Mid-line Teacher-Led Student Assessment Bihar 2014

ei educational INITIATIVES

बिहार शिक्षा परियोजना परिषद

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EXECUTIVE SUMMARY

BACKGROUND

The Bihar Educational Project Council has stated as its mission "*bringing about quantitative and qualitative improvement in the Elementary Education system in Bihar*". The government has provided access to elementary education for all, along with measures such as provision of books, uniforms and training to teachers. To ultimately achieve quality learning – one that is defined as every child having the ability to read and comprehend, do basic math and understand the different subjects taught in school – it is important that there is a unified focus on learning outcomes. Bihar is moving to a system where importance will be given to understanding the educational outcomes of the inputs it has historically focused.

Large scale assessments of the education system provide a better understanding of the strengths and weaknesses in student learning, which allows for better decision making on variety of domains. These include providing focussed remedial interventions, teacher training and understanding nuances of certain socio-economic groups of people or regions to improve the state of education. Decisions are driven by data on students, teachers and actual learning levels rather than qualitative inputs, surveys or general perceptions.

In 2013-14, the Bihar Education Project Council (BEPC) initiated Base Line and Mid Line Assessments - a state wide programme for assessing school quality and learning through student assessments. The Midline Assessment of this programme was conducted in September 2014 covering more than 59 lakh students of class 3, class 5 and class 7 in more than 68,000 schools in the 38 districts of Bihar. **This assessment was designed to raise awareness among all stakeholders (including school principals, teachers and even officers) on the need to focus on learning outcomes.** There is greater ownership of this census study since each school is provided with a 4 page report that is customized to the students who took the test from that school. The study helps identify the shortcomings at the state, district and block level which identifies for the relevant government officials the areas for improvements that are needed in the administrative regions that they monitor. Through this process, there is significant capacity building of Bihar state in the domains of test instrument design, question making, test administration, analysis of results and dissemination workshops.
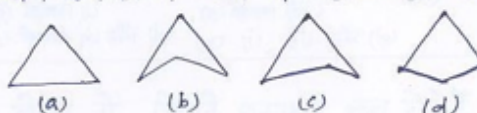
CAPACITY BUILDING OF TEACHERS

A pivotal objective of the Midline assessment was to increase awareness amongst the teachers on the learning levels of their students, understand issues of conceptual understanding and build their skills to address them in their classrooms. In light of this objective, the tools used in the teacher- led midline assessments were mainly prepared by the teachers of Bihar. Two capacity-building workshops were conducted for the teachers of Language and Maths at BEPC office, Patna between 19th- 24th May, 2014. The workshop contents were designed to equip teachers with necessary understanding about good questions and higher order questions testing conceptual understanding. The teachers were explained how to classify topics based on the Enduring Understanding (EU), Important to Know (IK) and Worth being familiar (WF).

Through these workshops around 80 teachers from different districts were oriented to design good quality questions. However, the impact is not limited to just this number. From the way teacher came to give their feedback and looking at their enthusiasm to take it ahead in their clusters/blocks/ districts was an indicator of a wider impact to the whole system. The capacity building workshops were different from the usual teacher training programmes as there was no effort to impart training- the whole focus was to make them do hands-on activities individually and in groups, which ultimately resulted in a wider spread of understanding, sharing of ideas and passing on the enthusiasm to change the way even their usual class tests/ unit tests were perceived by them.

Examples of a question developed by the teacher

Made by the teacher	Used in the paper

नीचे के चित्र में कौन सी आकृति त्रिभुज है?

(a)　(b)　(c)　(d)

नीचे दी गई कौन-सी आकृति त्रिभुज है? सही जवाब पर निशान (√) लगाएँ।
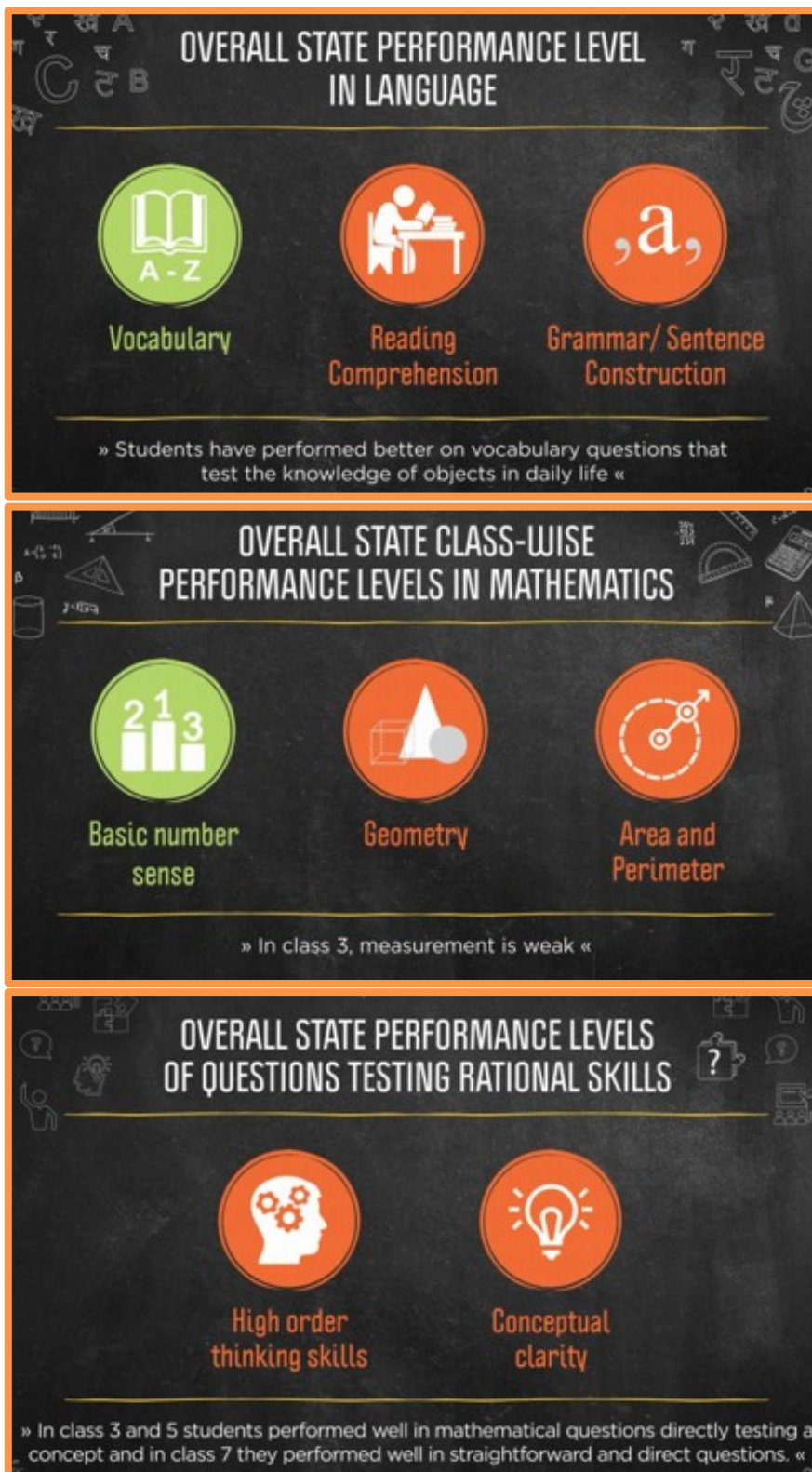
सज्जन लोग परोपकार के कार्य पर खर्च करते हैं।
इस वाक्य में विशेषण क्या है?

(a) परोपकार
(b) सज्जन
(c) लोग
(d) कार्य

सज्जन व्यक्ति परोपकार करते हैं जिससे उन्हें पुण्य और प्रशंसा मिलती है।

इस वाक्य में विशेषता बताने वाला शब्द कौन-सा है?

A परोपकार
B सज्जन
C पुण्य
D प्रशंसा

These workshops can be organized at cluster/ block levels by the participants being the resource persons and the whole perspective about assessments- be it high stake or low stake can take a new meaning and only by this the whole focus can shift to learning with understanding.

It is essential to understand that capacity building is not a one-time exercise. In order to ensure that the teachers build on their skills and understanding of the students' learning levels, these workshops need to be iterative, incorporating the response from the teachers, and addressing their key difficulties.

MAIN FINDINGS FROM THE ASSESSMENT

1. Across districts, the performance of students varies across classes and subjects. However, Saharsa, Gopalganj, Begusari and Aurangabad have the highest performance levels in both Hindi and Maths. Bhojpur, Muzaffarpur, Madhepura and Bhagalpur are among the lowest performing districts.

2. In Language, across classes, the students have performed better on vocabulary questions that test the knowledge of objects in daily life. Reading comprehension shows low performance across classes and is an immediate cause of concern. There is also low performance on intermediate questions on grammar and sentence construction.

3. In Maths, Class 3 and 5 students have shown higher performance on the questions testing basic number sense and daily life situations. However, Geometry and Measurement seem to be weak in class 3, whereas Geometry & Area and Perimeter are two areas that seem to be weak in both class 5 and class 7. Class 7 students have shown high performance on questions testing basic operations like addition and subtraction and measurement – which are typically concepts covered in much lower grades.

4. In general, Students seem to show low performance on questions which require higher order thinking skills and conceptual clarity such as word problems in Maths, or questions testing a concept in a non-straightforward manner.

OVERALL STATE PERFORMANCE LEVEL IN LANGUAGE

Vocabulary

Reading Comprehension

Grammar/ Sentence Construction

» Students have performed better on vocabulary questions that test the knowledge of objects in daily life «

OVERALL STATE CLASS-WISE PERFORMANCE LEVELS IN MATHEMATICS

Basic number sense

Geometry

Area and Perimeter

» In class 3, measurement is weak «

OVERALL STATE PERFORMANCE LEVELS OF QUESTIONS TESTING RATIONAL SKILLS

High order thinking skills

Conceptual clarity

» In class 3 and 5 students performed well in mathematical questions directly testing a concept and in class 7 they performed well in straightforward and direct questions. «

5. The state-wide performance of boys and girls was examined by medium of instruction. No difference was found in Hindi medium but in Urdu medium schools, Class 7 boys perform better than girls.

6. In Hindi medium schools, performance levels in rural and urban schools are similar in most classes and subjects. The few exceptions are that students in urban areas have meaningfully higher performance levels in Class 7 Language and Class 5 Maths. In Urdu medium schools, mixed trends are observed. In class 3, rural school students have meaningfully higher performance levels than urban students. In Class 5 Language and Maths and Class 7 Language however, urban school students have meaningfully higher levels of performance.

7. At the state level, no meaningful differences are observed in the performance of the General, SC, ST, OBC categories vis a vis the overall state average. In Urdu Medium schools, students of SC, OBC, GEN and OTH categories perform at par in most classes and subjects. Only ST students in Urdu medium schools perform meaningfully lower than the state average in all classes and subjects.

8. Based on the student responses to a background questionnaire, it is observed that

    - Students who claimed they find school fun and helpful in learning new things or to get a job performed better than students who claimed that school is boring and not useful. This has implications on how one can create an environment for children to find school engaging.
    - Student reading habits seem to be associated with their performance in Class 5 and 7. Students whofilled in the survey saying that they read for more than an hour daily seem to perform better than students who read for lesser time. Again, one needs to come up with interesting reading programs that cultivate a culture of reading among students.
    - For Maths and Hindi Class 3 & 5, students who said they take tuitions in both Maths and English score slightly higher than the students who don't take any tuition or take tuition in any one subject. In Class 7 Maths and Hindi, students who take tuitions in both Maths and English score significantly higher than their counterparts who don't take tuitions or take tuition for any one subject

RECOMMENDATIONS

Improvement in educational quality is a process, not an event. One or a small group of assessments or other initiatives will not by themselves produce the results. However, we believe that assessments provide a very powerful framework for initiating and sustaining such improvement and measuring the quantum of change when compared to status quo. We believe that recommendations from the assessments if implemented well and regularly, will create a culture of empowerment, scientific approach, peer learning, accountability and transparency.

The recommendations suggested below are mainly state-level recommendations for the BEPC, SCERT, the Board and other State Officers to bring about an overall improvement in student learning across the state through directed mechanisms to address gaps in learning, skills and competencies. We have also acknowledged the importance of a bottoms-up approach, that comes from the stakeholders on the ground in bringing about learning improvement with actionable feedback. Our recommendations are provided below.

1. **Aggressively disseminate findings of this study**: We recommend that a systemic and detailed plan be made to disseminate this report, giving every officer, researcher and teacher an opportunity to see it, understand and even question in discussion mode. The purpose of this is multi-fold: 1) initiate the 'rote' versus 'learning with understanding' debate within Bihar 2) get teachers to start thinking about 'what are children learning and not learning' rather than just focusing on 'what are we teaching, how we teach and when to teach what'. Teachers' responses and feedback should also be sought and compiled and published 3) Enable teachers to understand and utilize the findings of this assessment, such as strong, and weak areas, high and low performing questions and misconceptions. **Understanding what kind of conceptual difficulties students have is the first step for targeted effective remedial action in the classrooms.**

2. **The report reveals that student performance has been low across classes in Reading Comprehension, indicating that the students are struggling with reading and require practice and concerted efforts to improve reading skills. We recommend a targeted Reading Programme and Campaign** to build the habit of 'reading with comprehension' to address weak reading skills.

3. **To address the heterogeneity in learning levels and low student performance in conceptual questions, we recommend remedial programs**. One option is to use Mindspark - a personalized adaptive
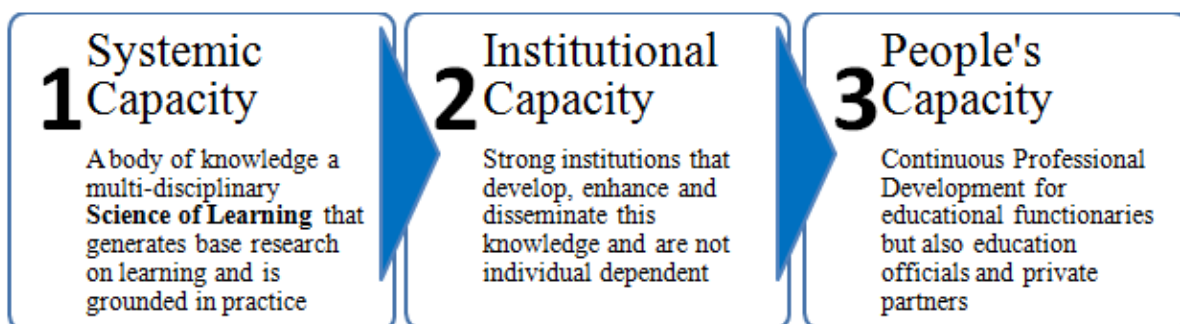
learning system created by EI. Mindspark is a computer based application that can systematically help students overcome misconceptions and improve the quality of their Reading and basic math. Mindspark is complementary to the teacher and is a professional development tool for the teachers themselves. The program is contextualized to the child's environment. The Language and Math content is in Hindi Language (in Math children have an option of splitting the screen and seeing the same question in English).

The teachers will also have access to misconception videos of their subject and topics, which will help them, identify the areas where focus should be given on during instruction and remediation.

4. A common and obvious remedy to system-wide learning gaps is to focus on 'capacity building', which normally refers to teacher training. Often, good ideas (for example, classroom assessments like Continuous and Comprehensive Evaluation) are implemented poorly because functionaries on the ground lack capacity.

However, what is ignored is that people's capacity can be built only on existing Institutional Capacity which, in turn, has to be built based on Systemic Capacity. **People's capacity building cannot happen without Systemic and Institutional Capacity:**

Systemic capacity means a *body of knowledge* that people can refer to and develop expertise in, for example in fields like 'reading skills' or 'misconceptions in learning subtraction' which relate to the actual ground level challenges faced. While a lot of ground experience exists in these areas, these need to be *shared*, supplemented by rigorous research and consolidated into a 'body of knowledge'. **This 'body of knowledge' will then drive textbooks and material preparation, teacher training and assessments.**

Build systemic and institutional capacity by establishing a 'Science of Learning' Centre- The focus of the Science of Learning Centre would be to create the 'body of knowledge' which will then drive textbooks and material

preparation, teacher training and assessments as mentioned above. The best individuals from the state (and from outside) should be identified and given the goal of building such a body of knowledge in a phased manner. They should be supported adequately through training and exposure to different international models to take this initiative ahead.

5. **Information from the Census Baseline, and Midline assessments as well as the Diagnostic assessments should be utilized for student improvements in learning. This can be done by implementing a Student Progress Tracking System.** This should be a learning data management system that sits on a basic data system which has information on every school, teacher and student. The learning data management system would track Student Progress with time (or possibly for schools or regions initially).

6. **Recommendations on capacity building:** Government can conduct a series of question making workshops at the district level. These workshops should focus on learning levels, and conceptual understanding. The value of learning assessments lies in its diagnostic nature, of identifying strengths and weaknesses. The quality of questions in such assessments is therefore of critical importance, and these questions should assess learning beyond rote to test conceptual understanding. Such workshops can build teacher skills in making such conceptual questions that check learning with understanding.

7. **Board Exam Reform:** There is an urgent need to improve board exams by asking questions which check for understanding. This will avoid the emphasis on tuitions, memorizing and rote learning the answers to questions asked in historical tests or textbooks. This will fundamentally change the focus from what needs to be learned to perform better in board exams. This shift can be made by equipping teachers to make better questions through question making workshops and changing the goal post by asking conceptual questions. This will lead to focus on learning with understanding at both the level of the student and the level of the teacher.

8. **Impact Evaluation:** Bihar has undertaken a series of initiatives to improve the quality of education in the state such as Worksheets for Grade 1 and 2, and co-scholastic sports initiatives like *Tarang*. In order to essentially know which one of these initiatives enable students to perform better and improve learning outcomes, it is recommended that as part of the annual assessment, Bihar also analyses which one of these interventions is contributing more to student learning.

9. **Stakeholder Awareness on Learning Achievement:** There needs to be greater awareness among stakeholders like students, parents, teachers and officials in the Bihar education system about student learning assessments. This will help stakeholders to reap benefits from learning achievement tests by addressing the learning gaps identified to improve learning.

1. DESIGN OF THE STUDY

1.1. Need for the study

Bihar Education Project Council (BEPC) is working for qualitative and quantitative improvements in education by providing access to quality education across sections of the society in Bihar. One of the main objectives with which BEPC works is *"Universalization of elementary education, as a composite programme of universal access, universal enrolment, universal retention and universal achievement."* With this objective BEPC has made its goal explicit- to provide educational facilities to all with an aim to provide universal achievement and making learning possible for each child.

In India it is a practice to measure the inputs like new schools, upgraded schools, teachers, teacher training, provision of books, provision of uniforms etc. This is an input based approach, where the focus is on improving the surroundings and physical enablers. In addition to this, states like Bihar have moved forward to understand the importance of measuring and focusing on learning outcomes, it will serve to focus the energies of the education system on the outcomes that actually matter to millions. It is important that the focus on outcomes be constantly reiterated in a large state like Bihar where there are new people (officers, government officials, headmasters, teachers, etc) joining the education sector on a continuous basis. This will make education system deliver in the future by giving regular inputs based on student learning outcomes.

The need for large scale assessments that provide granular information and insights across the education system assumes greater importance in our collective striving to provide quality education to our children. These assessments have to be valid, periodic and largely accepted.

1.2. About the Census Assessment, Bihar

Recognising the importance of student learning outcomes, Bihar Education Project Council (BEPC) has initiated Base Line and Mid Line Assessments - a state wide programme for assessing school quality and learning.

BEPC in partnership with Educational Initiatives conducted a **Teacher Led Midline Self Assessment aka Census assessment in September 2014 covering more than 59 lac students of class 3, class 5 and class 7** in more than 68,000 schools in the 38 districts of Bihar. The study has the following objectives:

> 1. To **spread awareness about the benefits and importance of regular assessments** for children every year
> 2. To **sensitise teachers about the learning level of children** in their own classes and hence increase focus on learning outcomes
> 3. To **provide system level information for policy level decision making** (such as what topics to focus in teacher training)
> 4. To build **capacity of education system** to take up such assessments on their own in future

The study aims to answer the following questions

1. How can capacity building for teachers be accelerated?
2. How students are performing in each class and subject at the district and state level?
3. What are the misconceptions or cognitive gaps in understanding that persist among the students?
4. How can the insights from this report translate to action points for the state?

To address this, this study conducted the following

1. **Test development by the teachers : capacity building** through question making workshops
2. Census assessment – **awareness and skill building for assessments through decentralized test conduction and data entry** processes
3. **Analysis** of findings – **Disaggregated by block, district state, socioeconomic variables and learning skills**.

1.3. Salient features of the study

All schools tested: All students of class 3, class 5 and class 7 were tested for learning in Language (Hindi and Urdu) and Math.

Capacity Building of Teachers: To build the teachers capacity to develop such test papers, EI conducted 2 test development workshops of 3 days each for the BEPC, SCERT, DIET officials and senior teachers. These workshops covered aspects of designing assessments and developing good questions. The workshops had practical sessions where participants made questions, commented on questions, presented them and modified them based on the comments from the participants. These workshops aimed to build awareness on learning levels and build teacher initiative to address learning gaps. As a key objective of this study, the capacity building workshops have been discussed in Chapter 2 of this report.

Test development: During the capacity building workshops, a total of 400 to 500 questions were made in Language and Math across classes. Each participant was asked to identify 5 best questions and share them separately. The questions were fine tuned in the workshop by modifying the language, options, images etc. About 70% of the questions in the question papers for classes 3,5 and 7 for Language and Math were from the pool of questions developed by teachers and were selected and finalised by EI. 30% of the questions were contributed by EI. The tool development, edits and final papers were made by a team of experts from EI.

Data entry system: To manage and analyse the large data entry exercise, EI designed a data entry software application for the entry of student's responses. The data entry was done at the district level by specially appointed/ designated data entry operators. The MIS team was trained at the state level and the manual for the data entry system was provided to each user. The details of data entry system are given in Chapter 7 in this report.

Training to test administrators: Training of the Master Trainers was organised at the state level at the BEPC office in Patna. In this training, around 76 master trainers were trained on the test papers, the process to administer the test in the classroom, the coding process for class 3 and instructions on OMRs. Similar trainings were organised at the district, block and cluster level.

Standardised test administration: The logistical arrangements for conduction of tests were made by the BEPC. The teachers in the schools carried out the testing in their own classrooms. After test conduction, the teachers evaluated the student answer responses and assigned appropriate codes as provided in the score card in class 3. In classes 5 and 7 students, filled the responses directly on the OMR. The process to conduct the tests in schools, test duration, test papers and invigilation process were kept the same as far as possible across schools.

Background questionnaire: A school questionnaire was designed to collect basic information about school infrastructure, school practices, and inputs on school needs and associated factors with learning. The data from this questionnaire was not available till the time this report was written. As a result, the analysis has not been reported. Analysis on the following factors will be reported once this data is received-

- Infrastructure at school
- Details of Head Teacher
- Details of teachers
- Details of other facilities

Paper Format, question types and length: The question paper had Multiple Choice Questions (MCQ) and Free Response (FR) Questions. In MCQ format questions, student had to choose an option which he/she feels is correct out of the 4 options provided for each question. In FR questions, students had an opportunity to respond to questions and write the answers in the question booklet itself. The test papers designed for class 3 had free response as well as multiple choice questions. While in class 5 and class 8 all questions were in MCQ format.

Class	Subject	Multiple choice questions	Free Response questions	Total questions	Time (in min)
3	Hindi	20	8	28	90
3	Maths	20	8	28	90
5	Hindi	33	0	33	90
5	Maths	35	0	35	90
7	Hindi	40	0	40	105
7	Maths	40	0	40	105

Analysis: The student level responses from the state were examined at multiple levels. At the state level, the overall performance was examined, and strong and weak areas were highlighted in each class and subject. Variations by gender and social classes and rural and urban areas were also examined, and the differences in performance were checked for statistical significance and an effect size value was calculated. This was done to ensure that only significant and meaningful differences are reported. This analysis was disaggregated at the district level as well. The analysis aims to ensure that the data is present at multiple level and is able to highlight critical learning gaps and differences across the state.

Reports: The study will provide reports to each district and school in addition to this main report, where learning gaps and concrete recommendations will be provided to the stakeholders..

1.4. Coverage

All tests were conducted on 22 September 2014 across Bihar with an aim to cover all government schools for class 3, class 5 and class 7. The number of students tested on the day of the test was 21.5 Lakh in class 3, 21.3 Lakh in class 5 and 16.5 Lakh in class 7. On 30th January 2015, data for 90% of the tested schools was entered into the data entry system, and this data was taken up for analysis. Instances where students might have been assisted during the test and instances of probable data entry errors were identified. Around 9,253 schools were dropped from analysis based on this check (Details in Chapter 7). The data used for the analysis was confirmed to be representative of the state. The details of the number of students whose data has been used for the analysis are given below.

Class	Number of schools	Number of students Tested	Number of students data entered in the system	Number of students taken for analysis	
				Language	Maths
3	71,175	21,51,548	19,39,632	16,48,400	16,42,148
5	70,725	21,37,178	19,60,964	16,52,426	16,45,689
7	30,433	16,50,639	15,08,193	12,70,753	12,65,301

1.5. Test Paper Blue Print

The test papers were designed to sensitise the teachers all across Bihar on the importance of assessments. An important aspect of this objective was to ensure that the tools were designed in such a way that they were majorly based on the questions developed by the teachers. This was discussed by BEPC and the following broad guidelines were followed:

- The question papers were developed on the "one class lower competency" than the actual class being tested. For example, question papers for class 3 were developed based on class 2 competency.
- Full length tests were developed covering different competencies based on research on the Bihar textbooks and National Curriculum Framework.
- Tests had multiple choice questions and free response items. Free response items were included only in class 3.
- **70% of the questions in these papers were from the pool of questions made and submitted by the teachers.** These were fine tuned by EI team with the teachers during the capacity building workshop and used in the paper.
- 30% of the questions in these papers were contributed by EI. Of these 30% questions, half the questions were repeated from the baseline papers for the purpose of purpose comparative analysis.
- Around 20%-25% of the questions in the overall paper were higher order questions which test concepts in a non-straightforward manner.

1.6. Data Entry, Cleaning and Scoring

Once the testing process in schools was over, the response sheets were packed in class wise and a school wise packet was made by each school, and then sent to a centralised location to their respective block. All the blocks sent the data to a centralised location in their district. Once the response sheets from all the districts were received, first the data on the number of students tested were entered in the system and then the entry of student response sheets started. The data entry process is explained in detail in Chapter 7.

To ensure clean data is entered in the system, validations were put in the data entry software in such a way that wrong data entry is not possible. Duplicate student records were identified by the system intelligently and were removed from the database on day to day basis. To score the data having more than 50Lac records high end server was used to ensure accuracy and save time. The data once scored was used for analysis.

1.7. Analysis

The aim of the analysis for this study was to ensure that critical gaps in learning are identified at multiple levels, which in turn will contribute in the development of concrete methods of addressing the problem at multiple levels. The analysis and insights aim to guide teachers as well as district and state officers in addressing specific concerns. The analysis assesses the following:

- What is the variation in the performance across the state in classes and subjects?
- How does this performance vary in different districts of the state?
- Is there a variation in the performance across gender, location and social categories?
- What kind of questions do the students find easy and difficult?
- Do the students have any learning gaps or misconceptions in any concept?
- Can student background and perception influence performance?

The report attempts to direct the discourse on learning with understanding by highlighting gaps and suggesting actions to address them. The subsequent chapters of the report will highlight key findings from the performance across skills and concepts, and across districts of the state.

2. CAPACITY BUILDING FOR TEACHERS

A pivotal objective of the Midline assessment was to increase awareness amongst the teachers on the learning levels of their students, understand issues of conceptual understanding and build their skills to address them in their classrooms. In light of this objective, the tools used in the teacher- led midline assessments were mainly prepared by the teachers of Bihar. To ensure that the objective of the assessment to find out learning levels of the students was fulfilled, the need to orient teachers to create conceptual and higher order questions was felt, and **addressed with the concept of capacity building amongst the teachers.**

With these objectives two capacity-building workshops were conducted for the teachers of Language and Maths at BEPC office, Patna between 19th- 24th May, 2014. Around 40 participants- senior teachers, BEPC, SCERT, DIET officials from 38 different districts of Bihar attended each 3- day long workshop. The workshops were moderated by Language and Math Experts from EI. In the workshop, each participant was provided with a workshop kit which had a manual on 'Making of Multiple Choice Questions', a note pad and a pen, feedback form and question rating exercise.

Without establishing a common understanding about the assessment, question quality and skills and blueprints, it would have been difficult to bring the teachers to develop a test which would assess students' learnings in a comprehensive manner. A capacity building concept in form of workshops was proposed through which the teachers were helped to generate a pool of conceptual questions of a quality that could be used for the assessments. **Not limiting it to a one time exercise to create a question pool, the workshop contents were designed to equip teachers with necessary understanding about good questions and higher order questions testing conceptual understanding.**

2.1. Detailed agenda and activities of the workshops:

During the three day workshops, on the first day, the focus was mainly kept onto orienting teachers about good questions by making them undergo a question rating exercise and explaining to them various characteristics of a good question. The question rating exercise was a mix of questions having good, medium or weak question. The classification in the categories happened on the basis of the language of the question, question clarity, clarity of testing objective, correctness of options, quality of distracters and class and age appropriateness. The teachers were made to rate questions on the scale of 1 to 5, 1 being a weak question and 5 being an excellent. Once the exercise was done, each question was discussed. This brought clarity and oriented teachers towards identifying and designing a quality question. They were also explained how higher order questions can help in assessing learning levels against rote learning by explaining certain misconceptions.

Basic idea of the concept of Understanding by Design was given through a presentation. The teachers were explained how to **classify topics based on the Enduring Understanding (EU), Important to Know (IK) and Worth being familiar (WF).** To ensure their understanding of this concept, they were then made to work on a chapter as a group. During this exercise, they were made to classify topics into EU, IK and WF. A quick feedback was taken. Through these the teachers were explained how planning a lesson keeping in mind the important concepts can impact the way they teach and the way their students run. With a recap and a feedback the day was closed.

On the second day, after a quick recap and relisting of features of good questions, the concept of question paper blue print was explained. The concept of grade specific skills for language and maths were discussed with teachers. The teachers were made to analyze the skills. Once the skills were understood and agreed upon, the teachers were divided into three groups of equal numbers. Each group was given the textbooks of Class 2, 4 & 6 respectively. The chapters were divided amongst them and they were asked to make the questions. The experts reviewed question and discussed with each one of them to ensure that they were on the right track. If needed

corrections were suggested to them. Around 500 questions were made in a workshop. Out of these, they were asked to short list their best five by group reviews. The day ended with this. On the third day, these short listed questions were reviewed one by one. The teachers were made to rate each question and if the need was felt, changes were made either in the question stem or in the distracters to make it a better question which tested the conceptual understanding. After the detailed discussion, they were given a sheet to write down their final five best questions.

Agenda of the question making workshop:

| Time	Session
Day-1	
10:00 AM- 10: 15 AM	Introduction of participants
10:15 AM - 11:00 AM	Introduction of EI and Bihar project
11:00 AM – 12: 15 AM	Exploring qualities of a good question
12.15 PM - 1:00 PM	MCQs and FRs
1:00 PM- 2:00 PM	Lunch Break
2:00 PM - 2:30 PM	Understanding by Design
2:40 PM - 4:30 PM	UbD Group activity & presentation
4:30 PM - 5:00 PM	Recap
5:00 PM - 5:15 PM	Feedback of Day- 1
Day- 2	
10:00 AM- 11:00 AM	Designing and discussing the Test paper blueprint
11:00 AM - 1:00 PM	Question making
1:00 PM- 2:00 PM	Lunch Break
2:00 PM- 3: 30 PM	Question making
3: 30 PM- 3:40 PM	Tea Break
3:40 PM - 5:00 PM	Review of questions within groups
5:00 PM - 5:15 PM	Feedback of Day- 2
Day- 3	
10:00 AM - 11:30 AM	Review of questions across groups - Group 1/Class 3
11:45 AM - 1:15 PM	Review of questions across groups - Group 1/Class 5
1:15 PM- 2:15 PM	Lunch Break
2:15 PM - 3:45 PM	Review of questions across groups - Group 1/Class 7
3: 45 PM- 4:00 PM	Tea Break
4:00 PM to 4:30 PM	Sharing of experiences and Feedback - Day 3

Test development: During the capacity building workshops, a total of 400 to 500 questions were made in Language and Math across classes. Each participant was asked to identify 5 best questions and share them separately. The questions were fine tuned in the workshop by modifying the language, options, images etc. About 70% of the questions in the question papers for classes 3,5 and 7 for Language and Math were from the pool of questions developed by teachers and were selected and finalised by EI. 30% of the questions were contributed by EI. The tool development, edits and final papers were made by a team of experts from EI.

2.2.   Questions developed by the teachers

The development of questions by the teacher is an important step in building on the skills of the teachers, and to build interest and initiative to address conceptual learning gaps among the students. Given below are some examples of the types of changes made in the questions, which were used in the test papers
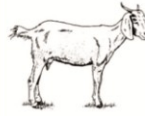
Example 1: No change made/Minor change made to make the instructions uniform

Made by the teacher:
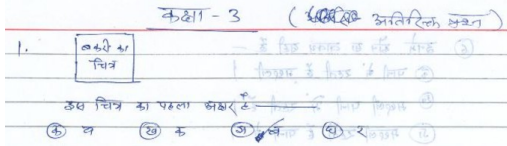
Used in paper:

दिए गए जानवर के नाम के पहले अक्षर पर निशान (√) लगाएँ।

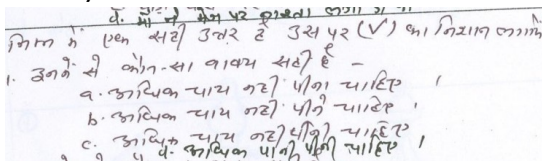| अ | व |
ब	क
स	ब
द	र

नीचे दी गई कौन-सी आकृति त्रिभुज है? सही जवाब पर निशान (√) लगाएँ।

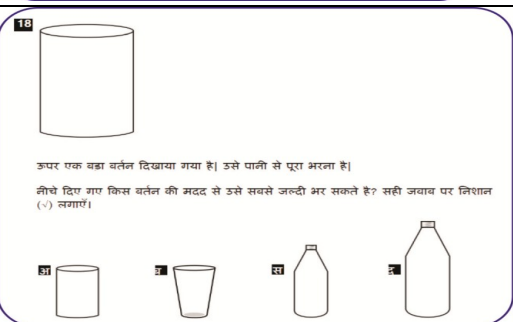

Example 2: Options modified to make them stronger

Made by the teacher:

Used in paper:

इनमें से कौन-सा वाक्य सही है?

A अधिक चाय नहीं पीना चाहिए।
B अधिक चाय नहीं पीने चाहिए।
C अधिक चाय नहीं पीनी चाहिए।
D अधिक चाय नहीं पीनें चाहिए।

Used in paper:

ऊपर एक बड़ा बर्तन दिखाया गया है। उसे पानी से पूरा भरना है।

नीचे दिए गए किस बर्तन की मदद से उसे सबसे जल्दी भर सकते है? सही जवाब पर निशान (√) लगाएँ।
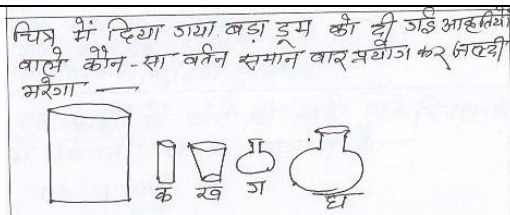
Example 3: Format of the question was changed to make it suitable for assessment

Made by the teacher:
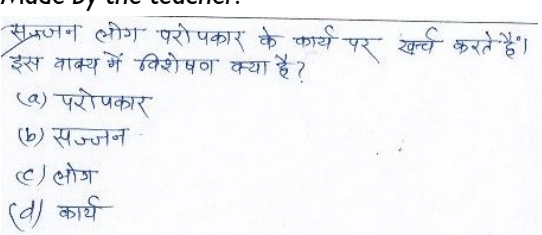
Used in paper:

सज्जन व्यक्ति परोपकार करते हैं जिससे उन्हें पुण्य और प्रशंसा मिलती है।

इस वाक्य में विशेषता बताने वाला शब्द कौन-सा है?

A परोपकार
B सज्जन
C पुण्य
D प्रशंसा

Used in paper:

25 नीचे दी गई आकृति के परिमिति और क्षेत्रफल क्या है?

A परिमिति - 8 सेमी; क्षेत्रफल - 4 चो. सेमी
B परिमिति - 2 सेमी; क्षेत्रफल - 16 चो. सेमी
C परिमिति - 16 सेमी; क्षेत्रफल - 4 चो. सेमी
D परिमिति - 4 सेमी; क्षेत्रफल - 12 चो. सेमी

2.3. Impact

It is essential to understand that **capacity building is not a one-time exercise. In order to ensure that the teachers build on their skills and understanding of the students' learning levels, these workshops need to be iterative**, incorporating the response from the teachers, and addressing their key difficulties.
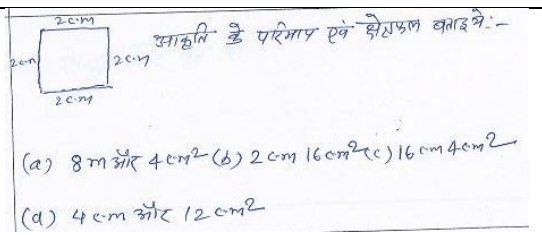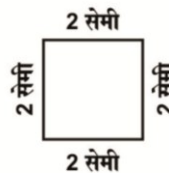
We engaged with the teachers in an open feedback session. The teachers reported the following points which can be kept in mind for future workshops by the state.

- Presentations, communication skills and quality of inputs by the resource persons were very good
- Elaborate discussion of each aspect of a good quality question.
- Real time question making and on-spot review and suggestions added to our understanding. Helped us make better questions.
- UbD and the way EU, IK and WF were discussed and explained is going to be very useful.
- Passage related question making was interesting.
- Workshop was conducted in a very interactive manner.
- The material given is useful and we will discuss it further in our clusters. More teachers should be trained like this.

Through these workshops around 80 teachers from different districts were oriented to design good quality questions. However, the impact is not limited to just this number. From the way teacher came to give their feedback and looking at their enthusiasm to take it ahead in their clusters/blocks/ districts was an indicator of a wider impact to the whole system. The capacity building workshops were different from the usual teacher training programmes as there was no effort to impart training- **the whole focus was to make them do hands-on activities individually and in groups, which ultimately resulted in a wider spread of understanding, sharing of ideas** and passing on the enthusiasm to change the way even their usual class tests/ unit tests were perceived by them.

These workshops can be organized at cluster/ block levels by the participants being the resource persons and the whole perspective about assessments- be it high stake or low stake can take a new meaning and only by this the whole focus can shift to learning with understanding.

Teacher Capacity Building Workshops
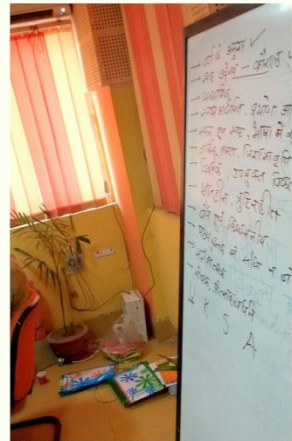
3. KEY FINDINGS FROM THE ASSESSMENT

The second objective of the midline assessment was to **provide disaggregated information on the learning levels across blocks, districts and socioeconomic indicators. The strength of the assessment lies in the focus on conceptual understanding, over rote learning.** The findings from this study therefore, **will shed light on the learning gaps among the students, which can be addressed by the teachers in the classroom.** Based on the student performances across the classes and subjects, some key insights have emerged from the analysis of learning levels across districts, regions, and across skills and competencies in each class and subject. This chapter highlights the key findings.

3.1. A snapshot - Overall Performance across subjects and classes

Data of over 12 lakh students each in Class 3, Class 5 and Class 7 across Bihar was analyzed for this report. Both Hindi and Urdu medium schools were tested. The performance across classes and subjects is given below.

Class	Subject	N	Average scores (%)	SD (%)	% of Zero Scorers
3	Maths	15,97,621	59.6	23.7	1.48
3	Language	16,08,804	63.2	23.3	0.59
5	Maths	16,24,725	43.0	22.3	1.52
5	Language	16,36,611	49.6	24.0	0.74
7	Maths	12,84,858	45.7	24.6	0.88
7	Language	12,94,610	50.6	23.2	0.34

N – Number of Students, AVG – Average performance on the test, in percentage, SD – Standard Deviation
 Zero scores are students who scored zero on the entire paper.

The performance at the state level is at 60% and 63% in Class 3, 43% and 49% in Class 5 and 45% and 50% in Class 7 in Language and Maths. The variation in the scores is similar in all classes and subjects. The percentage of zero scores is less than 1% of the tested students in most classes and subjects. **Understanding these scores requires an understanding of the variation within the paper based on concepts, and across regions of the state.**

3.2. Understanding the scores - strong and weak areas across classes and subjects

Understanding the strong and weak competencies in each class will guide the teachers to understand the concepts in which the students seem to be struggling, and initiate remedial action.

OVERALL STATE PERFORMANCE LEVEL IN LANGUAGE

Vocabulary   Reading Comprehension   Grammar/ Sentence Construction

» Students have performed better on vocabulary questions that test the knowledge of objects in daily life «

OVERALL STATE CLASS-WISE PERFORMANCE LEVELS IN MATHEMATICS

Basic number sense — Geometry — Area and Perimeter

» In class 3, measurement is weak «
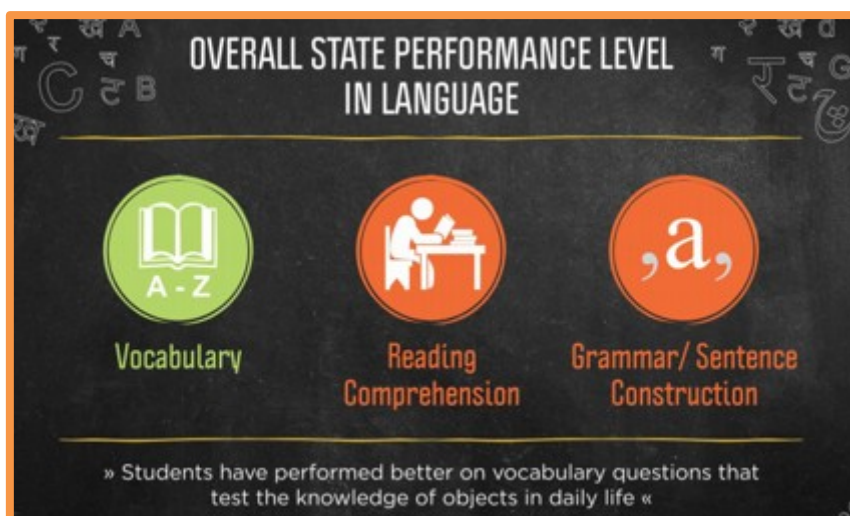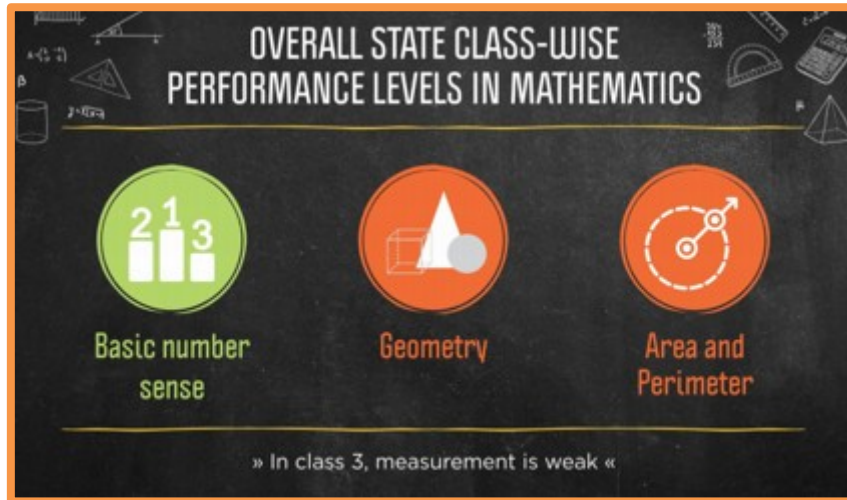
- **In Class 3 and Class 5 the students have performed well on questions which they can relate to their daily lives.** For example, they se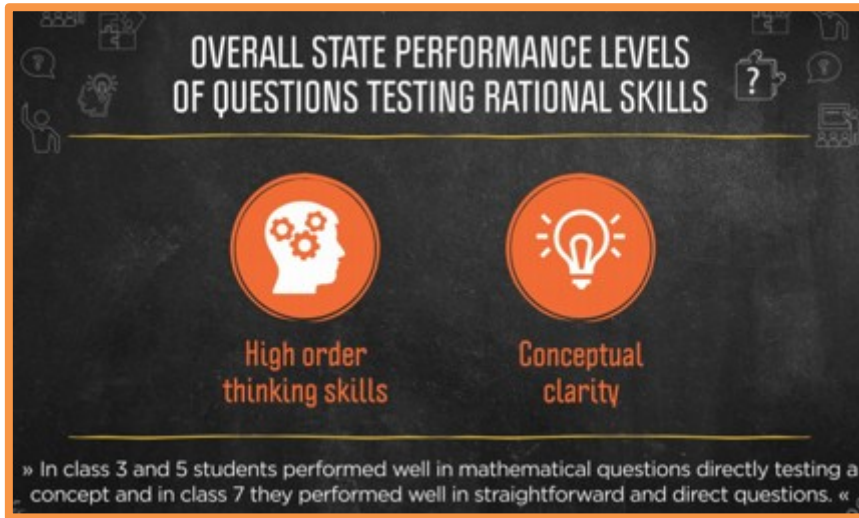em to know the names of objects, animals and birds which they may see in their surroundings. Similarly they perform well on mathematical questions which they can relate to their living environment. Students also perform well on straightforward questions, directly testing a concept

- In Class 7, the students seem to perform better on simple sentence construction questions, and on questions based on notices or posters. In Maths, they seem to perform well on straightforward and direct questions.

- Though it is desirable and good that the basic skills are clear and students master them, it is equally important for them to perform well on the intermediate skills, which are built on the basic skills. This holds true especially for classes 5 and 7.

Class	Question	Performance	
Class 3 Maths	3 रामू के पास कुल पाँच रुपए है. जिनमें रु. 2 और रु. 1 के कुछ सिक्के है। नीचे दिए गए विकल्पों में से कौन-से सिक्के रामू के पास हो सकते है? सही जवाब पर निशान (√) लगाएँ। 	A	7.7
		B	10.6
		C	**62.2**
		D	13.4
Class 3 Language	1 दिए गए जानवर के नाम के पहले अक्षर पर निशान (√) लगाएँ। अ व ब क स ब द र	A	9.1
		B	13.7
		C	**69.4**
		D	5.2

- Students seem to show low performance on questions which require higher order thinking skills and conceptual clarity such as word problems in Maths, or questions testing a concept in a non-straightforward manner. In Language, students seem to struggle with reading comprehension and intermediate questions on grammar and sentence construction. **Exposing them to different reading material (apart from the textbooks) will not only help in building their comprehension skill, but will also expand their vocabulary.**

Class	Question	Performance	
Class 5 Maths	33 नीचे दिए गए कागज़ के चक्र को देखें। इनमें से कौन-सा भाग इस कागज़ के चक्र का है?	A	14.6
		B	28.1
		C	21.3
		D	28.3

Question-wise analysis plays a very important role in understanding what students are able to do and the gaps in their understanding. One of the advantages of having MCQs in the test papers is that one can pinpoint the specific error students are making, and even go deeper and find out students of which particular ability level are making that error. This analysis shows that students have certain misconceptions or cognitive gaps in understanding. These are covered in detail in Chapter 3. An illustration of a common error made by students is given below.

Question and performance	Explanation
10 नीचे एक संख्या रेखा दी गई है जिसमें दो शहरों का तापमान दिखाया गया है। श्रीनगर से बैंगलूरु का तापमान कितना अधिक है? A -27° B 17° C 27° D 22°	The question tests the understanding of the number line involving negative integers. In the question the student has to move from -5 to 22 and understand that the difference between the two is 22 - (-5) = 27. 38.2% of the students have answered the question correctly. 21.9% students chose the option B. They have probably subtracted 5 from 22, 22-5 and ignored the minus sign in -5.

A	B	C	D
16.3%	21.9%	38.2%	18.6%

3.3. Performance across districts

A 'composite performance index' was calculated for each district, taking the average of scores of all the class in each subject: Hindi and Maths. Districts were then ranked based on this composite performance index. However, many of the differences in performance between districts are marginal and not meaningful. To visualize meaningful differences between districts, statistical procedures (Cohen's D) were used to classify districts into 3 bands- significantly above state average, similar to state average and significantly below state average. Thus, it is important to look at the performance of each district with reference to which band it is in, and it is not recommended to look at the exact 'rank' of each district.

Above average with large effect size		Below average with large effect size
Above average with medium effect size		Below average with medium effect size
Above average with small effect size		Below average with small effect size
Performance at par with state average		
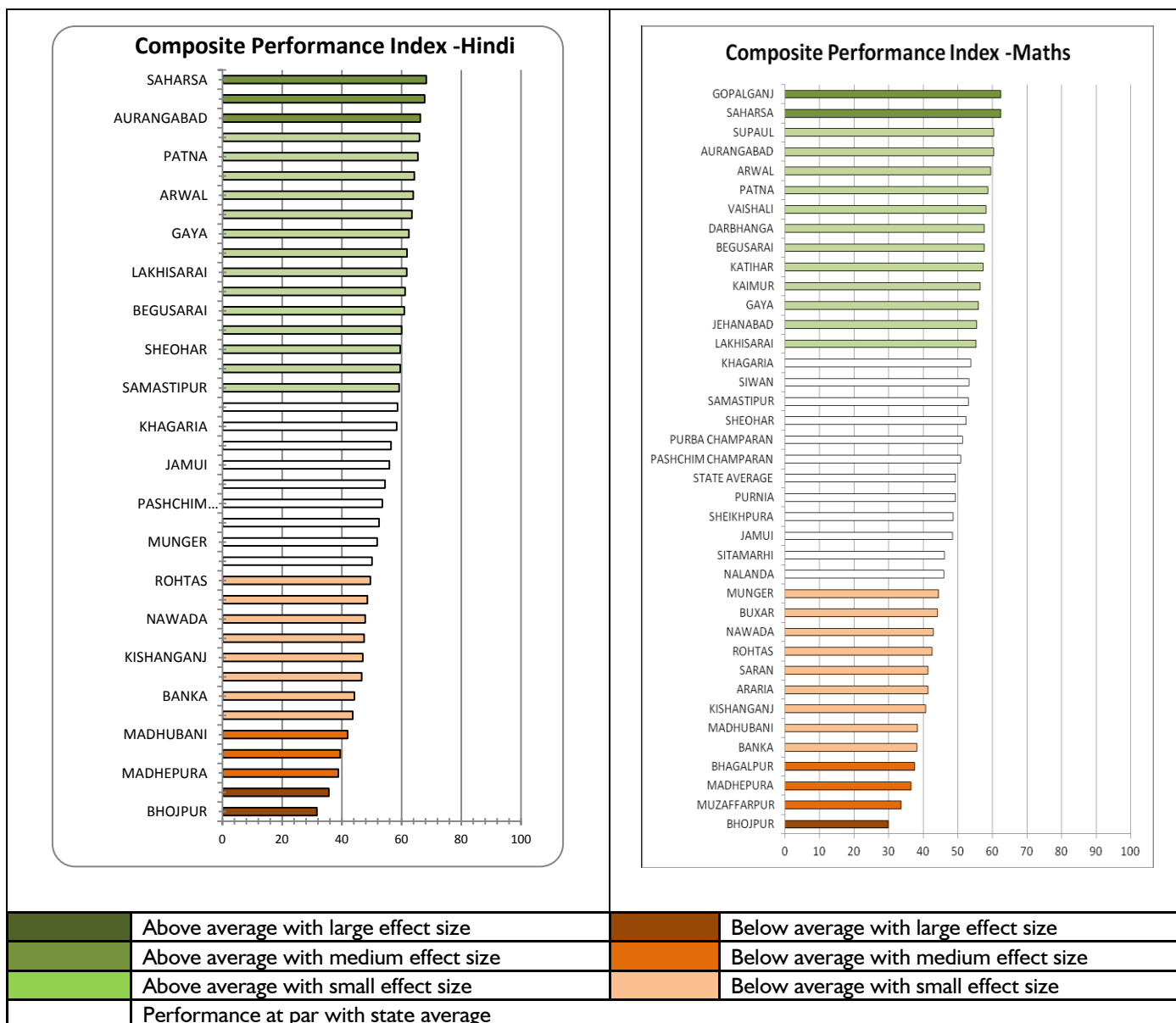
The key observations based on the composite index are given below.

- Saharsa, Gopalganj, Begusari and Aurangabad have the highest performance levels in both Hindi and Maths.
- Bhojpur, Muzaffarpur, Madhepura and Bhagalpur are among the lowest performing districts.
- Saharsa, Gopalganj, Katihar, Aurangabad, Patna, Khagaria, Begusarai, Vaishali, Arwal, Darbhanga, Supaul, Lakhisari have performed above the state average with small differences from the state average (based on cohen's d criterion)
- Araria, Nawada, Saran, Rohtas, Kishanganj, Buxer, Madhepura, Banka and Sitamarhi have performed below average , while Madhubani, Muzaffarpur, Bhagalpur and Madhepura have performed below average with medium effect size and Bhojpur with large effect size in different subjects.

The performance of districts in each class and subject was also examined; this is detailed in Chapter 4.

3.4. Performance comparison of boys and girls

Performance of over 6 lakh boys and girls was examined in each class. At the overall level, boys and girls have similar performance levels, with their performances within 1 percentage point of each other at the state level.

Class	Subject	Girls			Boys			Difference - Girls - Boys	Significance[1]	Effect Size[2]
		N	AVG	SD	N	AVG	SD			
3	Language	8,27,218	63.3	21.5	7,81,583	63.1	21.5	0.2	Significant	-
5	Language	8,49,883	49.4	21.7	7,86,727	49.8	21.5	-0.4	Significant	-
7	Language	6,87,505	50.2	20.6	6,07,105	51.0	19.9	-0.9	Significant	-
3	Maths	8,21,539	59.5	22.2	7,76,079	59.6	22.2	-0.2	Significant	-
5	Maths	8,43,886	42.6	20.7	7,80,838	43.3	20.5	-0.6	Significant	-
7	Maths	6,82,503	45.3	22.4	6,02,355	46.0	21.7	-0.7	Significant	-

To understand if there is a difference in the learning levels of boys and girls across the state, student performance across regions (location and districts) by gender was examined. This reveals that:

- The state-wide performance of boys and girls was examined by medium of instruction. **No meaningful difference in performance levels observed in Hindi medium. In Urdu, differences are observed in Class 7, where boys perform better than girls.**
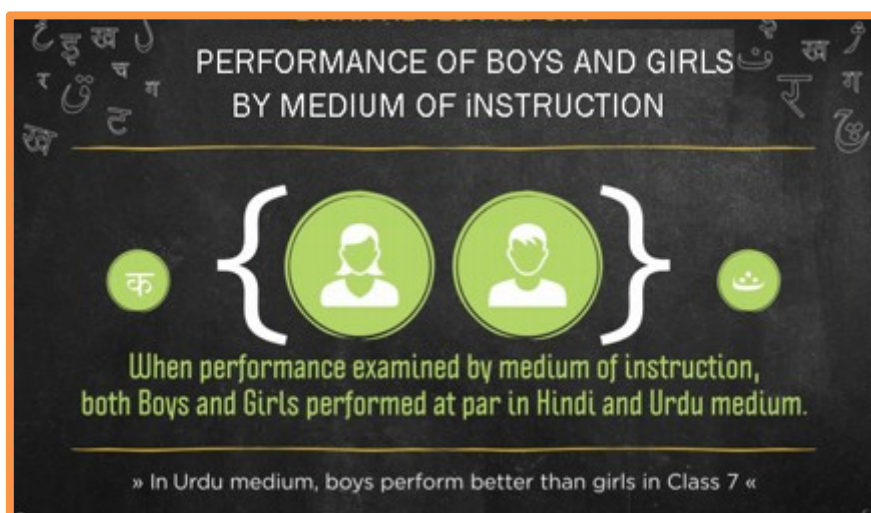
- While boys and girls perform at par in Hindi medium schools in both rural and urban areas at the state level, **in Urdu medium schools, meaningful differences are observed in urban schools – where boys perform meaningfully better in Class 7.** Differences are also observed in Class 5 in Urdu medium schools in urban areas.

- Looking at the performance of boys and girls at the district level across both mediums of schools, in most districts and most classes and subjects, boys and girls are performing at par. Differences in performances seen in Class 7 in Vaishali, Seohar, Purba Champaran, Lakhisarai, Kishanganj, Darbhanga, Aurangabad and Arwal, where boys have higher performance levels than girls in the district.

The performances by gender are examined in detail in Chapter 4.

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[1] Significance is determined through the student t-test, which established if the difference between the two scores is statistically significant

[2] Effect size checks if the difference between two values is meaningful or not. The metric for effect size used is Cohen's D.

The data here indicates that the differences between boys and girls is statistically significant. This may be because the number of students tested is large. Effect size determines that these differences, while significant, are not meaningful. It is important to see both significance and effect size with large data
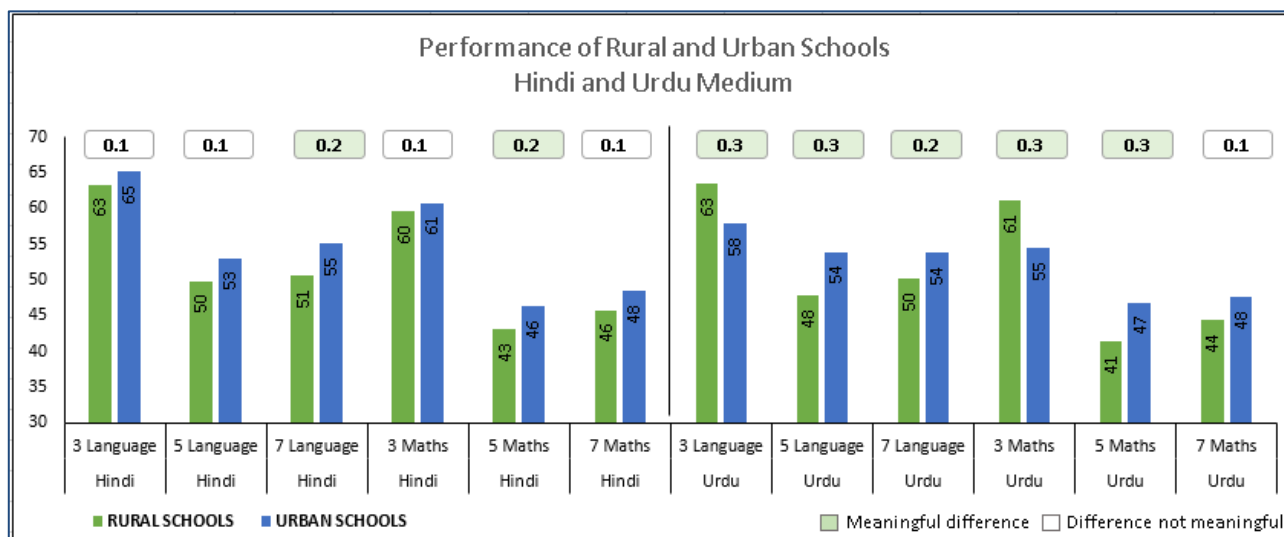
3.5. Performance of Rural and Urban Areas

Student performance of 15 lakh students in rural areas and 88 thousand students in urban areas was examined in each class. At the state level, meaningful differences (small based on cohen's d criterion) in the performance levels are observed **in Class 5 Language, and Class 7 Language and Maths, where Urban school students have higher performance levels.**

Class	Subject	Rural			Urban			Significance	Effect size
		N	AVG	SD	N	AVG	SD		
3	Language	1520474	63.1	21.3	88330	64.8	21.5	Significant	-
5	Language	1542320	49.4	21.5	94291	52.5	21.5	Significant	Small
7	Language	1201853	50.2	20.2	92757	54.5	20.0	Significant	Small
3	Maths	1509630	59.5	22.1	87991	60.5	22.3	Significant	-
5	Maths	1530733	42.7	20.5	93992	45.9	21.0	Significant	Small
7	Maths	1192310	45.4	21.9	92548	48.0	22.3	Significant	-

The student performance in rural and urban schools was also examined by the medium of instruction in the schools : Hindi and Urdu. This revealed that

- In Hindi medium schools, performance levels in rural and urban schools are similar in most classes and subjects. Hindi medium students in urban areas have meaningfully higher performance levels in Class 7 Language and Class 5 Maths

- In Urdu medium schools, mixed trends are observed. In class 3, rural school students have meaningfully higher performance levels than urban students. In Class 5 Language and Maths and Class 7 Language however, urban school students have meaningfully higher levels of performance.

To understand the variations in student performance of rural and urban schools across the districts of the state, we examined these levels at the district level for each class and subject.

- In Begusarai, Katihar, Kishanganj, Muzzafarpur, Nawada & Seohar, rural students have meaningfully higher performance in most classes and subjects. In Katihar (all classes) performances have large differences.

- In most other districts (with the exception of Saran where both rural and urban students perform at par) urban students perform better than rural students, with meaningful differences.

This has been detailed in Chapter 4.

3.6. Performance levels by social category

The average performance levels of these categories was compared against the overall average of the state or district. An understanding of variations in learning outcomes by social category can help in directing policy interventions to assist students who are particularly vulnerable or weak in different areas of the state. The analysis by social category revealed that

- At the state level, no meaningful differences are observed in the performance of the General, SC, ST, OBC categories vis a vis the overall state average. An illustration of the performance in Class 5 Language and Maths assessments is given below.
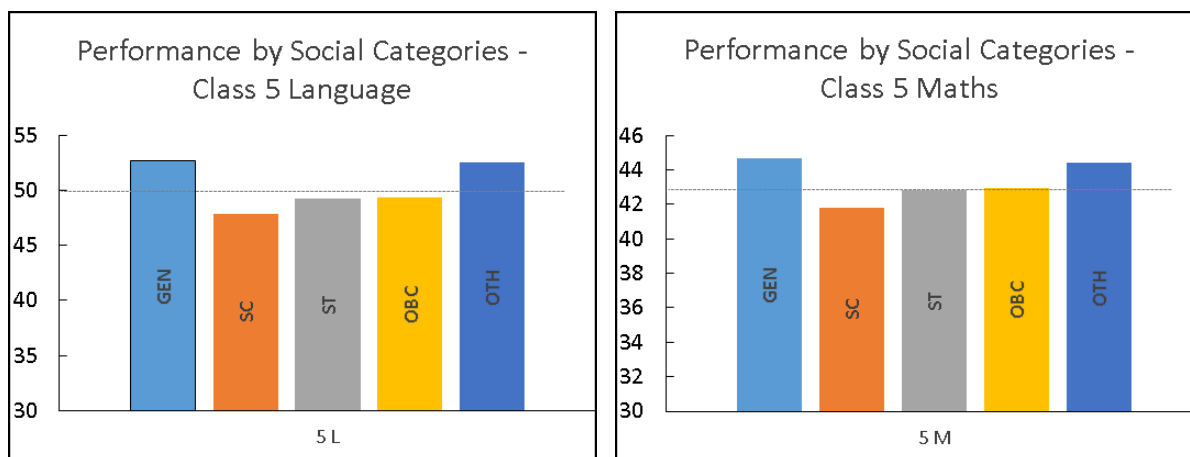
- When the data was disaggregated by the medium of instruction, it was observed that in Urdu Medium schools, students of SC, OBC, GEN and OTH categories perform at par in most classes and subjects. Only ST students perform meaningfully lower than the state average in all classes and subjects. This difference is small based on the Cohen's d criterion.

- In Urban schools across mediums of the state, students of SC, OBC, GEN and OTH categories perform similarly in all classes and subjects. ST students perform meaningfully lower (small effect size) than the average in both subjects in Classes 3 and 5.

- General Category students perform meaningfully better (small effect size) than the average in Class 7 Language in Hindi medium schools, and in rural schools of the state.

The student performance by social category was also examined at district level. This is detailed in Chapter 4.
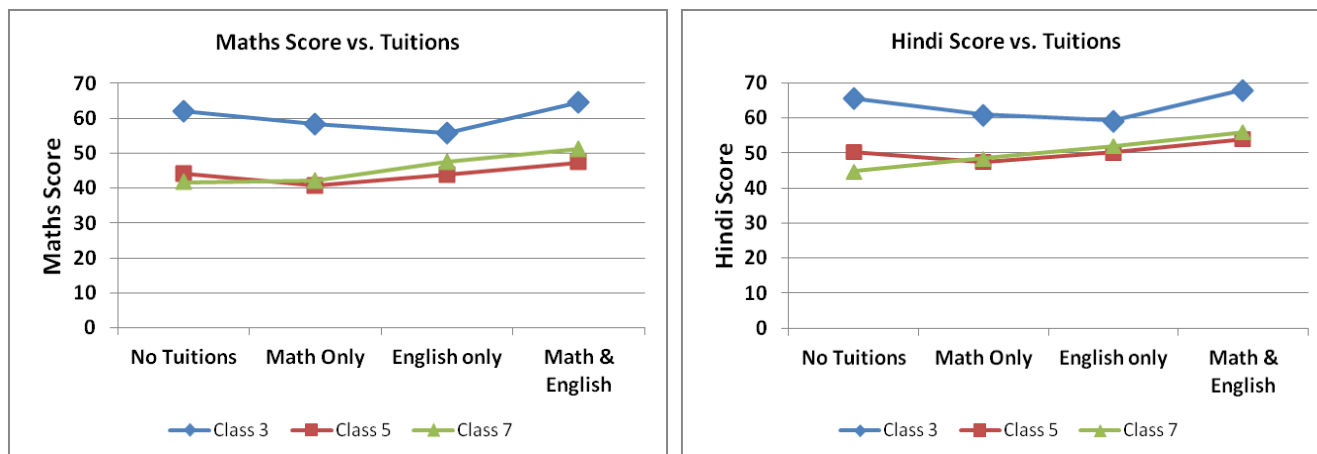
The differences across the state based on region, and socioeconomic profiles can aid the state in implementing targeted programmes for the lower performing regions or profiles. The differences between boys and girls can be addressed through community mobilization and academic mentorship for the girl students in areas where they perform lower. Similarly, specific action for rural government schools, with stronger academic training and support can be implemented.

3.7. Associated factors with learning – the student questionnaire

A student questionnaire was filled by every student who took the tests. This questionnaire covered questions on socioeconomic status, perception of school, students' self-perception and data about reading habits and tuitions. Detailed description of this analysis is given in Chapter 5. Key findings from this section are summarized below:

- Students who claimed they find school fun and helpful in learning new things or to get a job performed better than students who claimed that school is boring and not useful. This has implications on how one can create an environment for children to find school engaging.

- Student reading habits seem to be associated with their performance in Class 5 and 7. Students whofilled in the survey saying that they read for more than an hour daily seem to perform better than students who read for lesser time. Again, one needs to come up with interesting reading programs that cultivate a culture of reading among students.
- For Maths and Hindi Class 3 & 5, students who said they take tuitions in both Maths and English score slightly higher than the students who don't take any tuition or take tuition in any one subject. In Class 7 Maths and Hindi, students who take tuitions in both Maths and English score significantly higher than their counterparts who don't take tuitions or take tuition for any one subject

The subsequent chapters will cover these insights in detail. Chapter 3 covers findings from skill-wise and question-wise analysis of student learning levels. Chapter 4 covers comparative performance of districts, boys and girls, rural and urban areas and social categories. Chapter 5 covers the background factors collected in the student questionnaire and associations with learning levels.

4. PERFORMANCE IN SPECIFIC LEARNING AREAS

Introduction

The tools designed for the mid-line assessments were based on age appropriate skills. A well defined test blueprint ensured that various appropriate skills and topics were covered in detail so that the findings are more insightful than just the overall % performance. While overall performance is indicative of the overall learning levels in the state, further analysis done for each skill and individual questions emphasizes on the aspects of that subject where students seem to be strong at or are struggling. This information can be very useful in understanding the existing gaps in learning and can further help in designing/ modifying lesson plans at the teacher level, capacity building programmes and trainings at the system level and even guide in recommending policy level changes.

4.1. Skill-wise analysis

Analysis was carried out on the performance of students on various skills tested for different classes and subjects. This analysis enables one to understand the strong and weak areas for each subject and can in turn guide the teacher on the action that should be taken.

Performance on different skills in Language

- In language, students seem to be strong at identifying and writing letters and knowing sounds of words - *'Recognizes letters by their sound and form, writes them, and knows the starting sound as well as letter of familiar words'*.
- In classes 5 and 7, vocabulary seems to be the strongest skill.
- The skill testing reading comprehension has shown a low performance across all the classes. Students should be encouraged to read different kinds of material – stories, news articles, magazines etc. Exposing them to different reading material (apart from the textbooks) will not only help in building their comprehension skill, but will also expand their vocabulary. Performance on different skills in Language is given below.

Language: Class 3

Skill Name	Questions	Performance (Average %)
Recognises letters by their sound and form, writes them, and knows the starting sound as well as letter of familiar words	21,1, 24, 26, 27	69.1%
Knows names of objects, birds and animals seen in daily life	12, 2, 5	68.7%
Reads and writes simple words that have 3–4 letters with matras	3, 25, 22, 23, 8	66.2%
Uses words appropriate to the context based on their meanings and gender endings	11, 4, 6, 7	64.1%
Reads, understands, writes and constructs simple and short sentences that have less than 5 words in a sentence	13, 10, 28, 9, 14	61.1%
Reads short text of 5-6 sentences that describes daily activity, routine context, simple description, simple story independently and comprehends state	20, 18, 19	54.6%
Understands simple, short stories of 8-10 sentences when told and comprehends beyond the stated facts	16, 15, 17	54.3%

(Key: The Green Cell highlights the highest performing skill and the Yellow cell highlights the lowest performing skill.)

Language: Class 5

Skill Name	Questions	Performance (Average %)
Knows a wider range of names of objects, birds and animals not seen in daily life and words denoting actions and feelings	14, 1, 4, 26	63.0%
Reads moderately difficult words that have 4-6 letters with matras,dwitwas and samyukhtas	5, 6, 23	51.2%
Uses words appropriate to the context based on their meaning, time, number, gender and description	15, 16, 2, 3, 7, 8, 10, 11, 20, 21	50.2%
Understands written information presented in various forms as Tables, Notices, Tickets, Posters, Labels, etc seen in real life	30, 32, 33, 31	46.4%
Reads, understands, constructs and punctuates simple sentences that have 5-6 words in a sentence	13, 17, 9, 12, 25, 24, 22, 18, 19	45.8%
Reads descriptive text, short stories of 8-10 sentences independently and comprehends beyond stated facts	29, 28, 27	43.9%

Language: Class 7

Skill Name	Questions	Performance (Average %)
Reads difficult words of more than 6 letters with matras, dwitwas and samyukthas	6, 7, 17, 8	58.5%
Understands written information presented in various forms as Tables, Notices, Tickets, Posters, Labels, etc seen in real life	33, 34, 35	54.7%
Uses words appropriate to the context based on meaning, gender, time and description	4, 5, 24, 26, 9, 10, 16, 18, 12, 13, 28, 29, 22	54.6%
Knows a wider range of names of objects, birds and animals not seen in daily life and words denoting actions and feelings	1, 2, 3, 27, 15	51.0%
Reads, understands, constructs and punctuates simple sentences that have 6 or more words in a sentence	31, 25, 19, 20, 21, 32, 14, 30, 11, 23	45.3%
Reads descriptive text, short stories of 10-12 sentences independently and comprehends beyond stated facts	37, 39, 40, 38, 36	41.3%

Performance on different skills in Maths

- In Maths, students seem to be strong at basic numeracy skills like number sense and arithmetic operations. The strongest skill among classes 3 and 5 is *Number sense and for class 7, it is Four basic arithmetic operations*.
- However, they seem to be weak at intermediate skills. Class 3 students seem to be weak at understanding of basic shapes – *Geometry: Basic shapes;* while classes 5 and 7 students are weak at *Area and Perimeter*.
- Though it is desirable and good that the basic skills are clear and students master them, it is equally important for them to perform well on the intermediate skills, which are built on the basic skills. This holds true especially for classes 5 and 7.

The skill-wise performance levels are given below.

Maths: Class 3

Skill Name	Questions	Performance (Average %)
Number sense	23, 24, 17, 28, 21, 22, 1, 15	64.9%
Applications in daily life	27, 8, 13	63.1%
Four basic Arithmetic operations	25, 16, 7, 4, 14, 12, 11, 10	57.2%
Measurement and its applications	26, 18, 2, 3, 9	56.3%
Geometry: Basic Shapes	19, 20, 6, 5	55.4%

*Number Sense tests the understanding of the numbers, place value, expansion, writing in words and application of these concepts in real life.

Maths: Class 5

Skill Name	Questions	Performance (Average %)
Number sense	1, 2, 9, 28	49.3%
Applications in daily life	5, 15, 17, 26, 22, 23, 33	44.3%
Fractions, Decimals Ratios and Percentages	12, 14, 16, 19, 35	44.0%
Four basic Arithmetic operations	3, 4, 6, 7, 29	43.1%
Measurement and its applications	8, 10, 11, 27, 30	41.5%
Area and Perimeter, Volume and Surface Area	18, 20, 21, 25, 34	39.4%
Geometry: Basic Shapes	13, 24, 32, 31	39.2%

Maths: Class 7

Skill Name	Questions	Performance (Average %)
Four basic Arithmetic operations	2, 14, 15, 31	53.3%
Measurement and its applications	7, 23, 40	49.0%
Geometry: Basic Shapes*	1, 39, 33	48.7%
Basic Algebra	34, 17, 18	48.5%
Fractions, Decimals Ratios and Percentages	4, 5, 6, 19, 20, 21, 25	46.7%
Applications in daily life	3, 27, 26, 28	46.7%
Problem Solving	35, 38, 16	42.6%
Powers and bases: concepts and applications	29,36,37	42.4%
Number sense	8, 9, 10, 11, 12,13, 32	41.5%
Area and Perimeter, Volume and Surface Area	30, 22, 24	38.5%

* The names of skills can be the same but the questions asked in these skills are grade appropriate and vary according to class in which the skill is being tested

4.2.   High performing questions

Questions showing performance higher than 60% were identified and were analysed to understand the type of questions that the students are able to answer well..

Majority of the questions in this category seem to be textbookish/ with a familiar format or testing lower level skills.

In case of Language, questions where words having familiar pictures are asked, students show higher performance. Similarly, in case of Maths, certain questions testing number sense, geometry and application in real life have shown a higher performance.

Given here are some examples of questions where the performance was above 60%.

Maths: Class 3

Class	Question	Performance[3]	
3	हल करें और सही जवाब पर निशान (√) लगाएँ। 7 दहाई + 5 इकाई = _____ अ 70+ 51 ब 710+51 स 70+5 द 5+7+10	A	11.5
		B	8.6
		C	65.6
		D	7.1

Testing Objective: This question tests whether students understand the meaning of the terms 'tens' and 'ones' and can write the expression in numeric form. (65.6% students answered the question correctly.)
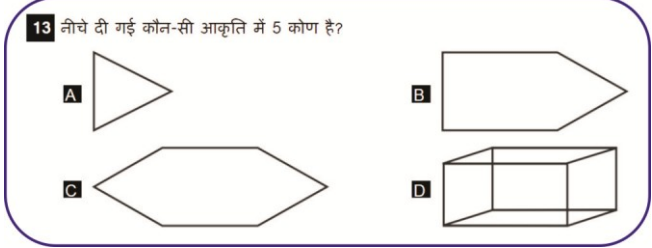
Class	Question	Performance[4]	
3	3 रामू के पास कुल पाँच रुपए है, जिनमें रु. 2 और रु. 1 के कुछ सिक्के है। नीचे दिए गए विकल्पों में से कौन-से सिक्के रामू के पास हो सकते हैं? सही जवाब पर निशान (√) लगाएँ। 	A	7.7
		B	10.6
		C	62.2
		D	13.4

Testing Objective: This question tests if students can interpret the given problem and identify the collection of coins whose total value is worth Rs.5. (62.2% students answered the question correctly.)

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[3] The tables here show option-wise performances on the questions. It is to be noted that some students may have not answered the question, or not marked their answers correctly.

[4] The tables here show option-wise performances on the questions. It is to be noted that some students may have not answered the question, or not marked their answers correctly.

Maths: Class 5

Class	Question	Performance[5]	
5	13 नीचे दी गई कौन-सी आकृति में 5 कोण है?	A	7.9
		B	62.1
		C	13.3
		D	11.5

Testing Objective: This question tests if students can identify the shape that has 5 corners. (62.1% students answered the question correctly.)

Maths: Class 7

Class	Question	Performance[6]	
7	22 इनमें से किस आकृति का क्षेत्रफल प्राप्त नहीं किया जा सकता?	A	9.2
		B	12.2
		C	64.7
		D	9.6

Testing Objective: This question tests if students understand that only closed shapes have area. (64.7% students answered the question correctly.)

Language: Class 3

Class	Question	Performance	
3	1 दिए गए जानवर के नाम के पहले अक्षर पर निशान (√) लगाएँ। आ व ब क स ब द र	A	9.1
		B	13.7
		C	69.4
		D	5.2

Testing Objective: This question tests whether students can identify the first letter of the name of the animal shown. (69.4% students answered the question correctly.)

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[5] The tables here show option-wise performances on the questions. It is to be noted that some students may have not answered the question, or not marked their answers correctly.
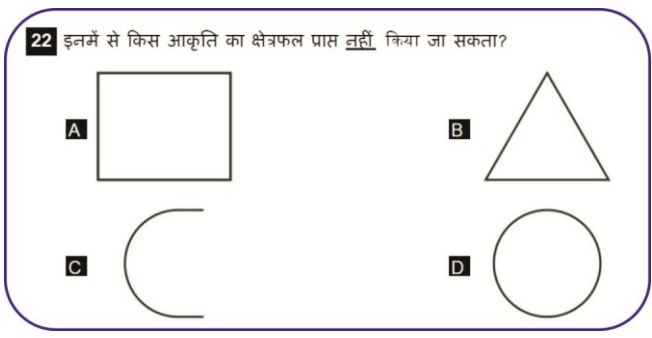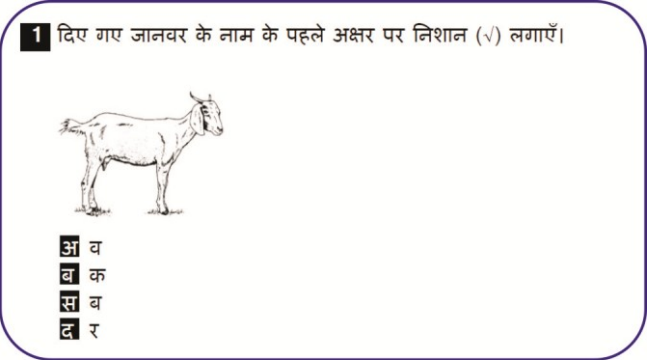
[6] The tables here show option-wise performances on the questions. It is to be noted that some students may have not answered the question, or not marked their answers correctly.

Class	Question	Performance[7]	
3	**21** चित्र में दिए गए फल के नाम का पहला अक्षर लिखें। ____ला	Answered correctly	82.8

Testing Objective: This question tests if students can write the first letter of the name of the fruit shown. (82.8% students answered the question correctly.)

Language: Class 5

Class	Question	Performance	
5	**1** इनमें से कौन-सा जानवर सबसे विशाल है? **A** बाघ **B** भालू **C** मोर **D** हाथी	A	11
		B	7.7
		C	9.8
		D	68.8

Testing Objective: This question tests if students can compare animals based on their size and identify the one that is the largest. (68.8% students answered the question correctly.)

Language: Class 7

Class	Question	Performance	
7	**2** नीचे दिए गए वाक्य को पूरा करने के लिए सही विकल्प चुनें। चिड़िया अपना _____ पेड़ पर बनाती है। **A** बिल **B** भोजन **C** घोंसला **D** जल	A	5.3
		B	9.4
		C	74.7
		D	8.4

Testing Objective: This question tests if students can identify the correct word, representing the place of living for a bird, based on the given context. (74.7% students answered the question correctly.)

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[7] The tables here show option-wise performances on the questions. It is to be noted that some students may have not answered the question, or not marked their answers correctly.

Class	Question	Performance	
7	**24** वाक्य को पूरा करने के लिए उचित विकल्प चुनें। मैंने वह टोपी एक _____ देखी थी। A दुकान में B दुकान के लिए C दुकान के बाद D दुकान के साथ	A	62.1
		B	11.6
		C	10.9
		D	11.8

Testing Objective: This question tests if students understand prepositions and can fill the blank appropriately. (62.1% students answered the question correctly.)
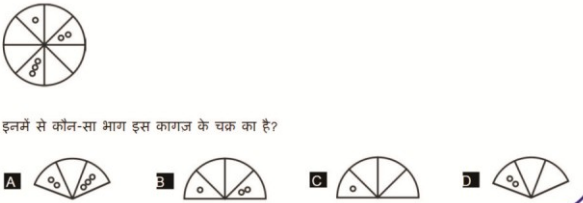
4.3.   Low Performing Questions:

Similar analysis was done for questions where performance was lower than 35% to understand areas/types of questions that students found difficult to answer.

Questions in this category tested different skills and the questions types included questions checking reasoning, application and analytical capacities of the students.

In Language, in classes 5 as well as 7, questions related to punctuations were the found to be low performing. In Maths, questions checking reasoning ability and conversion of a numeral from one system to another were found to be low performing.Given here are some examples of questions where the performance was less than 35%.

Maths: Class 5

Class	Question	Performance	
5	**33** नीचे दिए गए कागज के चक्र को देखें। इनमें से कौन-सा भाग इस कागज के चक्र का है? A B C D	A	14.6
		B	28.1
		C	21.3
		D	28.3

Testing Objective: This question tests if students can interpret the pattern given on the dial and identify the part that is of the same dial. (Only 28.3% students answered the question correctly.)

Maths: Class 7

Class	Question	Performance	
7	**9** दिए गए विकल्पों में से जिस विकल्प में 468 मिलियन को भारतीय अंकन पद्धति में सही तरह से लिखा गया हो उसे चुनें। A 46 करोड़ 8 लाख B 4 करोड़ 68 लाख C 46 करोड़ 80 लाख D 4 अरब 68 करोड़	A	19.3
		B	28.1
		C	28.9
		D	18.3

Testing Objective: This question tests if students can convert the given numeral into the Indian numbering system. (Only 28.9% students answered the question correctly.)

Language: Class 5

Class	Question	Performance		
5		A	15.6	
		B	27.1	
		C	23.9	
		D	27.3	

Testing Objective: This question tests the usage of punctuations in a sentence. (Only 27.1% students answered the question correctly.)

Language: Class 7

Class	Question	Performance		
7		A	23.5	
		B	26.1	
		C	30.5	
		D	15.7	

Testing Objective: This question tests the usage of punctuation in a sentence. (Only 26.1% students answered the question correctly. A similar question was tested in class 5 also and in both these classes low performance has been seen on this type of question.)

4.4.   Misconceptions and Common Errors

Question-wise analysis plays a very important role in understanding what students are able to do and the gaps in their understanding. One of the advantages of having MCQs in the test papers is that one can pinpoint the specific error students are making, and even go deeper and find out students of which particular ability level are making that error. One way of doing this analysis is to study the Item Response Curves (IRCs). It plots the percentage of students selecting different options at each ability level.

Example of an IRC:
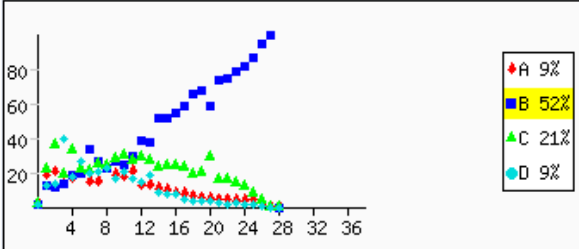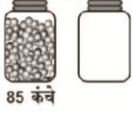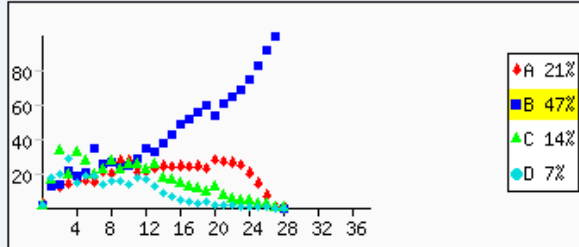
The X-axis of the plot indicates the possible scores (ability levels) and the Y-axis indicates the % of students. For all possible scores, % of students selecting different options is plotted. Different options are indicated by different shapes. Scores can be taken as a surrogate for the ability levels of students (since high ability

students are likely to get higher marks in the tests). As we can see, among the students who scored 1 to 8 marks, equal number of students selected different options. But as the scores increase beyond 8, students selecting the correct answer, option B steadily increases and the percentage of other options drops. Also, among the incorrect
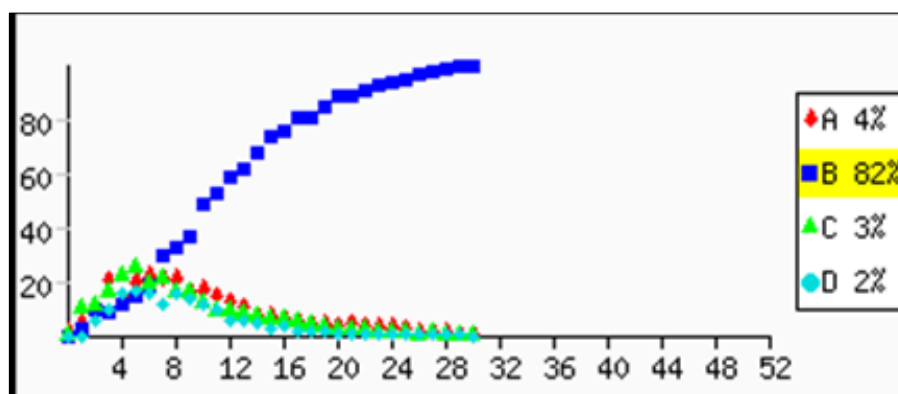
options, no particular option is being selected more than the others. From this IRC, we can conclude that students scoring high marks are clear about the question. At lower mark levels, students might have confusions related to the question. Since all wrong options are being selected by approximately equal number of students, misconception or common error is not clear. For each class and subject, we have identified misconception questions; questions where students have marked an option, which points at gaps in understanding of a concept.

Maths Class 3

Question[8]	Item Response Curve

Explanation: This question tests if students can understand and solve the given word problem. To answer the question, the students have to multiply the number of cows and calves with the number of legs each of them have (8x4).

53% of students answered the question correctly. 21.1% students have chosen C as the answer. A probable reason is that they have just added 4+4 and marked 8 as the answer.

The IRC curve also indicates that the students scoring low are marking C as the answer and as the marks increase, students are choosing B as the answer which means that the misconception is prevalent amongst the low scoring students.

Explanation: This question tests the concept of conservation of number - students need to understand that the *'total'* number of balls in the two jars will remain the same even when some balls are moved from jar 1 to jar 2.

47.6% students answered the question correctly. 21% students marked A as the answer. These students are probably subtracting 15 from 85 as 15 balls were moved from jar 1 to jar 2 and hence marking 70 as the answer.

As seen in the IRC curve, students of all ability levels are choosing option A. This common error is not limited to low scoring students

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[8]The tables here show option-wise performances on the questions. It is to be noted that some students may have not answered the question, or not marked their answers correctly.

Question[8]	Item Response Curve
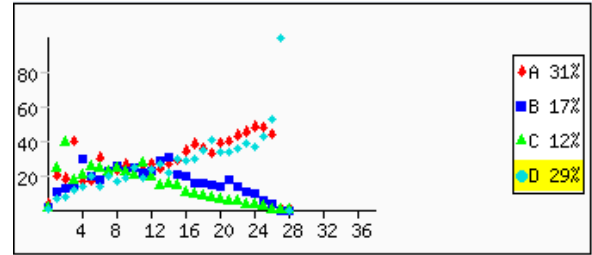
Explanation: This question requires students to understand the concept of volume measurement. The understanding required here is that a bigger vessel, with higher volume, will fill the jar faster than a smaller vessel having less volume. Students would have experienced this in their daily life and hence should be able to answer this question.

Only 29.4% of students answered the question correctly. 31.7% students chose A as the answer. A probable reason is that the shape of the vessel in option A is same as the Jar which has to be filled. Students have either not understood the question and selecting the option that matches the shape of the jar or have probably thought that with a similar shape vessel, the jar will be filled faster.

As seen in the IRC curve, the wrong answer A is being chosen even by high scoring students.

Maths Class 5

Question	Item Response Curve

7 330033 को 33 से भाग देने पर क्या प्रास होगा?
A 11
B 101
C 1001
D 10001
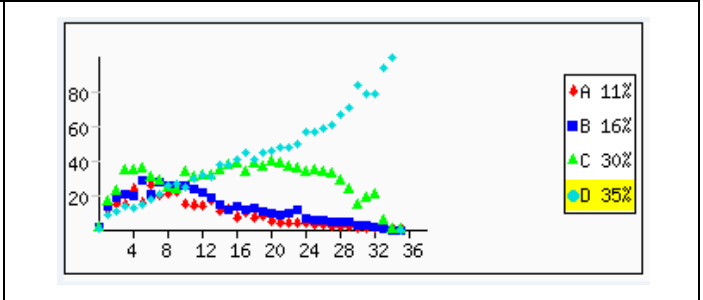
Explanation: This question tests the understanding of the concept of division of a number with the use of zeroes.

35.3% of the students answered the question correctly. 30.8% students have marked the wrong option C as their answer. A probable reason is that because 2 zeroes are present in the dividend, the students have chosen the answer as 1001, which also has two zeroes.

Another reason could be an improper understanding of the concept in which zeroes are required to be added to the quotient. As seen in the IRC, students across different difficulty levels are making this error.

20 25 मीटर लम्बे और 10 मीटर चौड़े बगीचे को चारों तरफ से घेरने के लिए कितने मीटर तार की आवश्यकता होगी?
A 70 मीटर
B 60 मीटर
C 35 मीटर
D 250 मीटर
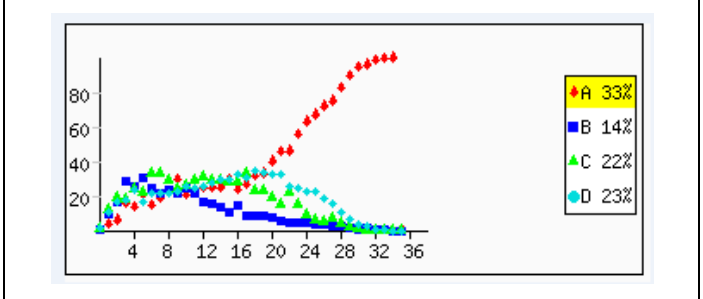
Explanation: This question tests the understanding of the concept of perimeter. The question can be answered by understanding that the sides of the garden are 25m, 10m, 25m and 10m.

33.2% of the students answered the question correctly.

22.7% students chose C as the answer. A probable reason is that they have added 25+10 once only and ignored the fact that there are 4 sides of the garden.

23.3% students have marked D as the answer. They have probably confused area with perimeter and have multiplied 25x10, which is used to find the area.

This arises from the lack of proper understanding of what *perimeter* means and how is different from *area*.

27 इनमें से किस चित्र में तरबूज़ का वजन ठीक 2 किलो बताया गया है?
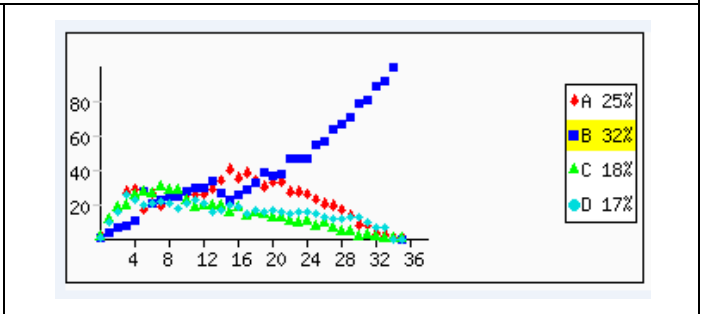
Explanation: This question tests the understanding of weights and measurement.

32.6% of the students answered the question correctly 25.3% students marked the answer A. A probable reason is that in A, a weight of 2 kg has been shown and seeing that the students may have selected it. But they have overlooked the fact that in A, the weight of the melon is more than 2 kg as the weight is tilting towards the left.

Question	Item Response Curve

Explanation: This question tests if students are able to interpret the key given along with the table and interpret the table accordingly. Here, they are required to understand that every 2 apples (🍎🍎) indicate 10 apples.

Only 30% students answered the question correctly. 34.6% students chose B as the answer. They have probably not understood the key and have chosen Tuesday as the answer as 5 apples are shown against it.

Another reason can be the lack of exposure to such data based tables and reading them.

As seen in the IRC, students scoring less have probably not understood the question and are selecting different options equally. However, as the scores increase, more and more students are selecting the incorrect option B and the number of such students reduces only beyond score 28.

Explanation: The question tests the understanding of the concept of fractions.

35.5% of the students answered the question correctly. 29.7% students have chosen D as the answer. These students are probably considering 1 in 1/3 as unshaded and 3 as shaded and hence selecting D as the answer. This shows that they do not have a very clear understanding of fractions.

Maths Class 7

Question	Item Response Curve

Explanation: The question tests the understanding of the number line involving negative integers. In the question the student has to move from -5 to 22 and understand that the difference between the two is 22 - (-5) = 27.

38.2% of the students have answered the question correctly. 21.9% students chose the option B. They have probably subtracted 5 from 22, 22-5 and ignored the minus sign in -5.

Explanation: This question tests if students are able to represent a fraction on a number line correctly.

38.1% of the students answered the question correctly. 28.4% students chose the option C as the answer. A probable reason is that the students don't understand the meaning of ½ and think that it will lie between 1 and 2, since these are the two digits in ½.
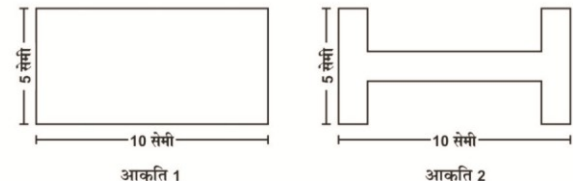
They lack the clarity on fractions and between which numbers the fraction will lie.

As seen in the IRC, students scoring less have probably not understood the question and are selecting different options equally. However, as the scores increase, more and more students are selecting the incorrect option C and the number of such students reduces only beyond score 28.

Explanation: This question tests the understanding of calculation of percentage. The students have to do the following calculation: (30/120) x 100 to get the answer.
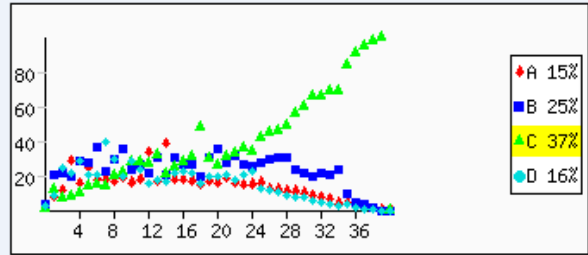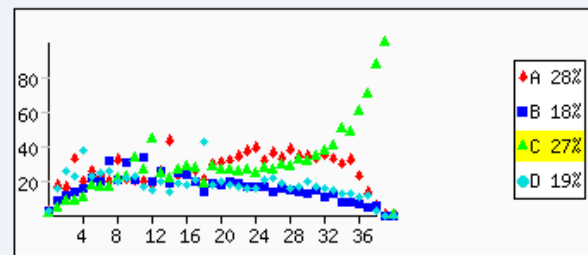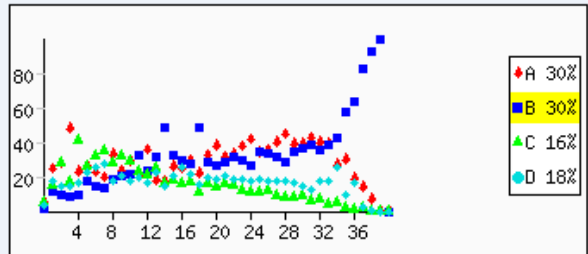
46.2% of the students answered the question correctly. 22.1% students have chosen B as the answer. They have probably done the following: (30 x 120)/100 thus calculating 36% of 120. The students lack the understanding of what percentage means and how is it calculated. Moreover, may be the students are used to calculating

Question	Item Response Curve
percentages with base 100.	

Explanation: This question tests the understanding of perimeter of a figure. It involves comparing the perimeter of two figures, both having the same length and breadth but with a difference in the shape.Only 24.1% of the students answered the question correctly. 35.1% students have chosen C as the answer. They are probably just seeing the length and the breadth of the shapes shown and thus concluding that the perimeter will also be the same. They have overlooked that figure 2 has additional sides which add to its perimeter.

Language Class 5:

Question	Item Response Curve
9 इनमें से कौन-सा वाक्य सही है? **A** अधिक चाय नहीं पीना चाहिए। **B** अधिक चाय नहीं पीने चाहिए। **C** अधिक चाय नहीं पीनी चाहिए। **D** अधिक चाय नहीं पीनें चाहिए।	A 35% / B 15% / C 33% / D 11%

Explanation: This question tests if students know the gender of the given noun and select the sentence with an appropriate framing.

33% of the students answered the question correctly. 35.6% students marked A as the answer. A probable reason is that they are not clear with the form of the word 'Drink' to be used in the sentence. Also, they might have associated the word 'Drink' with 'Water' and used the gender as used with 'Water'

Another reason could be that the students are influenced by the way they speak in the local dialect.

20 'आकाश' का पर्यायवाची शब्द क्या है? **A** पाताल **B** नाव **C** नभ **D** नल	A 23% / B 15% / C 45% / D 10%

Explanation: This question tests if the student can identify the synonym (समानार्थी) for the given word.

45.6% of the students answered the question correctly. 23.9% students marked A as the answer, which is the antonym (विलोम) for the given word.

A probable reason is that the students have not understood what 'synonym' (समानार्थी) means and are confused between 'synonym' (समानार्थी) and 'antonym'. (विलोम)

22 नीचे दिए गए दो वाक्यों को जोड़ने का सबसे अच्छा तरीका कौन-सा है? "गायें घास खाती हैं। खरगोश घास खाते हैं।" **A** गायें घास और खरगोश खाती हैं। **B** गायें घास खाती है और खरगोश घास खाते हैं। **C** गायें खरगोश खाती है और घास खरगोश खाती है। **D** गायें और खरगोश घास खाते हैं।	A 10% / B 24% / C 13% / D 46%

Explanation: This question tests the ability of the student to combine two sentences properly and in the best possible way.

46.6% of the students answered the question correctly. 24.8% students chose B as the answer. They probably don't know why and how conjunctions are used and think that to join 2 sentences 'and' should be added in between.

Language Class 7:

Question	Item Response Curve
14 'आएँ युवराज! आपकी <u>वीर भुजाओं की छाँव में</u> इस राज्य की प्रजा सुख की नींद सोती है।' इस वाक्य में 'वीर भुजाओं की छाँव' से क्या तात्पर्य है? **A** सशक्त बाहों की छाया **B** वीरता भरे कार्य **C** सशक्त सुरक्षा **D** मज़बूत कवच	A 15%　B 25%　C 37%　D 16%

Explanation: This question requires students to identify the meaning of the underlined phrase as per the context in the sentence.

37.7% of the students answered the question correctly. 25.8% students chose B as the answer. A probable reason is that the word 'वीर' is there both in the underlined phrase and the option B. Because of similarity between the two, option B has been chosen. They don't really understand the meaning of the phrase.

Question	Item Response Curve
40 कहानी में जो हो रहा था उसके बारे में चूहे क्या सोच रहे थे, यह कहानी में कैसे बताया गया है? **A** यह बताकर कि लखन चूहों के बारे में क्या सोचता है। **B** इस बात का वर्णन करके कि चूहे कहाँ रहते हैं। **C** यह बताकर कि चूहे एक-दूसरे से क्या कह रहे हैं। **D** इस बात का वर्णन करके कि चूहे कैसे हैं।	A 28%　B 18%　C 27%　D 19%

Explanation: This question is based on a passage and required comprehension skills.

Only 28% students answered the question correctly. 28.5% students chose A as the answer.

Question	Item Response Curve
3 सज्जन व्यक्ति परोपकार करते हैं जिससे उन्हें पुण्य और प्रशंसा मिलती है। इस वाक्य में विशेषता बताने वाला शब्द कौन-सा है? **A** परोपकार **B** सज्जन **C** पुण्य **D** प्रशंसा	A 30%　B 30%　C 16%　D 18%

Explanation: This question tests if students can identify the word which describes the quality (adjective) in the given sentence.

Around 30% of the students answered the question correctly. Almost equal number of students selected A as the answer. They probably think that the word describing a quality is the verb and hence selecting it. As seen in the IRC, students across different scores have selected the wrong option A.

Students seem to be struggling with questions which are asked in an unfamiliar format or are higher order and test the reasoning capacity or application. They can easily do the questions for which they have practised through the year either in the classroom or through textbook exercises. However, they struggle when they are asked the same concept in an unfamiliar way or have to apply the concepts that they already know.

It is essential that students are exposed to different types of questions – straightforward, as well as questions that help them reason and apply concepts better. Doing and practicing such questions would also help in their overall cognitive development and in integrating more than one concept in application in real life.

5. COMPARATIVE FINDINGS

Disaggregation of student learning levels based on location, region and identity can present a nuanced understanding of the status of student learning in Bihar. While the state level analysis provides an overall picture of the level of learning, this chapter attempts to explode this analysis by district, gender, social classes and location (rural/urban). We have also presented the highlights from a cross section of these parameters. This section will highlight any significant differences across these parameters, and guide action for specific areas or populations.

5.1. Performance of different districts

A 'composite performance index' was calculated for each district, taking the average of scores of all the class in each subject: Hindi and Maths. Districts were then ranked based on this composite performance index. However, many of the differences in performance between districts are marginal and not meaningful. To visualize meaningful differences between districts, statistical procedures (Cohen's D) were used to classify districts into 3 bands- significantly above state average, not significantly different from state average and significantly below state average. Thus, it is important to look at the performance of each district with reference to which band it is in, and it is not recommended to look at the exact 'rank' of each district.

- Saharsa, Gopalganj, Begusari and Aurangabad are best performing districts in both Hindi and Maths.
- Bhojpur, Muzaffarpur, Madhepura and Bhagalpur are among the lowest four districts.
- Saharsa, Gopalganj, Katihar, Aurangabad, Patna, Khagaria, Begusarai, Vaishali, Arwal, Darbhanga, Supaul, Lakhisari have performed above average with small effect size in both the subjects which shows the similar learning levels across districts.
- Araria, Nawada, Saran, Rohtas, Kishanganj, Buxer, Madhepura, Banka and Sitamarhi have performed below average with Small effect size, while Madhubani, Muzaffarpur, Bhagalpur and Madhepura have performed below average with medium effect size and Bhojpur with large effect size in different subjects.

The difference in performance across the districts can direct state action, by understanding the best practices in the high performing districts, such has Saharsa, Gopalganj, Begusarai and Aurangabad, and advocating stronger academic support to the weaker performing districts. At the same time, improving relative performance of the districts should not be seen as the end goal, an attempt should be made to improve conceptual understanding across the state.

Composite Performance Index -Hindi

Composite Performance Index -Maths

Above average with medium effect size	Below average with large effect size
Above average with small effect size	Below average with medium effect size
Performance at par with state average	Below average with small effect size
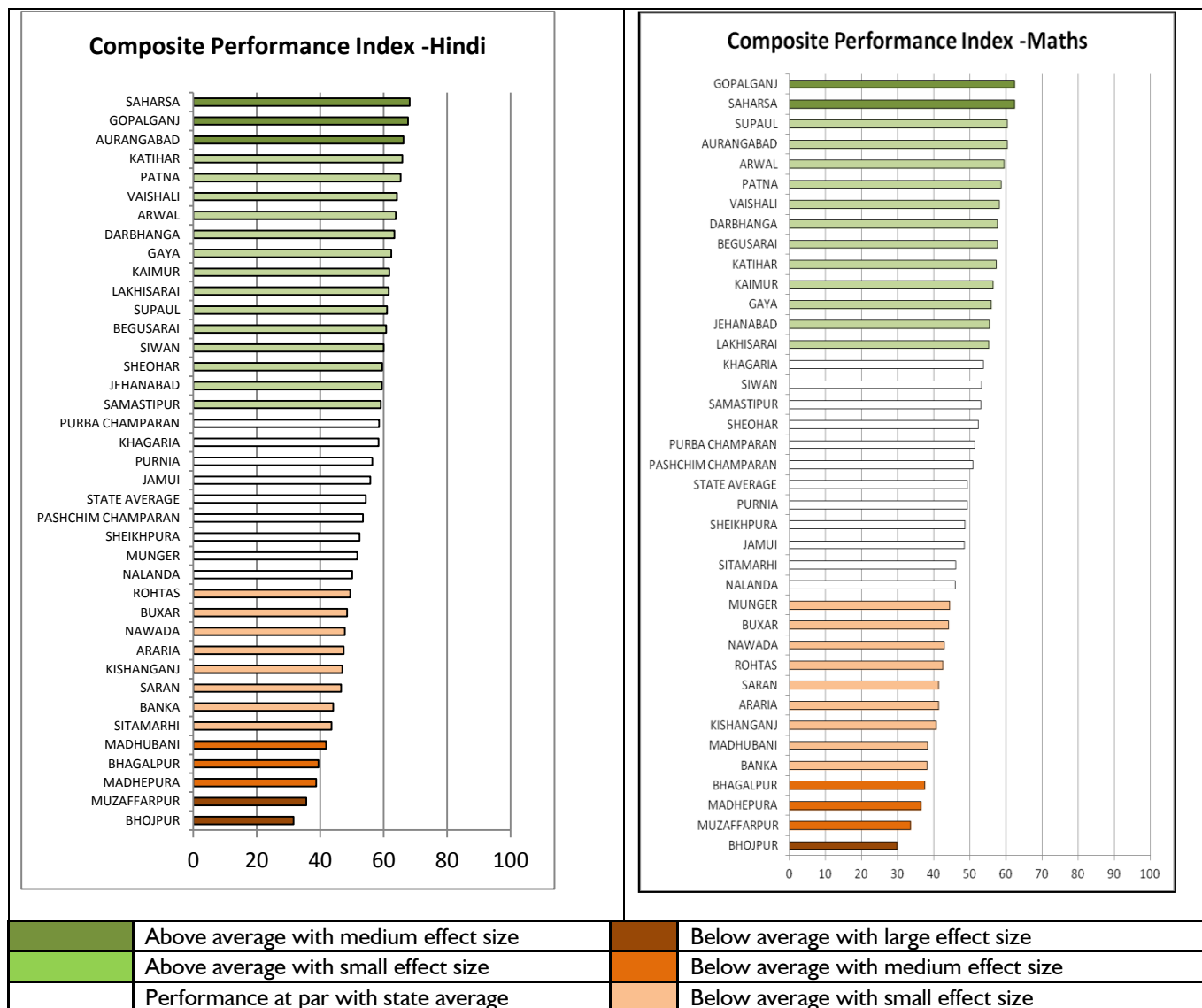
District Performance across classes and subjects

The following section analyses the performance of districts across all class-subject combinations to examine the performance of each district comprehensively.

- As shown in Composite Performance Index, Saharsa, Goplaganj and Aurangabad are among the top performers across all class-subject combinations.
- Similar to Composite Performance Index Muzaffarpur and Bhojpur are the lowest performers in all class-subject combinations

Class 3 -Hindi	Class 5 -Hindi	Class 7 - Hindi	Class 3 - Maths	Class 5 -Maths	Class 7 -Maths
GOPALGANJ	KATIHAR	SAHARSA	SUPAUL	GOPALGANJ	SAHARSA
AURANGABAD	SAHARSA	GOPALGANJ	GOPALGANJ	SAHARSA	GOPALGANJ
SUPAUL	GOPALGANJ	PATNA	AURANGABAD	AURANGABAD	KATIHAR
SAHARSA	AURANGABAD	AURANGABAD	ARWAL	SUPAUL	ARWAL
PATNA	PATNA	VAISHALI	SAHARSA	PATNA	BEGUSARAI
KATIHAR	VAISHALI	ARWAL	PATNA	DARBHANGA	VAISHALI
ARWAL	DARBHANGA	DARBHANGA	SITAMARHI	BEGUSARAI	AURANGABAD
KAIMUR	ARWAL	KATIHAR	KAIMUR	VAISHALI	SUPAUL
VAISHALI	GAYA	GAYA	JEHANABAD	ARWAL	DARBHANGA
DARBHANGA	LAKHISARAI	BEGUSARAI	VAISHALI	GAYA	PATNA
LAKHISARAI	KAIMUR	LAKHISARAI	KATIHAR	KAIMUR	KAIMUR
GAYA	BEGUSARAI	KHAGARIA	DARBHANGA	LAKHISARAI	KHAGARIA
JEHANABAD	SHEOHAR	KAIMUR	LAKHISARAI	SHEOHAR	JEHANABAD
SIWAN	SIWAN	SIWAN	GAYA	KATIHAR	GAYA
SAMASTIPUR	PURBA CHAMPARAN	PURBA CHAMPARAN	BEGUSARAI	SAMASTIPUR	LAKHISARAI
SHEOHAR	SAMASTIPUR	SHEOHAR	SIWAN	SIWAN	SIWAN
BEGUSARAI	JEHANABAD	SAMASTIPUR	SAMASTIPUR	KHAGARIA	PASHCHIM CHAMPARAN
JAMUI	SUPAUL	SUPAUL	SHEOHAR	JEHANABAD	SAMASTIPUR
PURNIA	KHAGARIA	JEHANABAD	KHAGARIA	PURBA CHAMPARAN	PURBA CHAMPARAN
PURBA CHAMPARAN	PURNIA	PURNIA	JAMUI	PASHCHIM CHAMPARAN	SHEOHAR
KHAGARIA	JAMUI	JAMUI	STATE AVERAGE	PURNIA	PURNIA
STATE AVERAGE	PASHCHIM CHAMPARAN	STATE AVERAGE	PURBA CHAMPARAN	STATE AVERAGE	STATE AVERAGE
SHEIKHPURA	STATE AVERAGE	PASHCHIM CHAMPARAN	SHEIKHPURA	SHEIKHPURA	SHEIKHPURA
MUNGER	ROHTAS	SHEIKHPURA	PURNIA	JAMUI	BUXAR
PASHCHIM CHAMPARAN	SHEIKHPURA	MUNGER	PASHCHIM CHAMPARAN	NALANDA	JAMUI
ROHTAS	MUNGER	BUXAR	NAWADA	BUXAR	NALANDA
NAWADA	NALANDA	NALANDA	MUNGER	ARARIA	MUNGER
NALANDA	KISHANGANJ	ARARIA	NALANDA	KISHANGANJ	SITAMARHI
SARAN	BUXAR	SARAN	ROHTAS	MUNGER	ARARIA
BANKA	ARARIA	ROHTAS	SARAN	ROHTAS	KISHANGANJ
KISHANGANJ	NAWADA	NAWADA	BHAGALPUR	NAWADA	NAWADA
ARARIA	SARAN	KISHANGANJ	BANKA	SARAN	ROHTAS
BHAGALPUR	SITAMARHI	SITAMARHI	MADHUBANI	SITAMARHI	SARAN
BUXAR	BANKA	BANKA	ARARIA	MADHUBANI	MADHUBANI
MADHUBANI	MADHUBANI	MADHUBANI	BUXAR	BANKA	BANKA
SITAMARHI	MADHEPURA	MADHEPURA	KISHANGANJ	MADHEPURA	MADHEPURA
MADHEPURA	BHAGALPUR	BHAGALPUR	MADHEPURA	BHAGALPUR	BHAGALPUR
MUZAFFARPUR	MUZAFFARPUR	MUZAFFARPUR	MUZAFFARPUR	MUZAFFARPUR	MUZAFFARPUR
BHOJPUR	BHOJPUR	BHOJPUR	BHOJPUR	BHOJPUR	BHOJPUR

	Above average with small effect size		Below average with small effect size
	Above average with medium effect size		Below average with medium effect size
	Performance at par with state average		Below average with small effect size

5.2. Extent of Zero scorers across districts

The number of students scoring zero in the entire paper is low in Bihar (less than 1% in most classes and subjects)This following section attempts to see the extent of zero scorers among all 39 districts tested in Teacher-led Midline assessment. Zero scorers of all classes and subjects put together and percentage of zero scorers per district are shown in below graph. Kishanganj, Sheohar and Jamui, Purba Champaran and Gaya showed the highest zero scorers.

Extent of Zero Scorers across Districts
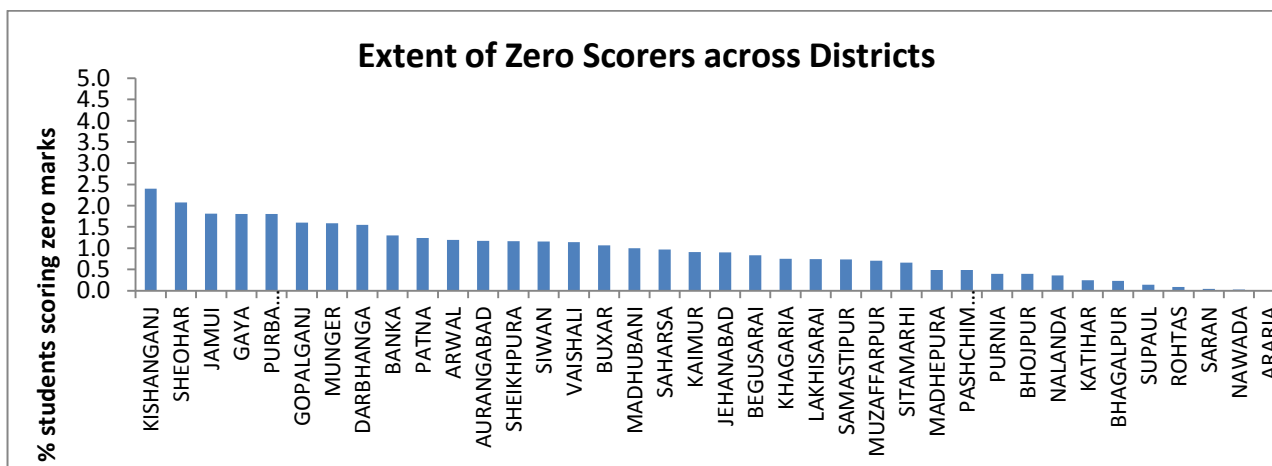
5.3. Performance of boys and girls

In this section, we have attempted to disaggregate our findings on learning levels, gaps and understanding by gender to understand if there is a difference in the learning levels of boys and girls across the state. This will include an analysis of student performance across regions (location and districts) and performance by gender as well as social classes, in an attempt to understand where and why there is a difference in performance, if any.

The key highlights from this section are given below:

State level performance of boys and girls by medium

Over 6 lakh boys and girls were tested in each class in this study. At the overall level, boys and girls have similar performance levels, with their performances within 1 percentage point of each other at the state level.

Class	Subject	Girls			Boys			Difference - Girls - Boys	Significance	Effect Size
		N	AVG	SD	N	AVG	SD			
3	Language	827218	63.3	21.5	781583	63.1	21.5	0.2	Significant	0.01
5	Language	849883	49.4	21.7	786727	49.8	21.5	-0.4	Significant	-0.02
7	Language	687505	50.2	20.6	607105	51.0	19.9	-0.9	Significant	-0.04
3	Maths	821539	59.5	22.2	776079	59.6	22.2	-0.2	Significant	-0.01
5	Maths	843886	42.6	20.7	780838	43.3	20.5	-0.6	Significant	-0.03
7	Maths	682503	45.3	22.4	602355	46.0	21.7	-0.7	Significant	-0.03

To capture social, economic and regional differences within the state, the student performance levels were analysed at multiple levels to draw out differences in performances at a nuanced level. When the state-wide performance of boys and girls was examined by medium of instruction, it is observed that

- In the Hindi medium there is no difference in the performance levels

- In Urdu, differences are observed in Class 7, where boys perform better than girls.

State level performance of boys and girls by location

To understand if the difference in performance levels is concentrated in a particular region, we examined the performance levels of boys and girls by medium and location – rural or urban. This reveals that while boys and girls perform at par in Hindi medium schools in both rural and urban areas at the state level. In Urdu medium schools, boys and girls perform similarly in rural schools, but show some meaningful differences in urban schools – where boys perform meaningfully better in Class 7 with small and medium differences in performance. Differences are also observed in Class 5 in Urdu medium schools in urban areas.

State level performance of boys and girls by social category

A further analysis of the performance levels of boys and girls was done by social category of the students. This reveals that

- At an overall level, the performance levels of boys and girls of General, SC, ST, OBC categories is at par. The same trend is seen in Hindi medium students as well

- In Urdu medium schools, in most classes and subjects, boys and girls across social categories perform similarly. Girls of the ST category perform better than boys (small effect size) in Class 3, and the trend seems to be reversed in class 7, where boys perform better in Class 7 Language. Performance levels of boys from the OBC category is also higher in Class 7 language.

Level	Category	Class-Subject	Meaningful difference?
Overall	All – SC, ST, GEN, OBC, OTH	All – 3,5,7 – Language and Maths	
Hindi Medium	All – SC, ST, GEN, OBC, OTH	All – 3,5,7 – Language and Maths	
Urdu Medium	OBC Category	Class 7 Language	
Urdu Medium	ST Category	Class 3 Language Class 3 Maths	
Urdu Medium	ST Category	Class 7 Language	

District level performance of boys and girls by medium

While trends at the state level give us a broad picture of performance differences, we also attempted ot understand if these differences are concentrated in a particular district or region of the state. The below illustration highlights performance differences between boys and girls in different districts of the state:

District	Class 3 - Language	Class 3 - Maths	Class 5 – Language	Class 5 - Maths	Class 7 - Language	Class 7 - Maths
ARARIA						
ARWAL				(difference)		(difference)
AURANGABAD					(difference)	
BANKA						
BEGUSARAI						
BHAGALPUR						
BHOJPUR						
BUXAR						
DARBHANGA					(difference)	
GAYA						
GOPALGANJ						
JAMUI						
JEHANABAD						
KAIMUR						
KATIHAR						
KHAGARIA						
KISHANGANJ					(difference)	
LAKHISARAI					(difference)	(difference)
MADHEPURA						
MADHUBANI						
MUNGER						
MUZAFFARPUR						

District	Class 3 - Language	Class 3 - Maths	Class 5 – Language	Class 5 - Maths	Class 7 - Language	Class 7 - Maths
NALANDA	👤👤	👤👤	👤👤	👤👤	👤👤	👤👤
NAWADA	👤👤	👤👤	👤👤	👤👤	👤👤	👤👤
PASHCHIM CHAMPARAN	👤👤	👤👤	👤👤	👤👤	👤👤	👤👤
PATNA	👤👤	👤👤	👤👤	👤👤	👤👤	👤👤
PURBA CHAMPARAN	👤👤	👤👤	👤👤	👤👤	👤 👤 💥	👤👤
PURNIA	👤👤	👤👤	👤👤	👤👤	👤👤	👤👤
ROHTAS	👤👤	👤👤	👤👤	👤👤	👤👤	👤👤
SAHARSA	👤👤	👤👤	👤👤	👤👤	👤👤	👤👤
SAMASTIPUR	👤👤	👤👤	👤👤	👤👤	👤👤	👤👤
SARAN	👤👤	👤👤	👤👤	👤👤	👤👤	👤👤
SHEIKHPURA	👤👤	👤👤	👤👤	👤👤	👤👤	👤👤
SHEOHAR	👤👤	👤👤	👤👤	👤👤	👤 👤 💥	👤 👤 💥
SITAMARHI	👤👤	👤👤	👤👤	👤👤	👤👤	👤👤
SIWAN	👤👤	👤👤	👤👤	👤👤	👤👤	👤👤
SUPAUL	👤👤	👤👤	👤👤	👤👤	👤👤	👤👤
VAISHALI	👤👤	👤👤	👤👤	👤👤	👤 👤 💥	👤 👤 💥

- In most districts and most classes and subjects, boys and girls are performing at par.

- Differences in performances seen in Class 7 in Vaishali, Seohar, Purba Champaran, Lakhisarai, Kishanganj, Darbhanga, Aurangabad and Arwal, where boys have higher performance levels than girls in the district.

- When district differences are examined by medium of instruction, it is revealed that

  o In most classes and subjects in Hindi and Urdu medium, performance of boys and girls is similar.
  o In the Hindi medium schools, boys perform better in Class 7 Language in 7 districts (given below) Lakhisarai and Sheohar districts show performance levels of boys meaningfully higher in both subjects of class 7.
  o In Urdu medium schools, Samastipur and Begusarai districts show higher performance levels of boys in Class 7. Few other districts also show meaningful differences, given below.

Level	District	Class-Subject	Direction and significance of difference
Hindi Medium	ARWAL	Class 5 Maths Class 7 Maths	
Hindi Medium	AURANGABAD, SIWAN DHARBHANGA, VAISHALI KISHANGANJ, PURBA CHAMPARAN,	Class 7 Language	
Hindi Medium	LAKHISARAI, SHEOHAR	Class 7 Language Class 7 Maths	
Urdu Medium	BEGUSARAI	Class 5 Language Class 7 Language Class 7 Maths	
Urdu Medium	SAMASTIPUR	Class 7 Language Class 7 Maths	
Urdu Medium	VAISHALI GOPALGANJ	Class 7 Language	
Urdu Medium	LAKHISARAI, BHOJPUR	Class 7 Maths	
Urdu Medium	DARBHANGA	Class 7 Language	

Different trends in performance levels of boys and girls are also seen in rural and urban areas in different districts. The meaningful differences in different districts have been summarized below.

Location	District	Class- Subject	Direction and significance of difference
RURAL	ARWAL	Class 5 Maths Class 7 Maths	*
RURAL	AURANGABAD, DARBHANGA, JAMUI, KISHANGANJ, SHEIKHPURA PURBA CHAMPARAN , SIWAN	Class 7 Language	*
RURAL	GAYA, LAKHISARAI, SEOHAR, VAISHALI	Class 7 Language Class 7 Maths	*
URBAN	SEOHAR	Class 7 Maths	
URBAN	SAMASTIPUR	Class 5 Language Class 5 Maths	
URBAN	JAMUI, KAIMUR	Class 5 Maths	
URBAN	LAKHISARAI	Class 7 Language Class 7 Maths	
URBAN	GOPALGANJ, VAISHALI	Class 7 Language	
URBAN	KAIMUR, ARARIA, PASHCHIM CHAMPARAN	Class 7 Maths	
URBAN	SEOHAR	Class 5 Language Class 7 Language	

5.4. Performance of rural and urban areas

This section highlights differences in performance levels at the state and district level based on the location of the schools in rural and urban areas of the state. Over 15 lakh students in rural areas and 88 thousand students in urban areas were tested in each class.

At the state level,

- Meaningful differences (small based on Cohen's d criterion) in the performance levels are observed in Class 5 Language, and Class 7 Language and Maths, where Urban school students have higher performance levels.

Class	Subject	Rural			Urban			Significance	Effect size
		N	AVG	SD	N	AVG	SD		
3	Language	15,20,474	63.1	21.3	88330	64.8	21.5	Significant	-
5	Language	15,42,320	49.4	21.5	94291	52.5	21.5	Significant	Small
7	Language	12,01,853	50.2	20.2	92757	54.5	20.0	Significant	Small
3	Maths	15,09,630	59.5	22.1	87991	60.5	22.3	Significant	-
5	Maths	15,30,733	42.7	20.5	93992	45.9	21.0	Significant	Small
7	Maths	11,92,310	45.4	21.9	92548	48.0	22.3	Significant	-

The student performance in rural and urban schools was also examined by the medium of instruction in the schools: Hindi and Urdu. This revealed that

- In Hindi medium schools, performance levels in rural and urban schools are similar in most classes and subjects. Hindi medium students in urban areas have meaningfully higher performance levels in Class 7 Language and Class 5 Maths

- In Urdu medium schools, mixed trends are observed. In class 3, rural school students have meaningfully higher performance levels than urban students. In Class 5 Language and Maths and Class 7 Language however, urban school students have meaningfully higher levels of performance.

Just as differences in performance are highlighted in urdu medium schools, peformance of students of different social categories was walso examined by location of the schools. This reveals that

- In most classes and subjects, rural and urban students of different social categories perform similarly

  o Meaningful differences between SC students of rural and urban schools is observed in Class 5 Maths and Class 7 Language, where the urban student perform better.
  o Similarly, urban OBC students also have higher performance levels than rural OBC students in Class 5, and in Class 7 Language.
  o ST students in rural areas perform better than urban ST students in Class 3, but in Class 7 Language, the trend seems to be reversed, with urban ST students performing better.

Head	GEN	SC	ST	OBC	OTH
Rural schools have higher performance levels than urban schools with SMALL effect size			Class 3 Language Class 3 Maths		
Urban schools have higher performance levels than Rural schools with SMALL effect size	Class 7 Language	Class 5 Maths Class 7 Language	Class 7 Language	Class 5 Language Class 5 Maths Class 7 Language	

To understand the variations in student performance of rural and urban schools across the districts of the state, we examined these levels at the district level for each class and subject. The visualization below presents the analysis by district.

- In Begusarai, Katihar, Kishanganj, Muzzafarpur, Nawada and Sheohar, rural students have meaningfully higher performance levels in most classes and subjects. In Katihar (all classes) performances have large differences.

- In most other districts (with the exception of Saran where both rural and urban students perform at par) urban students perform better than rural students, with meaningful differences. These differences by class and subject are presented below.

Region	3L	3M	5L	5M	7L	7M
ARARIA	Urban	Urban	Urban	Urban	Urban	Urban
ARWAL	Urban	Urban	Urban	Urban	Urban	Urban
AURANGABAD	Urban	Urban				
BANKA	Urban	Urban	Urban	Urban		
BEGUSARAI	Rural	Rural	Rural	Rural	Rural	Rural
BHAGALPUR	Urban	Urban				
BHOJPUR					Rural	Rural
BUXAR		Urban	Urban	Urban	Urban	Urban
DARBHANGA	Urban	Urban	Urban	Urban	Urban	
GAYA	Urban		Urban	Urban	Urban	Urban
GOPALGANJ			Urban	Urban	Urban	
JAMUI			Urban	Urban	Urban	Urban
JEHANABAD	Urban				Rural	Rural
KAIMUR	Urban		Urban		Urban	Rural
KATIHAR	Rural	Rural	Rural	Rural	Rural	Rural
KHAGARIA	Urban	Urban	Urban	Urban	Urban	Urban
KISHANGANJ	Rural	Rural			Rural	Rural
LAKHISARAI	Urban		Urban	Urban	Urban	Urban
MADHEPURA	Urban	Urban			Urban	
MADHUBANI	Urban	Urban	Urban	Urban	Urban	Urban

Region	3L	3M	5L	5M	7L	7M
MUNGER			Urban	Urban	Urban	Urban
MUZAFFARPUR	Rural	Rural	Rural	Rural	Rural	Rural
NALANDA			Urban	Urban	Urban	Urban
NAWADA			Rural	Rural		Rural
PASHCHIM CHAMPARAN			Urban		Rural	Rural
PATNA	Urban		Urban	Urban	Urban	Urban
PURBA CHAMPARAN	Urban		Urban	Urban		
PURNIA	Urban	Urban	Urban	Urban	Urban	Urban
ROHTAS					Urban	Urban
SAHARSA			Urban	Urban	Urban	
SAMASTIPUR		Rural	Rural		Urban	
SARAN						
SHEIKHPURA					Urban	Urban
SHEOHAR	Rural	Rural	Rural	Rural		
SITAMARHI	Rural	Rural	Urban	Rural		
SIWAN	Urban	Urban	Urban	Urban	Urban	
SUPAUL	Urban	Urban	Urban	Urban		
VAISHALI	Urban	Urban	Urban		Urban	

Rural	Rural schools performing better than urban schools with Small effect size
Rural	Rural schools performing better than urban schools with Medium effect size
Rural	Rural schools performing better than urban schools with Large effect size
	Rural and Urban schools performing at par
Urban	Urban schools performing better than Rural schools with Small effect size
Urban	Urban schools performing better than Rural schools with Medium effect size
Urban	Urban schools performing better than Rural schools with Large effect size

5.5. Performance of social categories

As a part of the assessment, the details of social categories were collected from every student tested. In order to understand if there are any differences between students from different social categories, we analysed this data at state and district level. The average performance levels of students from these categories were compared against the overall average of the state or district. An understanding of variations in learning outcomes by social category can help in directing policy interventions to assist students who are particularly vulnerable or weak in different areas of the state.

The analysis by social category revealed that

- **At the state level, no meaningful differences are observed in the performance of the General, SC, ST, OBC categories vis a vis the overall state average.** An illustration of the performance in Class 5 Language and Maths assessments is given below. Other class-subject performance levels also show the same trend and are given in the appendix.

Performance by Social Categories - Class 5 Language

Performance by Social Categories - Class 5 Maths

- When the data was disaggregated by the medium of instruction, it is observed that students of different social categories perform similarly in Hindi medium schools across classes and subjects. In Urdu Medium schools, GEN, SC, OTH and OBC categories perform similarly. ST students perform meaningfully lower than the state average in all classes and subjects. This difference is small based on the Cohen's d criterion.
- In Urban schools of the state, GEN, SC, OBC and OTH categories perform similarly in all classes and subjects. ST students perform meaningfully lower (small effect size) than the average in both subjects in Classes 3 and 5.
- General Category students perform meaningfully better (small effect size) than the average in Class 7 Language in Hindi medium schools, and in rural schools of the state.

The student performance by social category was also examined at district level. For illustration, the district level performance levels for Class 5 Language are given below. The tables for the other classes and subjects is given are the appendix. The trends across classes and subjects is similar.

CLASS 5 LANGUAGE					
Dist	GEN	SC	ST	OBC	OTH
ARARIA			↑		↑
ARWAL					
AURANGABAD			↓		
BANKA	↑				
BEGUSARAI			↓		
BHAGALPUR					
BHOJPUR			↓		
BUXAR			↓		
DARBHANGA					
GAYA					
GOPALGANJ					
JAMUI					
JEHANABAD	↑		↓		
KAIMUR					
KATIHAR			↓		
KHAGARIA		↓	↓		
KISHANGANJ			↑		
LAKHISARAI			↑		
MADHEPURA					
MADHUBANI			↓		

CLASS 5 LANGUAGE					
Dist	GEN	SC	ST	OBC	OTH
MUNGER	↑				
MUZAFFARPUR	↑	↓	↑		↑
NALANDA			↓		↑
NAWADA					
PASHCHIM CHAMPARAN	↑				
PATNA			↓		
PURBA CHAMPARAN			↓		
PURNIA	↓	↓	↑		↑
ROHTAS		↓			↑
SAHARSA			↓		
SAMASTIPUR			↑		
SARAN	↑	↓	↑		
SHEIKHPURA	↑		↓		
SHEOHAR			↓		
SITAMARHI	↑	↑			↑
SIWAN					
SUPAUL					↑
VAISHALI					
↑	Performance above district average with small effect size				
	Performance at par with district average				
↓	Performance below district average with small effect size				

- General category students perform meaningfully better than the district average in 8 districts.
- Scheduled Caste Students perform meaningfully lower than the district average in 5 districts, Scheduled tribes in 14 districts.

Conclusion

The differences across the state based on region, and socioeconomic profiles can aid the state in implementing targeted programmes for the lower performing regions or profiles. The differences between boys and girls can be addressed through community mobilization and academic mentorship for the girl students in areas where they perform lower. Similarly, specific action for rural government schools, with stronger academic training and support can be implemented.

6. INFLUENCE OF BACKGROUND FACTORS ON LEARNING

6.1. Student Questionnaire

The Student Background Questionnaire (SBQ) which collects the information about age, socio-economic status, perception of school, reading habits, Student's self perception etc. Each class paper has student questionnaire at the end. Student Background Questionnaire has 11 questions which are same across classes. The objective of collecting the student background information is to see what are other factors which are associated with students' performance. Visual tools and Statistical techniques were used to analyze the data from the Student Questionnaire so as to see the effect (if any) of these background factors on the performance of students.

6.2. Socio-Economic Background

SBQ has three questions to get information about the Socio-Economic Status (SES) of the students. First question was related to vehicle used as home (cycle - 1, scooter - 2, both cycle and scooter – 3). Second question was capturing data on electronic media at home (none - 0, radio - 1, television - 2, both radio and television - 3) and third and last question in this section was aimed to gather information about type of cooking fuels used at home. (firewood - 0, kerosene - 1, cooking gas - 2). Students responses were captured in A/B/C/D format which were further converted into values.

Composite Score vs. Socio Economic Status

Legend:
- No vehicle, No electronic media Firwood
- Cycle/Scooter, Radio/TV, Kerosene
- Cycle & Scooter, Radio & TV, Gas
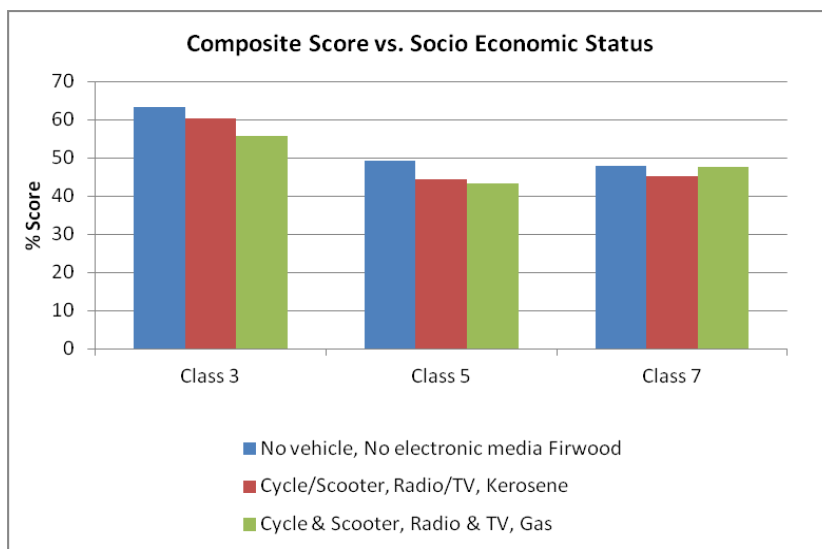
As shown below student economic background factors were categorized in three different categories. One is no vehicle, no electronic media and use of firewood for cooking, second category was either any one vehicle at home, any one electronic media at home and kerosene stove for cooking food. The third category includes more than 1 vehicle, electronic media and LPG gas. For the purpose of the analysis of background factors, a composite score was calculated for each student. The composite score is the average of the student's scores in all the subjects which were taken by the student.

It has been observed that in Class 3 and 5, students state that have basic economic amenities like vehicles, cooking gas and radio/television at home performed better than(>5%) those who state that they have these amenities at their homes. While in Class 7 students who don't have basic economic amenities as well as students who state that they have these amenities performed similarly.

6.3. Student's Perception of School

Students were asked to tell how they perceive school education. As seen in below graphs, students who claim that school as fun and useful for learning and getting jobs score higher compared to their counterparts who claim that school is boring and not useful across three classes. However students who claim that school is fun and helpful in getting job performed similar to the category of students who found school fun and helpful in learning new things. Furthermore in 12%-14% students across classes claim that school is not useful, and 70% -75% students claimed that school is useful across classes. The students were asked their opinion of school – whether they feel it is boring and not useful, fun but not useful etc. The student responses to this question against the student scores are shown in the graph.

Composite Score vs. Perception of School
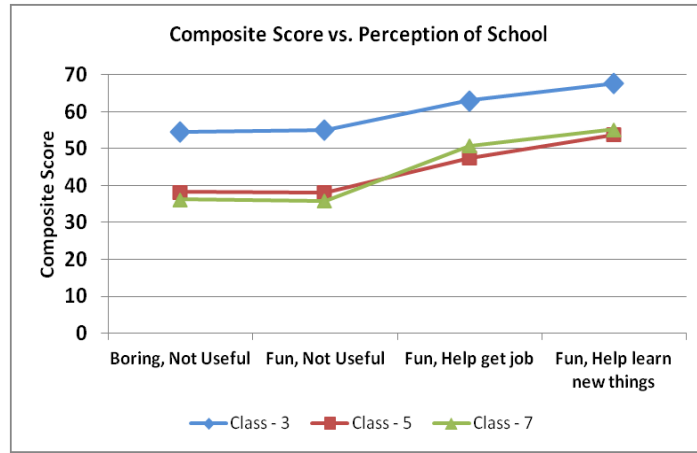
6.4. Tuitions

For Maths and Hindi Class 3 & 5, students who claim that they take tuitions on both Maths and English score marginally higher than the students (>3%) who claim that they don't take any tuition or take tuition for any one subject. There is no clear difference in the performance of all three categories. While in 7 Maths and Hindi, students who claim that they take tuitions on both Maths and English score significantly higher than their counterparts who claim that they don't take tuitions or take tuition for any one subject.
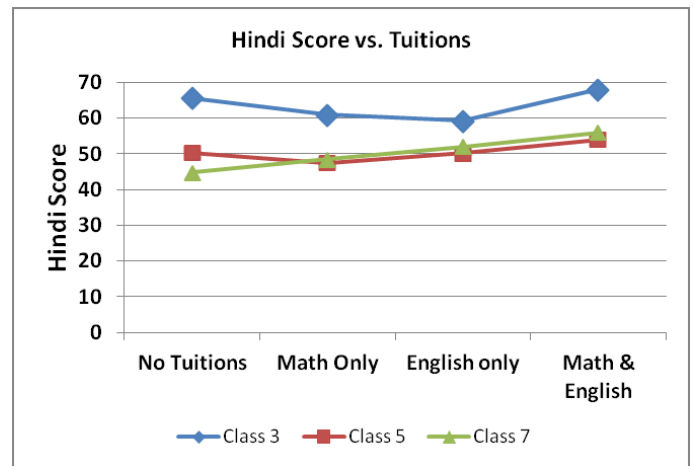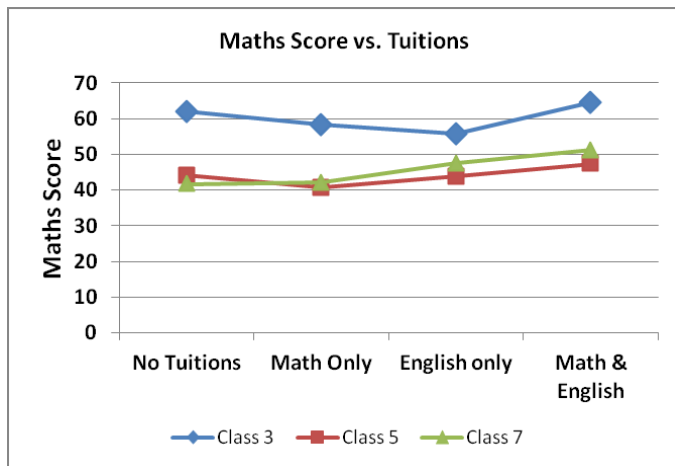
The plots below show the proportions of students who claim that they go for tuitions in Class – 3, Class 5 and Class – 7. At the Class – 3 level, about 28% of the students claim that they do not go for tuitions. In Class 5 and Class 7   the proportion of students who claim that they don't go for tuitions falls to 18% and 14% respectively.

Student Proportions vs. Tuitions
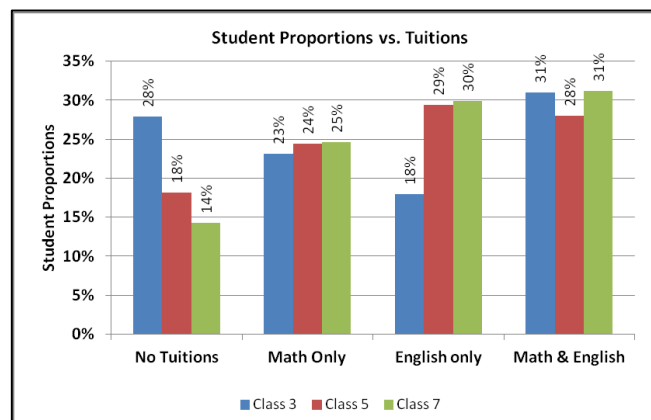
6.5. Reading Habits

Reading habits seem to be associated with student performance in higher classes.

- For Class – 3, there is no clear relationship between the scores of students who claim that they don't read at all or who read 30 minutes or more than an hour
- In Class 5, Students who claim that they spend more than an hour daily on reading performed marginally higher (>5%) than other students who claim that they don't read books at all or read for lesser time
- In Class 7, students who claim that they read for more than an hour performed significantly better than students who don't read books at all or read for lesser time

For Class – 3 the proportion of students who claim that they do not read at all or read less than 30 min or read between 30 min to 1 hour or read more than 1hour is similar 22% to 29%. However for Class – 5 and Class -7, the proportion of students who claim that they do not read at all drops to 21% and 14%, and the proportions of the students who read has gone up for all the different reading durations to 37% in Class 5 and 47% in Class 7.
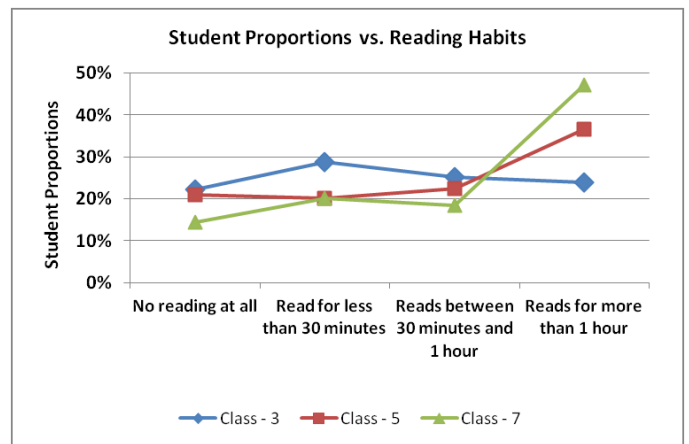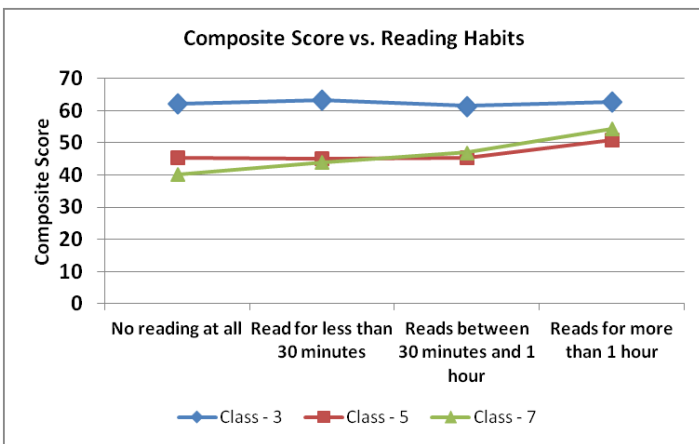
6.6. Student's Perception of Themselves

Information how students feel about them was also collected through student questionnaire. For all three Classes 3, 5 & 7 we see the same trend. The students who consider themselves not good at studies show the lowest performance across classes. In Class 3, students who consider themselves above average performed slightly better than students who are in top 10 and in top 5. In Classes 5 & 7, students perceive themselves in top 5 performed significantly better than students who consider themselves above average or in the Top 10.

The proportion of students who consider themselves not good at studies is 17% in Class – 3. This number drops to 14% in Class – 5 and 12% in Class - 7. Similarly the proportion of students who consider themselves Top 5, has gone up from 28% in Class – 3 to 37% in Class – 5 and 37% in Class 7.
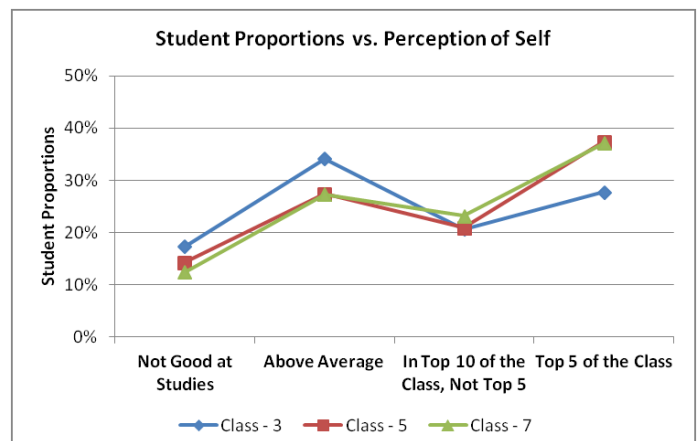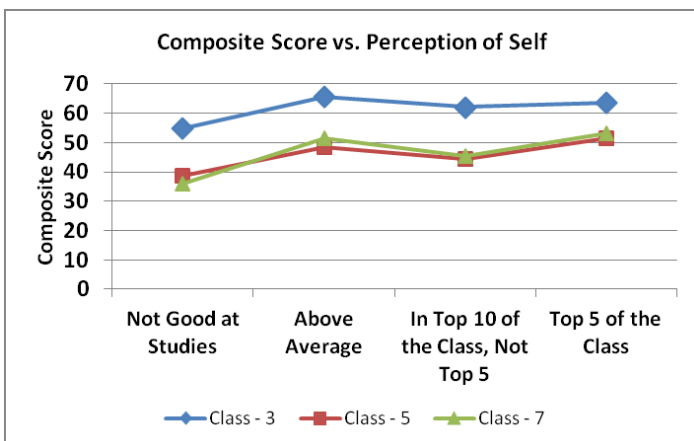
7. RECOMMENDATIONS

Improvement in educational quality is a process, not an event. One or a small group of assessments or other initiatives will not by themselves produce the results. However, we believe that assessments provide a very powerful framework for initiating and sustaining such improvement and measuring the quantum of change when compared to initial days. We believe that recommendations from the assessments if implemented well and regularly, will create a culture of empowerment, scientific approach, peer learning, accountability and transparency.

The recommendations suggested below are mainly state-level recommendations for the BEPC, SCERT, the Board and other State Officers to bring about an overall improvement in student learning across the state through directed mechanisms to address gaps in learning, skills and competencies. We have also acknowledged the importance of a bottoms-up approach in bringing about learning improvement with actionable feedback. Our recommendations are provided below.

1. **Aggressively disseminate findings of this study**: We recommend that a systemic and detailed plan be made to disseminate this report, giving every officer, researcher and teacher an opportunity to see it, understand and even question in discussion mode. The purpose of this is multi-fold: 1) initiate the 'rote' versus 'learning with understanding' debate within Bihar. 2) get teachers to start thinking about 'what are children learning and not learning' rather than just focusing on 'what are we teaching, how we teach and when to teach what'. Teachers' responses and feedback should also be sought and compiled and published. 3) Enable teachers to understand and utilize the findings of this assessment, such as strong, and weak areas, high and low performing questions and misconceptions. **Understanding what kind of conceptual difficulties students have is the first step for targeted effective remedial action in the classrooms.**

2. **The report reveals that student performance has been low across classes in Reading Comprehension, indicating that the students are struggling with reading and require practice and concerted efforts to improve reading skills. We recommend a targeted Programme and Campaign** to build the habit of 'reading with comprehension' to address weak reading skills. Research points out that if proficient reading is not acquired at lower classes, this leads to the student lagging behind in all subjects as he or she moves to higher classes. The following actions could help to improve students' reading comprehension skills:
   - Institute a state-wide campaign to improve reading levels and ensure every child can read fluently by class 3 or 4
   - Centre for Reading Research under the Science of Learning Institute (detailed in point 4 below)
   - Specialised training programmes for teachers on reading skill development and measurement
   - Research and tracking reading outcomes for Students using Technology – A Reading Test on Tablets
   - ICT-based Student Remedial Programme for improving reading (detailed in point 3)

3. **To address the low student performance in conceptual questions, and misconceptions, we recommend the use of a student remedial program**. EI has created a personalized learning system called **Mindspark,** which is a computer based program. Mindspark was created by EI to systematically help students overcome misconceptions and thus improve the quality of their learning. Mindspark is complementary to the teacher and is an unobtrusive professional development tool for the teachers themselves. The program is contextualized to the child's environment. The Language and Math content is in Hindi Language (in Math children have an option of splitting the screen and seeing the same question in English). There is also a small component of English as a Second Language (ESL) that is designed to familiarize kids with the basic words and phrases in English. All the content is designed to help children learn with understanding - rather than simply checking for procedural fluency or recall.

Mindspark has been identified as a tool for improvement in students across score bands, and in questions of varying difficulty. The Hindi version of Mindspark has been accessible to low income communities within South Delhi for close to 3 years through 5 remedial centres. It has also been piloted successfully inside a government school with the DoE of North Delhi. The same can be used in Bihar. The Gujarati version of Mindspark is being used in 18 Gujarati medium schools and the Hindi version in 3 Hindi medium schools in Gujarat with the support of UNMCT (Torrent). We recommend the use of Mindspark in Government Elementary Schools in Bihar – both in urban and rural areas. The picture below shows a Mindspark Centre inside a low-income school with Mindspark embedded in the school's time table. In this case the class/subject teacher accompanies the students.

The teachers will also have access to misconception videos of their subject and topics, which will help them, identify the areas where focus should be given on during instruction and remediation.

4. A common and obvious remedy to system-wide learning gaps is to focus on 'capacity building' which normally refers to building capacities of teachers and others involved in the system. Often, good ideas (for example, classroom assessments like Continuous and Comprehensive Evaluation) are implemented poorly because functionaries on the ground lack capacity.

However, what is ignored is that people's capacity can be built only on existing Institutional Capacity which, in turn, has to be built based on Systemic Capacity. **People's capacity building cannot happen without Systemic and Institutional Capacity:**

Systemic capacity means a *body of knowledge* that people can refer to and develop expertise in, for example in fields like 'pre-reading skills' or 'misconceptions in learning subtraction' which relate to the ground level challenges and will help improve learning levels. While a lot of ground experience exists in these areas, these need to be *shared*, supplemented by rigorous research and consolidated into a 'body of knowledge'. **This 'body of knowledge' will then drive textbooks and material preparation, teacher training and assessments.**

<u>Build systemic and institutional capacity by establishing a 'Science of Learning' Centre</u>- The focus of the Science of Learning Centre would be to create the 'body of knowledge' which will then drive textbooks and material preparation, teacher training and assessments as mentioned above. The best individuals from the state (and from outside) should be identified and given the goal of building such a body of knowledge in a phased manner. They should be supported adequately through training and exposure to different international models to take this initiative ahead.

5. **Information from the Census Baseline, and Midline assessments as well as the Diagnostic assessments should be utilized for student improvements in learning. This can be done by** <u>**Implementing a Student Progress Tracking System.**</u> This should be a learning data management system that sits on a basic data system which has information on every school, teacher and student. The learning data management system would track Student Progress with time (or possibly for schools or regions initially).

   Accessing information on learning levels including from multiple studies and surveys should be possible with an understanding of the caveats involved. Such a system would help administrators, curriculum experts and teacher trainers to take informed decisions. Such a system would also allow better allocation of budgetary resources by focusing spending on areas that need the most attention. This system would allow easy access to information at the needed level- both summarized information is available and one can also drill down to the last level of detail.

6. **Recommendations on capacity building:** Government can conduct a series of question making workshops at the district level. These workshops should focus on learning levels, and conceptual understanding. The value of learning assessments lies in its diagnostic nature, of identifying strengths and weaknesses. The quality of questions in such assessments is therefore of critical importance, and these questions should assess learning beyond rote to test conceptual understanding, else there is a risk that wrongly designed assessments will show an incorrect picture of learning levels. Such workshops can build teacher skills in making conceptual questions that check learning with understanding. This will result in a directed focus on the concepts in the classroom where low learning levels have been identified. The teachers will be equipped to understand and detect learning gaps and can work on these identified learning gaps in classrooms. Such focused and classroom level action can transform school education in the state.

7. **Board Exam Reform:** In a football match, everyone runs towards the goal post. Similarly if the Education system puts a lot of effort in measuring and improving quality at the primary level and upper primary level for better learning levels, but does not change what is being asked in the exams in 10th and 12th grade then it

may not result in sustained progress. As children move up the grades and start preparing for board exams, they limit themselves to the kind of questions asked in such exams, attend tuition classes and refer to practice books on such type of questions. There is an urgent need to improve board exams by asking questions which check for understanding. This will discourage students to memorize and rote learn the answers based on historical tests or practice questions given in the textbooks. This will fundamentally change the focus from what needs to be learned to perform better in board exams to conceptual understanding which would enable to do well on any competency test. This shift can be made by equipping teachers to make better questions through question making workshops and changing the goal post by asking conceptual questions. This will lead to focus on learning with understanding at both the level of the student and teacher.

8. **Impact Evaluation:** Bihar has undertaken a series of initiatives to improve the quality of education in the state such as Worksheets for Grade 1 and 2, and co-scholastic sports initiatives like Tarang. In order to essentially know which one of these initiatives enable students to perform better and improve learning outcomes, it is recommended that as part of the annual assessment, Bihar also analyses which one of these interventions is contributing more to student learning. Ideally such impact evaluations should be designed to check if the impact is proportional to the quantum of effort and time spent on it before it is scaled up for the entire state along with documentation of implementation challenges. This will help in understanding if the intervention would really work to improve student learning outcomes when it is scaled to entire state.

9. **Stakeholder Awareness on Learning Achievement:** There needs to be greater awareness among stakeholders like students, parents, teachers and officials in the Bihar education system about student learning assessments. This will help stakeholders to reap benefits from learning achievement tests by addressing the learning gaps identified to improve learning. For example, the study shows that the reading comprehension is a problem at primary level. To address this, parents can be encouraged to make their children to read newspaper in front of them. Application of Maths in daily life can be encouraged at home by making children transact at local markets. Once the awareness for better learning outcomes among various stakeholders especially parents improves gradually, the demand for quality education will also increase.

8. TEST ADMINISTRATION

The teacher-led midline self-assessment was conducted to ascertain the learning levels of classes 3, 5 and 7 students, spread awareness about the focus on learning outcomes, and understand learning difficulties to identify solutions for the gaps at the school level. With all these objectives, tests were conducted in all government schools of Bihar on 22nd September 2014 for Language and Maths in class 3, class 5 and class 7. To conduct these tests efficiently BEPC had planned and executed the test conduction with support from EI.

The following sages were followed in executing test conduction:

1. **Quantity of Test Material Sent to Schools:** The material to be printed, packed and sent to districts was calculated based on the number of students in each class at the state and district level from DISE data. For each school to be tested, the number of test packets needed was calculated and packed in round figures of 5, 10, 15, 30, 50 and 100. These numbers were calculated by EI based on the DISE data provided by BEPC. These numbers helped BEPC team to give the exact numbers for printing and packing for each school.

2. **Material for Test Conduction:** Each school was provided with the test material to conduct the test properly:
   - Test Papers for Language and Math and Student Questionnaires for classes 3, 5 and 7
   - Score Card Language and Maths for teachers to code the student responses in class 3. There was no scorecard for class 5 and class 7 as all questions in class 5 and class 7 were MCQ.
   - One answer sheet for each student was provided.
   - One School Information Schedule (SIS) was provided, where the information about the school as well school teachers was to be filled by the head teacher
   - Evaluator Manual explaining how the test is to be conducted in the school. For each school, 3 such manuals were provided.
   - Attendance sheets for taking attendance for each student appearing in the test were provided for each class.
   - Hindi test paper was translated in Urdu and was provided specially to Urdu medium school.

3. **Tools for Training:** Specially designed tools and response sheets were developed for the master training. These tools were designed to give the participants practice on how to read the questions, types of questions which are expected to test papers and coding practice. The tools provided for training were question papers for class 3, class 5 and class 7, scorecards for class 3, response sheets and the evaluator manual.

4. **Training for test conduction**: Trainings were planned and provided in each district, block and cluster resource centre to ensure that the test conduction happens in a standardised manner. In the trainings participants were informed that
   a. This test is not a test of the poor performing school or children, the results of the school will not affect the principal, teachers or students in any way.
   b. The test aims to understand the strengths and weaknesses of students to understand learning gaps and highlight areas of improvement.
   c. Schools adopting methods to inflate scores will be identified from the data, all were asked to conduct this test in a fair manner as per the directions given.

With this the training was conducted at following levels:

- **Training of Master Trainers at State Level** – To ensure that testing happens in a standardised and planned manner, a training for master trainers was organised on 14.07.2014 and 15.07.2014 at BEPC Patna by resource persons from Educational Initiatives. In this training, 2 participants each from 38 districts participated. The training provided detailed instructions on how the test is to be conducted, how to provide training at district level and the roles and responsibility of master trainers. To maintain the authenticity of the main test, specially designed test papers just for training were used.

  Similar Training were provided to BEO/BRP/CRC at district level, Head Teachers at Block level and training of teachers at cluster level. These trainings were to ensure that the BEOs, BRPs and CRCs were able to conduct similar trainings at the block level and cluster level. The training tools were same as used in the master training. training was provided to ensure that the tests were conducted as per instructions and planned properly in the schools. In addition to it a presentation in Hindi was also provided. Especially at cluster level another round of training was provided from 01.09.14 to 15.09.14 for revision of the test conduction process. Below table shows the details of trainings provided

Training Provided by	Training Provided to	Level	Training days	Number of trainings provided	Dates
EI Resource Team	Master Trainers	State Level	1	2 per state	14 to 15 July 2014
Master Trainers	BEO/BRP/CRC	District Level	1	1 per district	17 to 22 July 2014
BEO/BRP/CRC	Head Teachers	Block Level	1	1 per block	14 to 28th July 2014
CRCs	Teachers	Cluster level	1	2 per CRC	01 to 15 August 2014; 01 to 15 September

5. **Test Paper Printing and distribution:** The tools were sent for printing on 20.06.14 by BEPC to Bihar State Textbook Publication Corporation (BSTPC) for printing. The tools sent for printing were Test papers, answer sheets, SIS, Evaluator Manual and attendance sheet. The printed material was packed in bundles of 5,10, 20 and 50 and sent to block and districts with the help of BSTPC by 31.08.14. BEO and CRC distributed these to schools by 19.09.14. Packets sent were sealed and opened only on the day of testing.

6. **Test Conduction** – On 22.09.14 all primary and upper primary schools of Bihar appeared in the test. Students of classes 3, 5 and 7 participated in Teacher Led Self Assessment.

Date of test	Number of students appeared in the test			Number of schools participated
	Class 3	Class 5	Class 7	
22.09.2014	21,50,472	21,35,807	16,49,561	72,031

During the test conduction, the schools were visited by BEPC officials/EFE Coordinators/BEO/BRCc/CRCs to help schools conduct the test and clear doubts. A helpline number was provided to the schools, so that they can call and ask doubts. Queries about SIS, Evaluator Codes, Scorecards and doubts in answer sheets were asked on helpline on the test date.

7. **Field Monitoring by BEPC** – As per the directions of state project director, officials from BEPC at district and block visited schools extensively on the day of the testing i.e. 22nd September 2014. The officials reached

in districts on 21st September 2014 to oversee the test preparation in districts. Quality of testing was monitored based on the format and evaluator manual provided by BEPC to its officials.

8. **Sending the answer sheets back for data entry** – Once the test was completed, response sheets for each of the class 3 students was filled based on the score card and student responses. For class 5 and class 7 answers were marked by student themselves. Then from all the blocks the material was sent to districts for data entry.

9. **Data entry of number of students appeared in the test** – As soon as the test was completed, all districts across state entered the number of students appeared for the test against enrolled number of students.

10. **Data Entry System:** A census study requires coordination and management of a large number of schools, students, papers and manpower. To manage this efficiently, an online software application for the entry of student's responses a data entry system was developed. The data was entered in the system at the district level by specially appointed data entry operators. The System has the following features:

    1. Each user has a login ID and password to access the system.
    2. Data entry can be done at block level, and multiple users can enter the data for the same block.
    3. System can work online (with internet) as well as offline (without internet).
    4. Data is not lost even if system restarts while the data entry is in progress.
    5. School reports and district reports are be available online.
    6. System has an ability to store data for more than one year of testing.

Training of MIS team on Data Entry Software

Two trainings of one day each, along with a system demo was provided by EI team. During the training, each person was provided with a manual with detailed instructions. The manual is given in the appendix.

Weblink for data entry

The data entry system developed was made live and link was provided to BEPC team for data entry. The server was hosted on amazon cloud for faster speed and quick access.
http:///54.251.245.119bihar_assessment/bhr_login.html.
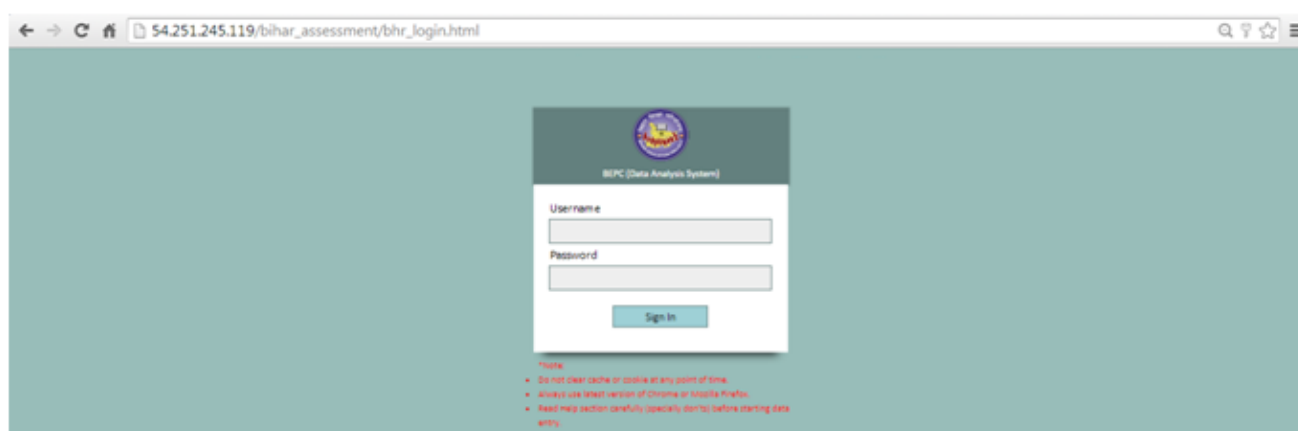
Field Visits by EI to Understand Ground Realities

The team noticed that several time lags had occurred in the data entry process. To understand the causes for these delays, EI team visited data entry centers. Based on the visits following steps were taken

1. Understanding and development of **keyboard based entry** in addition to mouse based entry in the system. This helped in increasing the speed of data entry from 35,000 records to 55,000 records per day at the state level.

2. The data entry manual was updated, with a **video on keyboard based entry**. The video was viewed more than 1000 times within a week. (https://www.youtube.com/watch?v=qjgwc6pZXRo). The image below shows the data entry screenshot from YouTube Video.

3. At block and district level, the lack of professional data entry vendors was a challenge. Such **districts had to send the material for data entry to Patna**.

4. Regular Field Visits by EI to monitor and support data entry continued from the start till end of data entry.

11. **Data cleaning** – As part of data cleaning the following was done:
    a. Duplicate records - If by mistake, the same student records had been uploaded in the system , these records were considered to be duplicate when all the data matched 100%. In this case, one of the records was removed automatically by the the system each night.

b. Students only with SQ data and no data for Math and Language: Districts where these instances were more than 5% were reported to BEPC for necessary action and data correction. Data entry corrections were made by the districts.

Possible Cases of Assistance in Testing

As part of our analysis procedures, we checked the assessment data of each school to make sure that testing happened in similar conditions in all the schools. To check the possibility of assistance, we used certain mathematical and statistical metrics which indicate if all the students in the class have similar scores and if their response patterns on individual questions are identical or not.

Based on these cases a total of 9253 schools out of 62368 schools have been removed from the assessment data across all the classes based on this. The school list was shared with BEPC separately. Such instances are not unusual in large scale assessments, and through continued emphasis on the low stakes nature of the assessment, and also pointing out that we are able to detect cases of assistance, we should be able to discourage and minimize further occurrence.

A school was only removed from the assessment data when such instances were 50% or higher of the total class-subject combinations(e.g. in a school with classes 3, 5 and 7 where there are 6 class-subject combinations, a school was removed only if there were 3 or more cases of possible assistance detected.)

Spread of schools dropped at district level: The schools dropped were further analysed at the district level. Based on table below, districts like Sitamarhi, Saran, Araria, Supaul, Rohtash, Purnia, Nalanda and Nalanda have more than 500 schools getting dropped.

District	Total Dropped	Total Schools	% of schools dropped	District	Total Dropped	Total Schools	% of schools dropped
State Level	9,253	62,368	14.8				
Sitamarhi	1,682	2,015	83.5	Buxar	51	1,141	4.5
Araria	968	1,764	54.9	Jehanabad	32	799	4.0
Supaul	813	1,575	51.6	Purba Champaran	115	2,917	3.9
Saran	1,007	2,498	40.3	Siwan	61	1,745	3.5
Rohtas	718	2,021	35.5	Lakhisarai	25	727	3.4
Purnia	700	2,049	34.2	Sheikhpura	8	240	3.3
Nalanda	690	2,120	32.5	Begusarai	45	1,375	3.3
Samastipur	596	2,274	26.2	Madhepura	45	1,379	3.3
Saharsa	183	9,68	18.9	Sheohar	11	370	3.0
Nawada	285	1,686	16.9	Jamui	30	1,163	2.6
Kaimur	102	1,199	8.5	Kishanganj	24	948	2.5
Vaishali	145	2,053	7.1	Arwal	11	436	2.5
Khagaria	51	732	7.0	Bhojpur	30	1,353	2.2
Darbhanga	97	1,647	5.9	Pashchim Champaran	52	2,518	2.1
Katihar	97	1,648	5.9	Munger	15	1,054	1.4
Patna	182	3,285	5.5	Banka	15	1,972	0.8
Gopalganj	94	1,706	5.5	Bhagalpur	13	1,747	0.7
Gaya	155	2,981	5.2	Muzaffarpur	16	2,761	0.6
Aurangabad	80	1,656	4.8	Madhubani	9	1,846	0.5

Example of schools dropped from the analysis:

To check the possibility of assistance, we used certain mathematical and statistical metrics which indicate if all the students in the class have similar scores and if their response patterns on individual questions are identical or not. This check was carried out for all the classes tested in the school for both Hindi and Maths. So for example if class 3 and class 5 were tested in a school then we checked all the 4 cases separately-

1. Class 3 Language
2. Class 3 Maths
3. Class 5 Language
4. Class 5 Maths

A school was only removed from the assessment data when at least 2 instances of possible assistance were found. This ensures accuracy of the data and the findings for the state. (e.g. Class 3 Language and Class 5 Language)

Example 1: Image showing similar student responses: We have selected a classroom with 31 students with average performance of 89 but when looked for the individual performance of students. It is interesting to note that in Question 22 and Question 3 all students giving same wrong answer. In Question 17, 16, 14 and 15, 50% students have answered these questions incorrectly have chosen exactly same wrong answer. So there is high probability of assistance provided to students in the schools during the test. Schools with cases were removed from the data before analysis.

Cheating Analysis (Bihar Midline) class 3 (School Code: X, questions arranged easy to difficult)

S. No.	Name	Gender	21	22	23	25	24	28	26	27	13	17	8	1	4	2	3	5	7	11	9	12	6	10	16	14	20	18	19	15
1	AANAND KUMAR	B	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C
2	PRINCE KUMAR	B	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C
3	MITHLA KUMAR	B	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C
4	GUDDU KUMAR	B	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C
5	LALIT KUMAR	B	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C
6	BECHAN KUMAR	B	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C
7	TRIVENDRA KUMAR	B	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C
8	BABAN KUMAR	B	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C
9	PUJA KUMAR	B	01	21	01	01	01	01	01	01	B	A	B	C	D	C	A	D	D	B	B	C	C	A	B	D	A	B	C	B
10	CHHOTI KUMARI	G	01	21	01	01	01	01	01	01	B	A	B	C	D	C	A	D	D	B	B	C	C	A	B	D	A	B	C	B
11	SHIVANI KUMARI	G	01	21	01	01	01	01	01	01	B	A	B	C	D	C	A	D	D	B	B	C	C	A	B	D	A	B	C	B
12	RAVINA KUMARI	G	01	21	01	01	01	01	01	01	B	A	B	C	D	C	A	D	D	B	B	C	C	A	B	D	A	B	C	B
13	NARENDRA KUMAR	B	01	21	01	01	01	01	01	01	B	A	B	C	D	C	A	D	D	B	B	C	C	A	B	D	A	B	C	B
14	NISHU KUMAR	B	01	21	01	01	01	01	01	01	B	A	B	C	D	C	A	D	D	B	B	C	C	A	B	D	A	B	C	B
15	SUMAN KUMAR	B	01	21	01	01	01	01	01	01	B	A	B	C	D	C	A	D	D	B	B	C	C	A	B	D	A	B	C	B
16	CHANDNI KUMARI	G	01	21	01	01	01	01	01	01	B	A	B	C	D	C	A	D	D	B	B	C	C	A	B	D	A	B	C	B
17	SITARA KUMARI	G	01	21	01	01	01	01	01	01	B	A	B	C	D	C	A	D	D	B	B	C	C	A	B	D	A	B	C	B
18	PAPPU KUMAR	B	01	21	01	01	01	01	01	01	B	A	B	C	D	C	A	D	D	B	B	C	C	A	B	D	A	B	C	B
19	SHILA KUMARI	G	01	21	01	01	01	01	01	01	B	A	B	C	D	C	A	D	D	B	B	C	C	A	B	D	A	B	C	B
20	MOTOLAL KUMAR	B	01	21	01	01	01	01	01	01	B	A	B	C	D	C	A	D	D	B	B	C	C	A	B	D	A	B	C	B
21	SARITA KUMARI	G	01	21	01	01	01	01	01	01	B	A	B	C	D	C	A	D	D	B	B	C	C	A	B	D	A	B	C	B
22	RAUSHAN KUMAR	B	01	21	01	01	01	01	01	01	B	A	B	C	D	C	A	D	D	B	B	C	C	A	B	D	A	B	C	B
23	SUDHIR KUMAR	B	01	21	01	01	01	01	01	01	B	A	B	C	D	C	A	D	D	B	B	C	C	A	B	D	A	B	C	B
24	JYOTI KUMAR	B	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C
25	PINTU KUMAR	B	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C
26	SHILPI KUMARI	G	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C
27	BABLI KUMARI	G	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C
28	MANISHA KUMARI	G	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C
29	PUJA KUMAR	B	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C
30	PUJA KUMAR	B	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C
31	GURI KUMARI	G	01	21	01	01	01	01	01	01	B	D	B	C	D	C	A	D	D	B	B	C	C	A	D	C	A	B	C	C

Note: Column 1 – Student Serial Number; Column 2 – Student name;   Column 3 – Gender; Rest of the columns are questions arranged in easy to difficult performance at the national level; Cells in green are the correct responses, Cells in white are the incorrect responses. Cells showing 01,21 are questions with free responses and cells with A,B,C and D are for question with multiple choice questions.

Example 2: We have selected a classroom with 35 students with average performance of 89.3% but when looked for the individual performance of students. It is interesting to note that all students are responding to all questions in exactly same manner. Schools with cases were removed from the data before analysis.

cheatinganalysis (Bihar Midline) class 3 (School Code: X, questions arranged easy to difficult)

S. No.	Name	Gender	21	22	23	25	24	28	26	27	13	17	8	1	4	2	3	5	7	11	9	12	6	10	16	14	20	18	19	15
1	ANAM PARWEEN	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
2	JEVA KHATOON	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
3	SABA PARWEEN	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
4	TASIN KHATOON	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
5	KHUSHBU KHATOON	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
6	MD DANISH	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
7	MD DANISH	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
8	ROKHASAR	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
9	MD SUFIYAN	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
10	TARANAM ARA	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
11	SHAHID	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
12	MD	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
13	MD KADIR	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
14	GULAFASA KHATOON	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
15	DAKHASA KHATOON	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
16	NAJIM	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
17	ANGOORI KHATOON	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
18	HASEEBA KHATOON	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
19	AJAERI KHATOON	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
20	MURAD	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
21	ANAM PARWEEN	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
22	SHADAB	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
23	MD ADIL	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
24	RAMIJA KHATOON	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
25	NISHAD	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
26	MD ASIF	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
27	FARHAT PARWEEN	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
28	RAUSHANI PARWEEN	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
29	MD NASEEB	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
30	MD NURAIN ASARAF	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
31	ALIYA PAWEEN	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
32	MD AKIB	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
33	NUSRAT PARWEEN	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
34	AFIYA KHATOON	G	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C
35	NUR AFASAD	B	01	01	01	01	01	01	01	01	C	D	B	C	D	C	D	C	D	B	B	C	C	A	C	C	A	B	C	C

Note: Column 1 – Student Serial Number; Column 2 – Student name;   Column 3 – Gender; Rest of the columns are questions arranged in easy to difficult performance at the national level; Cells in green are the correct responses, Cells in white are the incorrect responses. Cells showing 01,21 are questions with free responses and cells with A,B,C and D are for question with multiple choice questions.

APPENDIX

a. APPENDIX A: Effect size

Effect size is a standard metric of expressing the difference in performance between two groups. It indicates the standardised difference between means of two different groups. It is used internationally & well accepted in research and literature. Key points-

1. A way to quantify the performance gaps on a standard scale so that it can be interpreted and understood easily

2. Expressed in terms of Standard Deviation (SD) unit

3. SD should be calculated from the sample which is representative of the entire population

4. Applicable for normal distribution curves only

5. Measuring relative gain:
    $$d = (Mean_{Treatment} - Mean_{Control}) / SD$$

6. Measuring absolute gain:
    $$d = (Mean_{End\ of\ Treatment} - Mean_{Beginning\ of\ Treatment}) / SD$$

The other reason for using the effect size metric is that most research studies and literature in education use this metric to express differences in learning levels or impact of different interventions - this allows us to compare the effect sizes we observe in MSDF supported interventions with numbers we see in other research studies.

What is a significant effect size

In our analysis, we are using **Cohen's d Convention** for small, medium and large effects which is used when comparing averages of two different groups. Cohen's d is calculated by the dividing the difference of means of the two groups by the standard deviation of the reference group. The divisor could also be a combined standard deviation of the two groups together. In that case it will be known as the pooled standard deviation. Since we are always comparing where a group stands in relation to the reference group we decided to use the standard deviation of the reference group. In general we use the standard table below to interpret effect sizes.

Cohen's d	Effect Size
0.2 - 0.5	Small
0.5 - 0.8	Medium
> 0.8	Large

Since cohen's d convention is generic and applicable to wide range of studies we also referred to research literature related to effect sizes which is specifically applicable in the field of education. According to the research in education an effect size of 0.25 to 0.30 SD should be considered significantly large. Find below citations from 2 papers which talk about significant effect size in the field of education-

What Works Clearinghouse: Procedures and Standards Handbook (Version 3.0)

"For the WWC, effect sizes of 0.25 standard deviations or larger are considered to be substantively important. Effect sizes at least this large are interpreted as a qualified positive (or negative) effect, even though they may not reach statistical significance in a given study."

Abhijit Banerjee, Paul Glewwe, Shawn Powers, and Melanie Wasserman. 2013. "Expanding Access and Increasing Student Learning in Post-Primary Education in Developing Countries: A Review of the Evidence" Working Paper. 9 April. - *"In the education literature, a program or policy impact of less than 0.1 standard deviations is typically considered to be a small effect, while more than 0.3 standard deviations is considered a large effect, and 0.5 standard deviations would be a very large effect"*

Mid-line Teacher-Led Student Assessment Bihar 2014

Educational Initiatives Pvt. Ltd.
www.ei-india.com

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सर्व शिक्षा अभियान
सब पढ़ें सब बढ़ें