experience	15
6	Teacher's time spent on academic/non-academic activities, number of days spent on trainings and other activities and amount of leave taken	5
7	Principal's perception of teacher quality	1

The TUSK tool focussed primarily on one skill –teachers' understanding of student errors. The Mathematics tool had 8 multiple choice questions and 2 free response questions while the Language tool had 7 multiple choice questions and 3 free response questions. Each multiple choice question also had some space where the teacher could express his/her thoughts.

Table 6: Number of questions in TUSK tools

Sl. No.	TUSK Tool	Multiple Choice questions	Free Response questions	Total number of questions
1	Language	8	2	10
2	Mathematics	7	3	10

2.3 Tool Development Process

The tool development process was divided into 3 broad stages:

Stage 1 consisted of reviewing national and international surveys, defining the blueprint for each tool and developing questions for the tools. The blueprint was reviewed by members from the World Bank team.

Stage 2 consisted of translation (and its validation) of the tools in Hindi and Tamil languages.

Stage 3 consisted of collecting feedback on the tools through pilot testing and review by the members of the Advisory Committee. The tools were finalized based on their feedback. Changes in the translated versions (if needed) were incorporated. Such finalised tools were then used for final testing.

Figure 10: Process followed to develop survey tools

Tool Development Stages	
Stage 1: Development of framework and questions	Reviewing national and international surveys Development of questions for the tools
Stage 2: Translation and Validation of the tools	Translation and validation of the tools in Hindi and Tamil languages
Stage 3: Finalisation of the tools	Pilot testing of the tools Review of the tools by the members of the Advisory Committee. Finalisation of the tools based on the comments

Review of national and international surveys

In order to understand the different parameters captured through various national as well as international questionnaires, questionnaires of surveys such as National Achievement Survey, Trends in International Mathematics and Science Study, Programme for International Student Assessment, Teaching and Learning International Survey, Tripod Student Survey, etc. were reviewed. This was very helpful as it gave insights into the different detailed ways of asking some very simple questions.

For example, while reviewing the National Achievement Survey Background Questionnaire, it was noticed that instead of capturing the educational background and occupation of parents in general, it may be better to capture it separately for each parent.

Looking at international surveys such as Tripod Survey (used for the Tripod Project) was very helpful in understanding the questions used to capture student perspectives on teaching practices, classroom learning conditions and student engagement.

While most of the survey questionnaires tried to capture one or more parameters like social and economic background and student perceptions, very few focussed primarily on the student recall factor. For this, new questions were developed that suited the objective of understanding what students remembered from the class that just got over (the class that was also observed using the Stallings tool).

Development of blueprint for the tools

Based on the review of the different surveys and the objectives of developing the different tools for the ToT Study, a blueprint with an overall framework (as shared in section 3.2) for each tool was laid down. The blueprint also tried to specify how each parameter and its sub-components could be used in analysis.

For example, questions capturing social background of students could be used in descriptive analysis comparing schools with different student compositions and their correlation with types of classroom practices.

For the TUSK tool, there was no detailed framework as there was only one specific skill - 'teachers' ability to identify student errors' to be tested.

Item Development

While most questions for the student and school questionnaires were either used from past studies done by Educational Initiatives (EI) or adapted from surveys like National Achievement Survey and Tripod, the questions for TUSK were developed anew using information from earlier studies done by EI.

In order to ensure that there were sufficient items, extra items were developed and field-tested so that the irrelevant/difficult items could be dropped. Apart from this, detailed feedback from the Advisory Committee members was used to finalise the questions.

Translation of the tools

All the tools were developed in English and then translated into Hindi and Tamil based on the guidelines specified for translation. Reliability was ensured by further checking the translated tools with language experts and reverse translation into English (validation). Terminologies in the Mathematics and Language papers were retained as per the vernacular language. This rigorous process for translation and validation provided comparable test items across both the participating states.

Feedback from the advisory committee members

In order to review the tools critically, all the tools were subject to feedback from the Advisory Committee. Advisory Committee members were a diverse group of people with varied expertise in the education domain, ranging from subject and pedagogy experts to policy advocates.

Comments from the Advisory Committee members included inputs on objectivity and sensitivity of questions, clarity, language and format. All the comments were captured and a detailed response sheet addressing each comment was prepared (see sample in Figure 11).

Figure 11: Snapshot of comments resolution process followed

Questionnaire	Qno	Comment	EI comments	Status
Student	7	parents--→ parents/caregiver/ guardian	Modified	Done
TUSK- Language	General	Wouldn't we want teachers to have confidential IDs to link the time on task data?	The School-Class-Subject combination would act as a unique identifier which can be linked to the ToT classroom observation data.	No change
TUSK- Language	1	While B is the "most" accurate answer, the others also seem plausible. Should we make this clear in the instruction?	Agreed. Will change the instruction to 'What is the most likely reason...'	Done
TUSK- Language	1	Are we simply interested in whether teachers answer this question correctly or are we also interested in their incorrect answers? If the latter, the incorrect answers do not seem to be very informative.	If is both - their answer could be incorrect and tell us something about the wrong notion they may have, In this case, I agree that the strongest distract or is perhaps option D - the same mistake that the students may make. But teachers generally have the tendency to relate the wrong answer of the students to them 'not understanding the question' which is being captured by option A.	No change

Questionnaire	Qno	Comment	EI comments	Status
TUSK- Maths	9	C is the correct answer, but A and B are not entirely incorrect.	Yes, C is the intended answer, A looks very unlikely in this case as that understanding is not involved in answering the question. Most likely reason is that students think that n and p are two different variables and hence two different numbers. Will frame the question as 'most likely reason'.	Done
TUSK- Maths	12	How do you plan to score this answer?	Same as language - qualitative analysis of the responses will be done.	No change
TUSK- Maths	14	Watch where you place the image in this question.	Instruction followed.	Done
TUSK	General	Make a script for the evaluator to talk at the beginning and add that in the tool itself	Added	Done

Pilot testing and finalisation of the tools

Pilot tests were carried out for the following purposes:

- To get qualitative feedback on the tools and calibrate the questions based on it.
- To understand the process involved in conducting the tests and fine-tuning them for the main tests.

Table 7: Details of pilot conducted in Madhya Pradesh and Tamil Nadu

State	District	Dates	Schools	Classrooms	TUSK	Student questionnaire
Madhya Pradesh	Gwalior	3rd and 4th November	5	10	10 teachers	90 to 100 students
Tamil Nadu	Salem	5th and 6th November	5	10	10 teachers	90 to 100 students

To understand how teachers would react to the optional TUSK tool, one-on-one interviews were carried out with some teachers. One of the main concerns teachers shared was that the questions had 4 options and at times they may want to provide an answer that was not mentioned. The revised tool therefore included space for additional open-ended responses from teachers. Based on detailed feedback from the Advisory Committee members, the questions were fine-tuned and finalised. Field teams only raised a few points on translation which were addressed during the finalization of the tools.

3. Sampling

The key objective of sampling was to select 75 secondary government schools each from the states of Madhya Pradesh and Tamil Nadu. Sampling had to ensure:

- Random selection to ensure no bias in the data.
- Proportional distribution of students from urban and rural areas and gender breakup within government schools of the respective states.

3.1 Sampling Design

Since only 75 schools were to be sampled from each state, it was decided that the survey would be conducted in 3 districts in each state to minimize logistical challenges. A set of criteria were developed for each state (Table 8).

Table 8: Sampling criteria for each state

Madhya Pradesh	Tamil Nadu
1. Geographic spread 2. HDI variety as a measure of socio-economic criteria. 3. The population weighted average of the 3 districts' HDI being close to the state's overall HDI 4. Location of CTE/Regional Institute of Education/ DIETs/etc in districts. 5. Mix of Urban and Rural and Tribal & Backward localities.	1. Geographic spread 2. HDI variety as a measure of socio-economic criteria 3. The population weighted average of the 3 districts' HDI being close to the state's overall HDI 4. Location of CTE/Regional Institute of Education/ DIETs/etc. in districts 5. Ranking of districts based on pass %

Districts were selected such that were selected such that the Population Weighted Average Human Development Index (HDI) of the sampled districts (with the weights being the district populations based on the Census - 2011) was close to the weighted average HDI of the state (Table 9). Some component of convenience sampling did factor in the selection of final districts due to state preference for some districts. In Madhya Pradesh, Gwalior was selected to see how an urban district performs (it was considered similar to Bhopal). Bhagelkhand region lags in most of the indicators hence it was considered important to include Balaghat. Jhabua was representative of tribal districts. In Tamil Nadu, the state preferred Salem district in place of Thiruvallur. Thiruvallur district was not considered due to its proximity to Chennai. Coimbatore and Vellore were accepted as originally suggested by EI. The HDI values for Balaghat, Gwalior and Jhabua in Madhya Pradesh, and Coimbatore, Salem and Vellore in Tamil Nadu are given below:

Table 9: HDI values of the districts selected in each state

Madhya Pradesh		Tamil Nadu	
District	HDI	District	HDI
Balaghat	0.544	Coimbatore	0.699
Gwalior	0.638	Salem	0.658
Jhabua	0.398	Vellore	0.626
MP	0.560	TN	0.658

Sources: Madhya Pradesh Human Development Report 2007; Tamil Nadu Human Development Report 2003.

To select 25 schools from each district, a Stratified Two Stage Cluster Sampling technique was used. The first level of stratification involved classifying schools into Rural and Urban categories. The next level of stratification involved splitting the Rural and Urban schools into girls, boys and co-educational schools. The next phase of the sampling procedure involved calculating the number of schools to be sampled from each stratum based on the proportion of the stratum followed by simple random selection of required number of schools from each stratum.

As number of schools selected in each state was only 75, the error margin was higher than normally accepted. Based on the error margin calculator (Creative Research Systems - http://www.surveysystem.com/sscalc.htm) the sampling design had an 11.2 percent margin of error at the state level.

Steps/assumptions involved in calculation:

- Total population size taken as 4,000[2] secondary schools in the state.
- A school was considered a single observation not taking into account the number of teachers participating in the study in each school.
- Any clustering effect was not taken into account due to selection of schools from only 3 districts rather than selecting them randomly from the entire state.

3.2 Sampling Frame and Data Collection

The target population was all the schools run by Department of Education (DoE) of the respective states which have class 9 and class 10 in the selected districts. In the district of Jhabua, since the number of schools run by DoE was only 7, tribal schools were also included in the sampling.

This data was provided by the SCERT of the respective states and included the list of all the schools with necessary fields like 'UDISE code', 'School type', 'School location', 'District' and 'Management'.

3.3 Final Sample

To make sure the target of 25 schools in each district was achieved, schools were over sampled in each district increasing the sample by 10 percent or 3 additional schools in each district. These schools were selected from the blocks which represented the larger part of the district from the replacement list.

From this final list of schools, 2 schools in Balaghat, 1 school in Jhabua and 1 in Vellore were replaced due to incorrect school details or unavailability of Language or Mathematics teachers in the originally selected school.

2 The total population was taken as 4,000 based on preliminary discussion with the State officials in both Tamil Nadu and Madhya Pradesh on approximate number of secondary schools.

4. Field Operations

4.1 Process with Timelines

The field work started with preparation for survey activities, followed by identification of District Nodal Person and District Coordinator, training and recruitment of Master Trainers, pilot survey and identification of Field Observers. Detailed planning for the field survey was done for smooth and standardized administration in the field with spot checks. Regular progress reports were shared with the World Bank, RMSA Madhya Pradesh and RMSA Tamil Nadu. The field operation process was completed with data entry of survey tools. The process began in the first week of October and ended in the fourth week of December (Table 10).

Table 10: Detailed execution plan, 2015

Process	Activities	October				November				December			
	Weeks	1	2	3	4	1	2	3	4	1	2	3	4
Pre-survey work	Preparation for Survey												
Training and Recruitment	**Training of Master Trainers in MP**												
	Training of field Observers, Gwalior MP												
	Training of field Observers, Jabalpur MP												
	Training of field Observers, Jhabua MP												
	Training of Master Trainers in TN												
	Training of field Observers, Salem TN												
	Training of field Observers, Coimbatore TN												
	Training of field Observers, Vellore TN												
Pilot Survey	Pilot survey in MP												
	Pilot survey in TN												
Planning for field survey	Development of schedule for survey												
Field Survey and spot checks	Training of field Observers, Gwalior MP												
	Training of field Observers, Jabalpur MP												
	Training of field Observers, Jhabua MP												
	Training of field Observers, Salem TN												
	Training of field Observers, Coimbatore TN												
	Training of field Observers, Vellore TN												
Progress report to World Bank	Emails on work completion												
Data entry of survey formats	Development of data entry formats												
	Data Entry of tools and questionnaires												

4.2 Pre Survey Work

The pre survey work was divided and completed in the following stages:

- **Meetings:** Meetings with the senior state government officials in MP and Tamil Nadu were held in the first and second week of October by the World Bank and EI. In these meetings, information about the study was shared with state officials and their support was requested for smooth conduct of the study. As a follow-up, the EI team visited each of the 6 districts in both the states and met district officials to seek their help and support for the study.
- **Obtaining Permission Letter:** An official permission letter was obtained from the state government before the trainings.
- **Informing districts and inviting them for training:** All 6 districts were informed about the training, pilot and timeline for the main survey. District officials were invited to join the Master Training Workshop. The details of the pilot and main survey work were discussed in detail with district officials during and after the master training.
- **Training preparation:** A 3-day Master Training Workshop was planned in each district from the first to third weeks of November in coordination with the EI team and the respective district officials. The training sessions were planned in consultation with Dr. Sudhakar Venu, trainer of master trainers specially appointed for the study by The World Bank. All logistical arrangements were made by the EI team with the help of the district nodal person and concerned district officials. Identification of training venue, arrangement of projector and white board, seating arrangements, breakfast, meals, tea & snacks etc. were completed. To provide participants with hands-on experience using the Stallings tool, participants were taken to schools for 2 days to do the survey with actual tools. Travel arrangements were made in advance by the EI team for visiting these schools.

4.3 Preparation of Training Material

Training materials included tools and manuals, both in English and the local language, presentation slides and tablets:

- **Tools and manuals:** Stallings tool, TUSK for Mathematics and Language, Student Questionnaire, School Questionnaire, SOS log form[3] and description sheet for Stallings tool were used in the survey. All these tools were prepared before the training.
- **Translation:** Stallings tool manual for classroom observation was translated followed by validation by experts in Hindi for Madhya Pradesh and in Tamil for Tamil Nadu. Comments on translated manuals were received during the Master Training Workshop and the comments were incorporated in the final version. Teacher Understanding of Student Knowledge and student questionnaire were developed in English and translated in Hindi and Tamil.
- **Preparation of tablets:** To ensure that the Stallings tool would be administered in a standardized manner, a special application was developed by the Educational Initiatives IT team which can run online and offline. This application takes care of all the validations as recommended by Stallings. The screens made for this application are provided in appendix A. These screens were developed in Hindi and Tamil. A total of 60 tablets were procured for conducting the survey in Tamil Nadu and Madhya Pradesh. The Stallings tool prepared for the survey was tested on these tablets, the school questionnaires were also installed on these tablets. In all the trainings, the observers were trained to use tablets and the application developed for the survey.

4.4 Training and Recruitment of Observers

To ensure quality of the data and uniformity in survey administration, trainings were planned at two levels in each state. Level 1, three day training to master trainers and level 2, three day training to field team on

3 The SOS log form was included to capture any gender bias in teacher behavior against students in the class.

district level was given to conduct the survey. In Salem, the field team was trained along with the master trainers of the 3 districts of Tamil Nadu. Participants were invited from DIET, RMSA, SSA and Teacher Training Institutes.

The agenda of the training sessions included all aspects of the study an observer should cover during survey. Detailed and in-depth information on the Stallings tool was provided along with the other tools on each day of the training. Field visit to schools were organised where an observer could get maximum knowledge and experience on how to administer the Stallings tool in the classroom before going for the actual survey. The training agenda is given in appendix B.

The training process included the followed steps:

- **Hiring of field observers:** To conduct the survey in the field, professionals with B.Ed/M.Ed degree with teaching experience were called for training. In Madhya Pradesh, initially DIETs were considered to participate in the survey. Later, this idea was dropped due to limited number of faculty members in DIETs, already entrusted responsibilities of faculty members and location of districts. Another option was to consider DIET students for the survey. Based on discussion with *Rajya Shiksha Kendra* and DIET principals, it was decided not to consider them as they had just 12 years of school education and may not have enough experience to conduct classroom observations for class 10. Later, based on the recommendations of the *Rajya Shiksha Kendra*, professionals were hired from College of Teacher Education in Gwalior and Institute of Advanced Studies In Education, Jabalpur. Observers for Jhabua were from the pool of experienced professionals from Jaipur who had previously worked in educational projects in Rajasthan conducted by EI. This was done because at the time of training, Jhabua and Dewas were having elections, so to avoid delay in training the survey team was built in Jaipur. In Tamil Nadu, observers were selected from the DIET faculties and SSA, based on the availability of officials keeping in mind the scheduled routine work.
- **Classroom Training:** On the first day, the training focused on the Stallings tool and how to administer it with the help of tablet. Day 2 and day 3 were more focused on clearing doubts from the classroom observations made on day 2 and day 3 (Table 11).

Table 11: Training details

Sl. No.	Type of training	Location	Dates	Trainer	Number of Trainees	Number of trainees selected	EI team members
1	Master Trainers	Bhopal	27 to 29 Oct	Dr. Venu	13	3	5
2	Master Trainers	Salem	2 to 4 Nov	Dr. Venu	30	10	4
3	Field Observers	Gwalior	5 to 7 Nov	Mr. Rohatgi Dr. Tiwari	20	9	1
4	Field Observers	Coimbatore	11 to 13 Nov	Ms. Haripriya Mr. Jha	20	8	2
5	Field Observers	Jabalpur	17 to 19 Nov	Mr. Rohatgi Mr. Neogi	23	10	2
6	Field Observers	Jhabua (Jaipur)	23 to 25 Nov	Ms. Iyenger Mr. Vijay	12	9	2
7	Field Observers	Vellore	9to 11 Dec	Ms. Haripriya Ms. Valarmathi Mr. Jha	30	10	2

Note: Observers for Jhabua were trained and hired from Jaipur. This was done because at the time of training, Jhabua and Dewas were having elections, so to avoid delay in training, the team was built in Jaipur. The trainees chosen for training were of high quality. They have worked on education projects in schools earlier. Training in Salem had over 20 observers and 10 master trainers, so the selected trainees were only 10. In Vellore, more officials were trained for building the capacity in the system and only 10 were selected for the survey. In the Bhopal master training, 3 master trainers were chosen to train officials at the district level.

- **Field visit:** To get hands-on-experience of the Stallings tool, all participants were taken to actual classrooms on day 2 and day 3 of the training workshop. In school, they were assigned 2 classrooms each day to observe using the Stallings tool on tablet. In total, four classrooms were observed by each participant to get in-depth knowledge of the tool during the training period. The challenges faced by the participants during the school visit were shared and discussed in the second half of day 2 and day 3 along with individual experiences of each participant.
- **Written Test:** To maintain high quality of the study, all participants went through a written test prepared by the World Bank's Master Trainer. Participants were selected based on their performance on this written test, understanding of the Stallings tool and a positive attitude towards the study. Participants who scored 65% or more marks on the written test were selected to work on the survey. For those who scored close to the cut-off, their doubts were further clarified and they received additional hand-holding.

4.5 Survey in Schools

Actual field work involved 3 key stages: 1) Planning, 2) Conducting the survey in schools, and, 3) Auditing and data collection.

Planning

- **Making the survey and route plan:** A route plan to visit schools was prepared by the EI state coordinator with the help of the district nodal person. The total number of schools scheduled for each day was based on the number of persons available for the survey on a specific date. Each school was visited and surveyed independently by one observer as per the schedule. This was prepared in advance and was shared with the World Bank.
- **Informing schools about survey:** The DEO (District Education Officer) informed schools about the visit in Madhya Pradesh and schools were informed by the CEO (Chief Education Officer) in Tamil Nadu.
  - In Madhya Pradesh, a letter was issued by the DEO in each district to all the secondary schools of the district and not just the schools which were selected for the survey. The letter mentioned the survey and requested to support the team from EI visiting the school for survey. The selected schools were not informed especially about the visit beforehand.
  - In Tamil Nadu, the schools were informed in the following way:
    - **Coimbatore:** A letter from the CEO's office was sent to all 28 schools mentioning the date of survey. After completion of 7 - 8 schools, date of visits was changed for the remaining schools and surprise visits were made. To avoid bias in the classroom observations, in some of the schools both classroom observations were made on day 1 and remaining work if any was done on day 2.
    - **Salem:** RMSA informed all secondary schools in the district having class 9 and class 10 about the survey via e-mail. On day 1 of the survey, some schools complained that they were not aware about the survey. As a result, a letter from CEO was sent to all 28 schools mentioning date of survey in their school. After completion of 10 schools, the date of visit for the remaining 18 schools was changed. This was done to avoid bias in the classroom observations.
    - **Vellore:** A letter from the CEO was sent to all secondary schools having class 9 and class 10 that their school may be visited from 15 to 18 December as part of the survey. No school was informed about the exact date of visit and survey was done as per scheduled plan.

Conducting the survey

- **Visiting schools for survey:** Selected surveyors were informed about the survey schedule and they visited schools as per the schedule. Each school's survey was completed in 1-2 days based on the availability of teachers in the school and other logistical considerations (Table 12).

Table 12: Survey dates and number of schools covered, by district

Sl. No	District Name	State	Dates	Number of schools	
				Planned	Surveyed
1	Gwalior	Madhya Pradesh	17 Nov to 24 Nov	25	28
2	Balaghat	Madhya Pradesh	20 Nov to 26 Nov	25	28
3	Jhabua	Madhya Pradesh	27 Nov to 3 Dec	25	28
4	Salem	Tamil Nadu	20 Nov to 30 Nov	25	28
5	Coimbatore	Tamil Nadu	23 Nov to 2 Dec	25	28
6	Vellore	Tamil Nadu	15 Dec to 18 Dec	25	28

- **Activity of surveyor in school:** The surveyor performed the following activities in school on day 1 and day 2:
  1. Reach school before the school starts.
  2. Meet the principal to explain the purpose of the visit. Obtain details like whether teachers teaching Mathematics and Hindi/Tamil in class 10 or class 9 are present in the school and timing of the class. Based on the timetable, classrooms were selected for observation by the field observer.
  3. Before going in the classroom, the observer briefed the teacher whose class he/she was going to observe, about the process of classroom observation.
  4. Completed classroom observation for one subject. If the teacher was available for the second subject, then the second observation was also completed on day 1 else it was done on day 2.
  5. After classroom observation, the student questionnaire was administered to 5-10 students in the same classroom (25 percent of classroom strength with minimum 5 students and maximum 10 students).
  6. Requested the teacher whose classroom was observed to fill the 'Teacher Understanding of Student Knowledge' tool. Before the teacher started answering the questions, each teacher was briefed about the tool and its objective and that it was not necessary to answer all the questions.
  7. Filled the school questionnaire with the help of the principal and teacher on day 1 and complete it on day 2.

Auditing and data collection

- **Visiting schools for spot checks:** The EI team continuously visited schools during the survey period for spot checks. Every day, 1 to 3 schools were visited by EI team members in each district during the survey. They spent some time in school and observed how observers carried out the survey activities. Observers were guided by the team on how to maintain quality in their work and follow standardization in survey activities. Apart from this, a team member from the World Bank also visited 2 schools in Gwalior and 2 schools in Coimbatore for spot check along with EI auditors.
- **Syncing Stallings tool data:** At the end of each school visit day, the EI team used to meet all observers at 1-2 central points and synchronized the Stallings tool data in the tablets.
- **Checking supporting tools:** The EI team also checked supporting tools on a daily basis which were completed in school by the principal, teachers and students. Observers were guided to complete missing data, if any, the next day.
- **Receiving the tools back:** On completion of the survey in each school, the EI team checked all the tools and received completed tools back from the observer. After the survey completion in all the schools, the tablets were taken back and data was synchronized.

4.6 Material Packing and Delivery

Once all the schools were surveyed and all data collected from the observers, all the data was packed school-wise in separate envelopes and quality check was carried out before sending to the EI office for data entry and analysis.

4.7 Video Shooting of Classrooms

The list of classrooms and teachers to be recorded was received from RMSA in Madhya Pradesh and from the DEO of each district in Tamil Nadu. These classrooms were recommended as the teachers in these classes were considered effective in the classroom. Video recording was done with the overarching objective to study patterns of instructional activities across subjects and teachers and common teaching practices that result in effective learning.

A team of 2 people was selected in each school for video recording. The schools were informed in advance about the visit so that teachers were available during the specified date and time of the survey. The video recording was completed by mid-December 2015. Given below is the schedule during which video recording was carried out. Overall, 31 Language and Mathematics classrooms recommended by the RMSA across the states of Madhya Pradesh and Tamil Nadu were observed and recorded (Table 13).

Table 13: Details of video recording in Madhya Pradesh and Tamil Nadu

Details	Madhya Pradesh	Tamil Nadu
Number of videos recorded – Hindi/Tamil	7	8
Number of teachers recorded – Mathematics	8	8
Raw Footage (Minutes)	650	750
Recording Dates	26 Nov to 2 Dec	15 Dec to 30 Dec
Districts Covered	Bhopal and Ujjain	Salem and Coimbatore

Two cameras were used to capture the classroom; 1 stationary camera documenting the class (students) and 1 mobile camera documenting the teacher and his/her interaction with students. The cameras used were high resolution DSLR cameras and wireless microphones were used to ensure good audio-visual quality. During the shoot a clear list of do's and don'ts was followed.

Classes were recorded in real time without any major pre-preparation by the teachers. Subtle indicators such as teacher-student interaction before and after class, comfort of students during class, and teacher-student relationship were observed to assess the authenticity of the recorded classroom. At no point was the teacher/natural classroom environment disrupted for the purpose of this recording.

Students, during the class, were engaged in different activities like copying from the board, reading textbooks or responding to the teacher. The student footage was shot mainly to gauge how much of the students' attention and interest the teacher could hold and by what measure. At no point were the students made to repeat or speak louder for the benefit of the recording.

Guidelines for video shooting in the classroom were developed (Table 14).

Process of Analysis

1. The raw footage for each of the teachers was seen multiple times to get a sense of the different teaching practices and teacher behaviors. An exhaustive list was developed which was then logically divided into larger buckets and put into a framework.

Table 14: Video shooting guidelines

Do's

- Follow the guidelines and place the cameras accordingly.
- Talk to the teacher at the beginning of the class to understand what he/she is planning to do.
- Explain the purpose of recording the classrooms briefly to the teacher and tell her to communicate the purpose of your visit to the students at the beginning of the class.
- Inform students to be aware of the microphone in the middle of the classroom so that it doesn't get unplugged.
- Try and minimize interactions with the students/teachers during the classroom.
- Thank the teacher and students at the end before leaving.

Do Not's

- Do not interrupt the teacher/students during the classroom to record something specific.
- Do not make the teacher/students repeat something just for the camera.
- Do not engage with the students while the class is going on.
- Do not make eye contact with the teacher/students during the classroom to help them from becoming conscious of the recording.

2. The footage was watched again to select clips that would be the best representations to demonstrate the condensed list.
3. Frequency of occurrence of a certain trait across teachers was checked for, to understand the importance of each selected trait.
4. Multiple opinions were sought to analyse the same footage.
5. The selected traits were further divided under GENERAL and SPECIFIC (Subject specific) traits.
6. Final clips were selected to be used in the Teaching Practices videos.

4.8 Data Entry and Cleaning

During the study the following tools were used to collect data from the field with a brief description of the process followed to collect the data:

- **Stallings tool:** Was administered using tablets. Data was stored in pre-determined CSV format (comma separated values).
- **SOS log:** Was filled by observer on an A4 sheet after the classroom observation.
- **School questionnaire:** Was administered using tablets. Data was stored in pre-determined CSV format. The questionnaire was filled by the principals.
- **Student questionnaire:** Was administered in the paper-pencil mode. The questionnaire was filled by students.
- **Teacher understanding of student knowledge:** Was administered in the paper-pencil mode. The questionnaire was filled by teachers.

After the survey was complete, the student questionnaire, TUSK and SOS log tools were collected at a central location and data entry was carried out. Data entry was not required for the Stallings tool and the School Questionnaire as it was administered on tablets. Other tools and questionnaires were converted to pre-determined digital format by trained data entry persons. Data entry was done for only multiple choice questions type, free response questions were not captured digitally. To analyse free response questions,

all the tools were scanned and saved in soft copy format. There was no special treatment required during data entry.

Data cleaning steps were specific to each tool. Though some steps were common:

- Ensuring that correct school name and UDISE code has been filled
- Ensuring that there are no duplicate records
- Ensuring that school name and UDISE code match across different tools
- Ensuring that only valid values are entered in each cell

The data cleaning steps for the tools are as follows:

Stallings tool: For the Stallings tool, apart from the steps mentioned above, a lot of data cleaning was not required. But data was analysed to check for the following:

- If each classroom observation has 10 snapshots
- If each snapshot has teacher activity marked
- If all the other mandatory fields are filled for each snapshot or not

Snapshots belonging to one classroom observation for excessive similarity to ensure that observers had properly filled the snapshots and not just randomly marked the same observation multiple times.

School questionnaire and student questionnaire:

- Valid codes for each column were checked and ensured that each cell had only one value or was blank.
- At the time of data entry, some of the school data was selected at random and cross checked to see the quality of data.
- In questions where more than one option had to be selected, the options not chosen were considered as 'No' and chosen options were considered as 'Yes'.
- If the student had marked two qualifications for father or mother then entry with higher qualification was considered.

5. Analysis Methodology

This chapter summarizes the key objectives behind each of the questionnaires which was used in the survey along with the methodology used to analyse the respective datasets.

5.1 Stallings Tool and SOS Log

The key objective of the Stallings tool was to understand classroom practices in government schools especially related to teacher availability, instructional time and nature of tasks. Data from the Stallings tool and SOS log was analysed to answer the following questions:

- What proportion of time was devoted to learning related activities, classroom management activities and activities which are off task
- Use of materials in teaching learning processes and the type of materials used.
- Analysis of classroom practices, nature of task and material used by school characteristics such as type and location of school.
- How engaged students are in the classroom and what proportion of the classroom is not involved with teachers on average.
- Prevalent enrolment and attendance rate in the classrooms and if there are any differences based on the factors such that gender, school type and location.
- Percent of students using textbooks and notebooks in the classroom.
- Any bias towards a specific gender in the classroom.

Primarily descriptive statistics were used to analyse data captured through the Stallings tool. Except for the attendance rate at the beginning and end of the class which were summarized through mean values, other fields were analysed examining distributions in the class either across the time dimension or across the number of student dimension. Each of these fields were further analysed by districts, type of schools and location and relevant findings were included in the report.

During classroom observation, surveyors were also asked to record any unusual or noteworthy information in the form of the comments in each snapshot. These comments were later analysed qualitatively by distributing them into distinct themes which emerged from the analysis of all the comments. It was decided to report these themes and relevant comments as anecdotes since the instructions did not require that comments be recorded for each snapshot.

Similarly for the SOS Log tool data, the quantitative data which was mandatory to be recorded for each classroom was analysed using descriptive statistics. To analyse SOS log data, those records which were observed in 'Only Girls' or 'Only Boys' school as it would not have been possible to observe gender inclusion in those schools. Also there were large numbers of blank entries in SOS log data. Two options were considered – 1) 'Filling the blank cells with neither option, or 2) Rescaling the rest of the entries to 100 percent and the latter was chosen.' The comments were analysed qualitatively and presented in the form of anecdotes.

5.2 School Questionnaire

The school questionnaire was primarily designed to support the overall objective of understanding classroom practices better and how much time is available for teaching and learning activities in an academic year. The second objective was to collect data on the various background factors of interest which may have direct or indirect influence on the classroom practices of the respective schools, teachers and students surveyed.

How many school days (in the previous academic year):

- 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?
- Teachers were unable to attend schools due to personal leave, training and other duties?

In addition, the school questionnaire collected information about:

- How many hours teachers spend on academic activities vs non-academic activities?
- Availability of infrastructure and learning materials in schools.
- Materials used by school and teacher characteristics.

Analysis of functional days in schools, teacher absence and time spent on academic and non-academic activities

School and teacher questionnaires included some items to analyse how many days schools were open in the previous academic year, how many days teachers were unavailable in schools and how much time teachers spent on academic and non-academic activities. Along with this, data on the official number of days schools were supposed to be open in the previous year, if there is any recommended number of days teachers need to do training and if there are any guidelines on the time break up between academic and non-academic activities.

Before analyzing the data, a sanity check was run and outliers were removed. In some instances, the entered data was double checked with the respective schools.

Availability of infrastructure and learning materials in schools

A battery of 12 questions was asked to analyse infrastructure availability in the school. An additive index was created by adding the responses to these 12 questions. Since all the questions were asked in affirmative only, there was no need to reverse direction in any of the questions.

Similarly for 'Material and Resources', an additive index was created with one difference that all the questions were not included in creating the index. In the 'Material and Resources' section of the questionnaire, respondents were not only asked about availability of the index but also if it was functional and being used. So in creating the index, only questions which asked about functionality and usage were included. A separate analysis was carried out to check what percentage of resources was actually used by students.

5.3 Student Questionnaire

The student questionnaire was primarily designed to collect information on how students perceived the particular class which was observed by the evaluator. This information was useful in understanding if the

classes in each district were held as usual during the observation or if the classroom behaviour changed due to the observation (Hawthorne Effect).

Apart from this, the questionnaire also collected information on student background, time spent on studying at home, perception about school, studying pattern and co-curricular activities.

Most of the data in student questionnaire was analysed independently to understand the background of students who are attending the schools included in the survey. Two indices were developed – 1) An additive index was created to analyse the facilities and appliances available at home based on data collected in item 7 and 2) An additive index was created to analyse student's perception of good teaching practices in class based on data collected in item 14.

For analysing good teaching practices, 9 questions (shown in the appendix) were identified within item 14 which corresponds to good teaching practices. To ensure that all the items identified contribute to the theme of good teaching practices, a correlation matrix was calculated to check if all the items have positive correlation with each other. Based on this exercise, questions '14.F' and '14.O', which had a negative correlation with the rest of the items, were dropped. Cronbach's Alpha had a value above 0.5, so the index was retained for analysis'.

5.4 Teacher Understanding of Student Knowledge (TUSK)

The teacher-wise question-wise data was analysed to gain insights at two levels: Overall performance at state and district level; and Individual question level.

For this 8 multiple choice questions in Mathematics and 7 in Language were considered. While there was no direct comparison made between states to say that a given state was better or worse than the other, the data was analysed and presented for the two states together so that insights could be drawn for the same question for both the states.

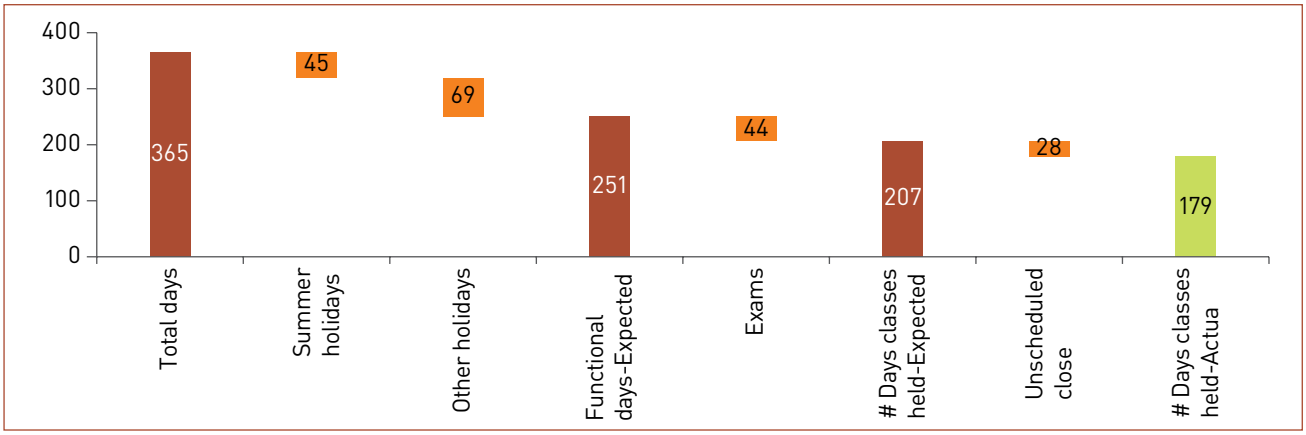
6. Discussion of Findings

6.1 Days Prescribed by the School Calendar and Teaching Time in Schools

In Madhya Pradesh and Tamil Nadu the school calendar is released every year at the state level. This calendar defines the number of leave days, working days, optional holidays, what will be taught in each month and exam dates/duration, etc.

In Madhya Pradesh, the number of functional days expected during the preceding academic session (2014-15) was 251 days and the expected number of days on which class should be held (excluding exams) in schools was 207. But it was found that, on average, classes were held for 179 days in schools (Figure 12).

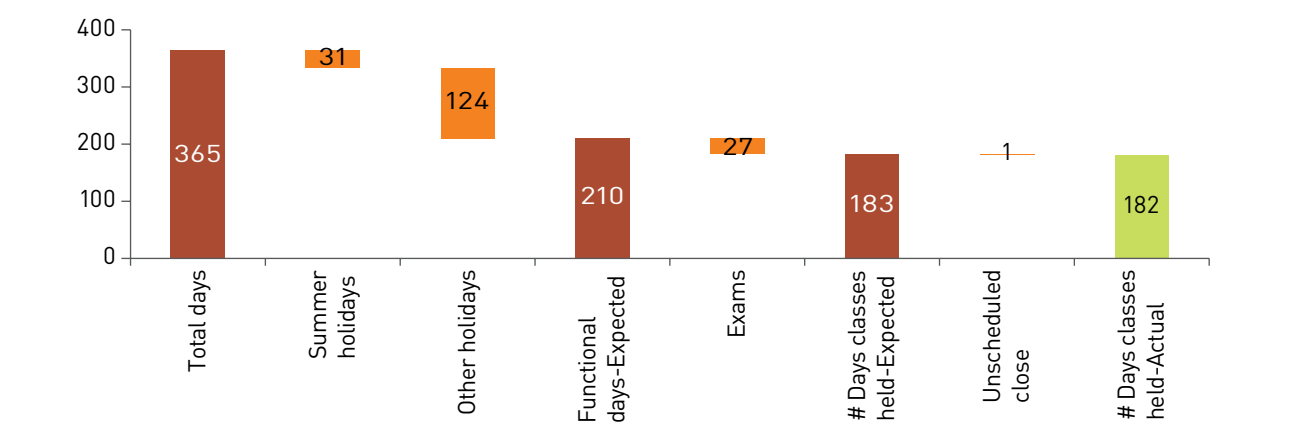
Figure 12: Expected vs actual days on which classes held, Madhya Pradesh (2014-2015)



Note: Actual number of days when classes held is based on questionnaire filled by school headmaster. The exact question is attached in the appendix. Details related to holidays and exam days was provided by respective government

In Tamil Nadu, the number of functional days expected during the preceding academic session (2014-15) was 210 days, while classes were supposed to be held for 183 days. It was found that, on average, classes were held for 182 days (Figure 13). It is noteworthy to mention that in Madhya Pradesh, schools run 6 days in a week with 6 periods (4 hours) per subject per week and in Tamil Nadu schools run for 5 days in a week with 7 periods (4.4 hours) per subject per week.

Figure 13: Expected vs actual days on which classes held, Tamil Nadu (2014-2015)



Note: Actual number of days when classes held is based on questionnaire filled by school headmaster. The exact question is attached in the appendix. Details related to holidays and exam days was provided by respective government.

6.2 Tracking Teachers' Teaching Time in Schools

To track a teacher's time being spent in schools, data was collected at two levels – 1) Percent of time the teacher is physically present in the school, and 2) When present at school, how much time is being spent by the teacher on academic and non-academic activities. This section describes the findings on each aspect.

Every teacher marks her attendance at school in the attendance register. This register captures the day the teacher had taken leave, was sent on training and/or spent the day on official duty. This data was used to calculate the total days teachers were found to be available at school. In Madhya Pradesh and Tamil Nadu, the data was taken from these registers and provided to the survey team by the teacher or the principal of the school. In MP, the surveyors randomly checked the data from the register based on need and on a case-to-case basis. In TN, it was taken as provided by the principal of the school.

Availability of teachers in Madhya Pradesh and Tamil Nadu

On average, teachers reported that they were not physically present in school for around 18 days in Madhya Pradesh and 21 days in Tamil Nadu during the academic year 2014-15 on which the school was functioning (Table 15).

Table 15: Average number of days teachers did not attend school due various reasons

State/District	#Teachers	Leaves	Training	Official duty	Total
Madhya Pradesh	**156**	**9.6**	**3.7**	**4.6**	**17.8**
Balaghat	51	9.5	1.9	5.7	17.1
Gwalior	52	7.5	2.5	3.8	13.8
Jhabua	53	11.7	6.6	4.3	22.5
Tamil Nadu	**162**	**11.6**	**6.3**	**2.7**	**20.6**
Coimbatore	53	11.8	6.4	3.0	21.3
Salem	56	12.3	6.3	3.1	21.7
Vellore	53	10.7	6.2	1.9	18.8

In Tamil Nadu, classes should have been officially held for 183 days but teachers were present in schools for 161 days only. As reported by the principals in Tamil Nadu, the teaching load of a teacher who is not present in the school is shifted to a teacher who is present in the school to ensure that classes are held as per schedule. Similar analysis for Madhya Pradesh was not done because there could be an overlap between the number of days when the teacher is not present in the school and number of days when the schools did not function.

The number of days of personal leave taken by teachers is comparable in Madhya Pradesh and Tamil Nadu and does not vary a lot across districts. The number of days spent in training is almost double in Tamil Nadu compared to Madhya Pradesh. Balaghat and Gwalior reported approximately 2 days of training which is significantly less than 6 days being spent by teachers in the other 4 districts. Discussions were held with state officials in Madhya Pradesh about how these trainings get organized and the criteria used to decide who will receive training. Based on their inputs we understood that trainings are provided to those teachers who have shown weak performance during the previous academic year. In the last year training was provided to 13,000 teachers out of approximately 43,000 teachers in the state.

Overall, teachers in Jhabua were not physically present in school for 22.5 days which is the highest among all the districts surveyed.

Overall, female teachers in Madhya Pradesh tend to be present in school for more days than male teachers, while in Tamil Nadu presence of male and female teachers was found to be similar

(Table 16). Data also reflects that female teachers received less days of training when compared to their male counterparts across all districts except Gwalior. Similarly, male teachers were sent more on other duty work like elections, census, scholarships, etc. when compared to female teachers. In Madhya Pradesh, during the discussion with the state officials they shared that some male teachers are more willing to attend trainings and hence their number of training days can be higher than others. The reasons could be that male teachers are comfortable going for trainings while female teachers find it difficult to go alone or have other family responsibilities or avoid going to far off locations to attend trainings.

Table 16: Number of days teachers were available in school, by gender

State/District	Female teachers					Male teachers				
	Number	Leaves	Training	Official duty	Total	Number	Leaves	Training	Official duty	Total
Madhya Pradesh	**56**	**10.1**	**2.4**	**2.2**	**14.7**	**100**	**9.3**	**4.4**	**5.9**	**19.6**
Balaghat	21	9.3	1.2	1.7	12.2	30	9.7	2.4	8.5	20.5
Gwalior	18	8.6	3.1	4.3	16.1	34	6.9	2.2	3.4	12.6
Jhabua	17	12.6	3.1	0.6	16.3	36	11.2	8.2	6.0	25.5
Tamil Nadu	**111**	**11.8**	**6.0**	**2.6**	**20.5**	**51**	**11.2**	**7.1**	**2.8**	**21.0**
Coimbatore	41	12.3	6.3	3.4	22.0	12	10.3	6.8	1.8	18.9
Salem	37	11.5	5.8	2.4	19.7	19	13.9	7.3	4.5	25.7
Vellore	33	11.7	5.8	2.0	19.5	20	9.1	7.0	1.8	17.9

It is interesting to note that in Madhya Pradesh, 71 teachers out of 156, i.e., over 45 percent, reported that they had not attended any training in the last year. In Tamil Nadu, 16 percent teachers did not receive any training in the last year.

In Madhya Pradesh, young teachers (aged up to 30 years) and teachers with experience of up to 10 years were available in schools for more days when compared to other groups of teachers. In Tamil Nadu, this trend was not observed (Table 17). In Madhya Pradesh, more experienced teachers were sent more on official duty, while in Tamil Nadu, teachers with 11 to 20 years of experience were sent more on official duty. In Tamil Nadu, leave taken by teachers increased with an increase in the average age of the teachers.

Table 17: Number of days teachers were in school, by teaching experience and age

Category	Group	Count	Leaves	Training	Official duty	Total
Madhya Pradesh						
Overall		156	9.6	3.7	4.6	17.8
Experience of teachers	0 to 10 years	69	7.9	3.8	2.4	14.1
	11 to 20 years	53	11.3	3.6	5.8	20.7
	More than 20 years	34	10.3	3.6	7.1	20.9
Age of teachers	21 to 30 years	23	5.9	2.8	2.0	10.7
	31 to 40 years	58	10.1	4.4	3.4	17.9
	41 to 50 years	54	10.4	3.3	6.4	20.1
	51 to 60 years	21	10.1	3.8	5.9	19.8

Category	Group	Count	Leaves	Training	Official duty	Total
Tamil Nadu						
Overall		162	11.6	6.3	2.7	20.6
Experience	0 to 10 years	91	10.9	6.9	2.5	20.3
	11 to 20 years	51	13.0	5.7	3.2	21.9
	More than 20 years	20	11.6	5.2	1.9	18.6
Age of teachers	21 to 30 years	9	7.2	7.1	1.3	15.7
	31 to 40 years	35	10.6	7.5	1.9	20.0
	41 to 50 years	106	12.0	5.8	3.1	20.8
	51 to 60 years	12	14.4	7.3	2.4	24.2

Teachers' time spent in classroom on academic activities and non-academic activities

In Madhya Pradesh, schools are typically open for 36 hours per week (6 days x 6 hrs per day). Schools follow three types of daily timings: 1) School starts at 10:30 AM and closes at 4:30 PM, 2) School starts at 7:30 AM and closes at 1:30 PM and 3) School starts at 11:30 AM and closes at 5:30 PM. If two schools run in the same building then type 2 and type 3 timings are usually followed. In this discussion, type 1 school timing is considered (Table 18).

Ideally, teachers are expected to reach school at 10.30 AM and remain in school till 4:30 PM, i.e. 6 hours per day and students remain in school from 11 AM to 4 PM i.e. 5 hours per day. So, teachers get around 1 hour of time to do office work other than teaching, when students are not in school. In the remaining 5 hrs, 50 minutes are spent in morning prayer and lunch, so a teacher is left with a maximum time of 4 hours and 10 minutes to teach in school. Based on the number of sections and number of teachers available in school, a teacher is allotted classrooms. A teacher can teach 2 classes per day to a maximum of 6 classes per day. So based on this a teacher can teach a maximum of 24 hours in a week.

In Tamil Nadu, schools work 5 days a week and the school timings are uniform across the state. Schools open at 9 AM and close by 5:20 PM. It is important to note that there are extra classes held for grades 7 to 12 from 4:20 PM to 5:00 PM. To keep uniformity with Madhya Pradesh, extra class time is not considered while calculating hours available for teaching and non-teaching activities. In Tamil Nadu, 8.3 hrs per week is spent on prayer and breaks for students. A teacher is expected to teach 28 periods per week i.e. 18.6 hrs of teaching time and has available free time of 12 periods i.e. 8 hrs per week of free time where she can prepare for class or non-teaching activities.

Table 18: Time spent on academic and non-academic activities

	Madhya Pradesh	Tamil Nadu
Working days per week	6 Days	5 Days
School Timing	10:30 AM to 4:30 PM = 6 Hrs	Regular – 9 AM to 4.20 PM = 7.20 Hrs Extra class – 4:20 PM to 5:00 PM
Duration of Teachers at school	10:30 AM to 4:30 PM = 6 Hrs	9 AM to 5.00 PM = 8.00 Hrs
Duration of Students at school	11:00 AM to 4:00 PM = 5 Hrs	9 AM to 5.00 PM = 8.00 Hrs
Total school hours per week	36 hrs	36 Hrs (other than extra time)
Morning Prayer	20 minutes + 10 min national anthem	20 minutes + 20 minutes to prepare
Break	30 minutes (lunch)	60 minutes (40 min lunch + two 10 Min break)

	Madhya Pradesh	Tamil Nadu
Prayer and break hours per week	6 Hrs	8.3 Hrs
Academic time available to teachers	24 Hrs Maximum 36 periods a teacher can teach in a week	18.6 Hrs ~ Minimum 28 periods per week
Non Academic time available to teachers	6 Hrs per week (30 minutes before morning bell and after school bell)	8 hrs ~ Maximum 12 periods per week

Note: The information presented here is based on the discussion with Additional District Project Coordinators (ADPC) of a district in Madhya Pradesh and of Tamil Nadu.

In this survey, teachers were asked to report number of hours they spend on academic and non-academic activities. Academic activity means the number of hours spent on teaching and preparation for teaching. Non Academic activity means the number of hours spent on non-teaching activities. During the survey in Madhya Pradesh, it was observed that in most of the schools teachers came at 11 AM and not at 10:30 AM and left mostly along with the students. Teachers reported that on average 17.8 hrs of time in the week was spent on academic activities and 9.1 hours on non-academic activity (Table 19). Similarly, in Tamil Nadu teachers on average spent 21.1 hrs per week on academic activity and 4.0 hrs per week on non-academic activity. In Vellore, 29 teachers out of 53 teachers reported that they spent 0 (zero) hours on non-academic activity. Many reported that they spent only 1-2 hours.

Table 19: Time spent on academic and non-academic activities as reported by teachers

State	Average hours spend on academic activity per week	Average hours spend on non- academic activity per week	Total
Madhya Pradesh	**17.8**	**9.1**	**26.9**
Balaghat	15.6	10.8	26.4
Gwalior	20.3	12.2	32.4
Jhabua	17.5	4.4	22.0
Tamil Nadu	**21.1**	**4.0**	**25.1**
Coimbatore	21.8	6.8	28.5
Salem	24.4	3.5	27.9
Vellore	16.9	1.8	18.6

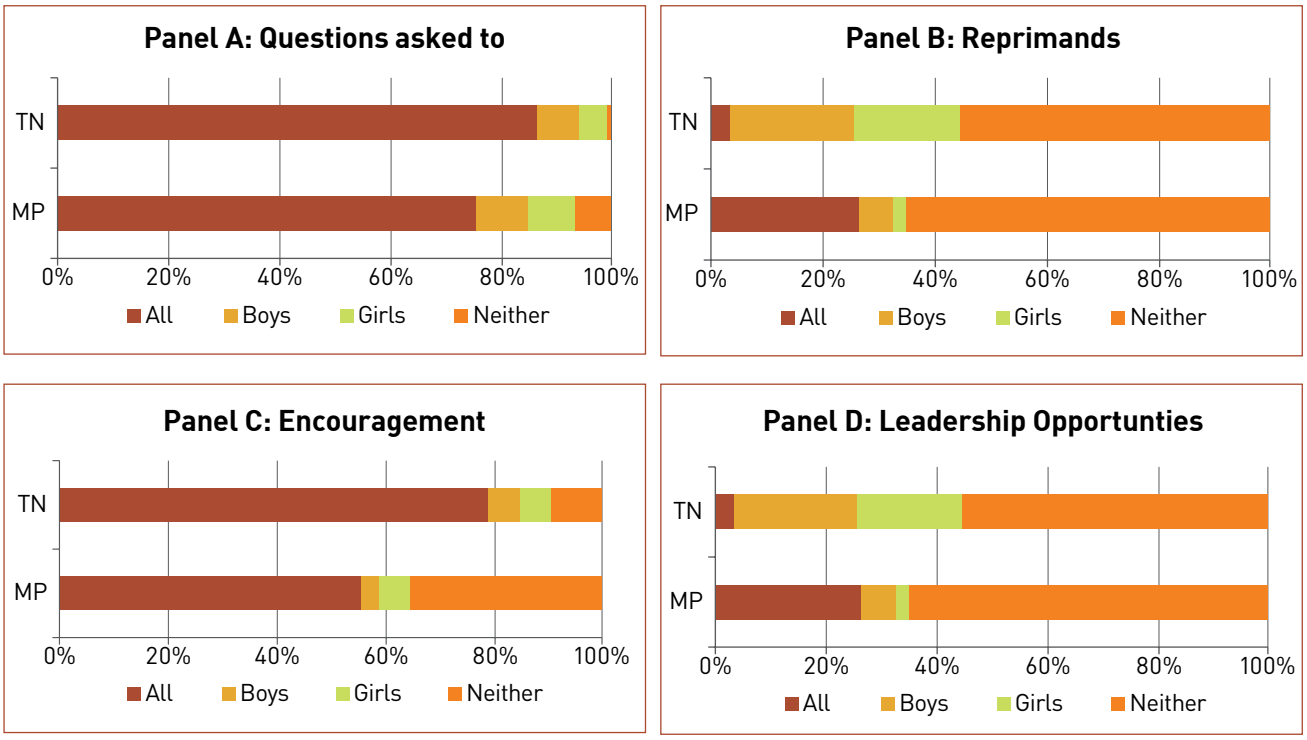
Gender equity of teachers' classroom behavior

The objective of this analysis is to check gender bias, if any, in the classroom. To do this analysis, 4 specific questions were asked to the observer who observed the class. The observer had to report if the teacher was asking questions in the class and to whom, and if the teacher scolded (reprimanded) or praised (encouraged) any students or a particular group. Along with that the observer also reported if the teacher gave leadership opportunities such as asking to discipline/monitor the class, distribute learning materials, and organize charts, etc. to a particular group only. These questions were compiled in a separate questionnaire which is attached in the appendix. Co-educational schools in the sample were considered for this analysis and included 108 classes from Madhya Pradesh and 124 classes from Tamil Nadu.

Overall teachers' attitude and perception was not different for girls and boys. During classroom observation, teachers were asking questions without any gender bias in 76 percent of observations in Madhya Pradesh and 87 percent of observations in Tamil Nadu (Panel A, Figure 14). The concern here is that teachers were not asking any question to students in 6 percent of observations in Madhya Pradesh and this was found in 20 percent of observations in Jhabua district. Neither

girls nor boys were reprimanded in 65 percent of observations in Madhya Pradesh and 55 percent of observations in Tamil Nadu (Panel B, Figure 14).

Figure 14: Dimensions of gender equity



All students were encouraged in 56 percent of observations in Madhya Pradesh and 79 percent of observations in Tamil Nadu (Panel C, Figure 14). The other side of this analysis shows that no student was encouraged in 35 percent of observations in Madhya Pradesh. Leadership opportunities were provided only in few observations in Madhya Pradesh, and in Tamil Nadu this percentage was 82 percent (Panel D, Figure 14). Similar to the rest, here also both boys and girls were involved when any leadership opportunities were given.

6.3 Students' Presence in the School

Average class size for schools in the study based on enrolment was found to be 56 in Madhya Pradesh and 38 in Tamil Nadu. Average attendance of 39 was recorded in Madhya Pradesh and 33 in Tamil Nadu on the day of the observation which translates to 70 percent attendance rate in Madhya Pradesh and 88 percent attendance rate in Tamil Nadu.

Girls' enrolment is almost equal or higher than boys' enrolment in all districts observed (Figure 15). There is no significant difference in the attendance rate for boys and girls or in rural and urban schools except in Balaghat (Figure 16). Balaghat being a rural area, only 4 urban schools were included in the sample.

No significant difference was found in the attendance rate at the beginning of the class and end of the class for both boys and girls (Figure 17).

Along with enrolment and attendance, students' perception about school and studies was analyzed to understand their willingness to come to school. As part of the student questionnaire, a few students were asked about whether they like to come to school every day and perceive education as important (see example in Figure 18).

Figure 15: Average class enrolment

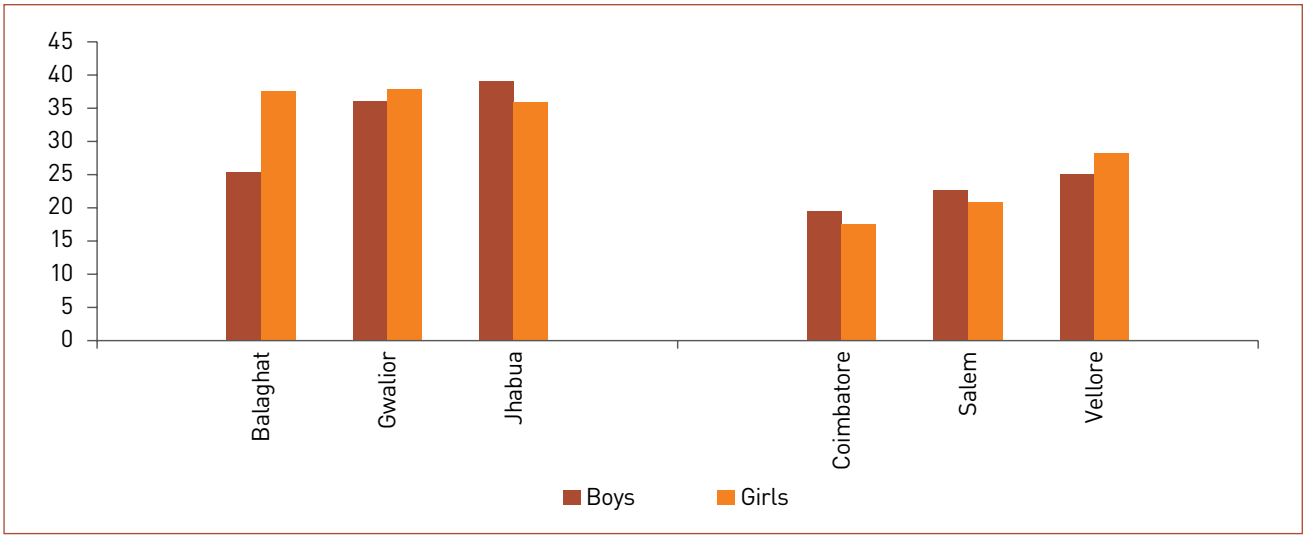
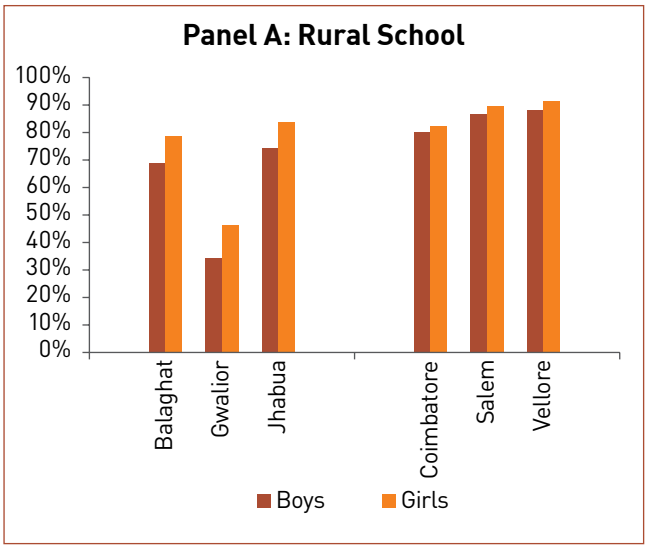


Figure 16: Attendance rate by location, by gender



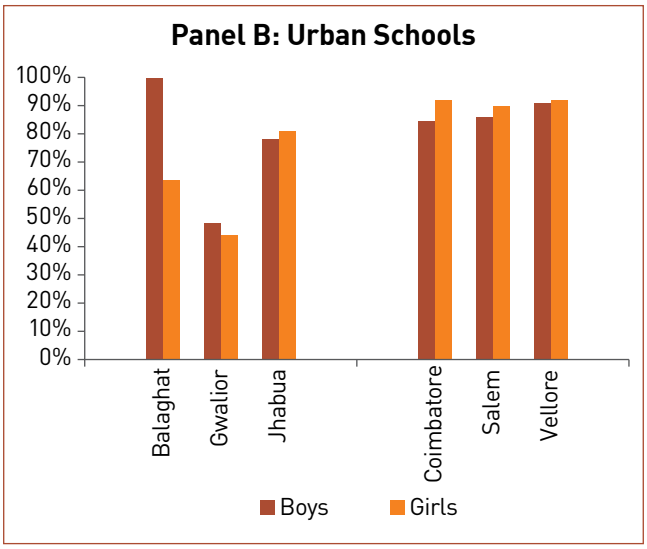
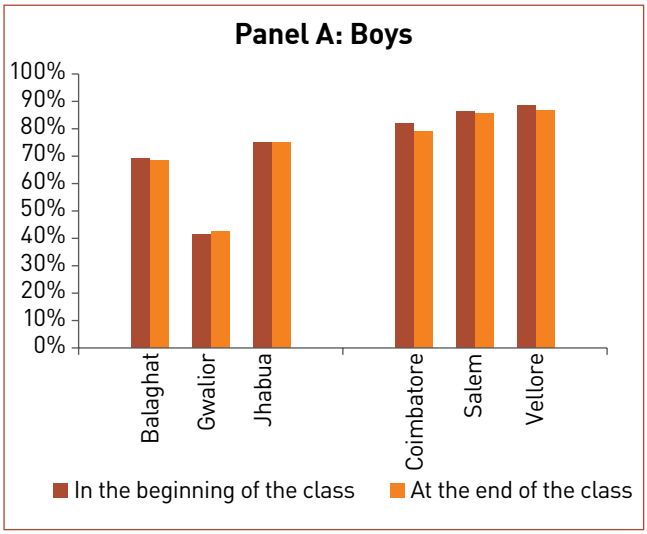


Figure 17: Attendance rate at the beginning and at the end of the class



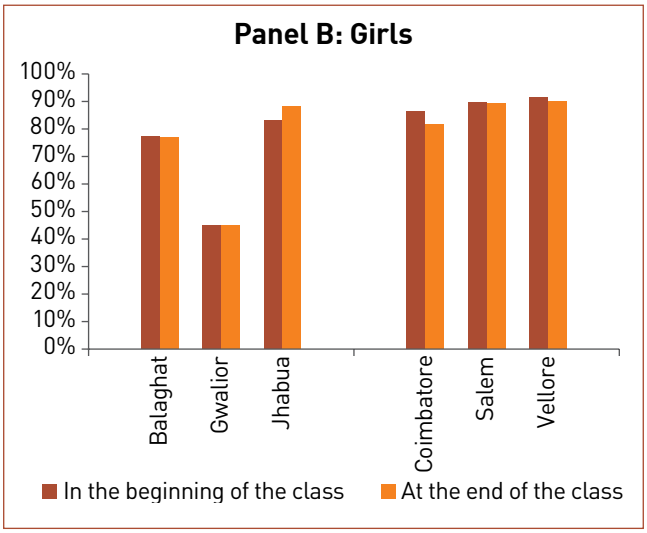


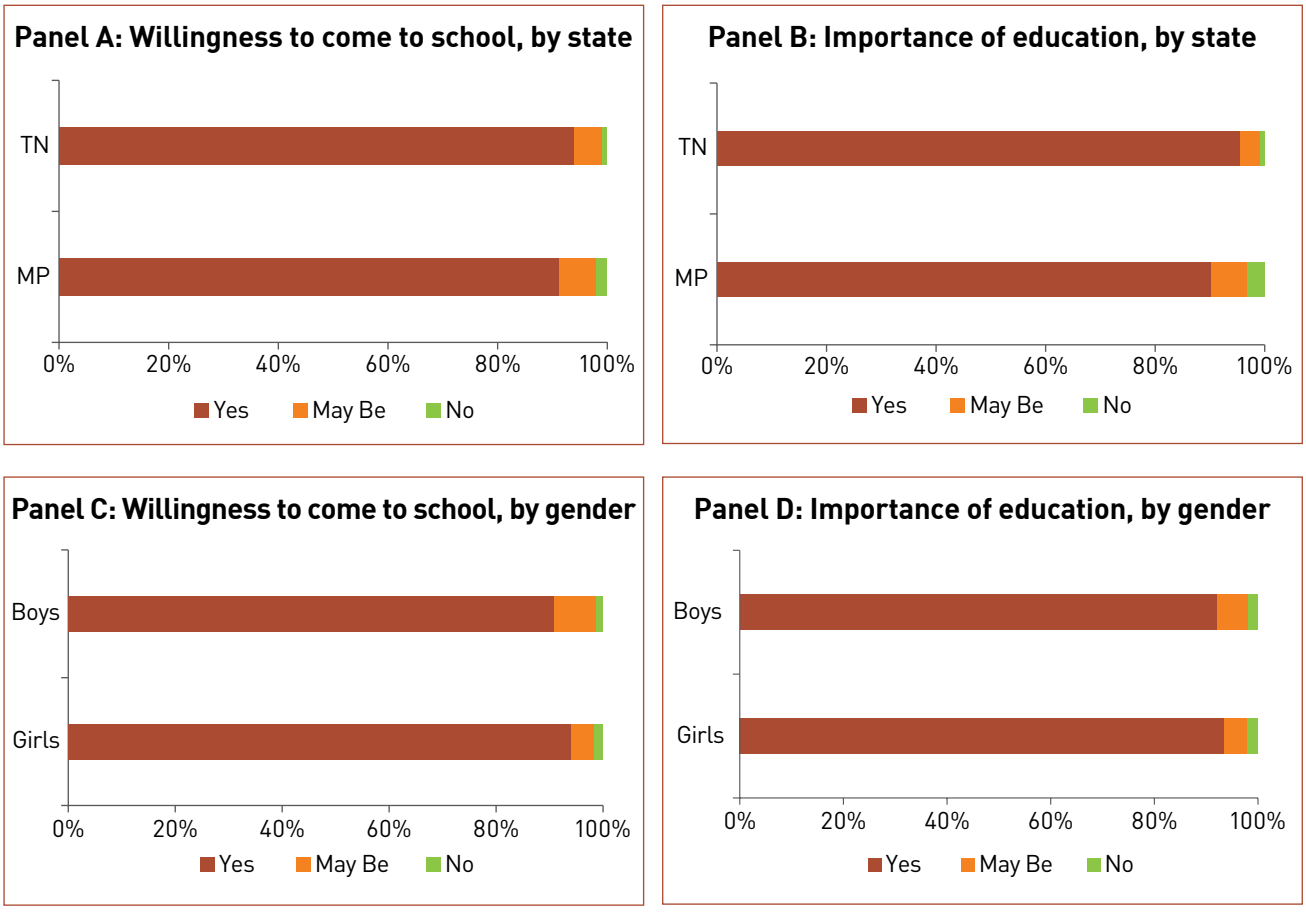
Figure 18: Example of question from student questionnaire

Part of student questionnaire

12. For each of the following, please tick one box to show how much you agree?	No	May be	Yes
a. Daily, I look forward to coming to school.	☐	☐	☐
b. I feel it is important to do well at school.	☐	☐	☐

More than 3,000 students answered these questions and 93 percent of students shared that they look forward to come to school daily and feel that it is important to do well at school (Figure 19). Overall, only 1 percent of students do not want to go to school daily and 2 percent of students said that it is not important to perform well in school.

Figure 19: Student perceptions of school and education

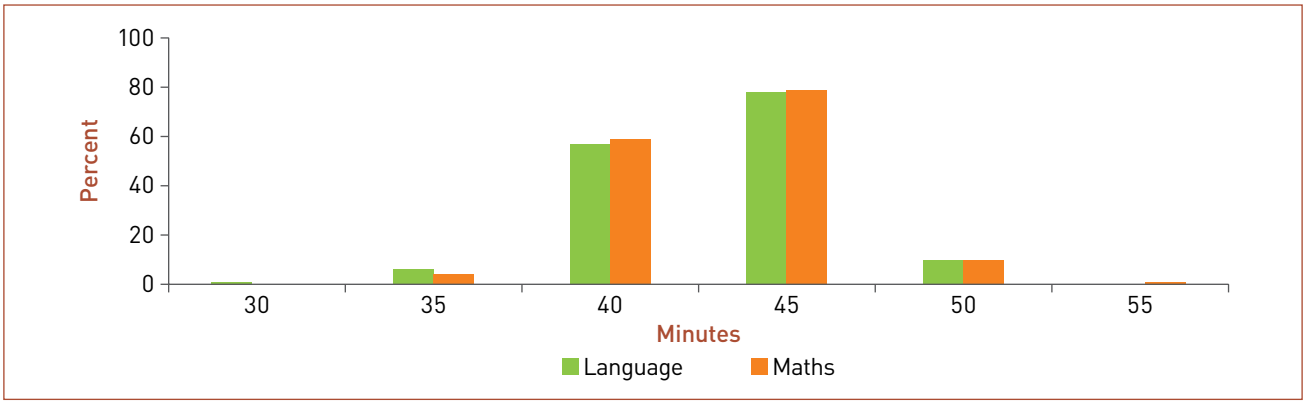


6.4 Classroom Practices

This section looks at what happens in the classroom when a teacher is teaching, in which type of activities teachers are spending most of their time, what type of materials they are using and what students are doing when the teacher is teaching. In both the states, almost 90 percent of classes were found to be scheduled for 40- 45 minutes (Figure 20). It was found that most classes (87 percent in Language and

91 percent in Mathematics) started on time and 3 percent or less were delayed by more than 5 minutes (not shown).

Figure 20: Length of class in minutes, percent



Time spent on different types of activities in the classroom

The Stallings snapshot observation method was used to capture different types of activities in the classroom. Many activities were recorded and these activities were grouped into four different categories: i) Active instruction, ii) Passive instruction, iii) Classroom Management and, iv) Off-task (Table 20). An activity is categorised as active instruction when teachers are directly engaging with students and passive instruction if students are involved in activities like copying what the teacher has already explained or completing assignments or class work while the teacher is more likely to monitor the class rather than engage directly. Classroom management occurs when the teacher is organising the classroom to maintain discipline, and off task activities are defined as instances when the teacher or student(s) are not involved in any learning-related task.[4]

Table 20: Classification of classroom activities

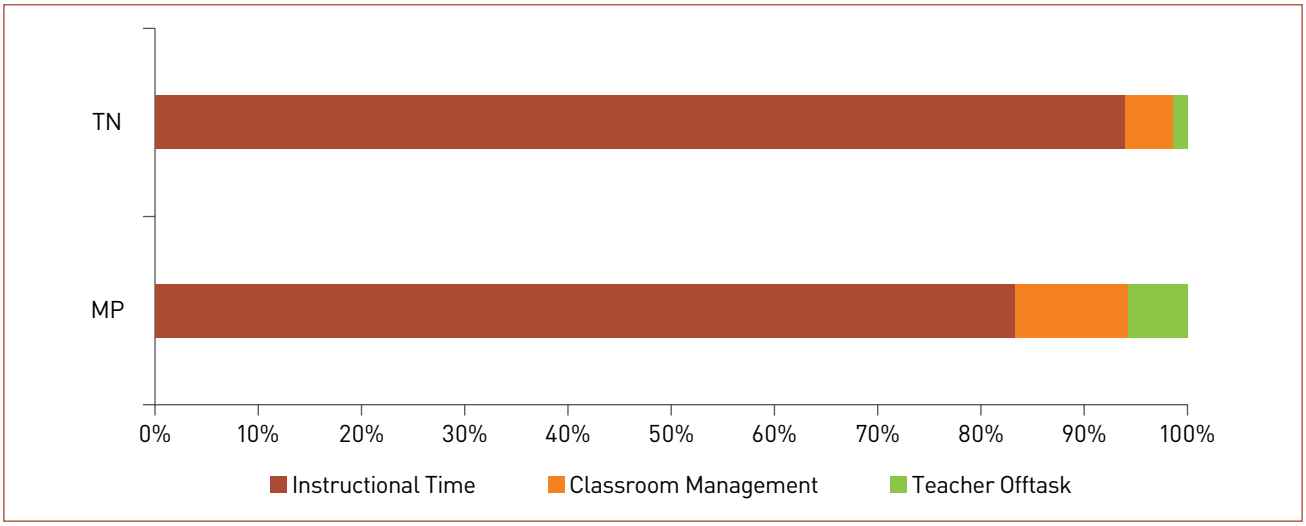
Sl. No.	Activity	Category	Stallings benchmark for effective time use
1	Reading Aloud	Active instruction	50% or more
2	Instruction/Demonstration/Lecture	Active instruction	
3	Discussion/Project work	Active instruction	
4	Practice/Drill	Active instruction	
5	Assignment/Class work	Passive instruction	35% or less
6	Copying	Passive instruction	
7	Verbal Instruction	Classroom management	15% or less
8	Discipline	Classroom management	
9	Classroom Management	Classroom management	
10	Classroom Management Alone	Classroom management	
11	Social Interaction (with students)	Teacher off task	0%
12	Teacher Social Interaction/Uninvolved	Teacher off task	
13	Teacher out of Room	Teacher off task	
14	Students Uninvolved	Student off task	6% or less

4 This classification is adapted from a World Bank study (2015), "*Great Teachers; How to Raise Student Learning in Latin America and the Caribbean*" by Barbara Bruns and Javier Luque.

Overall, almost 89 percent of teachers' time across the two states was spent on instructional activities which includes active and passive instruction (Figure 21). The Stallings benchmark suggests that at least 85 percent of time should be spent on instructional activities for effective use of classroom time. Almost 8 percent of time was absorbed in classroom management activities like managing or organising students, taking attendance, discussing time schedule and explaining homework. It is possible that teachers might behave differently during a classroom observation and observed sessions can be considered best practice scenarios. However, the way a teacher engages with students is very much dependent on practice and behaviour.

The general distribution of categories is similar across Madhya Pradesh and Tamil Nadu but there is significant difference in time being devoted to instructional activities, especially active instructional activities. In Tamil Nadu, teachers are devoting almost 94 percent of time on 'Instruction' while it is 83 percent in Madhya Pradesh.

Figure 21: Break up of teacher's time in classroom across different activities



In Madhya Pradesh, 11 percent of teachers' time is spent in classroom management and 6 percent of time in off task activities (Figure 22) while in Tamil Nadu, 5 percent of class time was observed to be spent on classroom management and only one percent of time was used for off task activities (Figure 23). This shows that teachers in Madhya Pradesh are spending less time in learning related activities compared to teachers in Tamil Nadu. Breakup of off-task activities in Madhya Pradesh shows that for around 2 percent of the total class time teachers were out of the room and spent 4 percent of time off-task (on social interactions with students).

Figure 22: Break up of teachers' time in classrooms across districts, Madhya Pradesh

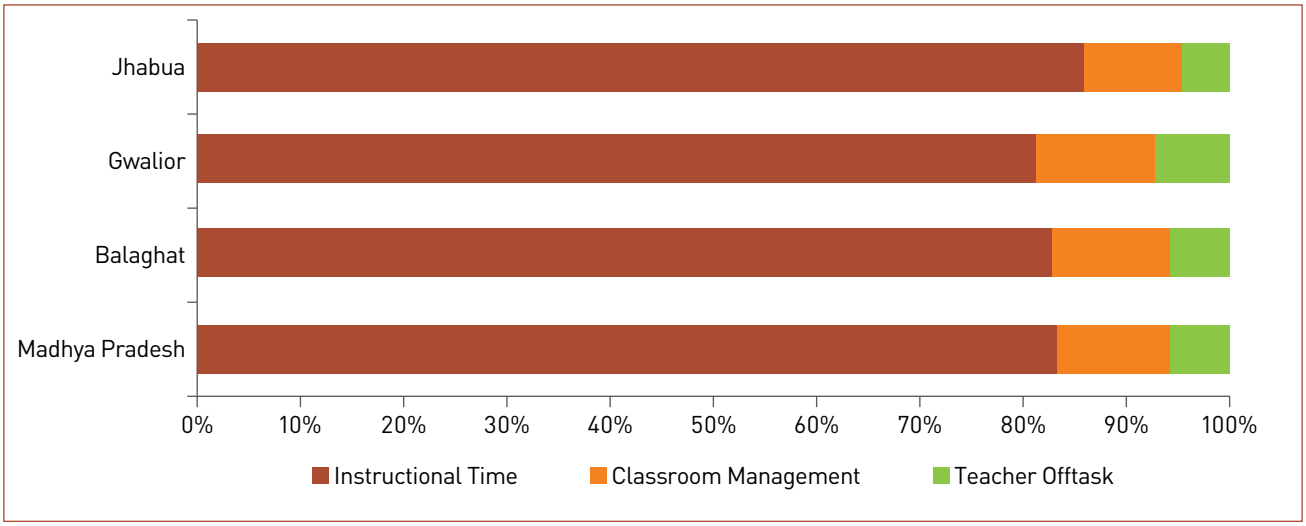
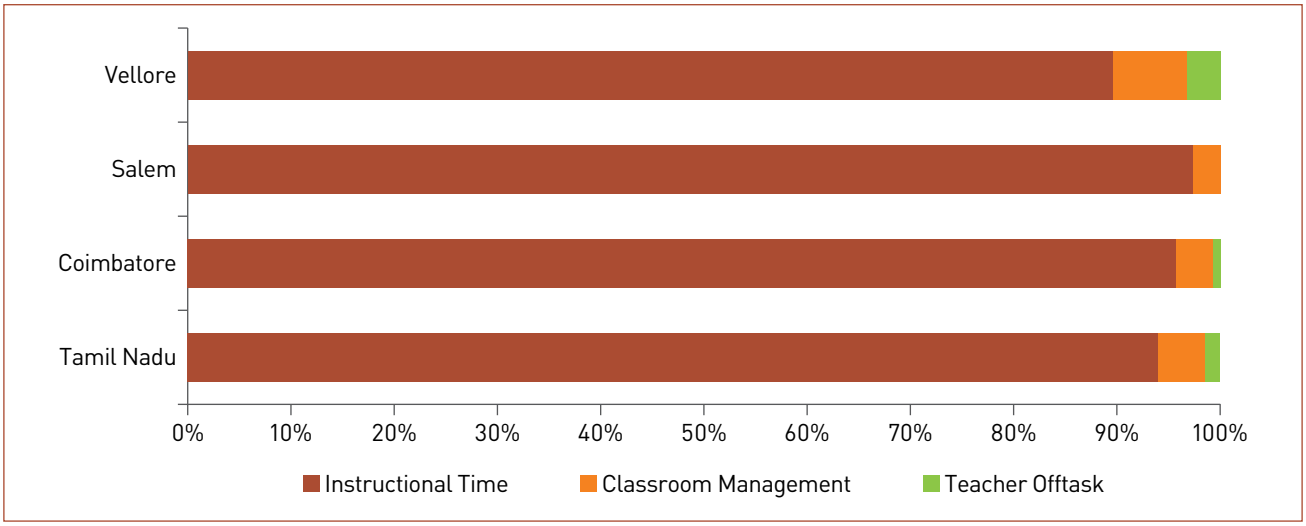


Figure 23: Breakup of teachers' time in classrooms across districts, Tamil Nadu



District-wise data shows that teachers in Coimbatore devoted almost 80 percent of time to active instruction while in Gwalior teachers spent only 61 percent of time on active instruction. Gwalior shows the highest time spent (7 percent) on off task activities compared to other districts.

Teachers are spending more time on 'Discussion' and 'Reading Aloud' in Language than Mathematics. 'Assignment/classwork' and 'Copying' activities occupy higher percentage for Mathematics than Language (Table 21). Observers found that most Mathematics teachers solve examples on the black board and ask students to copy it down which may be the reason more time is spent on classwork and copying in Mathematics classrooms.

'Instruction, demonstration or lecture' and 'Assignment/class work' dominates teachers' task in classroom which takes up almost 50 percent of the class time in Mathematics and language classes. It is interesting to note that 17 percent of class time (which in effect is about 7 to 8 minutes) is devoted for discussions across subjects.

Table 21: Time spent on each activity in the classroom

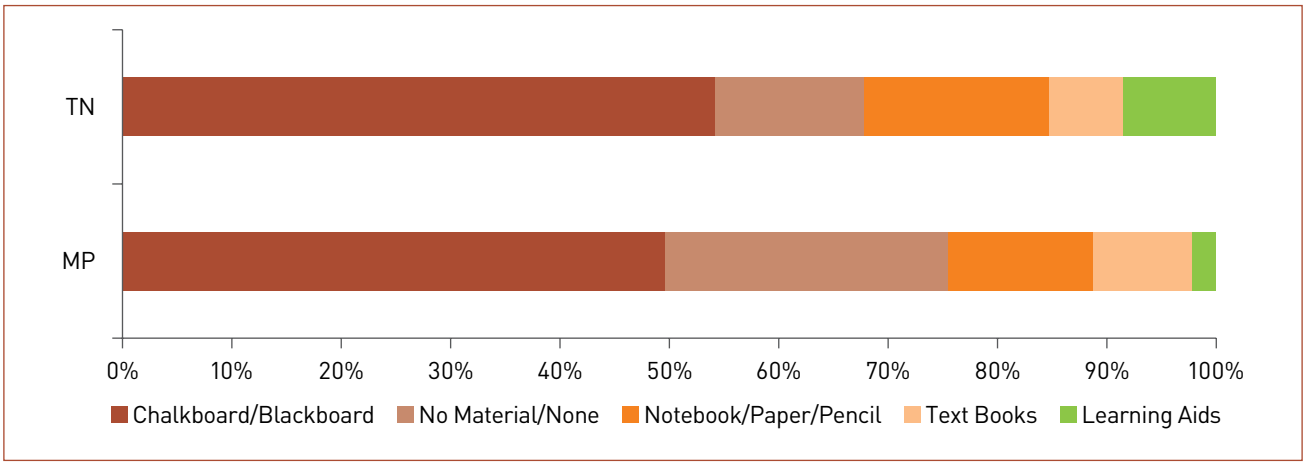
Activity	For Mathematics	For Language
Instruction/Demonstration/Lecture	37.6%	40.2%
Assignment/Class work	15.6%	8.5%
Discussion	14.8%	18.9%
Copying	8.6%	3.0%
Practice/Drill	7.1%	5.6%
Verbal Instruction	4.6%	4.2%
Reading Aloud	3.2%	14.1%
Classroom Management Alone	2.9%	0.8%
Teacher Social Interaction/Uninvolved	2.1%	0.8%
Classroom Management	1.2%	0.7%
Teacher out of Room	1.3%	1.5%
Discipline	0.6%	0.6%
Social Interaction (with students)	0.5%	1.0%
Students Uninvolved	3.0%	6.0%

6.4.1 Materials used in the classroom

Classroom practices and teaching methods can be better understood by analysing the type of materials used in the classroom. Most teachers rely heavily on using blackboards and for more than 20 percent of time spent on instructional activities no learning material was used in the classroom. This section includes material where students were involved with teacher. Student groups who were unengaged have not been included in the charts below.

Teachers are using the black board for more than 50 percent of time in Mathematics classrooms (Figure 24). In Madhya Pradesh, around 26 percent of class time was spent without any learning materials (Figure 25) and in Tamil Nadu this proportion was 14 percent (Figure 26). Notebook or paper-pencil was used for almost 15 percent of class time in both the states. These numbers do not differ signficantly across districts in each state.

Figure 24: Frequency of use of learning materials, Mathematics



Use of learning aids is limited and maximum use of learning aids like charts, graphs, posters, currency, compasses was observed in Coimbatore.

Co-operative learning and use of ICT is non-existent in both the states (these categories do not appear in the charts because they were not observed in any significant numbers). Material is reported as co-operative when students use any material but work together on a common task to produce a common product and ICT is used for any kind of electronic learning aid like, radio, television, videos or computers. Surveyors observed co–operative learning only in 3 classrooms in Gwalior and 1 classroom in Vellore.

Figure 25: Frequency of use of learning materials in Mathematics, Madhya Pradesh

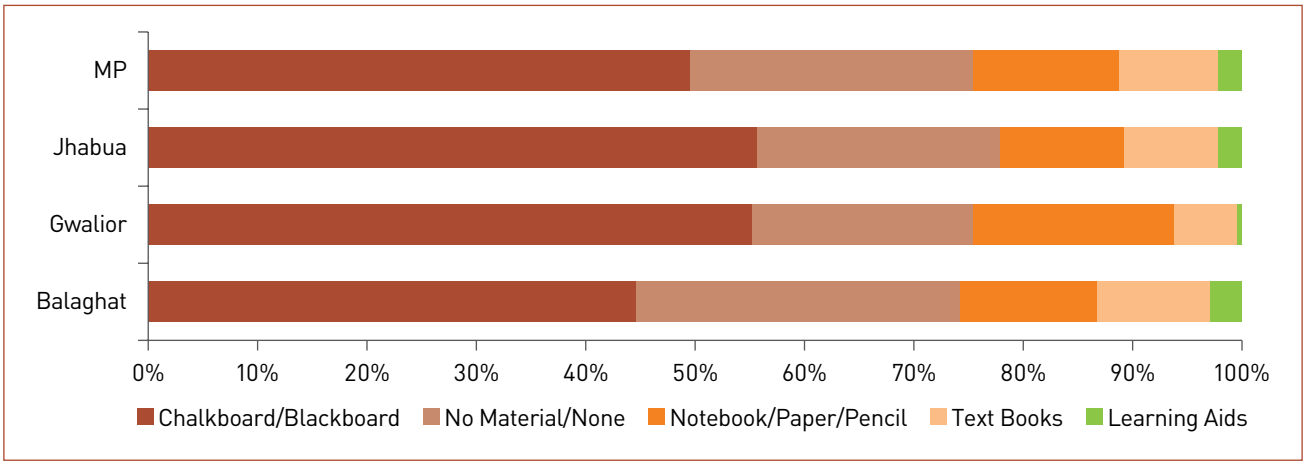
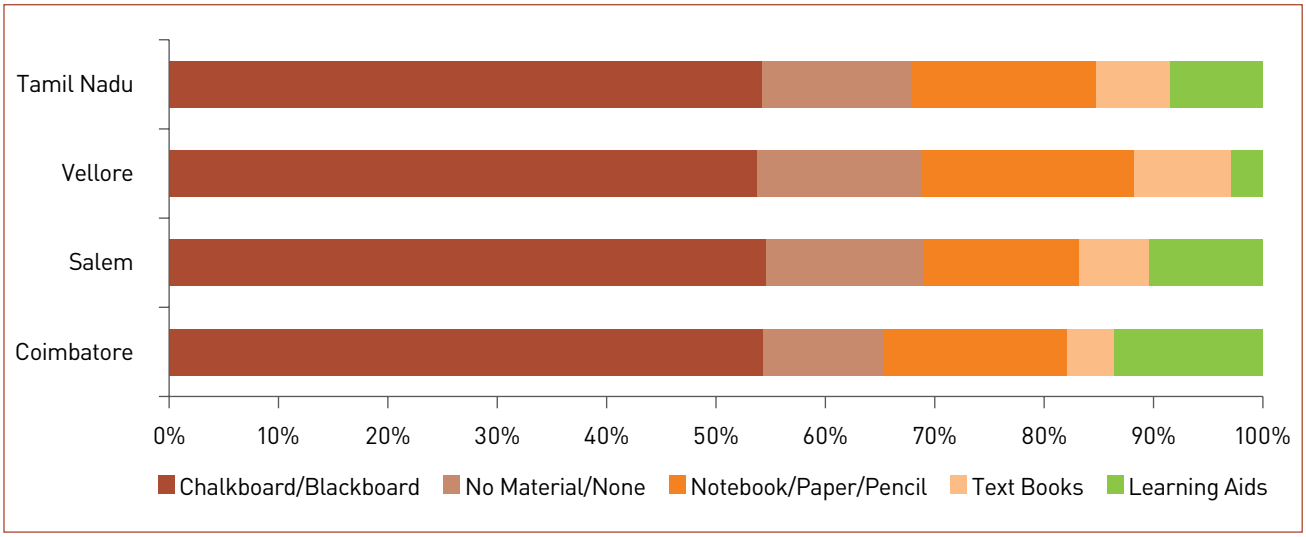


Figure 26: Frequency of use of learning materials in Mathematics, Tamil Nadu



It is insightful to see which activities are carried out in the classroom while different materials are being used. The blackboard and chalk are the most prevalent teaching aide (Table 22). When it is being used, 56 percent of the time teachers were engaged in 'Instruction, Demonstration or Lecture' in the Mathematics class, while 'Discussion' was observed in only 16 percent of the time when the chalk and blackboard are used. The next most frequent learning device was the notebook: in these cases, 'Copying' was observed 42 percent of the time. Interestingly, discussion was most frequently found when no teaching materials were being used.

Table 22: Break up of activities during the use of different materials, Mathematics

Material used	First most observed activity (in %)	Second most observed activity (in %)	Third most observed activity (in %)
Chalk/Blackboard	Instruction/Demonstration/ Lecture (55.9%)	Discussion (15.9%)	Assignment/Classwork (12.7%)
No Material/None	Discussion (20.4%)	Verbal Instruction (15.0%)	Classroom Management Alone (14.0%)
Notebook/Paper/ Pencil	Copying (42.1%)	Assignment/Classwork (37. 8%)	Practice/Drill (8.9%)
Textbooks	Reading Aloud (32.3%)	Discussion (21.0%)	Instruction/Demonstration/ Lecture (19.4%)
Learning Aides	Instruction/Demonstration/ Lecture (74.4%)	Discussion (10.0%)	Practice/Drill (10.0%)

In Language classes, 'Textbooks' are used most in the class, for 40 percent of the class time in both Madhya Pradesh and Tamil Nadu, followed by 'No material' which is used for 30 percent of the class time in Madhya Pradesh and 20 percent of the class time in Tamil Nadu. Learning aids are used for less than one percent of the class time in Madhya Pradesh and 7 percent in Tamil Nadu. Black board is used for almost 25 percent of class time. Similar to Mathematics classes, very rare usage for ICT and co-operative learning was observed. ICT was observed in two classes in Coimbatore but at both the places teachers used their own devices in the classroom and it wasn't a school driven practice.

Figure 27: Frequency of use of learning materials, Language

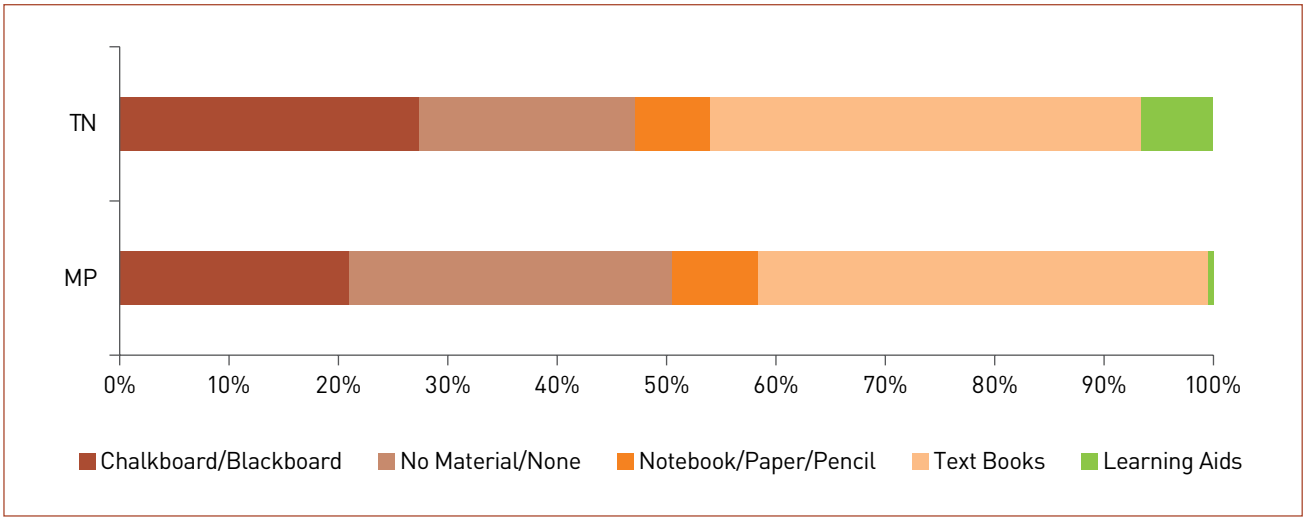


Figure 28: Frequency of use of learning materials in Language, Madhya Pradesh

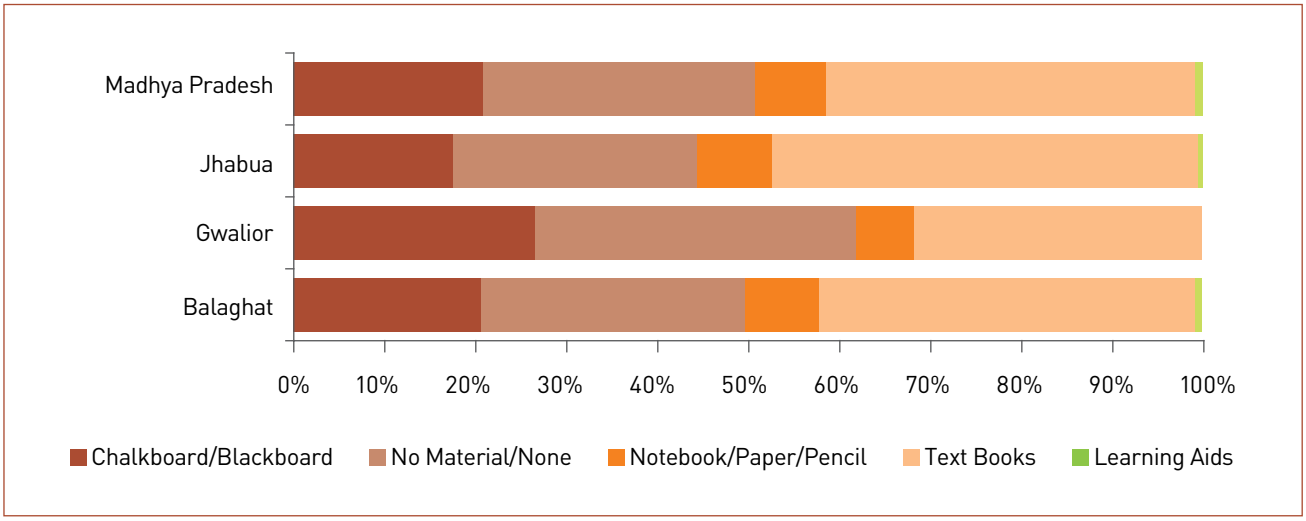
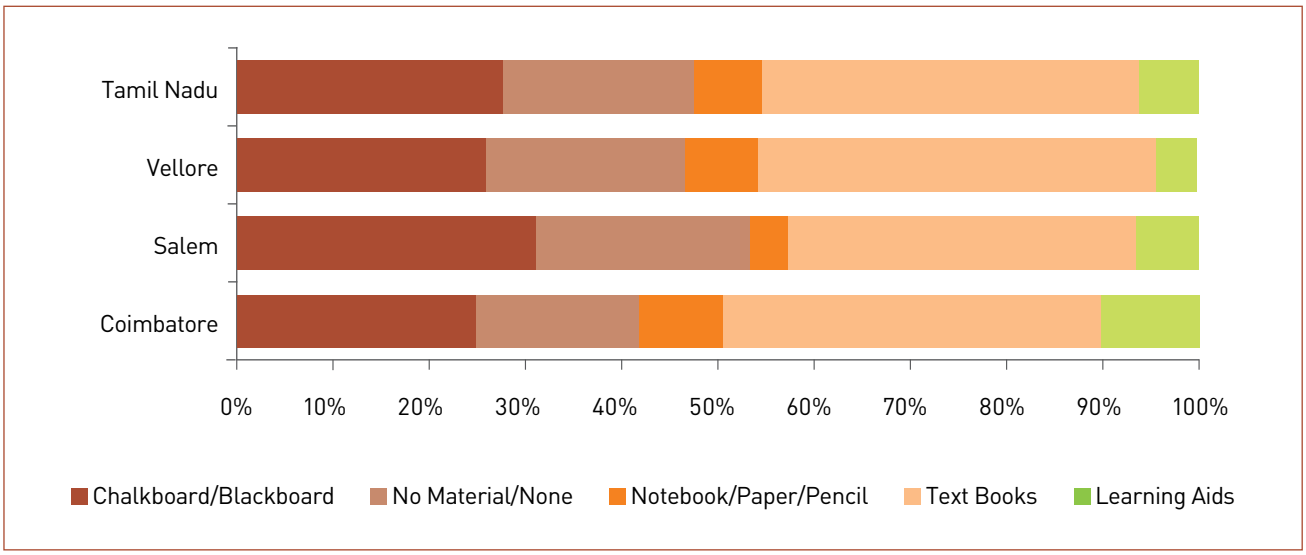


Figure 29: Frequency of use of learning materials in Language, Tamil Nadu



It is interesting to see that when 'Textbooks' are used in Mathematics class, the primary activity is 'Reading aloud' but when it is used for Language, the primary activity is 'Instruction, demonstration or lecture' which was observed for 44 percent of total textbook usage time (Table 23). When 'No material' is in use, the top activity is 'Discussion' for Mathematics and Language both.

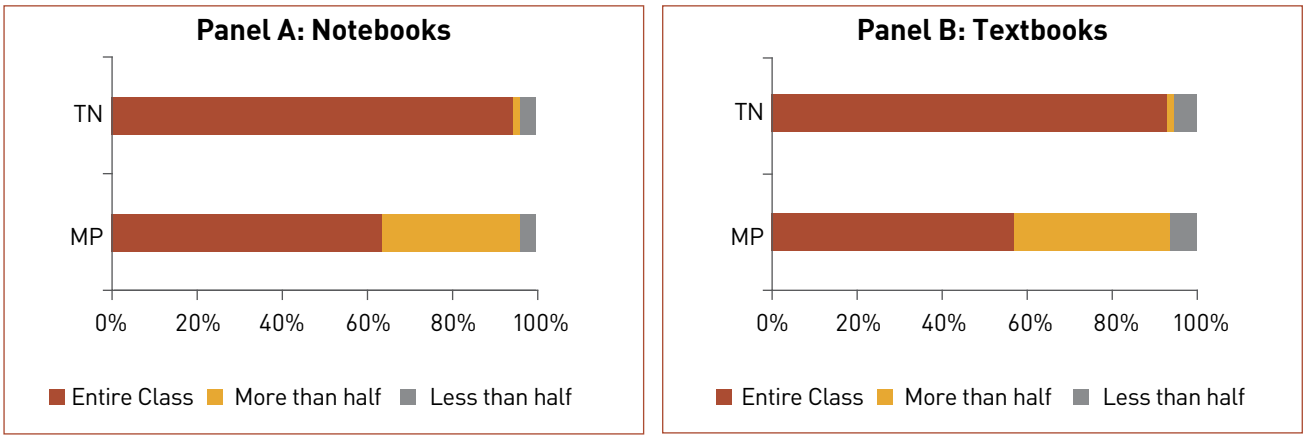
Table 23: Break up of activities during the use of different materials, Language

Material used	First activity (in %)	Second activity (in %)	Third activity (in %)
Textbook	Instruction/ Demonstration/Lecture (44.0%)	Reading Aloud (30.3%)	Discussion (15.7%)
No Material/None	Discussion (33.0%)	Instruction/Demonstration/ Lecture (24.6%)	Verbal Instruction (11.8%)
Chalkboard/Blackboard	Instruction/ Demonstration/Lecture (51.0%)	Discussion (16.5%)	Assignment/Classwork (10.1%)
Notebook/Paper/Pencil	Assignment/Class work (43.8%)	Copying (19.8%)	Verbal Instruction (10.7%)
Learning Aides	Instruction/ Demonstration/Lecture (65.6%)	Discussion (11.5%)	Practice/Drill (9.8%)

Availability of textbooks and notebooks with students

In Tamil Nadu, in 95 percent of classes all the students had textbooks and notebooks on the day of observation (Figure 30). In Madhya Pradesh, in 56 percent of classes all the students had textbooks and in 36 percent of classes more than half of students had textbooks. Similarly, in 64 percent of classes, all the students had notebooks and in 32 percent of classes more than half of the students had notebooks.

Figure 30: Availability of textbooks and notebooks with students, percent

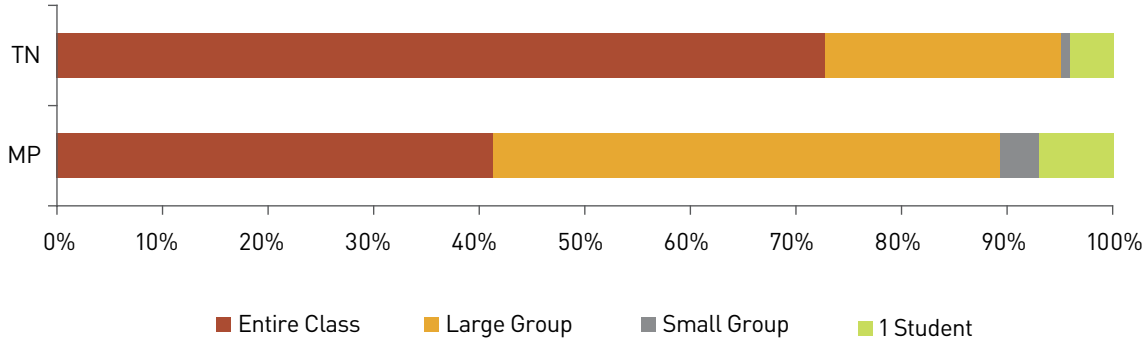


Engagement levels in the classroom

As part of the Stallings tool, the observers also note the number of students that are engaged with the teacher in learning. Observers note whether one student is engaged, between 2 and 6 students (categorised as a 'small group' activity), more than 6 students but not the whole class ('large group' activity) or the whole class.

Student involvement was higher in Tamil Nadu with the entire classroom paying attention for around 73 percent of the class time (Figure 31). The number for Madhya Pradesh was significantly less at 41 percent. Both states reported at least a large group of students working with teachers for around 90 percent of the class instructional time.

Figure 31: Students paying attention in the classroom, percent



Off task behaviour

Teachers were found spending around 4 percent of total classroom time on off-task activities. It would be useful to understand what these activities are and how much time is going into each of them. The Stallings tool recorded 3 types of Off-task activities – 1) Social interaction with students, 2) Social interaction with others, and 3) Teacher out of the classroom. The data shows that teachers' off-task time is split equally between social interaction with others and going out of the classroom (each with 45 percent of total off-task time). Teachers are spending very less time in social interaction with students.

Students: This section looks into the activities of those students who are not involved with teachers in the classroom. The key objective here is to understand:

- If these students, though unengaged with the teacher, are still involved in learning activities or are spending their time in unproductive activities (Off-task).
- The composition of these students, whether large group of students are unengaged or only small groups.
- The extent of unengaged behavior.

For almost 55 percent of the class time, the entire class is involved in the activities being carried out by the teacher in the classroom and for another 5 percent of the time the entire class is off-task when teacher is busy in classroom management or engaged in off-task behavior. So this section will only focus on the rest of the instances when few or many students are uninvolved. These cases have been classified into 3 categories for further examination:

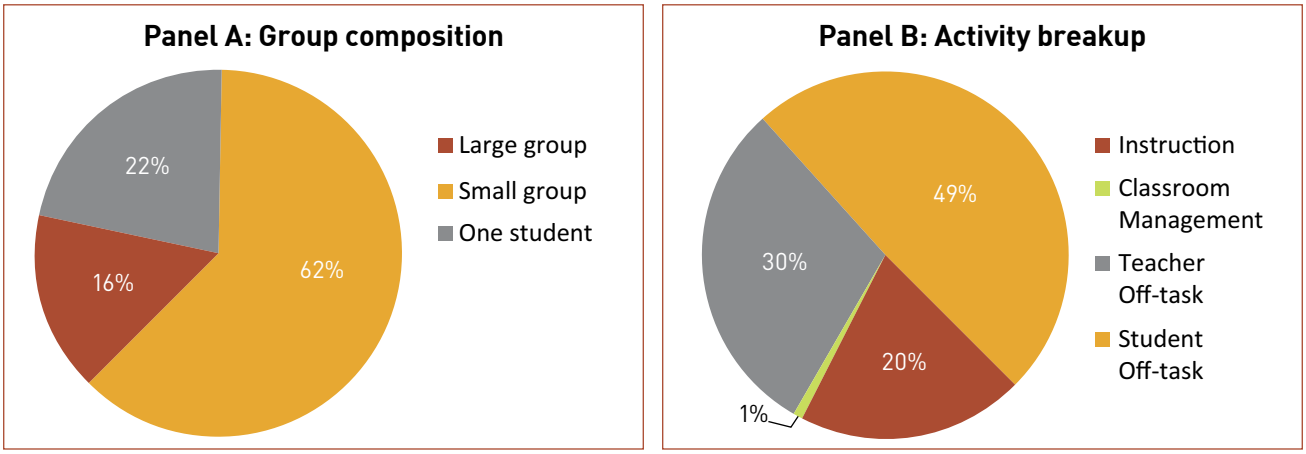
- Cases when a large group is involved with the teacher (33 percent of the class duration, on average).
- Cases when a small group is involved with the teacher (2 percent of the class duration, on average).
- Cases when one student is involved with the teacher (6 percent of the class duration, on average).

Group composition and activity breakup when a large group is involved with the teacher

This category is most critical to understanding what students are doing when they are not involved with teachers as it accounts for more than 75 percent of such cases. Almost two-thirds (62 percent) of the time small groups of students were not involved with the teacher and 80 percent of the

time students were not involved in instructional activities when doing something on their own (Figure 32).

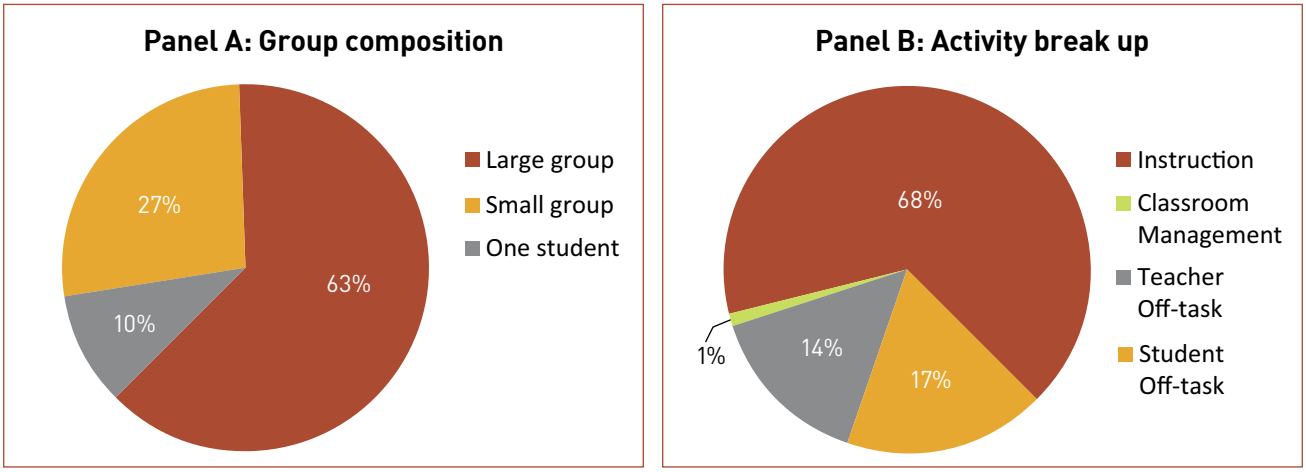
Figure 32: Students who were uninvolved with teacher when large group of students was engaged with teacher



Group composition and activity breakup when one student was involved with teacher

When a teacher was engaged with 1 student, in 63 percent cases a large group of students was doing the same activity and only 37 percent of the time the class broke up into smaller groups (Figure 33). This suggests that in most of these cases there was discipline in the classroom and students were working as instructed by the teacher. The activity breakup also suggests the same; in 68 percent of cases students were involved in instructional activities.

Figure 33: Students who were uninvolved with teacher when teacher is engaged with one student in the class



Correlation between classroom practices and school and teacher factors

Correlation analysis was carried out to find out if factors related to class, teacher or school have any impact on classroom practices such as time spent on different activities in class or engagement level of students.

Findings from the correlation analysis show that:

- Teacher rating is moderately positively correlated with time spent on 'Instruction' and 'Engagement level'.

- Effective teaching practice as perceived by students is moderately positively correlated to student engagement levels.
- Infrastructure and learning materials available in schools does not impact the time spent on instructional activities.
- Class size does not influence time spent on instructional activities.

6.5 Infrastructure and Resources

School infrastructure and resources can have an impact on students' learning and it is essential to have basic facilities to encourage teachers and students to come to school regularly. Data related to school infrastructure and resources was collected for each sampled school through the school questionnaire.

Infrastructure availability in schools

Data on school infrastructure was also analysed to understand which items were present in most of the schools and which were less readily available (Figure 34). Barring a compound wall and backup electricity, more than 80 percent schools surveyed had other infrastructure items. Other noteworthy points with regard to infrastructure are as follows:

- Overall 97 percent schools reported '*pucca*' buildings.
- More than 92 percent schools in both Madhya Pradesh and Tamil Nadu reported having a separate toilet for girls.
- Only 45 percent schools in Madhya Pradesh have a compound wall.

The school questionnaire checked for 11 different items related to school infrastructure. An additive index was created based on the 11 indicators. The school infrastructure index was further divided in three groups; index value between 0 to 4, 5 to 8 and 9 to 11 indicating low, medium and high categories (respectively) (Figure 35).

Most schools in both the states have good infrastructure and facilities. Seventy-four percent of schools in Madhya Pradesh and 90 percent of schools in Tamil Nadu have an index value between 9 to 11. Only 2 schools were found to have an index value of 4. These schools are in Balaghat and both these schools have a '*pucca*' building and separate classrooms and cupboards. One of the schools had electricity while the other has a separate toilet for girls. Overall, there is no significant difference in school infrastructure in Madhya Pradesh and Tamil Nadu.

Figure 34: Availability of different infrastructure items in schools

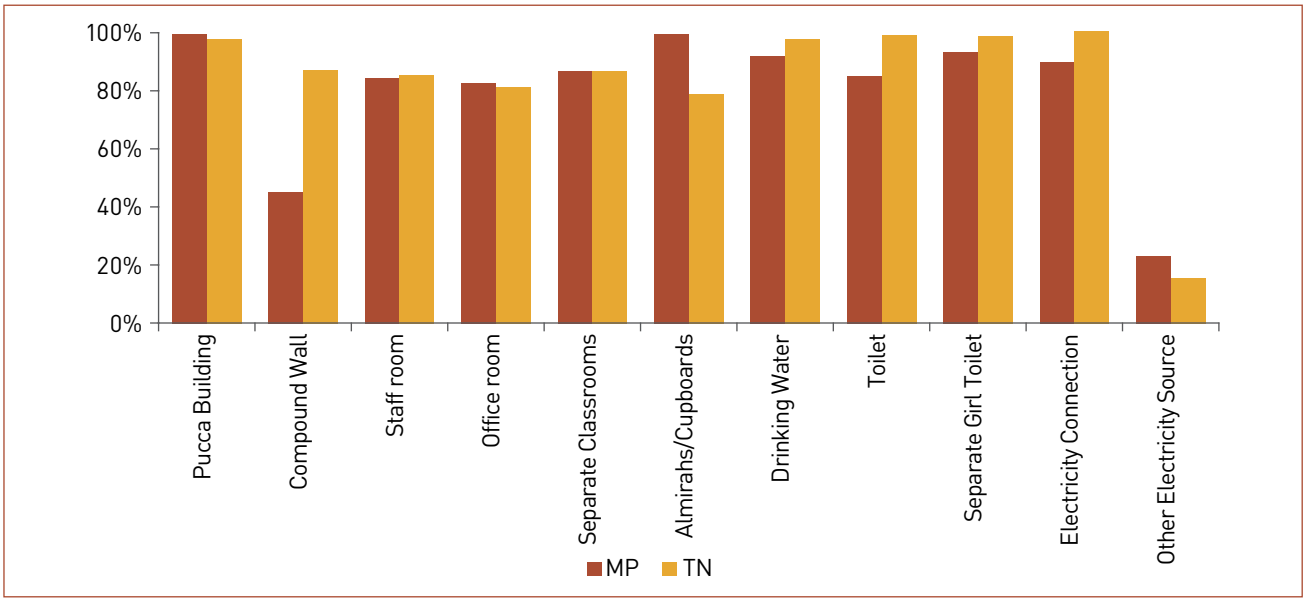
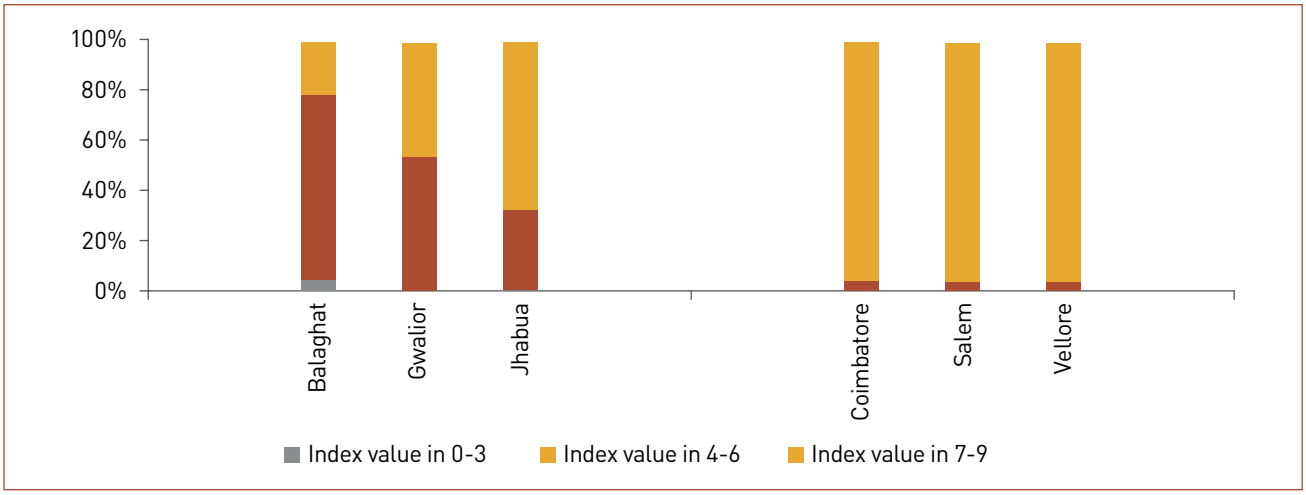


Figure 35: Distribution of schools across infrastructure index range

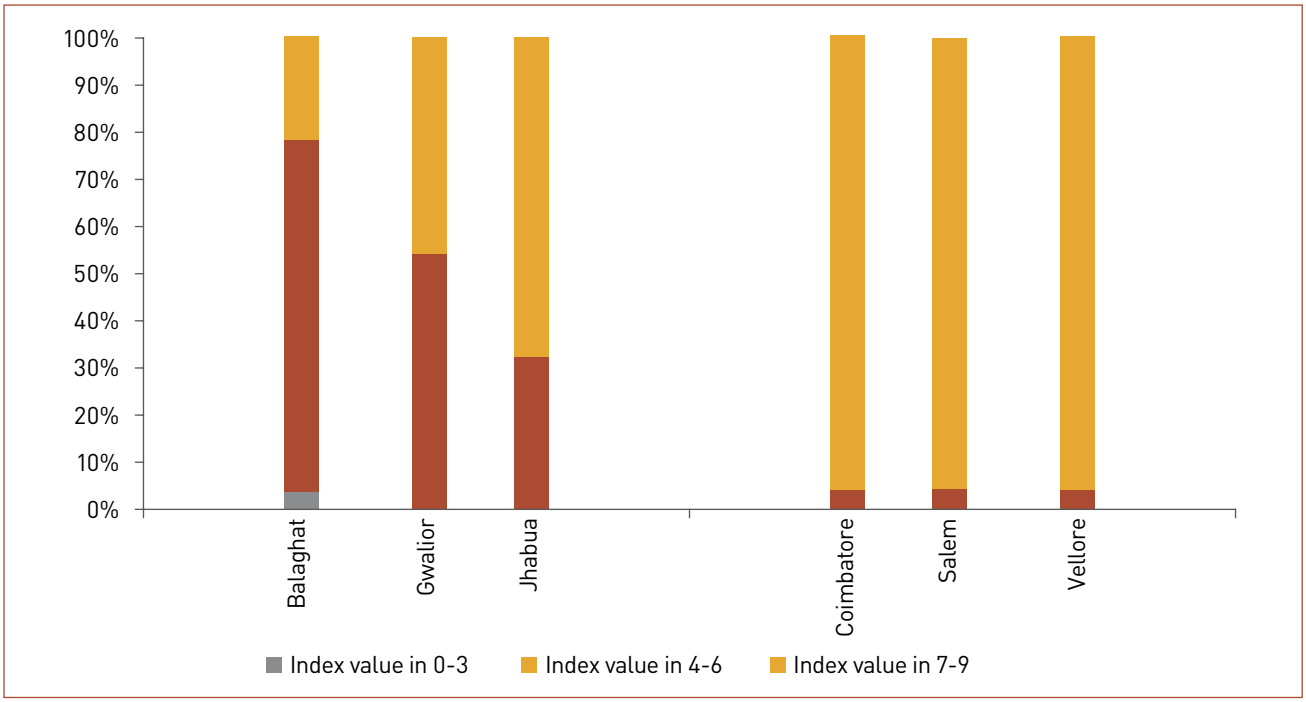


Learning resources availability in schools

Learning resources include materials which can directly or indirectly help achieve learning among students. The school questionnaire included 9 different items on availability of learning resources. A learning resources availability index was created using the additive method. Here, the index range is 0 to 3, 4 to 6 and 7 to 9 (the maximum achievable value for each school is 9).

In Tamil Nadu, more than 96 percent of schools show a learning resources availability index ranging from 7 to 9 while in Madhya Pradesh overall, 38 percent of schools scored in the same range (Figure 36). In Madhya Pradesh, schools from Jhabua district show the highest availability of learning resources and Balaghat scores the lowest on the learning resource availability index. One school in Balaghat shows an index in the 0 to 3 range though it has a blackboard, charts and chalks in each class.

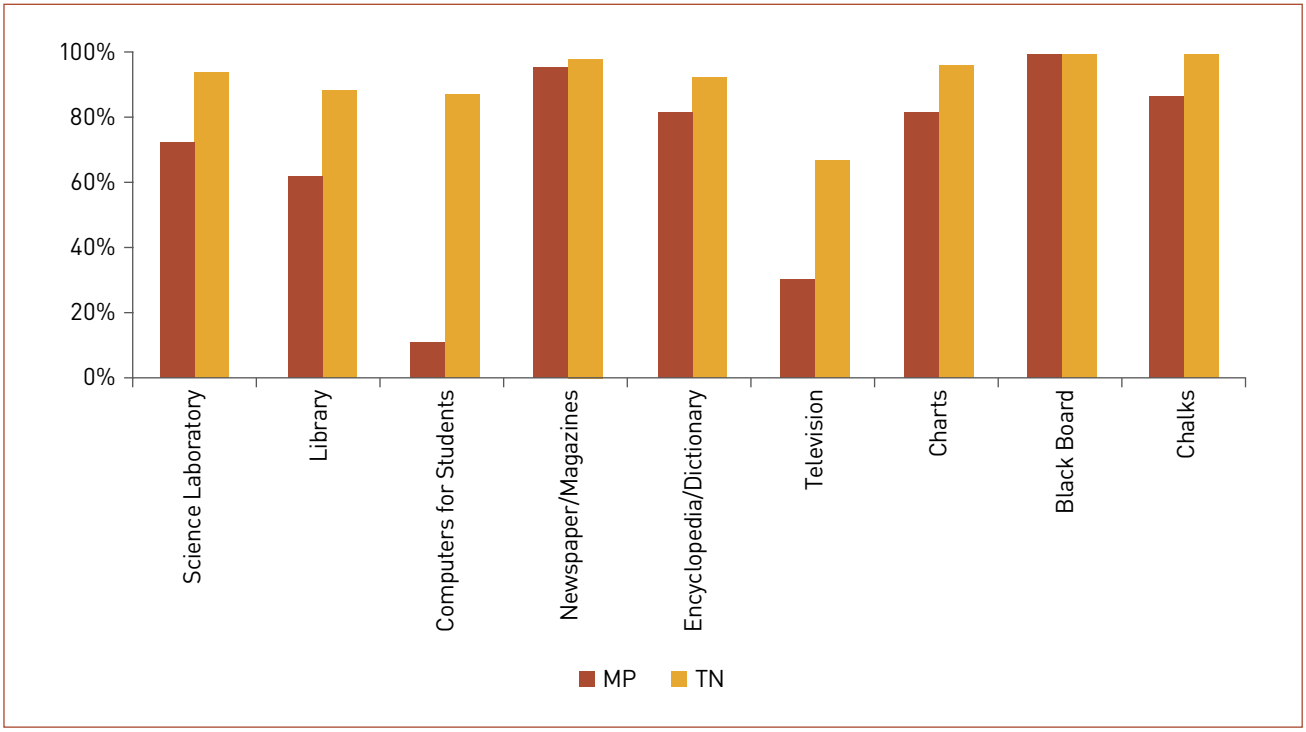
Figure 36: Distribution of schools across learning resources index range



In Tamil Nadu more than 94 percent schools have a science laboratory, 89 percent schools have a library and 88 percent schools have computers for student use; while in Madhya Pradesh 73 percent schools

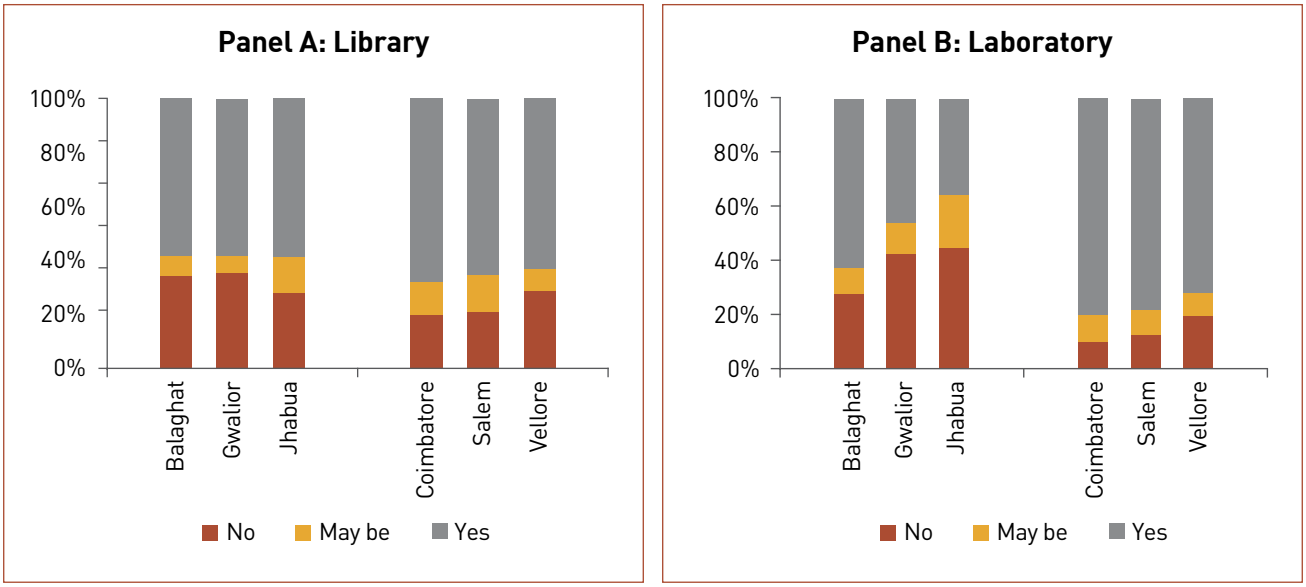
have a science laboratory, 62 percent schools have a library and only 11 percent schools have computers for student use. In Madhya Pradesh, averages have gone down as Balaghat is the outlier here. In Balaghat, only 64 percent schools have a science laboratory, 43 percent schools have a library and no school reports having computers for student use.

Figure 37: Availability of different learning resources in schools



In both Madhya Pradesh and Tamil Nadu, students are encouraged and allowed to use the library in more than 60 percent schools (Panel A, Figure 38). Use of the science laboratory is encouraged in 76 percent schools in Tamil Nadu and 52 percent schools in Madhya Pradesh (Panel B, Figure 38).

Figure 38: Schools where students report being encouraged to use the library and science laboratory, percent



6.6 Head Master and Teacher Background

Teachers' education and training, behavior, attitude, and perceptions shape the way students learn in their classroom. Information on these factors were gathered through the school questionnaire.

Overall in Madhya Pradesh and Tamil Nadu, across sampled schools, 72 percent head teachers are males and 28 percent head teachers are females. In Madhya Pradesh, the number is higher with almost 80 percent head teachers being males. 88 percent head teachers have a master's degree. 84 percent head teachers in Tamil Nadu have an M. Ed teacher training degree while 15 percent head teachers in Madhya Pradesh have an M.Ed. degree.

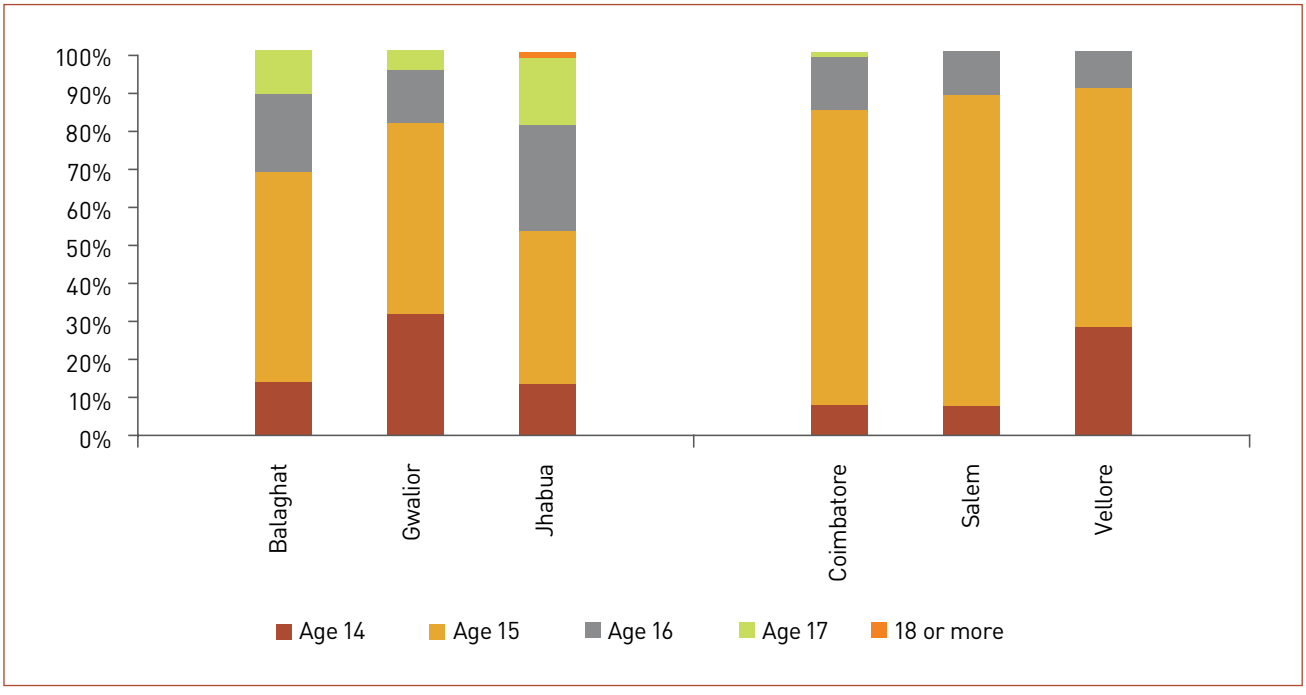
In Madhya Pradesh, 35 percent head teachers have attended in-service training in the last 12 months while 58 percent attended in-service training in Tamil Nadu. Head teachers had teaching experience of almost 20 years before becoming a head teacher.

6.7 Student Background

International evidence shows that a student's socio-economic status and parents' education have a big impact on a student's learning. In this study, in each sampled school, 5–10 students from an observed class were asked different questions on age, social and economic background, and parents' education and occupation. In addition, some other contextual questions were asked, relating to whether students received assistance with academic work outside school, what amenities they had at home, etc. These questions were asked as part of the student questionnaire.

Mostly grade 10 and very few grade 9 classrooms were observed during this study. Around 50 percent students in Madhya Pradesh and 74 percent students in Tamil Nadu are 15 years old. In Madhya Pradesh, schools have diverse groups in terms of age as at least 18 percent students are younger than 15 years and more than 30 percent students are older than 15 years. This diversity of student ages poses an additional challenge to teachers in responding effectively to the different educational needs of their students.

Figure 39: Distribution of students, by age and by district



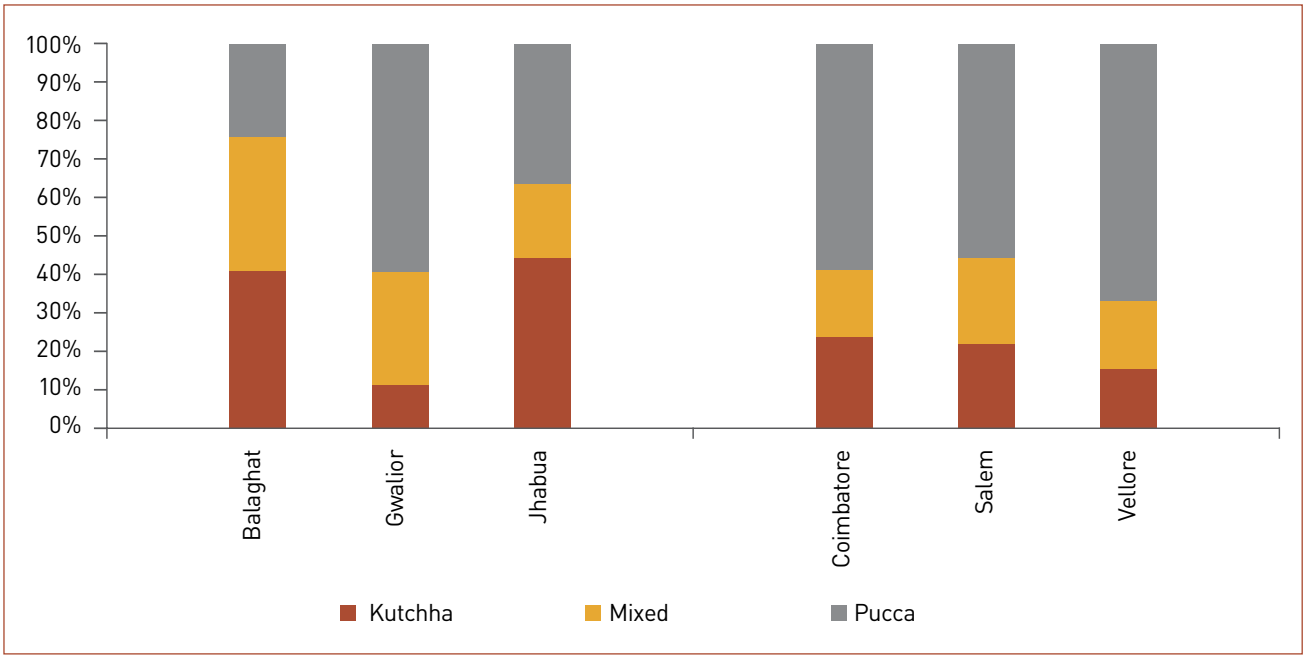
Students' Home Amenities

Thirty-four percent students in Madhya Pradesh and 61 percent students in Tamil Nadu report that they live in a 'pucca' house (Table 24). More than 95 percent students reported that they had 2 or 3 meals at home on the day before the observation (Figure 40).

Table 24: Number of meals per day students had at home

	1 Meal	2 Meal	3 Meal
MP	2 percent	73 percent	25 percent
TN	3 percent	42 percent	55 percent

Figure 40: Type of house in which students live

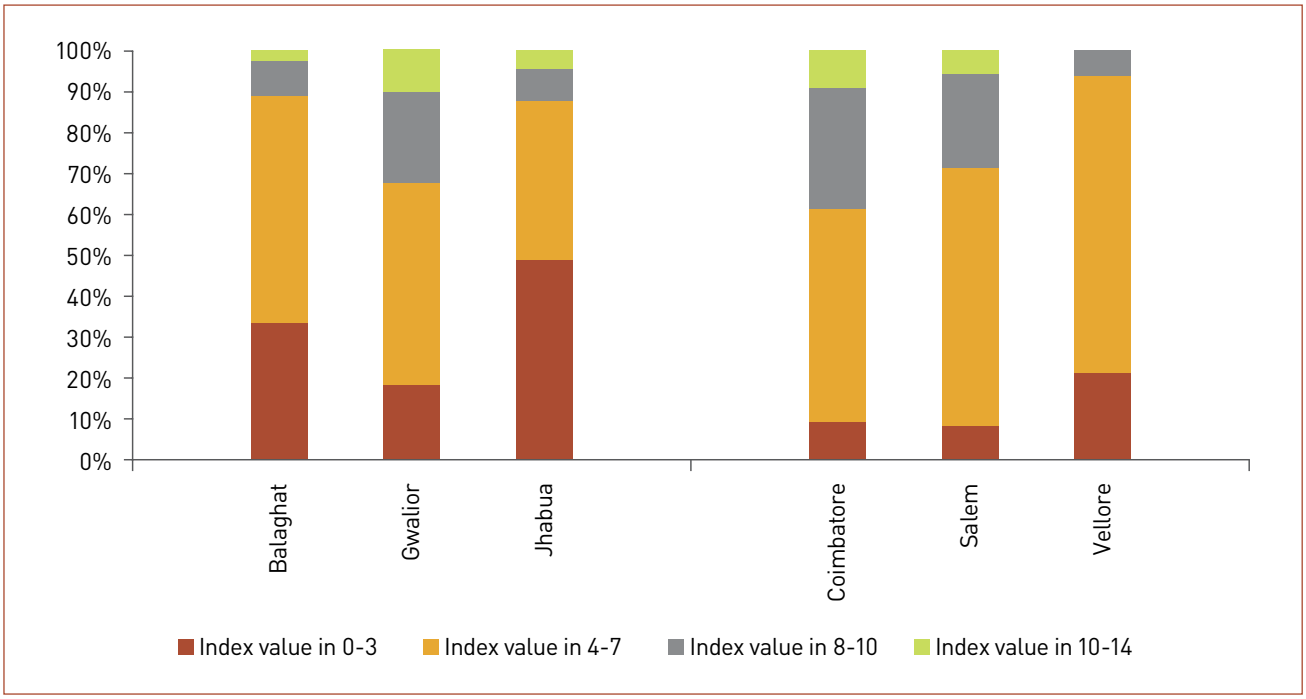


The student questionnaire listed 14 amenities which were used to create an additive index (Table 25). Overall, 20 percent students reported having more than 50 percent amenities available at home. Overall, comparison of amenities at home shows that students in Tamil Nadu are better off than their counterparts in Madhya Pradesh (Figure 41). It is interesting to note that 90 percent students have mobile phones though some other basic facilities are missing. More than 94 percent students reported having electricity at home which is a critical utility.

Table 25: Example of question from student questionnaire

Part of student questionnaire
7. Which of the following are available at your home? (Please tick ALL that are available.)
☐ Electricity ☐ Cooking gas ☐ Water all throughout the day
☐ Calculator ☐ Radio ☐ Television ☐ Refrigerator ☐ Bicycle ☐ Scooter/Motorbike ☐ Car
☐ Mobile phone ☐ Computer/Laptop ☐ Internet ☐ Newspaper/Magazines ☐ Other books

Figure 41: Distribution of students across amenities index range



6.8 Teacher Understanding of Student Knowledge

In each district, 28 Mathematics and Language teachers each, teaching class 10 were administered the Teacher Understanding of Student Knowledge (TUSK) questionnaire to check whether they could identify errors made by students (Table 26). The questionnaire was voluntary with no time limit.

Table 26: Number of questions on TUSK questionnaire

Subject	Multiple Choice Questions (MCQs)	Free Response Questions
Language	7	3
Mathematics	8	2

Overall Performance

On an average language teachers got 50 percent of the questions correct and Mathematics teachers got 40 percent of the questions correct in both states. Overall performance data shows that there is very little difference in performance between Madhya Pradesh and Tamil Nadu teachers.

Table 27: Teacher performance on TUSK

Subject	Average Performance	
	MP	TN
Mathematics	50.1 percent	47.0 percent
Language	40.2 percent	37.3 percent

Among all districts, the relative performance of teachers in Gwalior is highest in Mathematics as well as Language (Table 28). Relative difference in Mathematics performance is quite small.

Table 28: Responses on TUSK questionnaire

Mathematics (8 MCQs)		
District	Overall correct answers (%)	Average number of responses per question
Gwalior (MP)	52.7	26
Salem (TN)	50.0	26
Balaghat (MP)	49.2	24
Jhabua (MP)	48.0	22
Coimbatore (TN)	47.1	26
Vellore (TN)	43.9	25

Language (7 MCQs)		
District	Overall correct answers (%)	Average number of responses per question
Gwalior (MP)	47.4	24
Coimbatore (TN)	38.9	21
Vellore (TN)	38.3	20
Jhabua (MP)	37.7	22
Balaghat (MP)	35.0	23
Salem (TN)	34.8	23

There were, however, significant differences in the types of questions which teachers were able to answer correctly.[5] In particular, teachers were less able to identify student errors on questions related to subject material covered in higher classes (8, 9 and 10).

Question-wise analysis - Mathematics

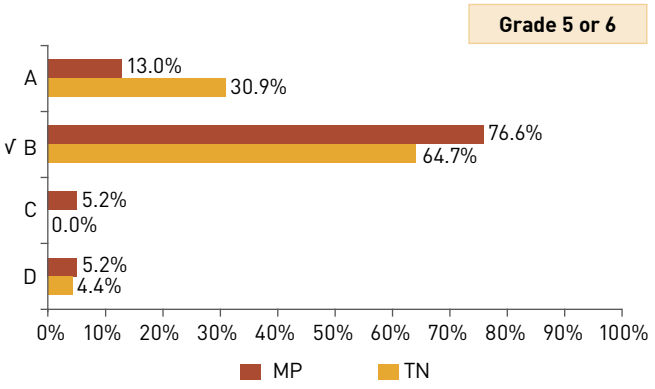
For some of the concepts covered in lower classes, as in the example below, teachers seem to be able to predict student errors correctly.

11 + 11 + 11 + 11 + 11 =_____ × 11

Many students of class 5 answered 55 to the above problem.

Which of the following concepts is most probably not understood by such student?

A. Addition
B. 'equal to' representing a balance
C. Division as repeated subtraction
D. Variables like 'x' and 'y'



Sample question 1: Around 77 percent teachers in Madhya Pradesh and 65 percent teachers in Tamil Nadu were able to point out the error made by students correctly. However, compared to Madhya Pradesh, significantly greater number of teachers in Tamil Nadu were not able to identify the error correctly; 31 percent Tamil Nadu teachers think that students have not understood addition in this case.

Sample question 2: Around 69 percent teachers in Madhya Pradesh and 64 percent teachers in Tamil Nadu were able to correctly point out the error related to lowest common multiple made by students.

5 Moreover, it is also noteworthy that not all teachers answered all the questions and it may that they were more likely not to respond to questions about which they were not less sure of the answers.

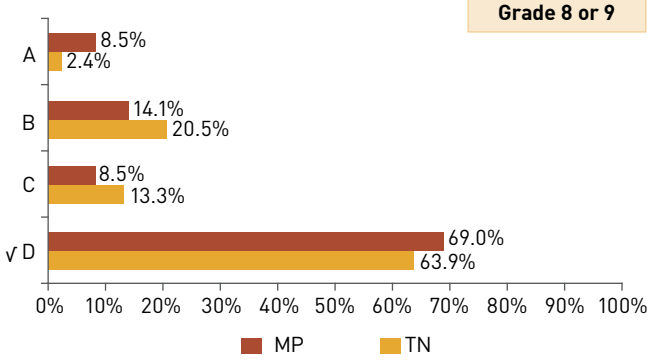
A teacher taught his class that LCM stands for Least Common Multiple and the various methods of finding LCM like prime factorisation and division method. He made sure that the class could use both the methods to find the LCM of ANY 3 two-digit number, and most of his students were able to.

In an exam, around 40% of the class was not able to answer the question "which is the least number that is a multiple of both 98 and 84?"

What could be the most likely reason for this?

A. This problem cannot be solved using the methods taught by the teacher.
B. They would have made errors in multiplication and so got a wrong answer.
C. The students would have found the numbers too large and so were not able to solve the problem.
D. They did not recognise that they had to find the LCM here as they just knew the procedures to find LCM.

Grade 8 or 9



However, for some other basic concepts as in the example below teachers don't seem to be able to predict student errors correctly.

Sanjay performs the operation $\frac{5}{8} \div \frac{1}{3}$ as follows:

$$\frac{5}{8} \div \frac{1}{3}$$

$$= \frac{15}{24} \div \frac{8}{24}$$

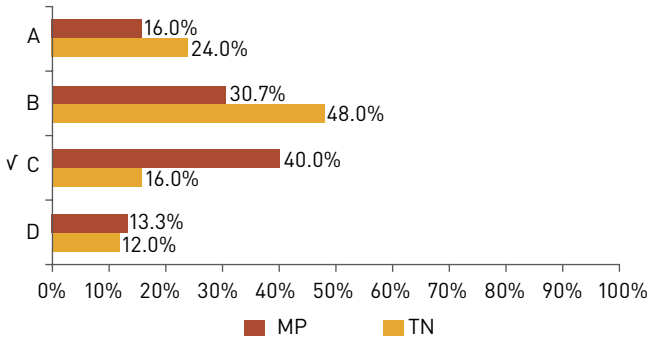
$$= 15 + 8$$

$$= \frac{15}{8}$$

Which of the following do you agree with?

A. He does not know division of fractions.
B. He is confusing addition of fractions with division of fractions.
C. The method is perfectly right and works for all problems on division of fraction.
D. This method will not give right answer for all problems, it works just for this particular case.

Grade 5



Sample question 3: Teachers seem to think that students are confusing addition of fractions with division of fractions. In fact, in this example, the method is perfectly correct and will work for any fraction.

Responses to some of the questions of higher class levels (classes 8, 9 and 10) seem to indicate that teachers might have the same wrong notions as students.

Here is a student's "proof" to show that 1 = 2.

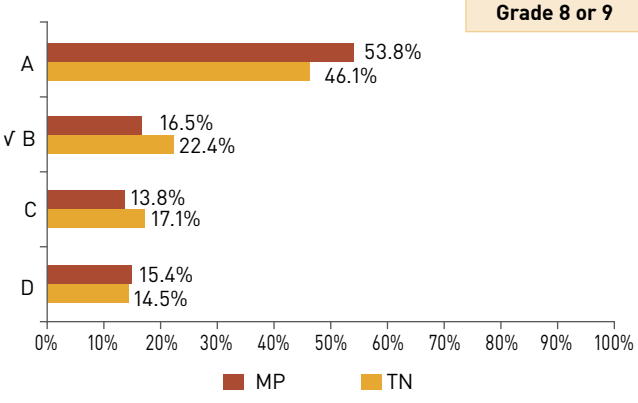
Let a = b_1 then

$ab = a^2$	(1)
$ab - b^2 = a^2 - b^2$	(2)
$b(a - b) = (a + b)(a - b)$	(3)
$b = a + b$	(4)
$b = 2b$	(5)
$1 = 2$	(6)

Which of the following do you agree with?

A. There is no error in this proof.
B. He has done division by zero in one of the steps.
C. He has cancelled variables without regarding their signs.
D. He has added/subtracted unequal numbers to both sides of the equality sign.

Grade 8 or 9



Sample question 4: Almost 50 percent of the teachers in both Madhya Pradesh and Tamil Nadu seem to think that there is no error in the given proof, even though this 'proof' concludes that 1 is equal to 2. They might be missing the fact that division by zero occurs in step 3, which is an error.

Grade 9 or 10

Given log 1.25 = 0.0969 evaluate cube root of 0.000125.

A part of a student's working to the above problem is shown below.

$\log 0.000125 = \bar{4}.0969$ Step (1)

$\log\sqrt[3]{0.000125} = \frac{\bar{4}.0969}{3}$ Step (2)

$= \bar{1}.3656$ Step (3)

Therefore $\sqrt[3]{0.000125}$ = anti log ($\bar{1}.3656$)

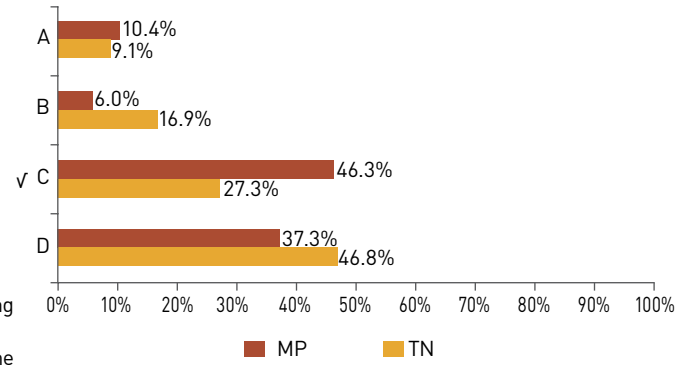
Which of the following do you agree with?

A. He has made a mistake in step (1) in calculating log 0.000125.

B. He has made a mistake in step (2) as he should be multiplying by 3, instead of dividing.

C. He has made a mistake in step (3) as he is interpreting the logarithm as -4.0969.

D. There is no mistake in his working.



Sample question 5: This is a concept that is taught by class 10. Majority of the teachers in Madhya Pradesh as well as Tamil Nadu seem to have a wrong notion that there is no mistake in the working of the student. Even they probably think that $\bar{4}.0969 = -4.0969$.

Question-wise analysis - Language

In a similar way, teachers of language were able to identify the errors in questions which were based on a relatively simple text (a poster) but were less successful with questions which were based on a story and required higher levels of comprehension.

A Painting Competition

Grade 9 or 10

Theme	:	Saving the environment
Eligibility	:	All children in the age-group of 10-15 years
Venue	:	The School Assembly Hall
Date	:	15 December 2008
Timing	:	10 am to 1 pm

Prizes included:

- Books worth Rs. 500
- 10 best paintings will be sent for display in the painting exhibition to be held in Town Hall on 26 January.
- The winners will represent the School in the inter - School competition.

The winners will be announced on: 20 December.

Please register your names with your respective Class Teacher.

Last date for Registration: 12 December.

2. For the question given below, most of the students were able to answer it correctly.

When is the completion going to be held?

A. 20th December

B. 12th December

C. 15th December

D. 26th January

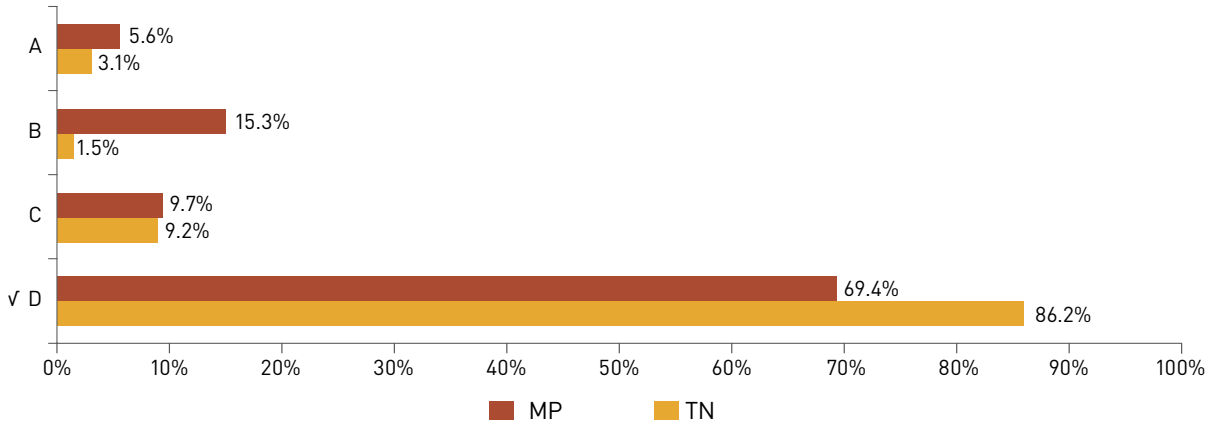
What could be the reason why they were able to answer this question well?

A. Because the correct option is the first option

B. Because they must have revised this earlier before the test

C. Because every year the painting competition is held on the same date

D. Because the correct option is clearly given in the poster with the word 'Date'



Sample question 6: Around 70 percent teachers in Madhya Pradesh and 86 percent teachers in Tamil Nadu were able to correctly point out the error made by students.

The Jackpot

Grade 8

Antara

The windowpane creaked a little on its hinges, as it was slowly pushed open. **A thin beam of light** furtively ran over the furniture, pausing for a brief second on a piece of metal that sparkled in the velvet darkness.

Both men quietly stepped over the windowsill into the marble-floored room, their rubber-soled slippers making no noise. Hearing no sound, Badri flicked on the flashlight again and surveyed the room. Birju's jaw dropped open as his eyes tried to take in the wealth that lay around. Badri reedily smacked his lips. **"Birju, we've hit the jackpot!"**

Badri pointed to the massive ceilling-to-floor cabinet of burnished wood holding slickly - designed electronic gadgets, television and audio system, flower vases and beautiful antique statuettes, on the right wall. 'We didn't wait in vain."

They had spent the entire previous week watching the goings-on in this spacious three-storeyed beach side bungalow. imported cars fleeted in and out, expensively dressed people bustled around, huge metal boxes and poles were brought in vans and carried into the house by workers. They were lucky to see a few film stars too.

Everything had quietened down the day before. Everyone had presumably left on a holiday and the tow had chosen this moonless night to move in for the kill.

Birju was running his hands over a large colourfully painted wooden panel set among the shelves of the cabinet. And before his amazed eyes, the panel slid open with a click, revealing a safe inside which spilled out gold coins on opening its lock.

Badri's heart was racing wildly. It was a windfall they hadn't expected. They would be rich overnight.
Birju's head was chalking out plans rapidly.

The sudden shrill whistle of the night guard pierced through the dark silence around. Badri and Birju almost jumped out of their skins. Without wasting another moment they hauled the huge, heavy sack over the window and dived after it.

Two days after "hitting the jackpot", Badri and Birju were back to roaming the streets. The sack of fake gold coins, the "antiques" of papier-mache and the gold-painted aluminium clock were lying in the junkyard behind their hovel in Dombivili, along with the hollow plastic cabinets resembling the VCR and the stereo. Sale of this "loot" had fetched them a total of 28 rupees from the junk collector. The two strangers in the tinsel town had not known that the mansion they had chosen for burglary was "Rang Mahal" which is lent out to movie producers for film shootings.

The student response data to the following question is shared below.

What made Badri exclaim that they had hit the jackpot?

Option No.	Option	Percentage of students choosing option
(i) (Correct)	The sight of the expensive furniture and antique pieces in the house	47.3%
(ii)	The flow of gold coins from the safe hidden inside the wooden panel	25.2%
(iii)	The sparking metal displayed on the furniture in the room	14.5%
(iv)	The marbled floors of the spacious and expensive house	8.7%

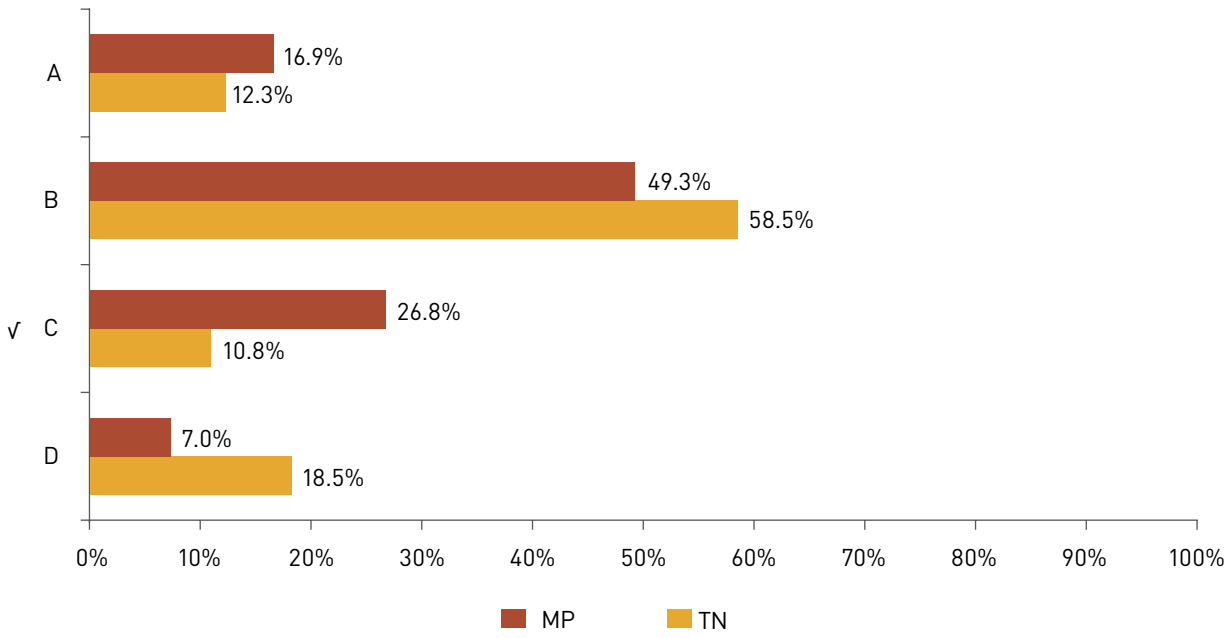
5. What can we say about students answering option 2, from the data in the table below?

A. They don't know the meaning of the word 'Jackpot' and have made a random guess based on the clue wealth that lay around'.

B. They don't understand how valuable electronic gadgets, furniture, and antiques can be, and think that only gold is valuable.

C. They are unable to connect what event led to the exclamation, and have relied mainly on their previous knowledge of 'jackpot'.

D. They probably don't understand the meaning of several words like 'antique', 'jackpot' etc. and so couldn't understand the story.



Sample question 7: While teachers seemed to be pointing out the incorrect connection students were making between 'gold coins' and 'jackpot', they were missing the fact that the sequence of events is also important in this case and students may be missing that critical piece of comprehension.

7. Conclusion

The importance of teacher quality for improving educational outcomes is widely recognized. Measuring teacher quality is a relatively new and expanding area of research that includes several components – teacher qualifications, attendance, instructional practices, governance and accountability. While several of these areas have been investigated in the Indian context, observing teachers' classroom practices has received little attention – especially at the secondary level. This study, for the first time, gathered information on teachers' time-on-task in secondary classrooms in India. The study systematically documented teacher practices in grade 10 classrooms across 150 schools in 6 districts in Madhya Pradesh and Tamil Nadu to better understand how teachers are spending their time on instructional and non-instructional activities, the kinds of teaching-learning materials being used for instruction and the extent to which the teaching practices used are able to engage students in these classes. The findings indicate that while the majority of teaching time is spent on instruction, the use of materials beyond the blackboard and textbook is very limited. Further, instruction is most often directed at the entire class or a large group of students in the class with few instances of the teacher focusing on small groups or individual students. We also find that these patterns vary across the districts included in this study requiring further exploration into factors like teacher recruitment and training that might be related to differential district patterns.

The findings from this initial study have several implications for policy and further research. More and better evidence from classroom observations is needed to gain a more holistic picture of teachers' instructional practices in secondary classrooms and to identify teachers' training needs. This information must be coupled with data on students' learning outcomes to make direct linkages between the kinds of classroom instructional practices that result in higher student engagement and learning. Finally, international classroom observation techniques like the Stallings and CLASS[6] tools offer a new and cost-effective way of thinking about alternative forms of teacher training. These tools can be used by principals, district officials and teachers themselves to generate discussions on effective classroom practices and provide direct and timely feedback on practices that could potentially improve the quality of teaching and learning in secondary schools.

6 The Classroom Assessment Scoring System (CLASS) is another observational tool developed at the Center for Advanced Study of Teaching and Learning at the University of Virginia.

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