NAS 2017
National Achievement Survey
CLASS III, V & VIII

National Report to inform Policy, Practices and Teaching Learning
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National Report to inform Policy, Practices and Teaching Learning

NAS 2017
NATIONAL ACHIEVEMENT SURVEY
Class : III, V and VIII
MESSAGE

I am glad to learn that the Technical Report on National Achievement Survey (NAS) based on assessment data conducted for Classes III, V and VIII is being brought out by NCERT. The most salient feature of NAS 2017 was its administration throughout the nation on a single day i.e. 13th November 2017. The data for NAS was collected from 2.2 million students in 1,10,000 schools from 36 States and UTs and Districts. The most significant departure of NAS 2017 was mapping progress in student learning against learning outcomes.

I am sure that the huge data generated in this survey will be fruitfully used in analyzing and understanding the education system of the country in a much better way. Relating learning outcomes with students’ learning will facilitate attainment of 21st century skills. It will also guide education policy, and implementation in a much systematic and coherent manner.

I hope that the report will be useful for policy planners, researchers and all others in understanding students’ learning levels and raising the quality of school education in the country.

I convey my best wishes to the team in this endeavour.

(PRAKASH JAVADEKAR)
MESSAGE

It is a matter of great pleasure to learn that after successfully conducting National Achievement Survey (NAS) throughout the nation on a single day for grades III, V & VIII in November, 2017, the NCERT has now brought out the Technical Report on NAS based on the countrywide data on student assessment.

Thirty six State Learning Reports (SLRs) and 7010 District Report Cards (DRCs) developed by the team to provide immediate interventions for improving the learning outcomes of students followed by a series intervention programmes at the regional, state and district level were added milestones as an epilogue to the NAS.

It is expected that this Technical Report will be useful for educational planners and policy makers including researchers in understanding the interdependence of assessment pedagogical processes and learning outcomes improving the quality of elementary education in the country.

This is a flagship programme of the MHRD in collaboration with NCERT and I wish this endeavour a great success.

(Rina Ray)
NCERT has been conducting National Achievement Survey (NAS) since 2001. It has successfully conducted four cycles for Classes III, V and VIII and two cycles for Class X. The latest NAS, conducted in 2017 for Classes III, V and VIII is based on learning outcomes.

The major objective of conducting NAS is to have a system level reflection on effectiveness of school education in the country. An accurate assessment of the learning outcomes at different stages of school education can provide important insight to inputs made available to the elementary education system that might help in improving the educational health of the system. The performance of students on the different learning outcomes in the different Districts is now available. The data collected and analyzed is summarized in the form of District Reports Card (DRC) that gives an objective overview of learning attainments of students in the District. State Learning Reports (SLRs) as well as DRCs developed for each State/UTs and district respectively were shared with stakeholders so that state/district-specific intervention programmes can be carried out. Regional Consultation workshops were organized on Post NAS Interventions with the purpose to sensitize States/UTs on how to use assessment results for collecting experiences of conducting NAS and develop an understanding of the use of NAS data for pedagogical interventions. These educational transformation workshops helped in gauging the need for developing capacities at State and District level on interpretation and use of assessment data.

This Technical Report on NAS is based on the data collected from approximately 1,10,000 schools, 2,70,000 teachers and 22,00,00 students through tests and questionnaires from 701 districts of 36 States/UTs of the country. It presents systematic process of conducting data starting from development of assessment framework tools development, sampling, data analysis procedures and interpreting survey data.

NCERT is grateful to MHRD, UNICEF, States/UT and District level functionaries for their continued support and cooperation in the conduct of the National Achievement Survey and its further implications in improving the learning process. It is hoped that this report will fill a gap in understanding and analyzing systematically assessment results for improving pedagogical processes, and in turn, the competencies of learners so as to equip young generation with essential competencies for 21st Century.

Professor Hrushikesh Senapaty
Director, NCERT
Merely expanding the education system is not adequate. Though improved enrolment is necessary, but it is not a sufficient condition for progress. Instead, enhanced learning outcomes—in the form of competencies—are a key to bring about quality in education and ensure its sustainability. Acquiring the relevant competencies and skills are fundamental to realise the Sustainable Development Goals (SDGs). Children need to develop the competencies to analyse, reason and communicate their ideas effectively and build their capacity for being a life-long learner. In this direction, periodic and technically robust learning assessment surveys play a vital role to gauge the competencies attained by the children and its subsequent progress through the grades.

National Council of Educational Research and Training (NCERT) has been periodically conducting the large-scale surveys of student learning achievement in government and government aided schools at grades III, V and VIII in different curricular areas since 2001 with an interval of three years. In year 2015, NCERT conducted learning achievement survey on grade 10 students for the first time covering the different types of school management, including those which are privately managed. In 2018, the second cycle of NAS for Class X was conducted.

NCERT has been implementing these surveys on sample basis at the State/UT level. Even though the learning gaps were being identified and shared, it did not percolate to the grass root and since the interventions suggested were generic, it lost its applicability and suitability at the implementation stage. With the passage of time it was felt that these concerns need to be addressed in a much more decentralized manner. Keeping the above in view, it was proposed to conduct the National Achievement Surveys, with districts as the unit of sampling. NAS (2017) provides the learning levels of the children vis-a-vis the learning outcomes developed by the Council. The learning gaps identified at the school level were used to provide feedback to the districts. A framework of intervention was developed which was shared with the States to improve the quality of teaching and learning in the schools.

NAS, 2017 had been a enormous exercise of assessing 2.2 million students from grades III, V and VIII on a single day. This necessitated meticulous planning at each and every step. The methodology used in developing the test items, preparing the sampling frame, sampling procedures, administration of the tests and the analysis of the results have been elaborately
discussed in the ensuing chapters. Some of the important steps in the implementation of NAS were:

- Sensitization of the state officials and the stakeholders in the States/UTs and Districts.
- Development of an assessment framework and the tools for assessing the learning levels and competencies of the students and the background information.
- Communicating the roles and responsibilities of the different personnel (‘who would do what’) involved at the State and National levels.
- Development of guidelines and protocol for administration of the survey in the schools.
- Development of templates using different software for data capturing, storing and analysis.
- Development of guidelines and protocol for data capturing, data storing, and data analysis.
- Sample selection for Classes III, V and VIII for reporting at the district level.
- Administration of tools in the sampled schools with the help of a trained cadre of field investigators.
- Monitoring the administration of the tools at the School, Block, and District level.
- Collation of the data collected from the Schools at the Block, District and State level.
- Following the protocol for data capturing, storing and analysis.
- Analysis of the data at the District levels to understand the learning gaps and preparation of 701 District Report Cards (DRCs), 36 State Learning Reports (SLRs) and the National Technical Report to Inform Policies, Practices and Teaching Learning.
- Development of packages for interventions and sharing with the States for addressing the learning gaps at the district level.

NAS 2017 helps us to understand the progress towards achieving the learning outcomes and also suggests ways to improve the learning levels of our children. But then again NAS is much more than just a report card for the districts. It is a protocol developed which helps us examine our student’s progress towards the attainment of learning outcomes. It is designed to look behind the scorecard to illuminate how our education policies and practices need to evolve to improve the learning levels of our children. The implementation of NAS includes in its ambit the capacity development of school leaders, teachers and the whole network of officials at blocks, DIETs, SCERT, boards of school education and the Directorate of Education in the different States/UTs.
NAS 2017 is a fair and accurate statement of the educational health of the different States and Union Territories in the country. The students who participated in NAS were randomly selected to represent all students in their respective districts. The entire assessment process was scrutinized by national and international experts to ensure its adherence to established standards. At each step of its development, NAS used careful quality control procedures. During the test development process, each item went through all the technical rigours before finalization. The items were translated adhering to the guidelines developed and vetting of each and every item was carried out before its acceptance. A cadre of field investigators were trained who administered the tests following standardized procedures. The tests administration was carefully monitored. The raw data from each district were scrutinized to be sure that no anomalies existed, and all analyses were double checked. Finally, this report has been written and carefully reviewed to make it suitable for the target audience. An external third party scrutinized each and every process of the implementation of NAS.

For dissemination purposes 4 reports for NAS are developed targeting the different audience. The District Report Cards (DRCs) which were 7010 in number and were auto generated using a web application and were meant for teachers and district level functionaries, State Learning Reports (SLRs), designed and developed for the State level functionaries, to enable them for differential planning at the district level in consonance with the DRCs and the National Technical Report for Policy, Practice and Teaching Learning (NPPTL) and the NAS highlights and Policy Briefs are for the researchers, and policy framers respectively.

I thank one and all who have participated, contributed and helped to make this study a success. I earnestly hope that this report is utilized as a baseline document by policy planners, researchers, curriculum developers and all others in raising the quality of elementary education in our country.

Indrani Bhaduri
Professor and Head, ESD
National Coordinator, NAS
NCERT
New Delhi, 2019
Executive Summary

Introduction
NAS 2017, a national-level large scale assessment study was conducted to provide information about the learning achievement of students studying in government and government-aided schools. This was achieved by administering standardized tests to students of Classes III, V and VIII. NAS 2017 has contributed several new elements and gave remarkable momentum to the development of competency based assessment. One of the main virtues of NAS 2017 is that it is embedded in an extremely rich system of background variables. The results help to accurately discover the students’ performance in different learning outcomes vis-à-vis the contextual variables. The very aim of this national assessment is to compare the performance across spectrum and across population in order to find the desirable direction for the changes and provide a basis for the necessary decisions. The synthesis of the results of the national level provides a rich repository of evidences for developing and designing the future course of action for the Indian education system.

Methodology
This report presents the findings of national achievement survey conducted on students studying in Class III, V and VIII. Selecting a representative sample in India is a challenging and arduous task. For selecting the representative sample of NAS, government and government aided schools were included in the sample frame. School level samples from each district were drawn using Probability Proportional to Size (PPS). The PPS methodology is accepted internationally and is used by Organisation for Economic Co-operation and Development (OECD) for drawing samples for Programme of International Student Assessment (PISA). The NAS survey comprises of sample of approx. 2.2 million students from 1,10,000 government and government aided schools across 36 States/Union Territories. The subjects covered in this survey were Language, Mathematics, and Environmental Studies (EVS) for Classes III and V; and Language, Mathematics, Science and Social Science for Class VIII.

An assessment framework was developed to assess the learning levels based on subject specific Learning Outcomes (LO) for Classes III, V and VIII. It was followed by item development process, translation and vetting of the translated tests before its administration. All the rigours of the item development process was followed which was in consent with the third party validation checks for quality control.

Tools Development
Both tests and questionnaires comprised multiple choice questions. Students of Classes III, V and VIII were assessed through two test forms while test forms of Classes III and V comprised of 45 questions,
forms of Class VIII comprised of 60 questions. Each question was associated with the measurement of one learning outcome. Students of Classes III and V were tested on Language, Mathematics and Environmental studies (EVS). Class VIII students were tested on Language, Mathematics, Science and Social Science. Three questionnaires i.e. Pupil Questionnaire (PQ), Teacher Questionnaire (TQ) and School Questionnaire (SQ) were also developed for NAS 2017 to analyze the associations between the achievement and the background variables.

Role of NAS in policy making processes

Use of NAS results in National and State/UTs policy-making processes

- Changes in educational policies and practices in light of NAS assessment results at the district level
- Use of NAS results in policy framing, and reference to high-low performing districts in National educational deliberations and debates

The use and integration of NAS finding to review curriculum, teacher training and school based assessment practices.

- Use of NAS data at the State/District level policies and practices
- Standard Setting and Key Findings of Students’ Performance Result in enabling child centered pedagogy
- Supporting and supervising NAS-based competencies and Learning Outcomes (LOs)

Use of IRT Theory

Within the domain of psychometric theory, two approaches are used for analyzing test data i.e. Classical Test Theory (CTT) and the Item Response Theory (IRT). Under CTT, raw percentages of correct responses are used to measure students’ abilities and item difficulties. However, the linkages between student scores and item difficulties are not clear in CTT. IRT models emphasize on estimating each student’s ability and make inferences about each student’s ability level on an underlying construct being tested. A construct is a latent trait such as intelligence, motivation or language ability. Constructs are latent, and can be indirectly measured through scores on tests and questionnaires.

Unlike CTT, where student ability is expressed within the boundaries of 0-100% correct responses on a test, a latent trait in IRT is measured on an infinite continuum, where the measurement unit is denoted as a logit. IRT uses a mathematical model to link a student’s probability of responding correctly to a particular item, thus taking care of the two main factors, i.e. the student’s level of ability and the item’s level of difficulty. Therefore, analysis in IRT is more complex than traditional methods like CTT. IRT uses the concept of an Item Characteristic Curve (ICC) to show the relationship between students’ ability and performance on an item.

Major Findings

Performance of States/UTs in Class III

In Language, 7 States/UTs performed substantially above the national average, 5 States/UTs performed substantially below,
and 24 States/UTs showed no substantial difference from the national average (refer p. 65). Some of the States and UTs in which the performance of the students in the Learning Outcomes of Language was found to be low were: Arunachal Pradesh, Lakshadweep, Uttar Pradesh, Puducherry and Delhi. It was observed that language poses a lesser challenge than other subjects.

In Mathematics, 8 States/UTs performed substantially above the national average, 10 States/UTs performed substantially below, and 18 States/UTs showed no substantial difference from the national average (refer p. 66). Some of the States and UTs in which the performance of the students in the Learning Outcomes of Mathematics was found to be low were: Arunachal Pradesh, Delhi, Punjab, Meghalaya and Haryana.

In EVS, 10 States/UTs performed substantially above the national average, 9 States/UTs performed substantially below and 17 States/UTs showed no substantial difference from the national average (refer p. 67). The average performance of the students at the national level being 321. Some of the States and UTs in which the performance of the students in the Learning Outcomes of EVS was found to be below were: Arunachal Pradesh, Lakshadweep, Uttar Pradesh, Delhi and Sikkim.

Students of Rajasthan, Andhra Pradesh, Karnataka, West Bengal, Chandigarh, Assam and Kerala performed substantially above the national average in all subjects, i.e. Language, Mathematics and EVS. Whereas Arunachal Pradesh, Lakshadweep, Uttar Pradesh and Delhi performed substantially below the overall national average in all three subjects.

Performance of States /UTs in Class V

In Language, 7 States/UTs performed substantially above the national average, 11 States/UTs performed substantially below and 18 States/UTs showed no substantial difference from the national average (refer p. 68). Some of the States and UTs in which the performance of the students in the Learning Outcomes of Language was found to be low were: Arunachal Pradesh, Meghalaya, Sikkim, Uttar Pradesh and Puducherry.

In Mathematics, 8 States/UTs performed substantially above the national average, 11 States/UTs performed substantially below and 18 States/UTs showed no substantial difference from the national average (refer p. 66). Some of the States and UTs in which the performance of the students in the Learning Outcomes of Mathematics was found to be low were: Arunachal Pradesh, Meghalaya, Sikkim, Uttar Pradesh and Puducherry.

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17 States/UTs showed no substantial difference from the national average (refer p. 69). Some of the States and UTs in which the performance of the students in the Learning Outcomes of Mathematics was found to be low were: Arunachal Pradesh, Sikkim, Meghalaya, Delhi and Daman & Diu.

In EVS, 10 States/UTs performed substantially above the national average, 10 States/UTs performed substantially below and 16 States/UTs showed no substantial difference from the national average (refer p. 70). Some of the States and UTs in which the performance of the students in the Learning Outcomes of EVS was found to be below were: Arunachal Pradesh, Sikkim, Meghalaya, Lakshadweep and Daman & Diu.

Students of Kerala, Karnataka, Chandigarh, Uttrakhand, Andhra Pradesh and Rajasthan performed substantially above national average in language, Mathematics and EVS. Whereas students of Delhi, Lakshadweep, Arunachal Pradesh showed substantially low performance than the national average.

Performance of States /UTs in Class VIII

In Language, 5 States/UTs performed substantially above the national average, 12 States/UTs performed substantially below and 19 States/UTs showed no substantial difference from the national average (refer p. 71). Some of the States and UTs in which the performance of the students in the Learning Outcomes of Language was found to be low were: Nagaland, Jammu & Kashmir, Puducherry, Arunachal Pradesh and Mizoram.

In Mathematics, 7 States/UTs performed substantially above the national average, 19 States/UTs performed substantially below and 10 States/UTs showed no substantial difference from the national average (refer p. 72). Some of the States and UTs in which the performance of the students in the Learning Outcomes of Mathematics was found to be low were: Puducherry, Sikkim, Daman & Diu, Punjab and Delhi.

In Science, 8 States/UTs performed substantially above the national average, 15 States/UTs performed substantially below

| Some of the low performing learning outcomes (LOs) in the States/UTs are: |
|---------------------------|-----------------------------------------------------------------|
| **Language**              | • Reads and comprehends independently story books, news items/  |
|                           |   headlines, advertisements etc.                                 |
|                           | • Estimates the volume of a solid body in known units            |
| **Mathematics**           | • Identifies and forms equivalent fraction of a given fraction   |
|                           | • Applies operations of numbers in daily life situations         |
| **Environmental Studies** | • Establishes linkages among terrain, climate resources (food,   |
|                           |   water, shelter, livelihood) and cultural life (eg. life in    |
|                           |   distant/difficult areas like hot/cold deserts)                |
|                           | • Groups objects, materials, activities for features/properties  |
|                           |   such as shape, taste, colour, texture, sounds, traits etc.    |
|                           | • Guesses (properties, conditions of phenomena), estimates spatial|
|                           |   quantities (distance, area, volume, weight) and time in simple|
|                           |   standard units and verifies using simple tools/setups          |

xviii
and 13 States/UTs showed no substantial difference from the national average (refer p. 73). Some of the States and UTs in which the performance of the students in the Learning Outcomes of Science was found to be low were: Puducherry, Lakshadweep, Nagaland, Daman & Diu and Delhi.

In Social Science, 8 States/UTs performed substantially above the national average, 17 States/UTs performed substantially below and 11 States/UTs showed no substantial difference from the national average (refer p. 74). Some of the States and UTs in which the performance of the students in the Learning Outcomes of Social Science was found to be low were: Puducherry, Lakshadweep, Tamil Nadu, Mizoram and Daman & Diu (refer Appendix F).

**Some of the low performing learning outcomes (LOs) in the States/UTs are:**

<table>
<thead>
<tr>
<th>Language</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Reads textual/non textual material with comprehension and identifies the details, characters, main idea, and sequence of ideas and events while reading</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mathematics</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Finds surface area and volume of cuboidal and cylindrical objects</td>
</tr>
<tr>
<td></td>
<td>• Generalises properties of addition and subtraction, multiplication and division of rational numbers through patterns</td>
</tr>
<tr>
<td></td>
<td>• Finds out approximate area of closed shapes by using units square grid/graph sheets</td>
</tr>
<tr>
<td></td>
<td>• Solves problems related to conversion of percentage to fraction and decimals and vice versa</td>
</tr>
<tr>
<td></td>
<td>• Arranges given/collection information in the form of table, pictograph and bar graph and interprets them</td>
</tr>
<tr>
<td></td>
<td>• Uses exponential form of numbers to simplify problems involving multiplication and division of large numbers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Science</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Conducts simply investigation to seek answers to queries</td>
</tr>
<tr>
<td></td>
<td>• Explains processes and phenomenon</td>
</tr>
<tr>
<td></td>
<td>• Plots and interprets graphs</td>
</tr>
<tr>
<td></td>
<td>• Constructs models using materials from surroundings and explains their working</td>
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<table>
<thead>
<tr>
<th>Social Science</th>
<th></th>
</tr>
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<tbody>
<tr>
<td></td>
<td>• Describes the functioning of rural and urban local government bodies in sectors like health and education</td>
</tr>
<tr>
<td></td>
<td>• Analyse the decline of pre-existing urban centers and handicraft industries and the development of new urban centers and industries in India during the colonial period</td>
</tr>
<tr>
<td></td>
<td>• Locates important historical sites, places on outline map of India.</td>
</tr>
<tr>
<td></td>
<td>• Locates distribution of important minerals, e.g. coal and mineral oil on the world map</td>
</tr>
<tr>
<td></td>
<td>• Draws interrelationship between types of farming and development in different regions of the world</td>
</tr>
<tr>
<td></td>
<td>• Applies the knowledge of the fundamental rights to find out about their violation, protection and promotion in a given situation</td>
</tr>
<tr>
<td></td>
<td>• Identifies the role of government in providing public facilities such as water, sanitation, road, electricity etc. and recognizes their availability</td>
</tr>
</tbody>
</table>
Performance of States/UTs by Gender in Class III

In Language, girls performed significantly better than boys in 18 States/UTs and there is no significant difference between the performance of girls and boys in 18 States/UTs (refer p. 75). Some of the States in which the performance of the girls in the Learning Outcomes of Language was found to be higher were: Andhra Pradesh, Karnataka, West Bengal, Kerala and Assam.

In Mathematics, girls performed significantly better than boys in 6 States/UTs, boys performed significantly better than girls in 5 States/UTs, and no significant difference between the performance of girls and boys was observed in 25 States/UTs (refer p. 76). Some of the States in which the performance of the girls in the Learning Outcomes of Mathematics was found to be higher were: Karnataka, Kerala, Assam, Gujarat and Maharashtra.

In EVS, girls performed significantly better than boys in 15 States/UTs, no significant difference between the performance of girls and boys was observed in 21 States/UTs (refer p. 77). Some of the States in which the performance of the girls in the Learning Outcomes of EVS was found to be higher were: Kerala, Karnataka, Andhra Pradesh, West Bengal and Assam.

Performance of States/UTs by Gender in Class V

In Language, girls performed significantly better than boys in 16 States/UTs, boys performed significantly better than girls in 1 State and no significant difference between the performance of girls and boys was observed in 19 States/UTs (refer p. 78). Some of the States in which the performance of the girls in the Learning Outcomes of Language was found to be higher were: Kerala, Karnataka, Maharashtra, Gujarat and Jharkhand.

In Mathematics, girls performed significantly better than boys in 6 States/UTs, boys performed significantly better than girls in 1 State and there is no significant difference between the performance of girls and boys in 29 States/UTs (refer p. 79). Some of the States in which the performance of the girls in the Learning Outcomes of Mathematics was found to be higher were: Karnataka, Jharkhand, Gujarat, Maharashtra and Tamil Nadu.

In EVS, girls performed significantly better than boys in 12 States/UTs, boys performed significantly better than girls in 2 States and no significant difference between the performance of girls and boys was observed in 22 States/UTs (refer p. 80). Some of the States in which the performance of the girls in the Learning Outcomes of EVS was found to be higher were: Kerala, Karnataka, Jharkhand, Assam and Gujarat.

Performance of States/UTs by Gender in Class VIII

In Language, girls performed significantly better than boys in 18 States/UTs, boys performed significantly better than girls in 4 States and no significant difference between the performance of girls and boys was observed in 14 States/UTs (refer p. 81). Some of the States in which the performance of the girls in the Learning Outcomes of Language was found to be higher were: Gujarat, Kerala, Maharashtra, Karnataka and Chandigarh.

In Mathematics, girls performed significantly better than boys in 9 States/UTs, boys performed significantly better than girls in 3 States and there is no significant difference between the performance of girls and boys in 24 States/UTs (refer p. 82). Some of the States in which the performance of the girls...
in the Learning Outcomes of Mathematics was found to be higher were: Jharkhand, Karnataka, Gujarat, Madhya Pradesh and Maharashtra.

In Science, girls performed significantly better than boys in 4 States, boys performed significantly better than girls in 9 States/UTs and no significant difference between the performance of girls and boys was observed in 23 States/UTs (refer p. 83). Performance of the girls in the Learning Outcomes of Science was found to be higher in the following States: Karnataka, Gujarat, Andhra Pradesh and Tamil Nadu.

In Social Science, girls performed significantly better than boys in 11 States/UTs, boys performed significantly better than girls in 4 States and no significant difference between the performance of girls and boys was observed in 21 States/UTs (refer p. 84). Some of the States in which the performance of the girls in the Learning Outcomes of Social Science was found to be higher were: Gujarat, Chandigarh, Karnataka, Andhra Pradesh and Haryana.

Although girls perform slightly higher than boys in most of tests, the differences are not significant.

Performance of States/UTs by Location in Class III

In Language, urban schools performed significantly better than rural schools in 11 States/UTs, rural schools performed significantly better than urban schools in 11 States/UTs and no significant difference between the performance of urban and rural schools was observed in 14 States/UTs (refer p. 85). Some of the States in which the performance of the rural students in the Learning Outcomes of Language was found to be higher were: Andhra Pradesh, Karnataka, Uttarakhand, Nagaland and Maharashtra.

In Mathematics, urban schools performed significantly better than rural schools in 12 States/UTs, rural schools performed significantly better than urban schools in 10 States/UTs, and no significant difference between the performance of urban and rural schools was observed in 14 States/UTs (refer p. 86). Some of the States in which the performance of the rural students in the Learning Outcomes of Mathematics was found to be higher were: Karnataka, Andhra Pradesh, Uttarakhand, Maharashtra and Himachal Pradesh.

In EVS, urban schools performed significantly better than rural schools in 10 States/UTs, rural schools performed significantly better than urban schools in 9 States/UTs, and there is no significant difference between the performance of urban and rural schools in 17 States/UTs (refer p. 87). Some of the States in which the performance of the rural students in the Learning Outcomes of EVS was found to be higher were: Karnataka, Andhra Pradesh, Uttarakhand, Maharashtra and Himachal Pradesh.

Performance of States/UTs by Location in Class V

In Language, urban schools performed significantly better than rural schools in 13 States/UTs, rural schools performed significantly better than urban schools in 10 States/UTs, and no significant difference between the performance of urban and rural schools was observed in 13 States/UTs (refer p. 88). Some of the States in which the performance of the rural students in the Learning Outcomes of Language was found to be higher were: Kerala, Karnataka, Maharashtra, Nagaland and Chhattisgarh.

In Mathematics, urban schools performed
significantly better than rural schools in 5 States/UTs, rural schools performed significantly better than urban schools in 16 States/UTs, and no significant difference between the performance of urban and rural schools was observed in 15 States/UTs (refer p. 89). Some of the States in which the performance of the rural students in the Learning Outcomes of Mathematics was found to be higher were: Karnataka, Kerala, Assam, Uttrakhand and Delhi.

In EVS, urban schools performed significantly better than rural schools in 8 States/UTs, rural schools performed significantly better than urban schools in 14 States/UTs, and no significant difference between the performance of urban and rural schools was observed in 14 States/UTs (refer p. 90). Some of the States in which the performance of the rural students in the Learning Outcomes of EVS was found to be higher were: Kerala, Karnataka, Uttrakhand, Assam and Odisha.

Performance of States /UTs by Location in Class VIII

In Language, urban schools performed significantly better than rural schools in 19 States/UTs, rural schools performed significantly better than urban schools in 6 States/UTs, and no significant difference between the performance of urban and rural schools was observed in 11 States/UTs (refer p. 91). Some of the States in which the performance of the rural students in the Learning Outcomes of Language was found to be higher were: Gujarat, Chandigarh, Karnataka, Uttrakhand and Andhra Pradesh.

In Mathematics, urban schools performed significantly better than rural schools in 4 States/UTs, rural schools performed significantly better than urban schools in 15 States/UTs, and no significant difference between the performance of urban and rural schools was observed in 17 States/UTs (refer p. 92). Some of the States in which the performance of the rural students in the Learning Outcomes of Mathematics was found to be higher were: Rajasthan, Jharkhand, Karnataka, Andhra Pradesh and Gujarat.

In Science, urban schools performed significantly better than rural schools in 8 States/UTs, rural schools performed significantly better than urban schools in 15 States/UTs and there is no significant difference between the performance of urban and rural schools in 13 States/UTs (refer p. 93). Some of the States in which the performance of the rural students in the Learning Outcomes of Science was found to be higher were: Rajasthan, Karnataka, Jharkhand, Gujarat and Andhra Pradesh.

In Social Science, urban schools performed significantly better than rural schools in 10 States/UTs, rural schools performed significantly better than urban schools in 12 States/UTs, and no significant difference between the performance of urban and rural schools was observed in 14 States/UTs (refer p. 94). Some of the States in which the performance of the rural students in the Learning Outcomes of Social Science was found to be higher were: Rajasthan, Gujarat, Jharkhand, Karnataka and Andhra Pradesh.

Differences between urban and rural students are virtually non-existing in Class III, however, they become statistically significant in Class V, and even stronger in Class VIII, indicating that urban students are higher performing in Language, whereas in Math, EVS, Science, and Social Science performance in rural areas is significantly higher than in urban areas.
Performance of States /UTs by School Management in Class III

In Language, Government aided schools performed significantly better than Government schools in 7 States/UTs, government schools performed significantly better than Government aided schools in 9 States/UTs and there is no significant difference between the performance of Government and Government aided schools in 20 States/UTs (refer p. 95). Some of the States in which the performance of the students of Government schools in the Learning Outcomes of Language was found to be higher were: Andhra Pradesh, Karnataka, Rajasthan, Kerala and Assam.

In Mathematics, Government aided schools performed significantly better than Government schools in 5 States/UTs, Government schools performed significantly better than Government aided schools in 12 States/UTs, and no significant difference between the performance of Government and Government aided schools was observed in 19 States/UTs (refer p. 96). Some of the States in which the performance of the students of Government schools in the Learning Outcomes of Mathematics was found to be higher were: Andhra Pradesh, Kerala, Rajasthan, Assam and Telangana.

In EVS, Government aided schools performed significantly better than Government schools in 9 States/UTs, Government schools performed significantly better than Government aided schools in 13 States/UTs, and no significant difference between the performance of Government and Government aided schools was observed in 16 States/UTs (refer p. 97). Some of the States in which the performance of the students of Government schools in the Learning Outcomes of EVS was found to be higher were: Kerala, Karnataka, Rajasthan, Andhra Pradesh and Assam.

Performance of States /UTs by School Management in Class V

In Language, Government aided schools performed significantly better than Government schools in 9 States/UTs, Government schools performed significantly better than Government aided schools in 9 States/UTs, and no significant difference between the performance of Government and Government aided schools was observed in 18 States/UTs (refer p. 98). Some of the States in which the performance of the students of Government schools in the Learning Outcomes of Language was found to be higher were: Kerala, Karnataka, Chandigarh, Gujarat and Assam.

In Mathematics, Government aided schools performed significantly better than Government schools in 7 States/UTs, Government schools performed significantly better than Government aided schools in 13 States/UTs, and no significant difference between the performance of Government and Government aided schools was observed in 16 States/UTs (refer p. 99). Some of the States in which the performance of the students of Government schools in the Learning Outcomes of Mathematics was found to be higher were: Karnataka, Kerala, Chandigarh, Assam and Gujarat.

In EVS, Government aided schools performed significantly better than Government schools in 7 States/UTs, Government schools performed significantly better than Government aided schools in 13 States/UTs, and no significant difference between the performance of Government and Government aided schools was observed in 16 States/UTs (refer p. 100). Some of the States in which the performance of the students of Government schools in the Learning Outcomes of EVS was found to be higher were: Kerala, Karnataka, Chandigarh, Assam and Gujarat.
Performance of States by School Management in Class VIII

In Language, Government aided schools performed significantly better than Government schools in 18 States/UTs, Government schools performed significantly better than Government aided schools in 2 States and no significant difference between the performance of Government and Government aided schools was observed in 16 States/UTs (refer p. 101). Some of the States in which the performance of the students of Government schools in the Learning Outcomes of Language was found to be higher were: Kerala and West Bengal.

In Mathematics, Government aided schools performed significantly better than Government schools in 9 States/UTs, Government schools performed significantly better than Government aided schools in 12 States/UTs and there is no significant difference between the performance of Government and Government aided schools in 15 States/UTs (refer p. 102). Some of the States in which the performance of the students of Government schools in the Learning Outcomes of Mathematics was found to be higher were: Jharkhand, Andhra Pradesh, Kerala, Gujarat and Bihar.

In Science, Government aided schools performed significantly better than Government schools in 10 States/UTs, Government schools performed significantly better than Government aided schools in 12 States/UTs and no significant difference between the performance of Government and Government aided schools was observed in 14 States/UTs (refer p. 103). Some of the States in which the performance of the students of Government schools in the Learning Outcomes of Science was found to be higher were: Jharkhand, Kerala, Gujarat, Andhra Pradesh and Uttarakhand.

In Social Science, Government aided schools performed significantly better than Government schools in 8 States/UTs, Government schools performed significantly better than Government aided schools in 9 States/UTs, and no significant difference between the performance of Government and Government aided schools was observed in 19 States/UTs (refer p. 104). Some of the States in which the performance of the students of Government schools in the Learning Outcomes of Social Science was found to be higher were: Gujarat, Jharkhand, Chandigarh, Andhra Pradesh and Uttarakhand.

In Class III the Government schools perform higher than the Government aided schools in Language and Mathematics, however, in Classes V and VIII the Government schools are outperforming the Government aided schools in all subjects but Language in Class VIII where the Government aided schools still perform higher.

Performance of States by Social Groups in Class III

States/UTs in which ST students performed better than other social groups in Languages are: Nagaland, Manipur and Tamil Nadu (refer Table 5.1, p. 105).

States/UTs in which SC students performed better than general category students in Languages are: Manipur, Karnataka and Tamil Nadu (refer Table 5.1, p. 105).

States/UTs in which ST students performed better than other social groups in Mathematics are: Delhi, Arunachal Pradesh, Nagaland and Manipur (refer Table 5.2, p. 106).

States/UTs in which ST students performed better than other social groups in EVS are: Delhi, Arunachal Pradesh and Manipur (refer Table 5.3, p. 107).

Performance of States by Social Groups in Class V

States/UTs in which ST students performed well along with general category students in
Languages are: Jammu and Kashmir, Bihar and Gujarat (refer Table 5.4, p. 108).

States/UTs in which ST students performed better than other social groups in Mathematics are: Chhattisgarh and Maharashtra (refer Table 5.5, p. 109). States/UTs in which SC students performed well along with general category students in Mathematics are: Punjab, Uttarakhand, Delhi, Rajasthan, Tripura and Gujarat (refer Table 5.5, p. 109).

States/UTs in which ST students performed better than other social groups in EVS are: Bihar, Arunachal Pradesh, Chhattisgarh, Gujarat and Maharashtra (refer Table 5.6, p. 110).

States/UTs in which SC students performed well along with general category students in EVS are: Himachal Pradesh, Punjab, Uttarakhand, Rajasthan, Uttar Pradesh and Tripura (refer Table 5.6, p. 110).

Performance of States by Social Groups in Class VIII

Table 5.7 shows that the State in which ST students performed better than other social groups in Languages is: Manipur (refer p. 111).

State in which SC students performed better than other social groups in Languages is: Assam (refer Table 5.7, p. 111).

States/UTs in which ST students performed well along with OBC category students in Mathematics is: Maharashtra (refer Table 5.8, p. 112).

States/UTs in which SC Students performed well along with general category students in Mathematics are: Punjab, Uttarakhand, and Kerala (refer Table 5.8, p. 112).

States in which ST students performed better than other social groups in Science are: Gujarat and Maharashtra (refer Table 5.9, p. 113).

States/UTs in which SC students performed better along with OBC category students in Social Science are: Uttar Pradesh, Gujarat and Tamil Nadu (refer Table 5.10, p. 114).

Reports and Dissemination

The results of NAS 2017 were disseminated using District Report Cards (DRCs), State Learning Reports (SLRs), National Report to inform Policy, Practices and Teaching Learning (NPPTL) and National Highlights and Policy Briefs reports. Several States/UT level workshops were organized to extensively discuss NAS results. NCERT also developed a comprehensive document on NAS Interventions (Short Term, Medium Term and Long Term) that elaborates the requisite steps to be taken at District, State and National Level in a time bound manner for the improvement of quality of education in the country.

The unit of sampling in the case of NAS being the Districts, the District Report Cards (DRCs) was a key element for understanding the NAS results by one and all. The DRCs were primarily targeted at the school teachers for their understanding of the performance of the district at different grades in the learning outcomes, The DRCs were made very simple, only two pages and the achievement in the learning outcomes were listed in percentages. There were in all 7010 district report cards for the 701 districts. The DRCs along-with the State learning Reports (SLRs) were designed keeping in mind the State level functionaries to enable a differential planning at the State level. The National Technical Report to Inform Policy, Practices and Teaching learning (NPPTL) and the National Highlights and Policy Briefs are developed keeping in mind the researchers, policy framers, decision makers and all the top administrative officials responsible for improving school education in the country.
Determinants of high or low level of learning achievement

Students’ learning achievement is influenced by numerous factors such as,
• socio-economic background,
• context and institutional factors like school, teachers and learning environment.

NAS 2017 reiterates that facilitations of students’ learning, teacher quality and institutional resources are the prominent determinants of the learning levels of students. Multiple regression analysis found that students’ attendance, participation in pre-school, their understanding of what teacher says in class and their engagement in the classroom are significantly associated with the learning achievement. School related factors such as functional library, monitoring of the schools by the department of education and participation of school in literary activities influences the learning achievement of students. Similarly, teacher related factors such as their engagement in professional development, peer support and networking, and job satisfaction significantly contribute to learning achievement of students.

Further, multiple indicators from high and low achieving States were processed to understand what are the key contributing factors that separate out low achieving States from high achieving States. Thus States and Union territories were grouped into high and low achieving States on the basis of following criteria.

Profiles of HIGH and LOW Performing States

<table>
<thead>
<tr>
<th>10 Highest Performing States (those with over 40% of students in top performing bands)</th>
<th>10 Lowest Performing States (over 35% of students performing in bottom bands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rajasthan</td>
<td>Arunachal Pradesh</td>
</tr>
<tr>
<td>Karnataka</td>
<td>Delhi</td>
</tr>
<tr>
<td>Chandigarh</td>
<td>Puducherry</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>Meghalaya</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>Lakshadweep</td>
</tr>
<tr>
<td>Dadra &amp; Nagar Haveli</td>
<td>Daman &amp; Diu</td>
</tr>
<tr>
<td>Assam</td>
<td>Uttar Pradesh</td>
</tr>
<tr>
<td>Gujarat</td>
<td>Sikkim</td>
</tr>
<tr>
<td>Kerala</td>
<td>Punjab</td>
</tr>
<tr>
<td>Uttarakhand</td>
<td>Nagaland</td>
</tr>
</tbody>
</table>
The graphical interpretation of the contextual analysis of variables for determining high performing and low performing States/UTs and the factors associated with their performance, is as given below:

**High-Low State Profiles by Teacher Background - School Environment**

Teachers having professional qualification, are permanently employed, have six or more years of experience and have attended training programs show higher impact on students’ achievement. Also, teachers’ participation in learning outcomes and their participation in informal dialogues with colleagues to improve teaching have higher association with students’ achievement.
Teachers’ expectations on students’ achievement, their understanding of curricular goals, their satisfaction with jobs and availability of learning outcomes document at school have a greater impact on the States/UTs where in students are performing better.
When we observe the affect of teachers’ activities on students’ achievement, we see that for most of the teachers’ activities, high performing States/UTs are in-line with low performing States/UTs. Teachers’ usage of books other than the text books shows impact on higher performing States/UTs.
School being monitored monthly by the Department of Education, teachers’ collaboration to improve students’ achievement, their high expectations on students’ achievement, their job satisfaction, schools’ participation in literary activities, school fair and school having library have a greater impact on States/UTs where in students’ achievement is higher.
Students’ participation in classroom activities, attending pre-primary schools/anganwadi, their understanding of what the teacher says in class, their being present in class and reading books other than the text books have higher impact on the States/UTs where in students are performing better.
# Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANCOVA</td>
<td>Analysis of Co-variance</td>
</tr>
<tr>
<td>ANOVA</td>
<td>Analysis of Variance</td>
</tr>
<tr>
<td>AWPB</td>
<td>Annual Work Plan Budget</td>
</tr>
<tr>
<td>BAS</td>
<td>Baseline Achievement Survey</td>
</tr>
<tr>
<td>B.Ed.</td>
<td>Bachelor of Education</td>
</tr>
<tr>
<td>BPL</td>
<td>Below Poverty Line</td>
</tr>
<tr>
<td>CABE</td>
<td>Central Advisory Board of Education</td>
</tr>
<tr>
<td>CM</td>
<td>Chief Minister</td>
</tr>
<tr>
<td>CTT</td>
<td>Classical Test Theory</td>
</tr>
<tr>
<td>DAMIAS</td>
<td>Data Management and Item Analysis System</td>
</tr>
<tr>
<td>DCs</td>
<td>District Coordinators</td>
</tr>
<tr>
<td>DCM</td>
<td>Data Capturing Manual</td>
</tr>
<tr>
<td>DIET</td>
<td>District Institute of Education and Training</td>
</tr>
<tr>
<td>DIF</td>
<td>Differential Item Functioning</td>
</tr>
<tr>
<td>DISE</td>
<td>District Information System for Education</td>
</tr>
<tr>
<td>DLUs</td>
<td>District Level Users</td>
</tr>
<tr>
<td>DMU</td>
<td>District Monitoring Unit</td>
</tr>
<tr>
<td>DPC-SSA</td>
<td>District Project Coordinators- Sarva Shiksha Abhiyan</td>
</tr>
<tr>
<td>DRC</td>
<td>District Report Cards</td>
</tr>
<tr>
<td>DSEL</td>
<td>Department of School Education and Literacy</td>
</tr>
<tr>
<td>ESD</td>
<td>Educational Survey Division</td>
</tr>
<tr>
<td>ETS</td>
<td>Educational Training Service</td>
</tr>
<tr>
<td>EVS</td>
<td>Environmental Studies</td>
</tr>
<tr>
<td>FIs</td>
<td>Field Investigators</td>
</tr>
<tr>
<td>ICC</td>
<td>Item Characteristic Curve</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>ID</td>
<td>Identity Document</td>
</tr>
<tr>
<td>IRT</td>
<td>Item Response Theory</td>
</tr>
<tr>
<td>JRM</td>
<td>Joint Review Missions</td>
</tr>
<tr>
<td>JRR</td>
<td>Jackknife Repeated Replication Technique</td>
</tr>
<tr>
<td>LMS</td>
<td>Learning Management System</td>
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<tr>
<td>LO</td>
<td>Learning Outcome</td>
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<tr>
<td>MAS</td>
<td>Mid-term Achievement Survey</td>
</tr>
<tr>
<td>MCQ</td>
<td>Multiple Choice Question</td>
</tr>
<tr>
<td>MHRD</td>
<td>Ministry of Human Resource Development</td>
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<tr>
<td>MIL</td>
<td>Modern Indian Language</td>
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<tr>
<td>MIS</td>
<td>Management Information Systems</td>
</tr>
<tr>
<td>MLE</td>
<td>Maximum Likelihood Estimation</td>
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<tr>
<td>MOS</td>
<td>Measure of Size</td>
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<tr>
<td>MPs</td>
<td>Members of Parliament</td>
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<tr>
<td>NAEP</td>
<td>National Assessment of Educational Progress</td>
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<tr>
<td>NAS</td>
<td>National Achievement Survey</td>
</tr>
<tr>
<td>Acronym</td>
<td>Full Form</td>
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<tr>
<td>NAS-PMU</td>
<td>National Achievement Survey-Project Management Unit</td>
</tr>
<tr>
<td>NCERT</td>
<td>National Council of Educational Research and Training</td>
</tr>
<tr>
<td>NIC</td>
<td>National Informatics Centre</td>
</tr>
<tr>
<td>NLUs</td>
<td>National Level Users</td>
</tr>
<tr>
<td>NPPTL</td>
<td>National Report to inform Policy, Practices and Teaching Learning</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>OMR</td>
<td>Optical Mark Recognition</td>
</tr>
<tr>
<td>PISA</td>
<td>Programme of International Student Assessment</td>
</tr>
<tr>
<td>PL</td>
<td>Performance Level</td>
</tr>
<tr>
<td>PPt</td>
<td>Power Point Presentation</td>
</tr>
<tr>
<td>PPS</td>
<td>Probability Proportional to Size</td>
</tr>
<tr>
<td>PQ</td>
<td>Pupil Questionnaire</td>
</tr>
<tr>
<td>PTA</td>
<td>Parent Teacher Association</td>
</tr>
<tr>
<td>PV</td>
<td>Plausible Values</td>
</tr>
<tr>
<td>RMSA</td>
<td>Rashtriya Madhyamik Shiksha Abhiyan</td>
</tr>
<tr>
<td>RS</td>
<td>Random Start</td>
</tr>
<tr>
<td>RTE</td>
<td>Right to Education</td>
</tr>
<tr>
<td>SCERT</td>
<td>State Council of Educational Research and Training</td>
</tr>
<tr>
<td>SE</td>
<td>Standard Error</td>
</tr>
<tr>
<td>SES</td>
<td>Socio Economic Status</td>
</tr>
<tr>
<td>SIE</td>
<td>State Institute of Education</td>
</tr>
<tr>
<td>SLMTs</td>
<td>State Level Master Trainers</td>
</tr>
<tr>
<td>SLR</td>
<td>State Learning Report</td>
</tr>
<tr>
<td>SLUs</td>
<td>State Level Users</td>
</tr>
<tr>
<td>SMC</td>
<td>School Management Committee</td>
</tr>
<tr>
<td>SMS</td>
<td>Short Message Service</td>
</tr>
<tr>
<td>SPD</td>
<td>State Project Director</td>
</tr>
<tr>
<td>SPD-SSA</td>
<td>State Project Director Sarva Shiksha Abhiyan</td>
</tr>
<tr>
<td>SPS</td>
<td>Setting Performance Standards</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
</tr>
<tr>
<td>SQ</td>
<td>Student Questionnaire</td>
</tr>
<tr>
<td>SRC</td>
<td>State Resource Centre</td>
</tr>
<tr>
<td>SS</td>
<td>Scale Score</td>
</tr>
<tr>
<td>SSA</td>
<td>Sarva Shiksha Abhiyan</td>
</tr>
<tr>
<td>STCs</td>
<td>Special Training Centres</td>
</tr>
<tr>
<td>TAS</td>
<td>Terminal Achievement Survey</td>
</tr>
<tr>
<td>TIMSS</td>
<td>Trends in International Mathematics and Science Study</td>
</tr>
<tr>
<td>TLM</td>
<td>Teaching Learning Material</td>
</tr>
<tr>
<td>TQ</td>
<td>Teacher Questionnaire</td>
</tr>
<tr>
<td>UDISE</td>
<td>Unified District Information System for Education</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
</tr>
<tr>
<td>URL</td>
<td>Uniform Resource Locator</td>
</tr>
<tr>
<td>UT</td>
<td>Union Territory</td>
</tr>
<tr>
<td>WLE</td>
<td>Weighted Maximum Likelihood Estimate</td>
</tr>
<tr>
<td>WML</td>
<td>Weighted Maximum Likelihood</td>
</tr>
</tbody>
</table>
Contents

Message .................................................................................................................................................. v
Foreword .................................................................................................................................................. ix
Preface ................................................................................................................................................... xi
Executive Summary .................................................................................................................................. xv
Acronyms ........................................................................................................................................... xxxiii
List of Tables ........................................................................................................................................... xxxvii
List of Figures ........................................................................................................................................... xli

Chapter 1. Introduction ............................................................................................................................ 1
1.1 History of NAS in India .......................................................................................................................... 2
1.2 Process .................................................................................................................................................. 5
1.3 Objectives ........................................................................................................................................... 5
1.4 Research Questions ............................................................................................................................... 5
1.5 Sample ................................................................................................................................................ 6
1.6 Assessment Framework ....................................................................................................................... 6
1.7 Administration .................................................................................................................................... 7
1.8 Monitoring .......................................................................................................................................... 8
1.9 Reporting ........................................................................................................................................... 8
1.10 Dissemination and Post NAS Interventions ....................................................................................... 8
1.11 Limitations ....................................................................................................................................... 9

Chapter 2. Methodology .......................................................................................................................... 11
2.1 NAS Tool Development ..................................................................................................................... 12
2.2 Sample ............................................................................................................................................... 15
2.3 Data Management ............................................................................................................................. 15
2.4 Trainings ........................................................................................................................................... 15
2.5 Data Analysis ..................................................................................................................................... 15

Chapter 3. Sample Design and Procedures ............................................................................................ 23
3.1 Target Population: Definition ........................................................................................................... 24
3.2 Stratification ...................................................................................................................................... 26
3.3 The National Sampling Plan ............................................................................................................. 27
3.4 School Sampling Frame .................................................................................................................... 28
3.5 Sampling of Schools .......................................................................................................................... 29
3.6 Sampling of Students ........................................................................................................................ 30
3.7 Sampling of Section ........................................................................................................................... 30
3.8 Random sample drawn at the District level ....................................................................................... 31

Chapter 4. Data Management Procedures ............................................................................................ 53
4.1 Data Management Activities in NAS 2017 ....................................................................................... 54

Chapter 5. Analysis ................................................................................................................................... 59
5.1 Evaluation of Technical Standards of Achievement Instruments .................................................. 61
Chapter 7. Association of Background Variables ................................................................. 155
  7.1 Association Results for Class III: Student Profile .................................................... 156
  7.2 Association Results for Class III: School Profile ..................................................... 159
  7.3 Association Results for Class III: Teacher Profile .................................................... 161
  7.4 Policy implications of the National Achievement Survey ......................................... 165
  7.5 Determinants of high or low level of learning achievement ...................................... 166

Chapter 8. Reporting and Dissemination ............................................................................. 173
  8.1 NAS Reports ............................................................................................................. 174
  8.2 NAS Dissemination ................................................................................................. 178
  8.3 District level Workshops ......................................................................................... 178
  8.4 State/UT level Workshops ...................................................................................... 179
  8.5 NAS Mobile Application ......................................................................................... 180
  8.6 Way Forward ........................................................................................................... 180

Appendices ........................................................................................................................ 183
  Appendix A: Learning Outcomes ................................................................................... 183
  Appendix B: List of Languages in which Test got Translated ........................................ 190
  Appendix C: Sample Forms .......................................................................................... 191
  Appendix D: Procedure for IRT Scaling of NAS ............................................................ 194
  Appendix E: Weighting Procedure ................................................................................. 197
  Appendix F: Results for Class III, V and VIII ............................................................... 198
  Appendix G: Specific Performance Level Descriptors and Percentages of Students ....... 202
  Appendix H: Field Tryout Results, Class III, V and VIII .............................................. 233
  Appendix I: List of Workshops ....................................................................................... 243

References ......................................................................................................................... 245
List of Tables

Table 1.1  Key Characteristics of NAS 2017  3
Table 1.2  Comparison between Previous NAS Cycles and NAS 2017  4
Table 1.3  NAS 2017 Test Details  6
Table 1.4  Class and Subject wise LO Exemplars  8
Table 1.5  Short, Mid and Long Term NAS Interventions  9
Table 2.1  Exemplar LOs assessed in NAS 2017  12
Table 2.2  Item wise Raw Responses of Students  16
Table 2.3  Item wise Raw Responses of Students  16
Table 2.4  Discrimination Values and Interpretation  19
Table 2.5  P-Values and Interpretation for dichotomous items  19
Table 3.1  Stratification Parameters  27
Table 3.2  Number of Schools and Students for Class III, V and VIII (Andaman & Nicobar Islands)  31
Table 3.3  Number of Schools and Students for Class III, V and VIII (Andhra Pradesh)  31
Table 3.4  Number of Schools and Students for Class III, V and VIII (Arunachal Pradesh)  31
Table 3.5  Number of Schools and Students for Class III, V and VIII (Assam)  32
Table 3.6  Number of Schools and Students for Class III, V and VIII (Bihar)  33
Table 3.7  Number of Schools and Students for Class III, V and VIII (Chandigarh)  34
Table 3.8  Number of Schools and Students for Class III, V and VIII (Chhattisgarh)  34
Table 3.9  Number of Schools and Students for Class III, V and VIII (Dadra and Nagar Haveli)  34
Table 3.10  Number of Schools and Students for Class III, V and VIII (Daman & Diu)  35
Table 3.11  Number of Schools and Students for Class III, V and VIII (Delhi)  35
Table 3.12  Number of Schools and Students for Class III, V and VIII (Goa)  35
Table 3.13  Number of Schools and Students for Class III, V and VIII (Gujarat)  35
Table 3.14  Number of Schools and Students for Class III, V and VIII (Haryana)  36
Table 3.15  Number of Schools and Students for Class III, V and VIII (Himachal Pradesh)  37
Table 3.16  Number of Schools and Students for Class III, V and VIII (Jammu and Kashmir)  37
Table 3.17  Number of Schools and Students for Class III, V and VIII (Jharkhand)  38
Table 3.18  Number of Schools and Students for Class III, V and VIII (Karnataka)  38
Table 3.19  Number of Schools and Students for Class III, V and VIII (Kerala)  39
Table 3.20  Number of Schools and Students for Class III, V and VIII (Lakshadweep)  40
Table 3.21  Number of Schools and Students for Class III, V and VIII (Madhya Pradesh)  40
Table 3.22  Number of Schools and Students for Class III, V and VIII (Maharashtra)  41
Table 3.23  Number of Schools and Students for Class III, V and VIII (Manipur)  42
Table 3.24  Number of Schools and Students for Class III, V and VIII (Meghalaya)  43
Table 3.25  Number of Schools and Students for Class III, V and VIII (Mizoram)  43
Table 3.26  Number of Schools and Students for Class III, V and VIII (Nagaland)  43
Table 3.27  Number of Schools and Students for Class III, V and VIII (Odisha)  44
Table 3.28  Number of Schools and Students for Class III, V and VIII (Puducherry)  44
Table 3.29  Number of Schools and Students for Class III, V and VIII (Punjab)  45
Table 3.30  Number of Schools and Students for Class III, V and VIII (Rajasthan)  45
Table 3.31  Number of Schools and Students for Class III, V and VIII (Sikkim)  46
Table 3.32
Number of Schools and Students for Class III, V and VIII (Tamil Nadu)
46

Table 3.33
Number of Schools and Students for Class III, V and VIII (Telangana)
47

Table 3.34
Number of Schools and Students for Class III, V and VIII (Tripura)
48

Table 3.35
Number of Schools and Students for Class III, V and VIII (Uttar Pradesh)
48

Table 3.36
Number of Schools and Students for Class III, V and VIII (Uttarakhand)
50

Table 3.37
Number of Schools and Students for Class III, V and VIII (West Bengal)
51

Table 4.1
Backend infrastructure for the application
54

Table 4.2
Categories of Users, Organizations Involved, Activities Performed
55

Table 5.1
Performance of States by Social Groups in Class III Language
105

Table 5.2
Performance of States by Social Groups in Class III Mathematics
106

Table 5.3
Performance of States by Social Groups in Class III Environmental Studies
107

Table 5.4
Performance of States by Social Groups in Class V Language
108

Table 5.5
Performance of States by Social Groups in Class V Mathematics
109

Table 5.6
Performance of States by Social Groups in Class V Environmental Studies
110

Table 5.7
Performance of States by Social Groups in Class VIII Language
111

Table 5.8
Performance of States by Social Groups in Class VIII Mathematics
112

Table 5.9
Performance of States by Social Groups in Class VIII Science
113

Table 5.10
Performance of States by Social Groups in Class VIII Social Science
114

Table 5.11
Subject wise Low Performing Learning Outcomes in Class III
116

Table 5.12
Subject wise Low Performing Learning Outcomes in Class V
116

Table 5.13
Subject wise Low Performing Learning Outcomes in Class VIII
117

Table 5.14
Item Parameters Language Class III
123

Table 5.15
Item Parameters Mathematics Class III
124

Table 5.16
Item Parameters Environmental Studies Class III
125

Table 5.17
Item Parameters Language Class V
126

Table 5.18
Item Parameters Mathematics Class V
127

Table 5.19
Item Parameters Environmental Studies Class V
128

Table 5.20
Item Parameters Language Class VIII
129

Table 5.21
Item Parameters Mathematics Class VIII
130

Table 5.22
Item Parameters Science Class VIII
131

Table 5.23
Item Parameters Social Science Class VIII
132

Table 6.1
General performance level descriptors
134

Table 6.2
Final cut scores for NAS tests
137

Table 6.3
Percentage of students at each performance level (National results)
137

Table 7.1
Association Results-- Below Poverty Line
156

Table 7.2
Association Results-- Education of Mother
156

Table 7.3
Association Results-- Likes coming to school
156

Table 7.4
Association Results-- Games period activity
156

Table 7.5
Association Results--Find Difficult to travel to school
156

Table 7.6
Association Results-- Student Absence over 10 days
157

Table 7.7
Association Results--Language spoken at home
157

Table 7.8
Association Results--Able to understand teacher
157

Table 7.9
Association Results--Number of siblings
157

Table 7.10
Association Results--Attended pre-primary classes/Anganwadi
158

Table 7.11
Association Results--Discusses the Lessons at Home
158
<p>| Table 7.12 | Association Results–Reads other materials in addition to Textbooks | 158 |
| Table 7.13 | Association Results–Gets help in study at home | 158 |
| Table 7.14 | Association Results–Participates in Classroom Activities | 158 |
| Table 7.15 | Association Results–Asks questions in the Class | 159 |
| Table 7.16 | Association Results–Most liked activity | 159 |
| Table 7.17 | Association Results–Teachers aware about the LO Document | 159 |
| Table 7.18 | Association Results–Use of Library | 159 |
| Table 7.19 | Association Results–School Activities | 160 |
| Table 7.20 | Association Results–Activities of School affected by Instructional Materials, Teaching Staff, Supporting Staff etc. | 160 |
| Table 7.21 | Association Results–School Perception | 161 |
| Table 7.22 | Association Results–Frequency of Monitoring | 161 |
| Table 7.23 | Association Results–Professional Qualification | 162 |
| Table 7.24 | Association Results–Teaching same subject as Highest Degree | 162 |
| Table 7.25 | Association Results–Employment Status | 162 |
| Table 7.26 | Association Results–LO document available at school | 162 |
| Table 7.27 | Association Results–Interaction with SMC | 162 |
| Table 7.28 | Association Results–Attitudes and Views | 163 |
| Table 7.29 | Association Results–Challenges in the Classroom Transactions | 163 |
| Table 7.30 | Association Results–Problems with Facilities | 163 |
| Table 7.31 | Association Results–Tools and Techniques | 164 |
| Table 7.32 | Association Results–Availability of resources to implement the strategies | 164 |
| Table 7.33 | Association Results–Teaching Resources | 164 |
| Table 7.34 | Profiles of HIGH and LOW Performing States | 166 |
| Table A-1 | Environmental Studies LOs Class III | 183 |
| Table A-2 | Language LOs Class III | 184 |
| Table A-3 | Mathematics LOs Class III | 184 |
| Table A-4 | Environmental Studies LOs Class V | 185 |
| Table A-5 | Language LOs Class V | 185 |
| Table A-6 | Mathematics LOs Class V | 186 |
| Table A-7 | Language LOs Class VIII | 187 |
| Table A-8 | Mathematics LOs Class VIII | 187 |
| Table A-9 | Science LOs Class VIII | 188 |
| Table A-10 | Social Science LOs Class VIII | 189 |
| Table D-1 | Overview of Calibrations | 194 |
| Table D-2 | Overview of Calibrations | 195 |
| Table G-1 | Specific Performance Level Descriptors for Language, Class III Advanced | 202 |
| Table G-2 | Specific Performance Level Descriptors for Language, Class III Proficient | 202 |
| Table G-3 | Specific Performance Level Descriptors for Language, Class III Basic | 203 |
| Table G-4 | Specific Performance Level Descriptors for Language, Class III Below Basic | 203 |
| Table G-5 | Specific Performance Level Descriptors for Language, Class V Advanced | 204 |
| Table G-6 | Specific Performance Level Descriptors for Language, Class V Proficient | 205 |
| Table G-7 | Specific Performance Level Descriptors for Language, Class V Basic | 205 |
| Table G-8 | Specific Performance Level Descriptors for Language, Class V Below Basic | 206 |
| Table G-9 | Specific Performance Level Descriptors for Language, Class VIII Advanced | 207 |</p>
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-10</td>
<td>Specific Performance Level Descriptors for Language, Class VIII Proficient</td>
<td>208</td>
</tr>
<tr>
<td>G-11</td>
<td>Specific Performance Level Descriptors for Language, Class VIII Basic</td>
<td>208</td>
</tr>
<tr>
<td>G-12</td>
<td>Specific Performance Level Descriptors for Language, Class VIII Below Basic</td>
<td>209</td>
</tr>
<tr>
<td>G-13</td>
<td>Specific Performance Level Descriptors for Mathematics, Class III Advanced</td>
<td>209</td>
</tr>
<tr>
<td>G-14</td>
<td>Specific Performance Level Descriptors for Mathematics, Class III Proficient</td>
<td>210</td>
</tr>
<tr>
<td>G-15</td>
<td>Specific Performance Level Descriptors for Mathematics, Class III Basic</td>
<td>210</td>
</tr>
<tr>
<td>G-16</td>
<td>Specific Performance Level Descriptors for Mathematics, Class III Below Basic</td>
<td>211</td>
</tr>
<tr>
<td>G-17</td>
<td>Specific Performance Level Descriptors for Mathematics, Class V Advanced</td>
<td>211</td>
</tr>
<tr>
<td>G-18</td>
<td>Specific Performance Level Descriptors for Mathematics, Class V Proficient</td>
<td>212</td>
</tr>
<tr>
<td>G-19</td>
<td>Specific Performance Level Descriptors for Mathematics, Class V Basic</td>
<td>213</td>
</tr>
<tr>
<td>G-20</td>
<td>Specific Performance Level Descriptors for Mathematics, Class V Below Basic</td>
<td>213</td>
</tr>
<tr>
<td>G-21</td>
<td>Specific Performance Level Descriptors for Mathematics, Class VIII Advanced</td>
<td>214</td>
</tr>
<tr>
<td>G-22</td>
<td>Specific Performance Level Descriptors for Mathematics, Class VIII Proficient</td>
<td>214</td>
</tr>
<tr>
<td>G-23</td>
<td>Specific Performance Level Descriptors for Mathematics, Class VIII Basic</td>
<td>215</td>
</tr>
<tr>
<td>G-24</td>
<td>Specific Performance Level Descriptors for Mathematics, Class VIII Below Basic</td>
<td>215</td>
</tr>
<tr>
<td>G-25</td>
<td>Specific Performance Level Descriptors for Environmental Studies, Class III Advanced</td>
<td>216</td>
</tr>
<tr>
<td>G-26</td>
<td>Specific Performance Level Descriptors for Environmental Studies, Class III Proficient</td>
<td>217</td>
</tr>
<tr>
<td>G-27</td>
<td>Specific Performance Level Descriptors for Environmental Studies, Class III Basic</td>
<td>218</td>
</tr>
<tr>
<td>G-28</td>
<td>Specific Performance Level Descriptors for Environmental Studies, Class III Below Basic</td>
<td>219</td>
</tr>
<tr>
<td>G-29</td>
<td>Specific Performance Level Descriptors for Environmental Studies, Class V Advanced</td>
<td>220</td>
</tr>
<tr>
<td>G-30</td>
<td>Specific Performance Level Descriptors for Environmental Studies, Class V Proficient</td>
<td>222</td>
</tr>
<tr>
<td>G-31</td>
<td>Specific Performance Level Descriptors for Environmental Studies, Class V Basic</td>
<td>223</td>
</tr>
<tr>
<td>G-32</td>
<td>Specific Performance Level Descriptors for Environmental Studies, Class V Below Basic</td>
<td>224</td>
</tr>
<tr>
<td>G-33</td>
<td>Specific Performance Level Descriptors for Science, Class VIII Advanced</td>
<td>225</td>
</tr>
<tr>
<td>G-34</td>
<td>Specific Performance Level Descriptors for Science, Class VIII Proficient</td>
<td>226</td>
</tr>
<tr>
<td>G-35</td>
<td>Specific Performance Level Descriptors for Science, Class VIII Basic</td>
<td>227</td>
</tr>
<tr>
<td>G-36</td>
<td>Specific Performance Level Descriptors for Science, Class VIII Below Basic</td>
<td>228</td>
</tr>
<tr>
<td>G-37</td>
<td>Specific Performance Level Descriptors for Social Science, Class VIII Advanced</td>
<td>229</td>
</tr>
<tr>
<td>G-38</td>
<td>Specific Performance Level Descriptors for Social Science, Class VIII Proficient</td>
<td>230</td>
</tr>
<tr>
<td>G-39</td>
<td>Specific Performance Level Descriptors for Social Science, Class VIII Basic</td>
<td>231</td>
</tr>
<tr>
<td>G-40</td>
<td>Specific Performance Level Descriptors for Social Science, Class VIII Below Basic</td>
<td>232</td>
</tr>
<tr>
<td>H-1</td>
<td>Field Tryout Result for Class III, EVS</td>
<td>233</td>
</tr>
<tr>
<td>H-2</td>
<td>Field Tryout Result for Class III, Language</td>
<td>234</td>
</tr>
<tr>
<td>H-3</td>
<td>Field Tryout Result for Class III, Mathematics</td>
<td>235</td>
</tr>
<tr>
<td>H-4</td>
<td>Field Tryout Result for Class V, EVS</td>
<td>236</td>
</tr>
<tr>
<td>H-5</td>
<td>Field Tryout Result for Class V, Language</td>
<td>237</td>
</tr>
<tr>
<td>H-6</td>
<td>Field Tryout Result for Class V, Mathematics</td>
<td>238</td>
</tr>
<tr>
<td>H-7</td>
<td>Field Tryout Result for Class VIII, Language</td>
<td>239</td>
</tr>
<tr>
<td>H-8</td>
<td>Field Tryout Result for Class VIII, Mathematics</td>
<td>240</td>
</tr>
<tr>
<td>H-9</td>
<td>Field Tryout Result for Class VIII, Science</td>
<td>241</td>
</tr>
<tr>
<td>H-10</td>
<td>Field Tryout Result for Class VIII, Social Science</td>
<td>242</td>
</tr>
<tr>
<td>I-1</td>
<td>List of Workshops for Item Development and Finalization</td>
<td>243</td>
</tr>
<tr>
<td>I-2</td>
<td>District Level Workshop Schedule</td>
<td>245</td>
</tr>
</tbody>
</table>
# List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>NAS Timeline</td>
<td>2</td>
</tr>
<tr>
<td>1.2</td>
<td>NAS 2017 Processes and Steps</td>
<td>5</td>
</tr>
<tr>
<td>2.1</td>
<td>NAS Activities</td>
<td>11</td>
</tr>
<tr>
<td>2.2</td>
<td>Details of Test forms</td>
<td>14</td>
</tr>
<tr>
<td>2.3</td>
<td>Proficiency Bands (Exemplar)</td>
<td>21</td>
</tr>
<tr>
<td>4.1</td>
<td>NAS 2017 Web Application</td>
<td>54</td>
</tr>
<tr>
<td>4.2</td>
<td>Preparatory Activities for Development of NAS 2017 Web Application</td>
<td>54</td>
</tr>
<tr>
<td>4.3</td>
<td>Snapshot of the offline tool.</td>
<td>56</td>
</tr>
<tr>
<td>5.1</td>
<td>Performance of States in Class III Language</td>
<td>65</td>
</tr>
<tr>
<td>5.2</td>
<td>Performance of States in Class III Mathematics</td>
<td>66</td>
</tr>
<tr>
<td>5.3</td>
<td>Performance of States in Class III Environmental Studies</td>
<td>67</td>
</tr>
<tr>
<td>5.4</td>
<td>Performance of States in Class V Language</td>
<td>68</td>
</tr>
<tr>
<td>5.5</td>
<td>Performance of States in Class V Mathematics</td>
<td>69</td>
</tr>
<tr>
<td>5.6</td>
<td>Performance of States in Class V Environmental Studies</td>
<td>70</td>
</tr>
<tr>
<td>5.7</td>
<td>Performance of States in Class VIII Language</td>
<td>71</td>
</tr>
<tr>
<td>5.8</td>
<td>Performance of States in Class VIII Mathematics</td>
<td>72</td>
</tr>
<tr>
<td>5.9</td>
<td>Performance of States in Class VIII Science</td>
<td>73</td>
</tr>
<tr>
<td>5.10</td>
<td>Performance of States in Class VIII Social Science</td>
<td>74</td>
</tr>
<tr>
<td>5.11</td>
<td>Performance of States by Gender in Class III Language</td>
<td>75</td>
</tr>
<tr>
<td>5.12</td>
<td>Performance of States by Gender in Class III Mathematics</td>
<td>76</td>
</tr>
<tr>
<td>5.13</td>
<td>Performance of States by Gender in Class III Environmental Studies</td>
<td>77</td>
</tr>
<tr>
<td>5.14</td>
<td>Performance of States by Gender in Class V Language</td>
<td>78</td>
</tr>
<tr>
<td>5.15</td>
<td>Performance of States by Gender in Class V Mathematics</td>
<td>79</td>
</tr>
<tr>
<td>5.16</td>
<td>Performance of States by Gender in Class V Environmental Studies</td>
<td>80</td>
</tr>
<tr>
<td>5.17</td>
<td>Performance of States by Gender in Class VIII Language</td>
<td>81</td>
</tr>
<tr>
<td>5.18</td>
<td>Performance of States by Gender in Class VIII Mathematics</td>
<td>82</td>
</tr>
<tr>
<td>5.19</td>
<td>Performance of States by Gender in Class VIII Science</td>
<td>83</td>
</tr>
<tr>
<td>5.20</td>
<td>Performance of States by Gender in Class VIII Social Science</td>
<td>84</td>
</tr>
<tr>
<td>5.21</td>
<td>Performance of States by School Location in Class III Language</td>
<td>85</td>
</tr>
<tr>
<td>5.22</td>
<td>Performance of States by School Location in Class III Mathematics</td>
<td>86</td>
</tr>
<tr>
<td>5.23</td>
<td>Performance of States by School Location in Class III Environmental Studies</td>
<td>87</td>
</tr>
<tr>
<td>5.24</td>
<td>Performance of States by School Location in Class V Language</td>
<td>88</td>
</tr>
<tr>
<td>5.25</td>
<td>Performance of States by School Location in Class V Mathematics</td>
<td>89</td>
</tr>
<tr>
<td>5.26</td>
<td>Performance of States by School Location in Class V Environmental Studies</td>
<td>90</td>
</tr>
<tr>
<td>5.27</td>
<td>Performance of States by School Location in Class VIII Language</td>
<td>91</td>
</tr>
<tr>
<td>5.28</td>
<td>Performance of States by School Location in Class VIII Mathematics</td>
<td>92</td>
</tr>
<tr>
<td>5.29</td>
<td>Performance of States by School Location in Class VIII Science</td>
<td>93</td>
</tr>
<tr>
<td>5.30</td>
<td>Performance of States by School Location in Class VIII Social Science</td>
<td>94</td>
</tr>
<tr>
<td>5.31</td>
<td>Performances of States by School Management in Class III Language</td>
<td>95</td>
</tr>
</tbody>
</table>
Figure 5.32 Performances of States by School Management in Class III Mathematics  96
Figure 5.33 Performance of States by School Management in Class III Environmental Studies  97
Figure 5.34 Performances of States by School Management in Class V Language  98
Figure 5.35 Performances of States by School Management in Class V Mathematics  99
Figure 5.36 Performance of States by School Management in Class V Environmental Studies  100
Figure 5.37 Performance of States by School Management in Class VIII Language  101
Figure 5.38 Performance of States by School Management in Class VIII Mathematics  102
Figure 5.39 Performance of States by School Management in Class VIII Science  103
Figure 5.40 Performance of States by School Management in Class VIII Social Science  104
Figure 5.45 National Performance Class wise and Subject wise  115
Figure 5.41 Participation by Gender  115
Figure 5.43 Participation by School Management  115
Figure 5.42 Participation by Location  115
Figure 5.44 Participation by Social Groups  115
Figure 5.46 Performance of Students by Gender  118
Figure 5.47 Performance of Students by Location  119
Figure 5.48 Performance of Students by School Management  120
Figure 5.49 Performance of Students by Social Groups  121
Figure 6.2 The Process of Setting Cut Scores  135
Figure 6.4 Ordered item booklet with cut scores.  135
Figure 6.5 Example of Feedback Agreement Data After Round 2 for Mathematics Class III  135
Figure 6.6 Example of Feedback Impact Data After Round 2 Mathematics Class III  136
Figure 6.7 Example of Feedback Cut Score Trend by Rounds for Mathematics Class III  136
Figure 6.8 Example of Feedback Impact Data by Rounds for Mathematics Class III  136
Figure 6.9 Example of Feedback Impact Data by Rounds for Mathematics Class III  136
Figure 6.10 Example of Impact Data Across Subjects Within Class III for Horizontal Moderation  136
Figure 6.11 Example of Impact Data Across Classes Within Mathematics III for Vertical Moderation  137
Figure 6.12 Percentage of students in each performance level (National Results)  138
Figure 6.13 Class III National Results by Gender  138
Figure 6.14 Class V National Results by Gender  138
Figure 6.15 Class VIII National Results by Gender  138
Figure 6.16 Class III National Results by School Location  138
Figure 6.17 Class V National Results by School Location  138
Figure 6.18 Class VIII National Results by School Location  138
Figure 6.19 Class III National Results by School Management  139
Figure 6.20 Class V National Results by School Management  139
Figure 6.21 Class VIII National Results by School Management  139
Figure 6.22 Class III National Results by Social Groups  139
Figure 6.23 Class V National Results by Social Groups  139
Figure 6.24 Class VIII National Results by Social Groups  139
Figure 6.25 Language Class III (LA03) State Results by Performance Levels  140
Figure 6.26 Mathematics Class III (MA03) State Results by Performance Levels  141
Figure 6.27 Environmental Studies Class III (EV03) State Results by Performance Levels  142
Figure 6.28 Language Class V (LA05) State Results by Performance Levels  143
Figure 6.27  Mathematics Class V (MA05) State Results by Performance Levels  
Figure 6.28  Environmental Studies Class V (EV05) State Results by Performance Levels  
Figure 6.29  Language Class VIII (LA08) State Results by Performance Levels  
Figure 6.30  Mathematics Class VIII (MA08) State Results by Performance Levels  
Figure 6.31  Science Class VIII (SC08) State Results by Performance Levels  
Figure 6.32  Social Science Class VIII (SS08) State Results by Performance Levels  
Figure 6.33  Combined Results by Performance Levels for Class III  
Figure 6.34  Combined Results by Performance Levels for Class V  
Figure 6.35  Combined Results by Performance Levels for Class VIII  
Figure 6.36  Percentage of students in each performance level (National results)  
Figure 7.1  High-Low State Profiles by Teacher Background - School Environment  
Figure 7.2  High-Low State Profiles by Teacher Perception - School Environment  
Figure 7.3  High-Low State Profiles by Teacher Activities  
Figure 7.4  High-Low State Profiles by School Background  
Figure 7.5  High-Low State Profiles by Student Background  
Figure 8.1  Exemplar of DRC for Andamans District for Class III in EVS  
Figure 8.2  Snapshot of an exemplar SLR  
Figure 8.3  Snapshot of Web Application
1. Introduction

The National Achievement Survey (NAS) is a large scale survey of students’ learning, administered periodically, since 2001, at the elementary level and from 2015 at the secondary level, to monitor the health of the country’s education system. NAS is led by the Educational Survey Division (ESD), National Council of Educational Research and Training (NCERT), under the aegis of Department of School Education and Literacy (DSEL), Ministry of Human Resource Development (MHRD). NAS conducted in November 2017 was administered in 7011 Districts of 36 States and UTs. Nearly 2.2 million students studying in 1,10,000 (approx) Government and Government aided schools were tested in the learning outcomes developed by the Council. To understand the contextual variables three questionnaires were developed; Pupil Questionnaire (PQ), School Questionnaire (SQ) and Teacher Questionnaire (TQ). The Teacher Questionnaire was administered on 2,87,393 teachers. In addition to documenting the implementation and findings of NAS 2017, the current report also summarizes the salient features and its departures from previous cycles.

West Bengal (Darjeeling) and Tamil Nadu (Krishnagiri) did not participate in NAS 2017.
NAS provides a ‘snapshot of what students know and can do’ at the end of Classes III, V, VIII and X in key curricular areas. NAS findings inform stakeholders at varied levels in policy, planning, practices and teaching learning processes to improve quality and ensure equity in learning. It apprises decision makers, academicians, teachers and researchers about the learning levels of students, probable determinants and variations in learning among diversified groups.

Large-scale assessment surveys linked to learning outcomes are being increasingly done in many countries. International Assessments such as the Programme for International Student Assessment (PISA) and the Trends in Mathematics and Science Study (TIMSS) are much in vogue. They collect vast amounts of data on schools, students and households. Apart from participating in international surveys, many countries are implementing national assessment surveys like National Assessment of Educational Progress (NAEP) in the USA and National Assessment Program (NAP) in Australia.

### 1.1 History of NAS in India

#### a) Background

The National Achievement Survey was originally planned and designed to be an independent project of NCERT. However, in 2000, NAS got subsumed under the Sarva Shiksha Abhiyan (SSA) of MHRD. Under SSA, the original strategy was to administer three NAS cycles, wherein, each cycle covered classes III, V and VII/VIII. The three cycles were to be called as Baseline, Mid Term and Terminal Achievement Surveys. The Baseline Achievement Survey (BAS) was carried out during 2001-2004, followed by the Mid-term Achievement Survey (MAS) which was carried out between 2005-2008.

Over the last decade of SSA implementation, focus shifted from dealing with challenges around access, to improving quality of learning. Hence, NAS emerged as a tool to provide periodic feedback to the system on the health of the education in the country. NAS became a regular and ongoing feature of the Indian education system, with each round of NAS being referred to as a ‘Cycle’. Therefore, the Terminal Achievement Survey (TAS) scheduled to take place between 2009 – 2013 was renamed as Cycle 3. Students of Classes III, V and VIII were tested once every three years.

During the third cycle of NAS, NCERT, made the imminent shift of analyzing NAS results through the Item Response Theory (IRT). Usage of IRT made it possible to link and thus, to compare student scores over time, even if different tests were used.

Under Rashtriya Madhyamik Shiksha Abhiyan (RMSA), NAS was conducted in Class X in 2015 to assess student learning at the end of the secondary stage. The second cycle of NAS Class X was conducted in 2018.

NAS Timeline is shown in Figure 1.1.

#### Figure 1.1: NAS Timeline

<table>
<thead>
<tr>
<th>Survey Cycle</th>
<th>Class III</th>
<th>Class V</th>
<th>Class VIII</th>
<th>Class X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle III</td>
<td>2012-2013</td>
<td>2009-2011</td>
<td>2010-2013</td>
<td></td>
</tr>
</tbody>
</table>

**Subjects Tested**

- Mathematics and Language
- Mathematics, Language and Environmental Studies
- Mathematics, Language, Science and Social Science
- Background Questionnaires – Student, Teacher and School
b) NAS 2017: The New Initiative

Up till the fourth cycle of NAS, Class III students were tested in Language and Mathematics; Class V students in EVS, Language and Mathematics; Class VIII students in Language, Mathematics, Science, and Social Sciences. Test questions were framed on the basis of common core content identified across States/UTs in different subjects.

In 2017, NCERT took a quantum leap forward by defining the subject and class wise Learning Outcomes (LOs) up to the Elementary Stage. The survey was designed to measure student attainment of LOs at the end of Classes III, V and VIII by assessing students through variety of items measuring skills and competencies.

It was envisaged that through post NAS interventions, the classroom teaching-learning processes would be geared towards enhancing the attainment of LOs and competencies amongst students.

Salient Features of the Survey

The salient features of NAS 2017 are given as under:

1. Student achievement was mapped against LOs.
2. Students of all the three classes i.e. III, V and VIII were assessed across the country, on a single day.
3. District was taken as the unit of reporting.

4. Technology was extensively used, e.g., data was uploaded onto a central web application for analysis and report generation.
5. District Report Cards (DRCs) were auto generated from the web application.
6. Using the findings reported in DRCs, NCERT helped districts frame post NAS interventions.
7. Reports were formally shared with Chief Minister (CM)/ Member of Parliaments (MPs) from all States/UTs.
8. Reports were put in public domain for wider dissemination.

IT IS….

- Evidence for systemic feedback
- A summary of Districts, States/UTs, Nation’s aggregated performance against the Learning Outcomes
- Identification of learning gaps at the District, State and National levels
- Evidence for differential planning within District/ State
- Contextual analysis of the background variables vis-a-vis the performance in the learning outcomes
- Inclusive in nature

IT IS NOT….

- An examination
- Indicative of individual student’s performance against Learning Outcomes
- Indicative of an individual school’s performance against Learning Outcomes

Table 1.1: Key Characteristics of NAS 2017

<table>
<thead>
<tr>
<th>IT IS….</th>
<th>IT IS NOT….</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence for systemic feedback</td>
<td>An examination</td>
</tr>
<tr>
<td>A summary of Districts, States/UTs, Nation's aggregated performance against the Learning Outcomes</td>
<td>Indicative of individual student's performance against Learning Outcomes</td>
</tr>
<tr>
<td>Identification of learning gaps at the District, State and National levels</td>
<td>Indicative of an individual school's performance against Learning Outcomes</td>
</tr>
<tr>
<td>Evidence for differential planning within District/ State</td>
<td>Contextual analysis of the background variables vis-a-vis the performance in the learning outcomes</td>
</tr>
<tr>
<td>Inclusive in nature</td>
<td></td>
</tr>
</tbody>
</table>

1 On 20th February 2017, Central Right to Education (RTE) Rules were amended to include reference on class and subject-wise Learning Outcomes. RTE amendment has made it mandatory for State Governments to map progress in student learning against Learning Outcomes.
Table 1.2: Comparison between Previous NAS Cycles and NAS 2017

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Previous NAS Cycles</th>
<th>NAS 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameters of Student Testing</td>
<td>• Based on State/ UT common core curriculum</td>
<td>• Based on Learning Outcomes developed by NCERT</td>
</tr>
<tr>
<td>Objectives</td>
<td>• Systemic Feedback at State/ UT level</td>
<td>• Decentralized systemic feedback on student achievement at District, State and National levels</td>
</tr>
<tr>
<td>Level of Sampling</td>
<td>• State level sample</td>
<td>• District level sample</td>
</tr>
<tr>
<td>Sample Size</td>
<td>• More than one lakh in Class III (cycle 3), more than one lakh in Class V (cycle 3) and nearly two lakhs in Class VIII (cycle 3)</td>
<td>• Nearly 2.2 million in Classes III, V and VIII (Combined)</td>
</tr>
<tr>
<td>Timeline</td>
<td>• Implementation and reporting completed within 3 years</td>
<td>• District and State level results released within the same academic year</td>
</tr>
<tr>
<td>Administration</td>
<td>• Students of Classes III, V and VIII assessed in different years</td>
<td>• Students of classes III, V and VIII tested on a single day i.e. 13 November 2017</td>
</tr>
<tr>
<td>Monitoring</td>
<td>• State level officials</td>
<td>• MHRD, NCERT</td>
</tr>
<tr>
<td>Survey Outcomes</td>
<td>• State Reports</td>
<td>• District Monitoring Unit (DMU)</td>
</tr>
<tr>
<td>Dissemination Strategy</td>
<td>• National Report</td>
<td>• Inter-Ministerial Observers</td>
</tr>
<tr>
<td></td>
<td>• Joint Review Missions (JRMs)</td>
<td>• International Organizations</td>
</tr>
<tr>
<td></td>
<td>• MHRD/NCERT website</td>
<td></td>
</tr>
<tr>
<td>Partners</td>
<td>• MHRD</td>
<td>• Central Advisory Board of Education (CABE Committee)</td>
</tr>
<tr>
<td></td>
<td>• NCERT</td>
<td>• MHRD/ NCERT website</td>
</tr>
<tr>
<td></td>
<td>• Technical Partners brought in by funding agencies</td>
<td>• District level workshops</td>
</tr>
<tr>
<td></td>
<td>• SCERTs</td>
<td>• Block level and cluster level personals</td>
</tr>
<tr>
<td></td>
<td>• DIETs</td>
<td>• School leaders</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• State level workshops</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• MPs from Rajya Sabha and Lok Sabha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Chief Ministers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• State Level Education Functionaries such as Principal Secretaries, SPDs and SCERT Directors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• NAS PMU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• NAS Mobile Application</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SCERTs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SPD SSA offices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• DIETs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• District level educational functionaries</td>
</tr>
</tbody>
</table>
**1.2 Process**

NAS 2017 provides reliable information to various stakeholders on the health of the education system, with specific reference to issues of quality, equity and efficiency. Activities undertaken during the design, implementation and reporting of NAS are shown in Figure 1.2.

It was ensured that the enlisted activities were designed, implemented and reported using international best practices and met the highest standard of technical rigour.

**1.3 Objectives**

NAS 2017 was designed with the following four objectives:

1. To report performance of students in different subjects and classes on specific learning outcomes
2. To compare the average performance of the following group of children:
   a) Girls and Boys
   b) Rural and Urban children
   c) Students studying in Government and Government Aided schools
   d) Students belonging to different social categories i.e. General, Scheduled Caste, Scheduled Tribes and Other Backward Classes
3. To identify key learning gaps in achievement of learning outcomes
4. To identify institutional and contextual factors that affect learning achievement of students

During the preparatory phase of NAS 2017, it became evident that NAS could be potentially used to give systemic level feedback on students' attainment against LOs and hence post-NAS Intervention strategy was planned to be undertaken at District and State/UT level.

Key objectives for the Post NAS Intervention are given below:

a) Support States / UTs / Districts / Blocks / Schools to interpret and understand findings of NAS.

b) Support States / UTs / Districts / Blocks to improve School wise attainment of LOs.

c) Ensure academic support for design and implementation of interventions to improve the learning levels of students.

National/ State/District and Block level collaboration was made to enable schools improve their LO attainment.

**1.4 Research Questions**

The following research questions were framed for NAS 2017:

1. How the performance of students varied in Language, Maths and EVS in Class III and V, and Language, Maths, Science and Social Science in Class VIII?

2. Is there any significant difference in performance of boys and girls in Language, Maths and EVS in Class III and V, and Language, Maths, Science and Social Science in Class VIII?
3. Is there any significant difference in students’ performance belonging to rural and urban schools?

4. How does the performance of the students vary in Language, Maths and EVS in Classes III and V, and Language, Maths, Science and Social Science in Class VIII across social groups?

5. How does the performance of the students vary in Language, Maths and EVS in Classes III and V, and Language, Maths, Science and Social Science in Class VIII across school managements?

The above research questions enabled the development of a data analysis framework.

1.5 Sample
In NAS 2017, school sample drawn through the Probability Proportionate to Size (PPS) methodology. About 2.2 million children from 1,10,000 schools spread across all districts in India were selected as sample of the study.

1.6 Assessment Framework

a) Test Design
Well designed assessment provides learners with feedback and sets standards for them to strive towards achieving learning outcomes.

The details about the test are given below:
- Paper and pencil based assessments were conducted for the students of all the classes.
- Assessments lasted for 90 minutes for Classes III and V; and 120 minutes for class VIII.
- All the items were standard multiple choice with four responses from which the students were required to select the correct option.
- Classes III and V students were tested in Language, Mathematics and Environmental Studies (EVS). However, Class VIII students were tested in Language, Mathematics, Science and Social Science.
- Two test forms were developed for each class. Each test booklet included 45 items (MCQs) for Classes III and V; and 60 items for Class VIII based on learning outcomes.

Details of the class and subject wise test forms are summarized in Table 1.3.

<table>
<thead>
<tr>
<th>Classes</th>
<th>Subjects</th>
<th>Test Forms (Codes)</th>
<th>Number of items</th>
<th>Question Type (MCQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class III</td>
<td>Language</td>
<td>31, 32</td>
<td>45 items (15 items each on Language, Mathematics and EVS) included in test forms 31 and 32</td>
<td>Duration of test: 90 minutes</td>
</tr>
<tr>
<td></td>
<td>Mathematics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EVS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class V</td>
<td>Language</td>
<td>51, 52</td>
<td>45 items (15 items each on Language, Mathematics and EVS) included in test forms 51 and 52</td>
<td>Duration of test: 90 minutes</td>
</tr>
<tr>
<td></td>
<td>Mathematics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EVS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class VIII</td>
<td>Language</td>
<td>81, 82</td>
<td>60 items (15 items each on Language, Mathematics, Science and Social Science) included in test forms 81 and 82</td>
<td>Duration of test: 120 minutes</td>
</tr>
<tr>
<td></td>
<td>Mathematics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Science</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Science</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Each subject included 25 unique items. 5 items were common (anchor items) in both the test forms.
b) Test Content
All of the NAS items were mapped to the class and subject wise Learning Outcomes.

1.7 Administration

National Level
Preparatory work for NAS 2017 commenced several months prior to the actual date of NAS administration. At the national level, preparatory work was led by MHRD and NCERT. A Steering Committee was established to guide and facilitate all the activities of NAS. Some of the activities performed at National Level are as enlisted below:

• Hold consultations at national level to finalize the objectives, policy decisions and design.
• Hold consultations with state institutions to reach an agreement and inform the assessment criteria and development of assessment framework.
• Build capacity at the State/UT level through training a cadre of State Level Master Trainers (SLMTs).
• Develop the survey tools – achievement tests and questionnaires – Pupil (PQ), Teacher (TQ) and School (SQ).
• Facilitate translation and linguistic control of tests in Hindi and regional languages with the help of States/UTs.
• Conduct field trial, review and quality assurance of NAS tests and questionnaires.
• Develop Operational Guidelines-cum-Training Manual.
• Design and develop a NAS web application for data collation, monitoring of NAS state implementation and timely generation of reports.
• Develop a state activity progress tracker for monitoring and reviewing the progress of NAS.
• Established Control room at NCERT to:
  a) address all queries related to NAS within 24 hours with documentation
  b) functional for 24 hours, five days before the Day of Assessment
• Develop District, State and National Reports and Policy Briefs
• Develop an action plan to facilitate implementation of quality interventions based on NAS findings
• Track the progress of NAS implementation at the National, State and District levels

State Level
At the State and District levels, SPD SSA, SCERTs/ SIEs, DIETs and MIS Coordinators undertook preparatory tasks for implementing NAS 2017 in their respective areas.

SPD Office
SPD office ensured availability of funds and infrastructure for NAS 2017 implementation and post NAS intervention activities. SPD office also identified, nominated and trained personnel and teams for monitoring the survey.

SCERTs
Academic activities of the survey were spearheaded by SCERTs. Tasks such as translations of tests, designing and framing of post NAS interventions were led by SCERTs.

SCERTs also nominated the District Coordinators.

District Coordinators (DCs)
DCs led the school related communication and activities. DCs assured quality trainings of Field Investigators (FIs). Some of the activities performed by DCs are enlisted below:

• Verify the existence of sample schools, medium(s) of instruction in Classes III, V and VIII in the school and number of students in the sample school with the school’s Unified District Information System for Education (UDISE) code and report discrepancy, if any.
• Ensure that a confidentiality agreement letter was signed by the head teacher before handing over the NAS test material.
• Provide printed copy of duly signed letter of introduction to each Field Investigator.
• Organize training workshops for the Field Investigators.

Field Investigators (FIs)
District Institute of Education and Training (DIET) students were appointed as FIs. FIs administered the survey on 13 November 2017.

Personnel not involved in the state government’s education system were trained as Field investigators for administration of the survey to introduce the element of third party administration. To maintain confidentiality, at all levels an undertaking was asked for, specially during the activities of translation, printing, and transporting.

Successful completion of NAS activities required the above mentioned organizations and personnel to work in collaboration with each other.
1.8 Monitoring

NAS 2017 was monitored and quality assured at various levels. At the national level, MHRD and NCERT supervised the completion of the NAS preparatory activities. Control unit was set up at NCERT, one month prior and at SCERT one week before the administration of the test. At the District level, the Monitoring Unit oversaw and reviewed the NAS preparatory activities.

NAS, on the day of its administration was monitored by Independent Observers. One Observer per Block was nominated for the survey. Each Observer was to fill a Monitoring Proforma and submit it to the SPD office.

1.9 Reporting

Under NAS 2017, for the first time, results have been reported in the same academic session, as the conduct of the survey. Auto generated District Report Cards (DRCs) were put in public view within two months of conducting the survey. Subsequently, State Learning Reports (SLRs) were also released. National Report to inform Policy, Practice and Teaching Learning (NPPTL) is the final report in the series of reports for NAS 2017.

The reports at all levels i.e. District, State and National focus on student attainment against Learning Outcomes (LOs).

Each LO was measured by one or more items. For each district, 10 District Report Cards were autogeneraled. These DRCs pertained to the students’ attainment of LOs in different classes and subjects. In the DRCs, the attainment of LOs by the students in the district in a particular class and in a subject is given in percentages. Example of few LOs Class and Subject wise are given in Table 1.4.

LO wise performance is shown in the DRCs, for example, a District recorded a performance of 46% on a Class III EVS LO (identifies relationships with and among family members). This meant that 46% of correct responses were received in the District for the question/group of questions which measured the LO.

This helps districts in developing interventions for LOs in which districts support the differential planning at the District level.

Low performance in specific LOs could help trigger a relook at the availability and quality of existing Teaching Learning Material (TLM) and Trainings.

Achievement against the tested LOs have been aggregated at the district level in the DRCs. Similar aggregation has been shown at the State level in the SLRs. Analysis of pupil, teacher and school questionnaires have been included in SLRs and the National Report to inform Policy, Practice and Teaching Learning (NPPTL).

With collaboration and support of NCERT, States and Districts are encouraged to design and frame interventions.

1.10 Dissemination and Post NAS Interventions

Several regional workshops are being organized to disseminate and discuss the findings of the DRCs and SLRs. The objectives of these workshop are as follows:

1. To sensitize the participants on how assessment helps to transform education system.
2. To share the experiences of the States/UTs in the conduct of the NAS.

Table 1.4: Class and Subject wise LO Exemplars

<table>
<thead>
<tr>
<th>Class</th>
<th>Subject</th>
<th>Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>EVS</td>
<td>Identifies relationship with and among family members</td>
</tr>
<tr>
<td>V</td>
<td>Mathematics</td>
<td>Estimates the volume of a solid body in known units</td>
</tr>
<tr>
<td>VIII</td>
<td>Language</td>
<td>Reads textual/non-textual materials with comprehension and identifies the details, characters, main idea and sequence of ideas and events while reading</td>
</tr>
</tbody>
</table>
3. To develop a common understanding on how NAS data will be used in policy, planning and improving pedagogical interventions.

NCERT in collaboration with UNICEF also developed a Data Visualization Application, which helps viewers to see the complex NAS data analytics in a simple and user friendly manner.

NCERT has also developed a document on Post NAS Interventions: Communication and Understanding of the DRCs, which clearly articulates the way to interpret and understand the DRCs. The document also lays down the actions which NCERT would take as a follow up of NAS. Follow up steps have been classified under short, mid and long term interventions, as summarized below in Table 1.5.

### Table 1.5: Short, Mid and Long Term NAS Interventions

<table>
<thead>
<tr>
<th>Duration</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short Term</strong></td>
<td>• Training of State Level Master Trainers (SLMTs) in communication and understanding of the DRCs</td>
</tr>
<tr>
<td></td>
<td>• Development of a District level intervention plan</td>
</tr>
<tr>
<td></td>
<td>• Introducing child centric pedagogy for achievement of the learning outcomes e.g. art and games integrated learning, experiential learning etc.</td>
</tr>
<tr>
<td></td>
<td>• Strengthening of State Annual Work Plan Budget (AWPBs) by using NAS data</td>
</tr>
<tr>
<td></td>
<td>• Development of ICT based Learning Resources/Material</td>
</tr>
<tr>
<td></td>
<td>• Data Sharing with States/UTs</td>
</tr>
<tr>
<td><strong>Mid Term</strong></td>
<td>• Development of National Policy Perspectives</td>
</tr>
<tr>
<td></td>
<td>• Curriculum Review and Reform</td>
</tr>
</tbody>
</table>

1.11 Limitations

- As the purpose of NAS was to assess the achievement of Government and Government Aided schools, private schools were excluded from the sample.
- Languages across India have differences in Grammar. This leads to difficulty in standardizing the procedures for scoring. Thus, only reading comprehension was tested across classes in the language subject.
2. Methodology

Well designed and rigorous methods are essential to collect reliable, valid and useful data. NAS data were collected and analyzed using technically robust psychometric standards and procedures, internationally accepted.

This section of the report provides an overview of the activities carried out during the design, administration, analysis and reporting of NAS 2017. Details are provided on test and questionnaire development, sampling, administration and monitoring, data management and analysis, reporting and dissemination.
2.1 NAS Tools Development

a) Development of Assessment Framework

Development of an assessment framework precedes the development of tests and questionnaires in a large scale assessment. Assessment frameworks explicitly define the aim/objectives of the assessment, and what it will cover in terms of content, skills and knowledge.

The assessment framework for NAS 2017 was based on assessing the learning levels of students against class and subject specific Learning Outcomes (LOs). In the year 2017, the union government amended Rule 23(2) under the Right to Education (RTE) Act making it compulsory for all state governments to codify expected levels of learning which students in Classes I to VIII should achieve in different subjects. The present NAS generates detailed report at the district level on the percentage of students achieving these learning outcomes. The district reports helps to develop evidenced based programmes for improving the quality of education. A framework of intervention was suggested to improve the quality of teaching and learning at the schools. The designing and implementation of these interventions included in its ambit the school leaders, teachers and the whole network of officials at clusters, blocks, DIETs, SCERT and the directorate of education at different levels in the States/UTs.

The learning outcome oriented assessment not only helped to make the shift in the focus of student learning from content to competencies. It also helped the teachers to divert their teaching-learning in the desired manner and make responsible and alert for ensuring quality education of other stakeholders especially the parents/guardians, School Management Committee (SMC) members, community and the state functionaries. The NAS assessment based on learning outcomes helped to guide and ensures the responsibility and accountability of different stakeholders.

The assessment was followed by provision of prompt feedback to all Districts and States/UTs regarding the status of their students’ attainment of LOs. States and Districts develop short and medium term interventions on the basis of the obtained feedback. NCERT facilitated the States and Districts to develop short term interventions.

In NAS 2017, achievement of students in relation to gender, location, social category and school management was measured and computed. In addition, questionnaires were administered to students, teachers and school principals to cull out relevant background factors which could be associated with student learning levels.

Both tests and questionnaires comprised Multiple Choice Questions (MCQs). Students of each class were assessed through two test forms. While, each test form of classes III and V comprised of 45 questions, each form of class VIII comprised of 60 questions. Each question was associated with the measurement of one LO. Class III and V students were tested on Language, Mathematics and EVS. Class VIII students were tested on Language, Mathematics, Science and Social Science.

The assessment framework was developed for each subject on the basis of input and feedback received from educationists, teachers, domain experts, item writers, data analysts and assessment experts.

Some exemplar LOs assessed in NAS 2017 are given in Table 2.1.

Table 2.1: Exemplar LOs assessed in NAS 2017

<table>
<thead>
<tr>
<th>Subject</th>
<th>Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class III</td>
</tr>
<tr>
<td></td>
<td>Class V</td>
</tr>
<tr>
<td></td>
<td>Class VIII</td>
</tr>
<tr>
<td>Language (Reading</td>
<td>Reads small texts with comprehension i.e., identifies main ideas, details,</td>
</tr>
<tr>
<td>(Reading Comprehension)</td>
<td>sequence and draws conclusions</td>
</tr>
<tr>
<td></td>
<td>Reads comprehends independently the storybooks, news items/ headlines,</td>
</tr>
<tr>
<td></td>
<td>advertisements etc.</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Reads and writes numbers up to 999 using place value</td>
</tr>
<tr>
<td></td>
<td>Applies operations of numbers in daily life situations</td>
</tr>
<tr>
<td>Environmental Studies</td>
<td>Identifies simple features (e.g. movement, at places found/ kept, eating habits,</td>
</tr>
<tr>
<td>(EVS)</td>
<td>sounds) of animals and birds in the immediate surroundings</td>
</tr>
<tr>
<td>Science</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td></td>
</tr>
</tbody>
</table>

1 For the complete list of tested LOs refer Appendix A
(b) Development of Tools : Tests and Questionnaires

Test development, Review and Finalization

The tools for carrying out any large survey need to be simple, understandable, valid and reliable. To measure the learning levels of classes III, V, and VIII students reliably, the construction of the achievement tests in key curricular subjects was a critically important activity. The tests needed to be pegged at a level wherein these activities measured the abilities of children across all the States. For this assessment frameworks were developed in different subjects. These frameworks described the competencies covered in the tests, the number and type of items used for testing each competency, the structure of the test forms and number of test forms used.

In order to measure each learning outcome with sufficient precision, two test forms were constructed for each class subject wise. A three dimensional grid for indicating the learning outcomes, competencies tested and the difficulty level of items, was prepared.

Item Writing

The item writing process included plenary sessions on subject-specific workshops for writing and reviewing/editing test items.

The general principles followed during the item development workshop are as follows:

• Characteristics of sample-based achievement surveys (national and international)
• Test specifications and their role in test development
• Item writing rules and guidelines
• Procedures and checklists for reviewing the quality of items
• Introduction to classical item statistics
• Filling of three dimensional grid

Item Development Process

Item Development Process calls upon many constituents to guide the process and review the items created. The process for item development consisted of the following steps:

• Writing of Items
• Carrying out Pilot Tests of Items
• Conducting an extensive field trial
• Producing final source versions of all items in regional languages
• Preparing coding guides and coder training material, and
• Selecting and preparing items for the main survey

During the process of item development, focus was placed on the following common rules of item development, such as:

• All options of the item are plausible and mutually exclusive to each other
• Only one option is the correct answer (the key)
• Item dependencies need to be avoided

Test items were developed through workshop mode, in consultation with teachers, subject experts and faculty/personnel from different departments of NCERT and assessment agencies. List of workshops for item development are appended in Appendix I.

All test items were written in English, and thereafter translated in Hindi and other regional languages. MCQs were developed for the intended classes and subjects. Each item/MCQ consisted of stem (question) and four options (distractors). The options included only one key (correct answer).

Efforts were made to develop items of varying difficulty levels and complexities, for as many LOs as possible. Illustrations/diagrams were used in a few items to break the monotony of answering the questions for students.

Developed tests were translated and field tested in 6 languages. Optical Mark Recognition (OMR) sheets were used during the field test for recording the responses. Based on the field test results, test questions were extensively reviewed and improved upon. The result of the field tryouts are appended in Appendix H.

Two test forms were developed for each class. Test forms were numbered 31 and 32 for class III, 51 and 52 for class V and 81 and 82 for class VIII. Each test form for classes III and V consisted of 45 items. 15 test items in each subject Language, EVS and Mathematics. Class VIII test forms consisted of 60 items each. 15 test items in each subject Language, Mathematics, Science and Social Science. For each
Figure 2.2: Details of Test forms

### Class III
- Test Form 31
- Language
- Mathematics
- EVS

### Class V
- Test Form 51
- Language
- Mathematics
- EVS

### Class VIII
- Test Form 81
- Language
- Mathematics
- Science
- Social Science

subject, first 5 items were kept common across both the test forms e.g. in test forms 31 and 32, first five items for each subject were common\(^1\). (Figure 2.2)

Classes III and V students were given 90 minutes to complete the test. Class VIII students were provided 120 minutes for test completion.

Questions with appropriate difficulty level (0.20 to 0.80) and discrimination index (more than 0.25) were included in the final test forms.

**Questionnaire Development**

Three Questionnaires were developed for NAS 2017 – Pupil Questionnaire (PQ), Teacher Questionnaire (TQ) and School Questionnaire (SQ).

PQ consisted of 21 questions pertaining to the home background of students including questions on parents’ level of education and occupation; help available at home for studies from parents and liking of subjects and participation in classroom activities etc. (www.ncert.nic.in/programmes/NAS/pdf/Pupil_Questionaire.pdf)

TQ comprised of 20 questions covering information related to the age of teachers, educational and professional qualifications, experience, training programmes attended, classroom transaction practices affecting students absenteeism, classroom indiscipline etc. (www.ncert.nic.in/programmes/NAS/pdf/Teacher_Questionaire.pdf)

SQ sought information on 9 questions regarding awareness and sharing of the LO document amongst teachers, presence and usage of school library, monitoring of school activities etc. (www.ncert.nic.in/programmes/NAS/pdf/School_Questionaire.pdf)

**Translation and Vetting of Tests and Questionnaires**

NCERT developed the test items in English, which was the source language. In order to collect nationally comparable data, the equivalence of regional language versions was required. This means that the translation of materials met the stringent quality standards in each of the state language. Tests were translated in 20 languages. List of languages in which the test got translated is given in Appendix B.

States translated the tests and questionnaires in different languages. A comprehensive translation guidelines were provided to States by NCERT for carrying out translation.

The guidelines laid out general translation rules such as those used to adapt fictional and non-fictional names, mathematical expressions, adapting scientific terms, etc.; item-specific translation rules

\(^1\) The process of including common/same questions across test booklets is called anchoring. Under Item Reponses Theory (IRT) anchoring helps to link different forms.
2. Methodology

e.g. maintaining a pattern of synonym, dealing with idioms/phrases, dealing with situations where an adaptation should/should not be made for example using local names, etc.

Translated tests were vetted by NCERT. State officials had to physically carry the tests to NCERT, where each page of test was ratified by NCERT and officially approved. Only NCERT approved tests were sent for printing by the States/UTs.

2.2 Sample

Sample frame of NAS 2017 consisted of government and government aided schools. District was the unit of reporting.

Nearly 2.2 million children studying across classes III, V and VIII of government and government aided schools were tested under NAS 2017.

School samples were drawn in each district using the Probability Proportional to Size (PPS) sampling procedure. Selection of students was done through random sampling procedure. District wise school lists were provided to States/UTs by NCERT one month before the test administration. The details of school sample design and student selection procedure are provided in the Operational Guidelines-cum-Training Manual. (www.ncert.nic.in/programmes/NAS/pdf/Operational_Guidelines_Training_Manual.pdf)

2.3 Data Management

A web application was developed by NCERT to collect and collate NAS 2017 data and subsequently produce DRCs. Preliminary levels of cleaning prior to the DRC generation was also done through the web application.

Optical Mark Recognition (OMR) sheets were used to record achievement and questionnaire data in NAS 2017. OMR sheets were scanned and uploaded at District level. Upon completion of the survey, OMR sheets were scanned and converted into .CSV files. These files were cleaned using an offline tool and uploaded into the web application by the Districts and States/UTs.

Database generated through the web application were cleaned before merging and analysis. Completely cleaned files from different sources (student responses, and response of students, teachers, and schools on questionnaires) were later merged together for analysis using both Classical Test Theory (CTT) and Item Response Theory (IRT).

An in-depth Data Capture Manual was also shared with Districts and States/UTs to facilitate the process of scanner procurement, OMR design and printing, scanning and processing of data etc.

2.4 Trainings

A State level orientation of State Coordinators was provided by NCERT. For the first time NCERT trained District and MIS Coordinators on NAS procedures between 31st August to 18th September 2017. Eight regional workshops were organized across the country to train the DCs and MIS Coordinators.

Training was provided on the following aspects of NAS administration:

• Roles and responsibilities of different personnel involved in NAS administration.
• Sampling of section and students.
• Administration of test and questionnaires.
• Test monitoring.
• Data cleaning and uploading etc.

Sessions on all the above aspects were conducted in an interactive and activity-based mode, with the use of demonstration and group work as facilitation techniques. A comprehensive set of training material was shared with training personnel prior to the trainings for an enhanced understanding of NAS processes. Training material consisted of Power Point Presentation on NAS administration and videos on roles and responsibilities of stakeholders.

Upon being trained, DCs further trained FIs using the material shared with them during the District Level Workshops. List of District-level workshops are appended in Appendix I. DCs were also instructed to use interactive methods to train the FIs. (www.ncert.nic.in/programmes/NAS/Training.html)

2.5 Data Analysis

Within the domain of psychometric theory, two approaches are used for analyzing test data i.e. Classical Test Theory (CTT) and the Item Response Theory (IRT).

Under CTT, raw percentages of correct responses are used to measure students’ abilities and item difficulties. However, the linkages between students scores and item difficulties are not clear in CTT.

IRT models emphasize on estimating each student’s ability and make inferences about each student’s ability level on an underlying construct being tested.
A construct is a latent trait such as intelligence, motivation or language ability, which can be indirectly measured through scores on tests and questionnaires.

Unlike CTT, where student ability is expressed within the boundaries of 0 - 100% correct responses on a test, a latent trait in IRT is measured on an infinite continuum, where the measurement unit is denoted as a logit.

IRT uses a mathematical model to link a student’s probability of responding correctly to a particular item, thus taking care of the two main factors, i.e. the student’s level of ability and the item’s level of difficulty. Therefore, analysis in IRT is more complex than traditional methods like CTT. IRT uses the concept of an Item Characteristic Curve (ICC) to show the relationship between students’ ability and performance on an item.

In Table 2.2, students’ responses on 5 items have been indicated.

First student answers all five items correctly and is tentatively considered as possessing 100% proficiency. Similarly, second and third student are attributed to have 80% and 60% proficiency levels. However, under IRT, the above assertions are considered tentative.

Student’s abilities cannot be judged based on the number of correct items alone. For accurate ability estimation, item attributes such as discrimination/difficulty also need be taken into account. For example, two children (student 6 and 8) get the same raw scores on a test (shown in Table 2.3). However, it is difficult to state that, whether both the students have the same level of proficiency attainment. The eighth student may have answered two easy items correctly and the sixth student may have answered two difficult items correctly. Hence, both the item attributes and the examinee proficiency need to be measured before estimating student performance.

CTT can help us get estimate only ‘tentative item difficulty’ and ‘tentative student proficiency levels’. In IRT, tentative proficiency and item difficulty levels are used to fit a model, which is then employed to predict the data. Given the proficiency level of a student, the probability of answering a particular item correctly is computed by the following equation:

\[
P_{ij} = \frac{1}{1 + \exp[-(\theta_i - b_j)]}
\]

Where \( P_{ij} \) is the probability of the examinee, \( \theta_i \) ability \( i \) and item difficulty is given by \( b_j \) (being successful on the \( j \)th item)

<table>
<thead>
<tr>
<th>Table 2.2: Item wise Raw Responses of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Student 1</td>
</tr>
<tr>
<td>Student 2</td>
</tr>
<tr>
<td>Student 3</td>
</tr>
<tr>
<td>Student 4</td>
</tr>
<tr>
<td>Student 5</td>
</tr>
<tr>
<td>Average</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2.3: Item wise Raw Responses of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Student 6</td>
</tr>
<tr>
<td>Student 7</td>
</tr>
<tr>
<td>Student 8</td>
</tr>
</tbody>
</table>
Advantages of IRT over CTT

IRT has many advantages over CTT. Few advantages are given below:

- IRT measures the learning ability of students regardless of the different levels of tests difficulty, by calculating the probability of a student to respond to an item correctly.
- IRT analysis places students and test items on the same numerical scale and this helps us to create meaningful ‘maps’ of item difficulties and student abilities.
- In IRT, the difficulty of an item does not depend on the group of test takers.
- Multiple test booklets can be used in IRT to increase the measurement points in any subject and the booklets can also be linked.
- Use of IRT in NAS 2017 will help to compare scores across tests which will be used in different NAS cycles. This will help in monitoring progress of the health of the Indian education system over time.

Use of IRT in NAS 2017

The IRT scaling approach used for NAS has been similar to that used in the international survey Trends in Mathematics and Science Study (TIMSS). This was originally developed in the US by Educational Testing Service (ETS) for use in the National Assessment of Educational Progress (NAEP) and in the UK by the National Foundation for Educational Research for the Assessment of Performance Unit (Beaton [ed.], 1987; Foxman, Hutchison and Bloomfeld, 1993). The psychometric model was used in scaling the Classes III, V and VIII (NAS) data and for this commercially available software was used in order to apply IRT models.

In order to calibrate the test items, the 2-PL model was used in NAS. Under assumptions of the 2-PL model, the probability of a response to an item is modeled based on the examinee’s ability, the item difficulty and the item discrimination. This model was chosen over the 1-PL or Rasch Model because the inspection of the item characteristics showed that the item discriminations were not comparable across the pool of items (an assumption of the Rasch model). Furthermore, the 2-PL was chosen over the 3-PL model because the 3-PL model has stricter assumptions over the other models, and also has higher requirements with respect to sample size and coverage of the ability distribution for obtaining reliable estimates of item parameters, in particular the guessing parameter. This results in unstable and often inestimable parameters for some of the test items. Considering these limitations, the 2-PL offered a widely acceptable compromise between the lesser and the more restrictive IRT models available.

The following section includes details on the major types of IRT models, item fit, reliability and the key IRT procedures followed to analyze NAS 2017 data:

a) IRT Models

Owing to the highly complex nature of an IRT analysis, it is beyond the scope of this report to include in detail all the steps taken to analyze NAS 2017 data through IRT.

Item response models are classified on the basis of item parameter(s) used in it. Some of them are described as under:

i. One-parameter model: It includes only the item difficulty parameter (b)

The expression for $P_j^i$, the probability of the examinee, $i^{th}$ ability $\theta_i$, being successful on the $j^{th}$ item, difficulty $b_j$ is given by

$$P_j^i = \frac{\exp(\theta_i - b_j)}{1+ \exp(\theta_i - b_j)}$$

$$= \frac{1}{1+ \exp[-(\theta_i - b_j)]}$$

There is only one parameter for each item, namely the difficulty $b$. The one parameter logistic model is mathematically equivalent to the Rasch model (Andrich, 1988).
Two-parameter model: It includes difficulty ($b_j$) and discrimination ($a_j$) of the item. The expression for $P_{ij}$, the probability of the $i^{th}$ examinee, ability $\theta_i$, being successful on the $j^{th}$ item, difficulty $b_j$ is given by (Thissen and Wainer, 2002)

$$P_{ij} = \frac{\exp[a_j(\theta_i - b_j)]}{1 + \exp[a_j(\theta_i - b_j)]} = \frac{1}{1 + \exp[-a_j(\theta_i - b_j)]}$$

This is comparable to the 1-PL model with the addition of a scaling or slope parameter $a_j$ which varies between items. (This parameter is related to the item's power of discrimination across the ability scale.)

Three-parameter model: It includes item difficulty ($b_j$), item discrimination ($a_j$), and guessing ($c_j$).

The expression for $P_{ij}$, the probability of the $i^{th}$ examinee, ability $\theta_i$, being successful on the $j^{th}$ item, difficulty $b_j$ is given by (Thissen and Wainer, 2001)

$$P_{ij} = c_j + (1-c_j) \frac{\exp[a_j(\theta_i - b_j)]}{1 + \exp[a_j(\theta_i - b_j)]}$$

$$= c_j + (1-c_j) \frac{1}{1 + \exp[-a_j(\theta_i - b_j)]}$$

Where $a_j$ is a scaling parameter which varies between items, and $c_j$ is the lower asymptote, or ‘pseudo-guessing’ parameter.

Generally, two important functions are derived from IRT parameters that are used to explain how well a test is functioning. These functions are as follows:

- Test Characteristic Function: It represents the average of all ICCs on the test,
- Test Information Function: It reflects the test’s reliability by providing the overall test precision information.

Both test characteristic function and test information function play a critical role in test development and test evaluation.

b) Model Adoption

Different IRT models are used for analyzing test data. Each model is based on a particular parameter. The 1PL model also called the Rasch model links student’s ability to a single item parameter i.e. item difficulty. The 2PL model associates student’s ability to both item difficulty and item discrimination. The 3PL model links student’s ability to item difficulty, item discrimination and a guessing parameter for each item.

2PL and 3PL models are also called the Birnbaum models. The general form of the Birnbaum models is given below:

$$P_{in}(Q_n, \delta) = c_i + (1-c_i) \frac{e^{a_i(\theta_i - \delta)}}{1 + e^{a_i(\theta_i - \delta)}}$$

The 2PL IRT model has been used to analyze NAS 2017 data.

c) Item Fit

The fit of the 2-PL model to the items was examined graphically using a chi-squared fit index and this was done on a state to state basis. Items identified as problematic were investigated to see if there were any faults and these were rectified wherever possible. Moreover, if it proved impossible to make changes in the item, then that item was dropped from the scoring for the state concerned.

d) Reliability

Reliability of the test score scales was estimated from the IRT scaling BILOG (Zimowskiet al, 1996) runs. For simplicity and familiarity the marginal reliability coefficient is quoted here, rather than showing test information graphs (Thissen and Wainer, 2001). This is given by

$$\rho = \frac{\sigma_\theta^2 - \sigma_e^2}{\sigma_\theta^2}$$

Where $\sigma_\theta^2$ is the variance of the test score scale in the sample and $\sigma_e^2$ is the mean error variance of scores; both available from BILOG output.

e) Item Parameters

Item parameters such as item difficulty and discrimination are computed both within CTT and IRT.
Table 2.4 shows a common interpretation of discrimination values with respect to quality of an item.

**Table 2.4: Discrimination Values and Interpretation**

<table>
<thead>
<tr>
<th>Discrimination Value</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;0.40 (&gt;40%)</td>
<td>Strong, positive discrimination</td>
</tr>
<tr>
<td>0.25–0.40 (25%–40%)</td>
<td>Moderate, positive discrimination</td>
</tr>
<tr>
<td>0.10–0.25 (0%–25%)</td>
<td>Weak discrimination</td>
</tr>
<tr>
<td>=0.00 (0%)</td>
<td>No discrimination</td>
</tr>
<tr>
<td>&lt;0.00 (&lt;0%)</td>
<td>Negative discrimination</td>
</tr>
</tbody>
</table>

As a precursor to scaling, item statistics were reviewed specifically for difficulty, discrimination and bias towards any particular group/language (i.e. Differential Item Functioning). Item person maps were used to assess whether tests were aligned/ targeted to the ability of the students (i.e. test targeting). The fit of the 2-PL model to the items was examined graphically using a chi-squared fit index on a state to state basis.

Test Reliability was estimated using the following formula

$$\bar{\rho} = \frac{\sigma_e^2 - \sigma_o^2}{\sigma_o^2}$$

$\sigma_o^2$ is the variance of the test score scale in the sample and $\sigma_e^2$ is the mean error variance of scores.

i.e. an item should discriminate between high and low ability children. The a parameter expresses how well an item differentiates among children with different ability levels. It is computed by studying the correlation between the right/wrong scores that, children receive when their scores are summed up across the remaining items. Good items usually have discrimination values ranging from 0.5 to 0.7.

An ICC, with a steep slope represents a high discrimination value which further indicates that higher-scoring students tend to answer the item correctly, while lower-scoring students tend to answer it incorrectly.

**Item Difficulty (The b Parameter)**

Item difficulty is measured by calculating the percentage of students who answer an item correctly. e.g. if, out of 100 students only 30 students were able to correctly respond to an item, then the item difficulty is adjudged to be 0.3 (30/100). Item difficulty is denoted by letter p.

**Table 2.5: P-Values and Interpretation for dichotomous items**

<table>
<thead>
<tr>
<th>P-Value</th>
<th>Interpretation for dichotomous items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>Items are extremely easy (everyone gets it right)</td>
</tr>
<tr>
<td>0.80</td>
<td>Items are easy (80% get it right)</td>
</tr>
<tr>
<td>0.50</td>
<td>Items are of medium difficulty (half get it right; half get it wrong)</td>
</tr>
<tr>
<td>0.30</td>
<td>Items are difficult (70% get it wrong)</td>
</tr>
<tr>
<td>0.00</td>
<td>Items are very difficult (everyone gets it wrong)</td>
</tr>
</tbody>
</table>
f) Test Linking and Test Equating

The process of placing two or more tests forms on a common scale is called linking. Linking can also be done to different test forms of the same test. Linking can be carried out following any of the procedures given below:

- Single-group design: This design links two tests by administering each test to the same group of students.
- Equivalent-groups design: This design links two tests by giving the tests to equivalent but not identical groups of students who have been randomly chosen.
- Common-person design: This design links two tests by giving each test to two groups of students, where there is a common group of students taking both tests.
- Anchor-test design: This design links tests by having a set of common items in each test. The two tests are administered to different groups of students.

Test forms are equated to adjust for differences in difficulty levels. This process is called test equating. Both, separately developed tests/test forms or alternate forms of the same test can be equated. However, different tests/forms should be measuring the same constructs. Raw scores on a different test form are adjusted to consider the differences in form difficulty from a base or reference form.

In NAS 2017, tests were linked by placing common items across the two forms of each class. Tests were also equated. Items were calibrated using the strategy that centers the mean of item difficulties to zero and evaluates the distribution of ability estimates in relation to the mean of item difficulties.

h) Scaling

For computing comparable scores across various test forms, a process known as Scaling is used. In scaling, raw scores are transformed into a new set of scores by using either linear or nonlinear method. The converted scores are called as Scaled Scores. In IRT, results are reported using scaled scores.

In NAS 2017, student scores were determined by means of the IRT ‘pattern-scoring’ approach, where a pattern of student responses to items is used to estimate the latent ability (i.e., knowledge and competencies) underlying students’ test performance. The techniques used for ability estimation was based on the Weighted Maximum Likelihood (WML) method, which is widely supported in research literature.

j) Student Ability Estimation

Post adjustment for item difficulty levels, student ability scores are computed. Two types of commonly used student ability estimates in IRT are point estimates and plausible values.

Point Estimates

The process of producing a single ability estimate based on the score obtained on a particular set of items is called the Maximum Likelihood Estimation (MLE). Another type of point estimate which is frequently used is called the Weighted Maximum Likelihood Estimate (WLE). WLE corrects some bias in the MLE.

Plausible Values (PVs)

The most likely range in which a student’s true ability lies is called the posterior distribution. PVs are random draws from the posterior distribution of scores. Usually a set of 5 PVs, are drawn for each student for each scale or subscale and then average to provide an estimate of student ability.

In NAS 2017, student scores were determined by means of the IRT ‘pattern-scoring’ approach, where a pattern of student responses to items is used to estimate the latent ability (i.e., knowledge and competencies) underlying students’ test performance. The techniques used for ability estimation was based on the Weighted Maximum Likelihood (WML) method, which is widely supported in research literature.
Tests are equated and thereafter 'scaled'. Scaled scores are used internationally in large scale assessments. They help to meaningfully interpret large scale assessment data, specifically when multiple tests forms are used.

Various IRT specific software packages place items on a continuous scale measured in logits. After the equating and scaling processes, the scores in logits are transformed to a scale with a chosen mean and standard deviation by applying a linear transformation.

i) Proficiency Band Development

Large scale assessment results can help to monitor trends in student performance over time. Proficiency bands are created by using the metric (numeric score) established by the scale and adding qualitative

![Figure 2.3: Proficiency Bands (Exemplar)](Image)

- **Students are typically able to demonstrate the skills at and below their ability level**
  - On average, boys in 'Region X' are performing at level 8 on this scale
  - On average, students in 'Region X' are performing at level 7 on this scale
  - On average, girls in 'Region X' are performing at level 6 on this scale

**Example Mathematics Scale**

<table>
<thead>
<tr>
<th>Scale Score</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-500</td>
<td>300</td>
<td>50</td>
</tr>
</tbody>
</table>

The linear transformation from ability estimates expressed on the logit scale to the reporting scale scores was conducted using the expression: 

\[
\text{Scale Score} = \text{Logit Score} \times 50 + 300.
\]
descriptions to the same. The descriptions synthesize the item contents within each level. A proficiency scale can be used to make comparisons between different sub-groups of students across states. Proficiency bands provide a convenient way to describe profiles of student achievement. Children whose results are located within a particular level of proficiency are expected to understand the competencies and skills associated with that and lower levels.

An exemplar proficiency band is given in Figure 2.3.

### Proficiency bands and levels have been determined in NAS 2017

**j) Associating Achievement with Background Factors**

Associations between children, teacher and school related background factors with student achievement have been explored using multiple regression models. Indices and indicators developed using the questionnaires were regressed upon student achievement.

Regression analysis refers to a set of techniques for predicting an outcome variable using one or more explanatory variables.

In NAS 2017, student achievement was the outcome variable and indices derived from questionnaires were the explanatory variables.

**Student Achievement has been associated with student, teacher and school background factors in NAS 2017**

**k) Weights, Standard Errors and Replications**

On several occasions, samples do not accurately represent the population and therefore increase the chances of producing biased population estimates. To reduce the bias in the sample a correction technique called weighting is used.

Weights may need to be applied in situations where there is over or under representation of certain types of schools, high non response rates and over sampling of some explicit strata etc.

Accuracy of a sample statistic as an estimate of an unknown population parameter is assessed through standard errors. Standard errors are computed through the following formula:

$$
\sigma_{(d)} = \sqrt{\sigma_{(d)}^2}
$$

This formula assumes use of Simple Random Sampling (SRS). Large scale assessments including NAS use complex sampling procedures. To ensure unbiased estimates of Standard Errors (SE) are generated, SEs are computed using the Jackknife Repeated Replication technique (JRR).

The general application of JRR entails systematically assigning pairs of schools to sampling zones. Following this, while one of the schools is selected at random to have its contribution doubled, the other school in the pair has its contribution set to zero. This constructs a number of 'pseudo-replicates' of the original sample. Conclusively, the statistic of interest (e.g. the state's mean achievement score) is computed once for the entire original sample and once again for each jackknife pseudo-replicate sample. The resultant variation between the estimates for each of the jackknife replicate samples and the original sample is the jackknife estimate of the sampling error of the statistic.

The jackknife sampling estimate for the sampling variance is given by the following equation:

$$
V_{jrr}(t) = \sum_{h=1}^{H} [t(J_h) - t(S)]^2
$$

where H is the total number of sampling zones in the sample of the State/UT under consideration. The term t(S) corresponds to the statistic of interest for the State/UT computed with the overall sampling weights unchanged.

Data has been weighted in NAS 2017. SEs and necessary replications have been applied.
3. Sample Design and Procedures

In any research study, sampling plays a crucial role in providing reliable estimates of population parameters. There were three Classes namely III, V and VIII for which NAS was conducted. The descriptions in this chapter are confined to Class III, however the same procedure was followed for Classes V and VIII. In this section of the report, details are provided on defined and desired target population at national and district level, the construct of stratification, national sampling plan, school sampling frame, sampling of schools and sampling of students.
3.1 Target Population: Definition

National Desired Target Population

National desired target population includes all students enrolled in Class III, V and VIII in Government and Government aided schools. In simple terms, the national desired target population includes full coverage of all eligible students studying in Classes III, V and VIII in Government and Government aided schools as part of Indian education system.

National Defined Target Population

The national defined target population is the national desired target population minus certain exclusions. The schools having enrolment less than 5, invalid school categories and invalid medium of instruction were removed from the district sampling frame for all districts in Class III. Similar exclusions were carried out separately for Classes V and VIII.

District Desired Target Population

District desired target population includes all students enrolled in Classes III, V and VIII in Government and Government aided schools in a particular district. The District desired target population is described in Appendix C. In cases, where this population deviates from the full District coverage of all eligible students, the deviations were described and enrolment data was provided to measure the extent of the reduced coverage. Any deviations, in terms of reduced coverage, from the national target population are presented in this national report.

District Defined Target Population

The District defined target population is essentially the school sampling frame. Any differences between the District desired and defined target populations that arose out of practical considerations were kept to a minimum. It was ensured all exclusions must not exceed 5% of the District desired target population. Districts that exceeded this limit are annotated in the National Report.

Exclusions

The District Defined Target Population represented a subset of the District Desired Target Population. All

---

**Example 1: District Desired Target Population and Defined Target Population**

<table>
<thead>
<tr>
<th>Desired Target Population</th>
<th>Total No. of Schools</th>
<th>Total Enrolment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>911</td>
<td>67194</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exclusion Category</th>
<th>Values to be Excluded</th>
<th>Total number of Schools</th>
<th>Total Enrolment excluded</th>
<th>% of Exclusions</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invalid School Category</td>
<td>7,8,10</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>&lt;5</td>
<td></td>
<td>5</td>
<td>21</td>
<td>0.031</td>
<td>It Should be less than or equal to 5%</td>
</tr>
<tr>
<td>Total Exclusion</td>
<td></td>
<td>5</td>
<td>21</td>
<td>0.031</td>
<td></td>
</tr>
<tr>
<td>Total Inclusion</td>
<td></td>
<td>906</td>
<td>67173</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

The Total Defined Target Population is 906 schools with enrolment of 67173 students.
the excluded schools and students from the District Desired Target Population form the District Defined Target Population and are referred to as the excluded population.

Usually, practical reasons are involved for excluding schools and students, such as increased survey costs, increased complexity in the sample design and difficult test conditions. Exclusions can occur at the school-level, i.e. entire schools are excluded, or within schools, i.e. specific students within sampled schools, or sections, are excluded.

**School Level Exclusions**

School-level exclusions are documented in Appendix C. The schools were excluded for the following reasons:

- They were geographically inaccessible
- They were of extremely small size
- They offered a curriculum or school structure, radically different from the mainstream educational system

**Note:** The target population was limited to schools that contained the target class. Schools that did not contain the target class were therefore not considered part of the excluded population.

**Coverage and Exclusions**

The distinctions among the National Target Population, District Desired and District Defined Target Population can be nebulous. Example 2 and 3 illustrate District Defined Target Population and State Defined Target Population respectively.

---

**Example 2: District Defined Target Population**

The following is a fictitious example of a District Defined Target population.

In this example, State A has chosen to exclude the South Island because of its remote location and very small schools because of its reduction in sample yield. These school level exclusions accounted for 3.1% of eligible students in the District Desired Target Population.

---

**Example 3: State Defined Target Population**

The following is an example of a State Defined Target Population using the data for the State. In this example, the State has chosen to exclude very small schools (schools with less than 5 students), because of its reduction in sample yield and schools with invalid management. These school-level exclusions account for 0.1% of eligible students in the State Desired Target Population.

No anticipated within-school exclusions were reported.
In this survey, it was aimed to achieve full coverage of the National Target Population among all participating Districts and strived to keep all exclusions to minimum. The difference between the National Target Population and District Desired Target Populations is labelled as ‘exclusions from District coverage’. As a guiding principle, only a sizeable exclusion of the target population, whereby the remainder could be succinctly described and in a coherent manner was considered.

All other sources of exclusions would constitute exclusions from the District Desired Target Population. Exclusions therefore, describe the difference between the District Desired and District Defined Target Population. Ultimately, the District Effective Target population is the population that the sample of participating students effectively represents, after all sources of exclusions have been taken into account.

The term “within-sample exclusions” is used to describe exclusions found among the sampled schools, sections and students. All within-school exclusions will fall in this category. The sizes of the District Effective Target population and within-sample exclusions were estimated from the weighted sample.

### 3.2 Stratification

#### Overview

Prior to sampling, schools were ordered or stratified, in the sampling frame. Stratification consisted of grouping schools into strata according to some grouping or stratification variables. Stratification is generally used to improve the efficiency of the sample design, thereby making survey estimates more reliable. Stratification variables using District data are explained in Example 4.

**Example 4: Stratification using District Data**

The following is an example of the stratification variables using a District’s data.

‘District’ was defined as explicit stratification variable and five implicit stratification variables and their levels are listed in order of importance:

1. Block- This variable refers to the 17 blocks within this District.
2. School Management- This variable refers to the two major school management groups in the District: Government and Government aided.
3. Location- This variable refers to the two main locations of schools: Rural and Urban.
4. Medium of Instruction- This variable refers to two medium of instruction, namely Hindi and Urdu across schools of this District.
5. School Type-This variable refers to the gender composition of schools in the District, i.e., co-educational, all boys and all girls schools.

The District defined a total of one explicit stratum and five implicit strata with various levels per explicit stratum, for a total of 408 implicit strata.

There are two types of Stratification: Explicit and Implicit.

**Explicit Stratification**

Explicit stratification consisted of building separate school lists or sampling frames, according to the set of explicit stratification variables under consideration. For example, District as an explicit stratification variable was considered, thereafter separate school sampling frames were constructed for each District. A constant sample size was then applied to each school sampling frame to select the sample of schools.

In this survey, the major reason for considering explicit stratification was to implement a disproportionate allocation of the school sample to the explicit strata. For example, the same number of schools were sampled from each explicit stratum, regardless of the relative size of each stratum. The objective in this situation was to produce equally reliable estimates for each District.
Another important reason for defining explicit strata was to deal with specific sample design issues. For example, explicit strata might be required to deal with very large schools (very large schools are discussed in following section).

**Implicit Stratification**

Implicit stratification consisted of sorting the schools uniquely by a set of implicit stratification variables. It is a very simple way of ensuring a strictly proportional sample allocation of schools across all implicit strata. It also leads to improved reliability of survey estimates, provided the implicit stratification variables being considered are known to have a significant between-strata variance component. The details are shared in Table 3.1 below:

### Table 3.1: Stratification Parameters

<table>
<thead>
<tr>
<th>Explicit Stratification</th>
<th>Implicit Stratification</th>
</tr>
</thead>
<tbody>
<tr>
<td>District</td>
<td>Block</td>
</tr>
<tr>
<td></td>
<td>Area</td>
</tr>
<tr>
<td></td>
<td>Management</td>
</tr>
<tr>
<td></td>
<td>Type of School</td>
</tr>
<tr>
<td></td>
<td>Medium of Instruction</td>
</tr>
</tbody>
</table>

**3.3 The National Sampling Plan**

**Introduction**

NAS Class III, V and VIII has set high standards for sampling precision, participation rates and implementation of sampling plans. These standards resulted in samples of the highest quality and consequently survey estimates which are unbiased, accurate and nationally comparable.

**Effective Sample Size**

The NAS Class III, V and VIII standard for sampling precision required that all District samples achieved an effective sample size, for the main criterion variables, of at least 500 students. In other words, all District samples should yield sampling errors that are no greater than the sampling errors that would be obtained from a simple random sample of 500 students.

Since, NAS Class III, V and VIII also produce data at the school and section levels, a minimum of 61 schools for class III and V and 51 schools for class VIII were selected from each participating District.

The NAS Class III, V and VIII sample design is a two-stage stratified cluster sample, which is far more efficient than a simple random sample. The actual sample sizes were therefore much larger than 500 students.

**Participation Rates**

The NAS Class III, V and VIII required maximum participation rates for schools and students. This requirement minimised the potential for response biases.

**Schools**

NAS Class III, V and VIII required a minimum participation rate of 85% of sampled schools. Non-participating sampled schools were substituted with “replacement schools” to meet sample size requirements. The use of replacement schools did not guarantee that potential response biases have been reduced. Districts were encouraged to persuade as many sampled schools as possible to participate in the Main Survey. The criteria for selection and use of replacement schools is described later.

**Sections**

Section participation rates were not computed, since generally only one section per school was sampled and a non-participating section resulted in the non participation of school itself. It is important to mention, however, that the substitution of sampled sections was not allowed.

**Students**

NAS Class III, V and VIII also required a minimum participation rate of 85% of students among participating schools. Student participation rates were calculated over all participating schools, whether sampled schools or replacement schools. The student participation rate requirement of 85% was met at the District level.
Reporting Participation Rates

District participation rates are presented in the NAS Class III, V and VIII report. They include:

- Weighted and unweighted school participation rates with and without replacement schools (minimum 85% required without replacement schools)
- Weighted and unweighted student participation rates (minimum 85% required)
- Weighted and unweighted combined school and student participation rates, i.e., the product of the school participation rate and the student participation rate

Sample Design Framework

The sampling design used for NAS 2017 classes III, V and VIII survey is a two-stage stratified cluster sample design. District sampling plans relied on sound and defensible sampling methods. These methods are briefly described in the following points:

- For the first stage of sampling, schools were stratified, explicitly and/or implicitly, and selected with probabilities proportional to size (PPS). The sampling method used is called a PPS systematic sampling method
- The second stage of sampling consisted of the selection of section, if there are more than one section, from each sampled school

3.4 School Sampling Frame

School Measure of Size

A suitable school measure of size (MOS) is a critical component of a school sampling frame, since school selection probabilities are based on this MOS. Possible school MOS, in decreasing order of suitability, are:

1. Student enrolment in the medium of instruction;
2. Student enrolment in the target class;
3. Average student enrolment per section, i.e., total student enrolment divided by the number of sections in the school;
4. Number of sections in the target class;
5. Total student enrolment.

In NAS 2017, we have used Total student Enrolment as Measure of Size (MOS). The enrolment data used was of DISE 2015-16.

The Sampling Frame

The sampling frame consisted of a comprehensive list of schools from the District. Each school entry in the frame included the following:

- a unique national school ID i.e. UDISE Code
- school contact information such as name, physical address, email address, phone number, etc.
- all explicit stratification variables
- all implicit stratification variables
- a school measure of size

School Sample Allocation

For the Main Survey, a minimum of 61 schools for class III and V and 51 schools for class VIII were sampled from each participating District.

Excluding Schools From the Sampling Frame

Based on the information reported in Example 1 (National Defined Target Population), some schools were excluded from the school sampling frame.

Sorting the Sampling Frame

Each school in the sampling frame was assigned a value for each implicit stratification variable. For example, if location (rural or urban) and school management (government and government aided) are used, each school was classified as either rural or urban and as either government and government aided.

The school sampling frame was then sorted by the implicit stratification variables. The schools were first sorted by the first implicit stratification variable, then by the second implicit stratification variable, and so on, until all the implicit stratification variables had been exhausted. The result was a cross-classification structure that represented the implicitly stratified school sampling frame.
**Very Large Schools**

The District sampling frame contained schools wherein MOS was greater than the calculated sampling interval. In theory, this would mean that some of these very large schools are sampled more than once. This situation could be problematic during survey operations as this would require sampling more sections in those schools. It also complicates the data base design and computation of sampling weights.

In order to avoid these problems, an explicit stratum of very large schools was constructed. This stratum contained all schools wherein MOS was greater than the calculated sampling interval.

**Identifying Replacement Schools**

It is not always possible to obtain the participation of all sampled schools. In order to avoid the resulting sample size losses, a mechanism of Field verification of Schools was adopted to identify a priori replacement schools for non-participating sampled schools. Another, perhaps more important, reason for identifying replacement schools a priori was to avoid the haphazard use of alternate schools as replacements, which may amplify response biases. Although this approach does not necessarily avoid non-response bias, it tends to minimise the potential for bias. Furthermore, it is conceptually more palatable than over-sampling to accommodate a low participation rate.

The Districts were asked to make every effort to get as many of the sampled schools to participate as possible. In some cases, however, districts needed to consider the use of replacement schools. To allow for this, wherever possible, each sampled school in the Main Survey was assigned two replacement schools in the sampling frame.

### 3.5 Sampling of Schools

**Overview**

This section describes how to select the sample of schools. It is presented as a series of operational steps leading to the selection and identification of all sampled schools. The school sampling method is described as a PPS systematic sampling method.

For each sampled school, where possible, up to two replacement schools were identified. Although the replacement schools serve as possible substitutes for non-cooperating schools, Districts were asked to keep their use to a minimum by ensuring the highest possible participation rate for sampled schools.

Schools were selected once the school sampling frames were sorted, according to the implicit stratification variables and had been constructed for each explicit stratum. School samples were selected separately for each explicit stratum, with each explicit stratum having its own sampling frame. Each school entry in the sampling frame contained:

- a unique national school ID (this should be numerical),
- school contact information such as name, physical address, email address, phone number, etc.,
- all implicit stratification variables
- a suitable school measure of size

BEFORE progressing further, it was ensured that sampling forms 1 to 3 had been completed (Appendix C). The sampling forms were used as a reference to indicate the implicit stratification variables, their order of importance and their levels. The information outlined in the sampling forms was reflected in the sampling frame and sample selection process.

**Sampling Steps**

Overall, there are seven key steps described in this section to successfully prepare, draw and check the sample of schools. Within seven of these steps, four involved the use of pre-written Excel macros. The seven key steps are:

1. Preparation of the sampling frame file
2. Identification of certainties, i.e.; identification of those schools which are certain to get selected
3. Determine sample selections, i.e.; to determine the random start and obtain the selection numbers of those schools which will be selected after the procedure is done
4. Sorting the frame and sample selection
5. Checking the assigned replacement schools
6. Generating a school participation file to hand over to the States/UTs for the final physical verification of the selected schools
7. Populating population and sample summary statistics

3.6 Sampling of Students

Student selection procedures in the main study were the same as those used in the field trial.

The desired student sample size per class was 30. If the number of students in the sampled section was less than 30, the FI were asked to continue to test the students. However, if there were more than 30 students in the sampled section in a class, then only 30 students were selected as per procedure given below:

Step 1: The students of the sampled section/class as per school register were listed.

Step 2: The Sampling Interval (SI) was calculated by using formula given below:

\[ \text{Sampling Interval} = \frac{\text{Total number of students enrolled in sampled section or class in the school}}{30} \]

Example: Suppose the total enrollment in the sampled section/class in the school is 58, then

\[ \text{SI} = \frac{58}{30} = 1.93 \text{(rounded to 2)} \]

Example: Suppose the total enrollment in the sampled section/class in the school is 44, then

\[ \text{SI} = \frac{44}{30} = 1.46 \text{(rounded to 1)} \]

Note: If the value after decimal is more than or equal to 0.50, then it would be rounded to the next whole number and if the value after decimal is less than 0.50 then it would be rounded to the preceding whole number.

Step 3: In order to select the student by Random Start (RS) method, a procedure that led to the summation of individual digits of district code and school code were used:

For example: If the

\[ \text{District Code} = 12 \]
\[ \text{School Code} = 13 \]

Then, Random start (RS) = 7

Step 4: Thus, first student was selected from serially arranged students’ list at respective serial numbers i.e 7, determined by the random start (RS) value. The next student was selected as per following method:

\[ \text{RS+SI; RS+2SI; RS+3SI; RS+4SI} \]

For example: If SI is 2, then the selected students would be at serial number 7, 9, 11, 13, 15, 17, 19 demonstrated below:

\[ \begin{array}{cccccccc}
\text{RS} & \text{SI} & \text{9} & \text{RS} & \text{11} & \text{RS} & \text{13} & \text{RS} \\
1 & 2 & 9 & 3 & 11 & 4 & 13 & 5
\end{array} \]

Step 5: If list ended before getting 30 students, process was repeated from the beginning until count of selected 30 students was reached.

Step 6: Student ID were allotted against each selected student.

3.7 Sampling of Section

The procedures followed for sampling of section for schools which had sections more than one are given below:

If there are more than one section in the selected school in a class, then only one section through random sampling method as specified below was selected.

Following information was collected before selection:

<table>
<thead>
<tr>
<th>S.No. of Section</th>
<th>Section Name</th>
<th>Number of Students Enrolled</th>
<th>No. of Students Present on the Day of Assessment</th>
<th>Selected Section (Please tick ✓ mark)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Students

30
3.8 Random sample drawn at the District level

Coverage of Sampled Schools and Students at District level is as follows:

Table 3.2: Number of Schools and Students for Class III, V and VIII (Andaman & Nicobar Islands)

<table>
<thead>
<tr>
<th>District</th>
<th>Class III</th>
<th></th>
<th>Class V</th>
<th></th>
<th>Class VIII</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sampled</td>
<td>Students</td>
<td>Sampled</td>
<td>Students</td>
<td>Sampled</td>
<td>Students</td>
</tr>
<tr>
<td>Andamans</td>
<td>70</td>
<td>739</td>
<td>83</td>
<td>1137</td>
<td>51</td>
<td>990</td>
</tr>
<tr>
<td>Middle and North</td>
<td>70</td>
<td>507</td>
<td>100</td>
<td>963</td>
<td>55</td>
<td>923</td>
</tr>
<tr>
<td>Nicobars</td>
<td>40</td>
<td>343</td>
<td>36</td>
<td>524</td>
<td>20</td>
<td>267</td>
</tr>
</tbody>
</table>

Table 3.3: Number of Schools and Students for Class III, V and VIII (Andhra Pradesh)

<table>
<thead>
<tr>
<th>District</th>
<th>Class III</th>
<th></th>
<th>Class V</th>
<th></th>
<th>Class VIII</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sampled</td>
<td>Students</td>
<td>Sampled</td>
<td>Students</td>
<td>Sampled</td>
<td>Students</td>
</tr>
<tr>
<td>Anantapur</td>
<td>60</td>
<td>793</td>
<td>60</td>
<td>861</td>
<td>51</td>
<td>1289</td>
</tr>
<tr>
<td>Chittoor</td>
<td>60</td>
<td>574</td>
<td>60</td>
<td>880</td>
<td>51</td>
<td>1218</td>
</tr>
<tr>
<td>East Godavari</td>
<td>54</td>
<td>809</td>
<td>58</td>
<td>996</td>
<td>51</td>
<td>1333</td>
</tr>
<tr>
<td>Guntur</td>
<td>59</td>
<td>828</td>
<td>61</td>
<td>887</td>
<td>51</td>
<td>1158</td>
</tr>
<tr>
<td>Kadapa</td>
<td>59</td>
<td>738</td>
<td>52</td>
<td>798</td>
<td>51</td>
<td>1273</td>
</tr>
<tr>
<td>Krishna</td>
<td>61</td>
<td>839</td>
<td>60</td>
<td>835</td>
<td>50</td>
<td>1158</td>
</tr>
<tr>
<td>Kurnool</td>
<td>61</td>
<td>1076</td>
<td>61</td>
<td>1052</td>
<td>51</td>
<td>1154</td>
</tr>
<tr>
<td>Nellore</td>
<td>61</td>
<td>738</td>
<td>61</td>
<td>738</td>
<td>51</td>
<td>1204</td>
</tr>
<tr>
<td>Prakasam</td>
<td>61</td>
<td>932</td>
<td>61</td>
<td>971</td>
<td>51</td>
<td>1266</td>
</tr>
<tr>
<td>Srikakulam</td>
<td>60</td>
<td>814</td>
<td>61</td>
<td>853</td>
<td>51</td>
<td>1296</td>
</tr>
<tr>
<td>Visakhatapatnam</td>
<td>54</td>
<td>821</td>
<td>61</td>
<td>946</td>
<td>50</td>
<td>1170</td>
</tr>
<tr>
<td>Vizianagaram</td>
<td>61</td>
<td>702</td>
<td>61</td>
<td>929</td>
<td>51</td>
<td>1236</td>
</tr>
<tr>
<td>West Godavari</td>
<td>58</td>
<td>763</td>
<td>59</td>
<td>890</td>
<td>51</td>
<td>1252</td>
</tr>
</tbody>
</table>

Table 3.4: Number of Schools and Students for Class III, V and VIII (Arunachal Pradesh)

<table>
<thead>
<tr>
<th>District</th>
<th>Class III</th>
<th></th>
<th>Class V</th>
<th></th>
<th>Class VIII</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sampled</td>
<td>Students</td>
<td>Sampled</td>
<td>Students</td>
<td>Sampled</td>
<td>Students</td>
</tr>
<tr>
<td>Anjaw</td>
<td>35</td>
<td>199</td>
<td>31</td>
<td>238</td>
<td>17</td>
<td>206</td>
</tr>
<tr>
<td>Changlang</td>
<td>60</td>
<td>883</td>
<td>61</td>
<td>1037</td>
<td>50</td>
<td>1204</td>
</tr>
<tr>
<td>Dibang Valley</td>
<td>6</td>
<td>63</td>
<td>6</td>
<td>70</td>
<td>3</td>
<td>59</td>
</tr>
<tr>
<td>East Kameng</td>
<td>58</td>
<td>704</td>
<td>56</td>
<td>607</td>
<td>38</td>
<td>557</td>
</tr>
<tr>
<td>East Siang</td>
<td>55</td>
<td>815</td>
<td>56</td>
<td>830</td>
<td>50</td>
<td>942</td>
</tr>
<tr>
<td>Kra Daadi</td>
<td>57</td>
<td>382</td>
<td>59</td>
<td>330</td>
<td>38</td>
<td>290</td>
</tr>
<tr>
<td>Kurung Kumey</td>
<td>45</td>
<td>374</td>
<td>30</td>
<td>250</td>
<td>23</td>
<td>350</td>
</tr>
<tr>
<td>Lohit</td>
<td>48</td>
<td>616</td>
<td>45</td>
<td>636</td>
<td>30</td>
<td>585</td>
</tr>
<tr>
<td>Longding</td>
<td>56</td>
<td>902</td>
<td>56</td>
<td>814</td>
<td>13</td>
<td>321</td>
</tr>
<tr>
<td>Lower Dibang Valley</td>
<td>49</td>
<td>731</td>
<td>42</td>
<td>699</td>
<td>30</td>
<td>604</td>
</tr>
<tr>
<td>Lower Subansiri</td>
<td>55</td>
<td>354</td>
<td>50</td>
<td>371</td>
<td>38</td>
<td>447</td>
</tr>
</tbody>
</table>
### National Report to inform Policy, Practices and Teaching Learning

<table>
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### Table 3.9: Number of Schools and Students for Class III, V and VIII (Dadra and Nagar Haveli)

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### Table 3.10: Number of Schools and Students for Class III, V and VIII (Daman & Diu)

| District | Class III | | Class V | | Class VIII | |
|----------|-----------|---------|---------|---------|-----------| |
|          | Sampled Schools | Students | Sampled Schools | Students | Sampled Schools | Students | |
| Daman    | 30         | 534      | 33       | 642      | 26         | 587      | |
| Diu      | 14         | 263      | 13       | 296      | 12         | 286      | |

### Table 3.11: Number of Schools and Students for Class III, V and VIII (Delhi)

| District                | Class III | | Class V | | Class VIII | |
|-------------------------|-----------|---------|---------|---------|-----------| |
|                         | Sampled Schools | Students | Sampled Schools | Students | Sampled Schools | Students | |
| Central Delhi           | 61         | 1043     | 61       | 1136     | 50         | 998      | |
| East Delhi              | 56         | 959      | 60       | 1017     | 50         | 1067     | |
| New Delhi               | 56         | 1462     | 54       | 1417     | 49         | 1261     | |
| North Delhi             | 58         | 1186     | 58       | 1265     | 51         | 1186     | |
| North East Delhi        | 58         | 1031     | 61       | 1199     | 51         | 1100     | |
| North West Delhi        | 58         | 1178     | 60       | 1253     | 50         | 1210     | |
| South Delhi             | 59         | 1035     | 58       | 1128     | 50         | 1013     | |
| South West Delhi        | 61         | 1199     | 61       | 1268     | 51         | 1139     | |
| West Delhi              | 60         | 1168     | 61       | 1262     | 51         | 1092     | |

### Table 3.12: Number of Schools and Students for Class III, V and VIII (Goa)

| District | Class III | | Class V | | Class VIII | |
|----------|-----------|---------|---------|---------|-----------| |
|          | Sampled Schools | Students | Sampled Schools | Students | Sampled Schools | Students | |
| North Goa | 141       | 2995     | 148     | 3862     | 43         | 895      | |
| South Goa | 104       | 2419     | 109     | 2847     | 110        | 2930     | |

### Table 3.13: Number of Schools and Students for Class III, V and VIII (Gujarat)

| District                | Class III | | Class V | | Class VIII | |
|-------------------------|-----------|---------|---------|---------|-----------| |
|                         | Sampled Schools | Students | Sampled Schools | Students | Sampled Schools | Students | |
| Ahmedabad               | 61         | 1443     | 61       | 1504     | 51         | 1306     | |
| Amreli                  | 61         | 1267     | 61       | 1321     | 51         | 1152     | |
| Anand                   | 61         | 1395     | 61       | 1440     | 51         | 1359     | |
| Aravalli                | 61         | 1015     | 61       | 971      | 51         | 1235     | |
| Banas Kantha            | 61         | 1370     | 61       | 1477     | 51         | 1394     | |
| Bharuch                 | 61         | 1054     | 61       | 1165     | 51         | 1224     | |
| Bhavnagar               | 61         | 1511     | 61       | 1466     | 51         | 1273     | |
| Botad                   | 61         | 1545     | 61       | 1620     | 51         | 1375     | |
| Chhotaurdepur           | 61         | 992      | 61       | 1079     | 51         | 1249     | |
| Devbhoomi Dwarka        | 61         | 1241     | 61       | 1222     | 51         | 1164     | |
| Dohad                   | 61         | 1416     | 61       | 1400     | 51         | 1306     | |
| Gandhinagar             | 61         | 1378     | 61       | 1380     | 51         | 1319     | |
| Gir Somnath             | 61         | 1409     | 61       | 1404     | 51         | 1195     | |
| Jamnagar                | 61         | 1101     | 61       | 1150     | 51         | 1107     | |
| Junagadh                | 61         | 1104     | 61       | 1116     | 51         | 1072     | |
### Table 3.14: Number of Schools and Students for Class III, V and VIII (Haryana)

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**Table 3.15: Number of Schools and Students for Class III, V and VIII (Himachal Pradesh)**

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**Table 3.16: Number of Schools and Students for Class III, V and VIII (Jammu and Kashmir)**

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### Table 3.17: Number of Schools and Students for Class III, V and VIII (Jharkhand)

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### Table 3.18: Number of Schools and Students for Class III, V and VIII (Karnataka)

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- District names are listed alphabetically.
- Class III, V, and VIII represent different grade levels.
- Sampled Schools and Students columns indicate the number of schools and students surveyed.
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**Table 3.23: Number of Schools and Students for Class III, V and VIII (Manipur)**

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### Table 3.28: Number of Schools and Students for Class III, V and VIII (Puducherry)

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### Table 3.30: Number of Schools and Students for Class III, V and VIII (Rajasthan)

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Table 3.36: Number of Schools and Students for Class III, V and VIII (Uttarakhand)
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**Table 3.37: Number of Schools and Students for Class III, V and VIII (West Bengal)**

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<td>1069</td>
<td>61</td>
</tr>
<tr>
<td>Kolkata</td>
<td>59</td>
<td>1011</td>
<td>59</td>
</tr>
<tr>
<td>Maldah</td>
<td>60</td>
<td>1281</td>
<td>60</td>
</tr>
<tr>
<td>Murshidabad</td>
<td>61</td>
<td>1335</td>
<td>59</td>
</tr>
<tr>
<td>Nadia</td>
<td>61</td>
<td>1153</td>
<td>61</td>
</tr>
<tr>
<td>North Twenty Four Pargana</td>
<td>58</td>
<td>1157</td>
<td>55</td>
</tr>
<tr>
<td>Paschim Bardhaman</td>
<td>59</td>
<td>1132</td>
<td>59</td>
</tr>
<tr>
<td>Paschim Medinipur</td>
<td>61</td>
<td>861</td>
<td>61</td>
</tr>
<tr>
<td>Purba Bardhaman</td>
<td>61</td>
<td>1165</td>
<td>61</td>
</tr>
<tr>
<td>Purba Medinipur</td>
<td>61</td>
<td>1065</td>
<td>61</td>
</tr>
<tr>
<td>Puruliya</td>
<td>60</td>
<td>927</td>
<td>61</td>
</tr>
<tr>
<td>Siliguri</td>
<td>51</td>
<td>741</td>
<td>56</td>
</tr>
<tr>
<td>South Twenty Four Pargana</td>
<td>61</td>
<td>1219</td>
<td>61</td>
</tr>
<tr>
<td>Uttar Dinajpur</td>
<td>61</td>
<td>1055</td>
<td>61</td>
</tr>
</tbody>
</table>
NAS 2017 was a paper pencil based test which was administered in all 36 states/UTs across India, following uniform and systematic procedures. Post data collection, the OMR sheets were scanned using a software and converted into .csv files. Cleaned .csv files were uploaded into a web application which was developed specifically for NAS 2017. Use of a single web application to collate, carry out preliminary analysis and generate District Report Cards (DRCs) was a novel feature of NAS 2017.
URL of the NAS 2017 web application was nasslo.ncert.gov.in. Figure 4.1 shows the snapshot of the home page of the NAS 2017 Web application.

**Figure 4.1: NAS 2017 Web Application**

![Snapshot of NAS 2017 Web Application](image)

### 4.1 Data Management Activities in NAS 2017

The sequence of major preparatory activities for development of NAS 2017 web application are illustrated below:

**Figure 4.2: Preparatory Activities for Development of NAS 2017 Web Application**

![Flowchart of Preparatory Activities](image)

(a) **Codebook Development**

A codebook includes details on all the variables mentioned in the assessment data set. Details commonly included in the codebook are related to variable definitions/descriptions, variable codes/values, validity parameters and codes for missing values.

For NAS 2017, an online codebook was developed and stored within the NAS web application. The codebook served as a structural database, wherein, details on NAS variables were stored. Information on Items, form numbers, LO codes and descriptions and keys were all stored in the NAS 2017 online codebook. All the above information was saved separately for each tested subject and class.

NAS 2017 online codebook was used to analyze the uploaded raw data and auto-generate DRCs from the web application.

(b) **NAS Web Application Hardware and Software**

The NAS web application was hosted on a NIC cloud-based server. Details of the backend infrastructure used to configure the application are given below:

<table>
<thead>
<tr>
<th>Web Server:</th>
<th>LAMP or NGINX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Server:</td>
<td>MySQL 5.5.54</td>
</tr>
<tr>
<td>Database Cache:</td>
<td>Redis 2.4.10</td>
</tr>
<tr>
<td>Application Development Framework:</td>
<td>CodeIgniter (CI) 3.1.0</td>
</tr>
<tr>
<td>Server Side Language:</td>
<td>PHP 5.6.30</td>
</tr>
<tr>
<td>Programming Language:</td>
<td>PHP, Javascript (Jquery), HTML</td>
</tr>
</tbody>
</table>

Upon development, the application was put through rigorous security checks/audits. The purpose of these checks was to ensure that the application was not susceptible to virus/malware or any other cyberattacks.

The NAS 2017 web application developed was NIC standards-compliant portal with a user-friendly interface.

(c) **Setting up of Web Application Access Processes**

The following 3 category of users were provided access to the web application - (i) National level Users; (ii) State level Users and (iii) District level Users.

Each level of user could access the application by logging in through a distinct username and password. A specific SMS and email system was activated to transmit the username and passwords to the web application users.
Each level of user could perform only pre-defined set of activities on the web application (details of the same are provided in Table 4.2)  

Table 4.2: Categories of Users, Organizations Involved, Activities Performed  

<table>
<thead>
<tr>
<th>User Level</th>
<th>Personnel/Organizations Involved</th>
<th>Activities performed on the NAS 2017 Web Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>National</td>
<td>NCERT</td>
<td>View progress in upload of data at the national level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Create State Level Users</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Download DRCs</td>
</tr>
<tr>
<td>State</td>
<td>State Coordinator</td>
<td>View progress in upload of data at the State/UT level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Download DRCs</td>
</tr>
<tr>
<td>District</td>
<td>District Coordinators</td>
<td>Upload District Level Data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manually enter details such as FIs number, contact details etc.</td>
</tr>
</tbody>
</table>

(d) Setting up of Data Entry and Upload Protocols  

The web application supported two forms of data entry – manual and online. Manual data entry required the DCs to physically enter data into the web application. This was done when details such as FIs name, number of students present or absent on the day of assessment etc. had to be entered into the application.

Test and questionnaire data could only be uploaded or entered into the system using the non-manual/software facilitated mode of data entry.

Detailed procedures on ways to upload test and questionnaire data were mentioned in the Data Capturing Manual (DCM) developed by NCERT. The DCM clearly specified and explained the fields which needed to be filled/completed at the time of data upload. The document also specified the validation checks for each of the above mentioned fields.

Validation checks referred to the values and its ranges which could be filled/accepted by the application.

Each district uploaded 6 .csv files – 3 .csv files for achievement tests and one each for PQ, SQ and TQ data. Each of the achievement .csv files included data on all the subjects tested for a particular Class. However, in case of questionnaires, districts uploaded all the data across Classes for a particular questionnaire in a single .csv file.

(e) Database Security Measures  

Several measures were put in place to ensure that the datasets entered into the application were secure and error free. Given below are some key safety measures instituted within the application.

- Username and password based entry: A user could enter the application only after entering a preset username and password
- All passwords were encrypted: Plain text passwords were not accepted by the application
- File upload: The application rejected any other type of upload apart from .csv files
- Different captchas built: Different captchas were built into the application for login, data upload and DRC download. Users were required to correctly enter a captcha before entering the application, uploading data and downloading DRCs.
- Access to the application based on approvals: Only pre-defined users could access the application. The application accepted only 3 levels of users: National Level Users (NLUs), State Level Users (SLUs) and District Level Users (DLUs). NLUs could only create SLUs, SLUs could only create DLUs.
- Same right users could not change/update or modify the data of other users

(f) Provisions of Backup Procedures  

Within the application, the NAS 2017 database was set up in a table format and had the following functionalities:
• A Login tracker which tracked the user ID which logged into the web application along with the date and time of the login

• A .csv upload tracker which tracked the user ID that uploaded the file along with the format of the file and the time of modification (if any)

• LO code book along with number and times of modification

• National/State/District Response Master Trackers which tracked and created back up of all the achievement and questionnaire data, along with the number and date of modifications. Information on the IDs through which the modifications were made was also stored.

A copy of the database was also stored in the Redis server. The Redis server held all the versions of the uploaded data and any preliminary version of data could be retrieved from it.

(g) Data Cleaning & Validation Procedures

All efforts were taken to ensure that only clean data was uploaded into the web application. Preliminary levels of data cleaning were done by DCs, following the procedures mentioned in the DCM. While preparing files for upload, the DCs manually scrutinized the OMR sheets to correct errors and any cases of duplication.

Post this initial round of manual correction, the data files were scanned and converted into .csv files using a software. The .csv files were put through an offline correction tool, which helped to identify errors, specifically, in fields which were preset as mandatory. Mandatory fields were defined as fields for which entry in a specified format was needed and essential. Fields which required details on UDISE Code, Student ID, Social Group, Area Code, School Management, Gender, Medium (Language) and Test forms codes were defined as mandatory.

Data collected in the mandatory fields were crucial to the analysis of NAS 2017.

A short guideline was also developed to help users understand the procedures of cleaning the data using the tool. Prior to data upload, the offline tool along with its guideline was hosted on the web application.

The NAS 2017 offline tool was a simple macro-based excel sheet with in-built validations that helped users clean their data. Validation ranges for the mandatory fields were same as those mentioned in the DCM and offline tool guidelines. In addition to the above, item responses from children were restricted to 1 to 4, numbers 8 and 9 were affixed for multiple and no responses respectively. Mandatory fields and columns in which values deviated from the preset values/not filled in as expected were shown as errors in the offline tool. Upon running the .csv file through the offline tool, DCs were expected to check and correct the errors in case any. The final cleaned file was also saved as .csv file which could be uploaded into the application.

Offline cleaning tool was only developed for achievement data in NAS 2017.

Snapshot of the offline tool is given below.

**Figure 4.3: Snapshot of the offline tool.**

![Image of the offline tool](image-url)

Upon completion of data upload, UDISE codes of schools included in the .csv files uploaded into the web application were matched against the UDISE codes mentioned in NCERT’s verified sample school lists. This step became a precursor to DRC generation.

DRC results were computed for the number of schools which matched between the uploaded .csv file and the NCERT’s verified sample school lists.

(h) Data Transfer Protocols

After all the districts had uploaded the data, and the DRC’s had been auto generated, the data was handed over to Head, ESD by the technical team setup by MHRD.
(i) **Quality Assurance Measures**

An attempt was made to set up stringent quality control processes at every step of data collection, cleaning, verification and upload.

Listed below are few quality control measures which were set up with regards to data management:

- Prior to data upload, all achievement test data had to be screened and corrected using the data offline tool.
- Only .csv files could be uploaded into the web application.
- DRC generation relied completely on the list of sampled schools verified by States/ UTs and shared with NCERT making result computation a transparent and bias free process.
- The web application was screened through a security audit before being put into the public domain.
5. Analysis

Analysis for NAS 2017 elaborates the statistical analyses that was performed in order to produce outputs used for creation of the following types of reports:

- District Report Cards (DRCs)
- State Learning Reports (SLRs)
- National Report to inform Policy, Practices and Teaching Learning (NPPTL)
- NAS Highlights and Policy Briefs
There are two types of data sources in NAS 2017: Achievement data and Questionnaire data. The achievement data entails a total of 10 assessments targeting the following Classes and Subjects:

- **Class III**: Students were tested in three subjects Language, Mathematics, and Environmental Studies. There were 15 items for each subject arranged within a single test booklet containing a total of 45 items. Achievement test was produced in two sets with 5 anchor items per subject (total of 15 anchor items and 25 unique items across 3 subjects per Class).

- **Class V**: Students were tested in three subjects Language, Mathematics, and Environmental Studies. There were 15 items for each subject arranged within a single test booklet containing a total of 45 items. Achievement test was produced in two sets with 5 anchor items per subject (total of 15 anchor items and 25 unique items across 3 subjects per Class).

- **Class VIII**: Students were tested in four subjects Language, Mathematics, Science, and Social Science. There were 15 items for each subject arranged within a single test booklet containing a total of 60 items. Achievement test was produced in two sets with 5 anchor items per subject (total of 20 anchor items and 25 unique items across 4 subjects per Class).

The questionnaire data was collected by means of three instruments:

- **Pupil Questionnaire (PQ)**: The purpose of PQ was to collect student related information (home background and study habits). It contained questions which were filled in by a Field Investigator in an interview mode.

- **Teacher Questionnaire (TQ)**: The purpose of TQ was to collect information about the teacher background. It was administered to each subject teacher (Language, Mathematics, EVS/Science and Social Science) who was teaching to the sampled students of Classes III, V and VIII. It contained questions which were filled in by a Field Investigator in an interview mode.

- **School Questionnaire (SQ)**: The purpose of SQ was to collect information about the school infrastructure, teaching learning process and community involvement. The respondents were school principals (head teachers) or their deputies. This contained questions which were filled in by a Field Investigator in an interview mode.

The first step prior to carrying out the statistical analyses included the presentation and Installation of Data Management and Item Analysis System (DAMIAS). This included Data Preparation phase that entailed merging district data files, verification of data integrity, and formatting data for analysis using DAMIAS. This step was followed by a series of analyses targeting the following major purposes:

1. Evaluation of technical characteristics of achievement instruments at item and test levels. These analyses were carried out for selected languages that covered majority of population in India, that is, English, Hindi, Telugu, Bangla, Kannada, and Tamil.

2. Evaluation of student performance at national and State levels included comparisons between different categories of students such as gender, urban/rural location, social groups, and school management.

3. Analysis of contextual factors associated with student performance was collected by means of questionnaires.

In order to develop a reporting frame for achievement tests that was fully aligned with industry standards, the following was also conducted:

a) IRT scaling and

b) Setting Performance Standards (SPS).

Since, the IRT scaling and standard setting activity were allocated later in the project timeline, the first version of National and State reports were considered that were based on classical analysis and performance bands which were constructed using the traditional percent-correct intervals.
5.1 Evaluation of Technical Standards of Achievement Instruments

Quality of achievement instruments at item and test level was conducted using Classical Test Theory (CTT) and Item Response Theory (IRT) indices, such as:

- **Item difficulty**: The difficulty of an item was determined using CTT and IRT metrics. In CTT, item difficulty was based on the proportion of students giving a correct answer, and in IRT, difficulty was represented by the estimate of ability needed to answer an item correctly.

- **Item discrimination**: Based on the concept that an item divides learners into two groups – those who answered an item correctly and those who answered incorrectly – item discrimination indices told us how sharply an item discriminated between these two groups. Technically, we computed the measures of relationships between item scores and total scores on the test.

- **Options analysis**: Used for scrutinizing the behavior of multiple choice options to determine if they were working as expected: proportions of students choosing each option, option point-biserial correlations.

- **Differential Item Functioning (DIF)**: It was used to determine if there were unexpected differences in item performance between different groups of examinees that were matched by ability level (overall performance on the test). Most typically DIF was checked to evaluate possible item bias for gender groups, but for NAS 2017, it had also been suggested to carry out DIF between groups taking selected pairs of languages (keeping Hindi as a reference and selected languages as focal).

- **Item-location**: Evaluated IRT item locations (difficulty) on the ability distribution of persons taking the test.

- **Test reliability**: Determined the degree to which the test scores were independent from non-systematic variations or errors of measurement. In CTT the estimation of reliability was mainly based on internal consistency methods (split-half and Cronbach alpha) and in IRT test reliability was based on the concept of Test Information Function.

- **Test validity**: Determined the degree to which a test measured what it purports to measure. In educational assessments, validity was typically based on the evaluation of the alignment between content coverage of the test and curriculum standards. However, it included studies of concurrent or predictive validity in regard to some external criterion, or evaluation of construct validity using factor analysis and/or some similar methods such as cluster analysis and MultiTrait-MultiMethod analysis.

5.2 Analysis of Contextual Factors associated with Student Performance

The analysis of contextual information is important for informing policy decisions aimed at supporting improvements in the quality of instruction and student learning outcomes. Contextual data analysis were designed around the research questions which focussed on exploring the factors associated with student learning outcomes. These factors included student and parent background data (e.g. age, gender, study habits, richness of home environment, socio-economic status including parent level of education, attitudes toward school and teachers, etc.) and school level data assessed by means of subject teacher and school head questionnaires (e.g. school socio-economic status, school type, regional location, qualifications of teachers, policy support, etc.). This data analysis was carried out using SPSS software.

- **Pupil Questionnaire**
  To what extent are the student characteristics associated with performance on NAS? Is the pattern different in Classes III, V and VIII?

- **Teacher Questionnaire**
  To what extent are teacher characteristics and instruction-related factors associated with student performance? Is the pattern different in Classes III, V and VIII?

- **School Questionnaire**
  To what extent are school-related factors (school environment) associated with student performance?
5.3 Procedure of Data Analysis

**Data Cleaning**

The paramount goals of data cleaning procedures were the following: (1) to ensure that the data accurately reflected the information collected; and (2) to format the data in a manner that facilitated ease of use. Data cleaning procedures which were considered important for achieving these key goals were carried out and determined the extent to which data had been appropriately cleaned and formatted to enable fluid analysis. Quality assurance checks were carried out after data had been cleaned. Item quality checks included review of the response distribution of items to ensure that the items functioned as expected and that all standard response options employed a consistent coding scheme. After the evaluation of item and test quality using both Classical Test Theory (CTT) and Item Response Theory (IRT) indices, IRT scaling was done (refer Appendix D).

**IRT Scaling**

The reporting scale for the National Achievement Survey (NAS) 2017 data was based on the Item Response Theory (IRT). The benefits of the IRT scale are not only in the provision of a meaningful reporting framework, but also in providing a foundation for establishing comparability between the results obtained in different administration years. The most valuable feature of the IRT models was in providing a fruitful framework that could be effectively utilized for monitoring and promoting quality of education.

The IRT model chosen for item calibration was a two-parameter logistic (2-PL) model because it utilized the two item characteristics that were most pertinent for assessing educational achievement: item difficulty and item discrimination. Items were calibrated using the strategy that centered the mean of item difficulties to zero and evaluated the distribution of ability estimates in relation to the mean of item difficulties.

Student scores were determined by means of the IRT ‘pattern-scoring’ approach, where a pattern of student responses to items was used to estimate the latent ability (i.e., knowledge and competencies) underlying students’ test performance. The techniques used for ability estimation was based on the Weighted Maximum Likelihood (WML) method, which was widely supported in research literature.

The IRT ability estimates were independent of any set of items, and given that the item parameters of multiple test forms (item sets) were calibrated to the same scale, the scores from multiple test forms obtained by pattern-scoring were directly comparable. The IRT scores were initially generated in the logit metrics, and then they were linearly converted into a meaningful and publicly communicable scale that facilitated score interpretation. The reporting scale was set to the range of 100 to 500 with a mean of 300 and standard deviation of 50. Thus, the linear transformation from ability estimates expressed on the logit scale to the reporting scale scores was applied using the expression:  

\[ \text{Scale Score} = \logit \text{ Score} \times 50 + 300. \]

**Sampling Weights**

Sampling weights were determined using an industry standard definition of a sampling weight as an inverse of the probability of being selected into the sample. School and student weights reflect the sample design by considering the approach to cluster-based sampling and included adjustments for the different probability of a student being selected from schools of different size. Weights were also determined for each District and State based on the ratio of the respective population and sample distributions. The final weights were determined as a product of the school base weight, District weight, and State weight (refer Appendix E). The creation of sampling weights relied on the sampling frame which contained information about the schools in population and schools selected in the sample.

**Developing Performance Standards**

Performance Standards represented a necessary component of standards-based assessment system that was used for summative and formative evaluation of student academic performance in regard to the expectations derived from National Curriculum at each targeted Class and Subject.
NCERT’s vision for providing maximally useful assessment-based support to the States, and especially at the school and District supervisory level, required setting of performance standards, that is, the development of conceptual and operational definitions of student performance levels. There were multiple benefits of establishing performance standards system:

- Performance Standards were developed using the representative panels of national experts.
- They were based on national curriculum, and designed to be internationally comparable with similar systems with regard to methodology and standards level.
- They were established for each targeted Class and Subject enabling summative and formative evaluation at each targeted Class and Subject.
- They were developed as vertically aligned prescribing student learning expectations at each targeted Class level, which enabled evaluation of student learning progress across Classes.
- They were linked to the IRT scale, which enabled horizontal equating to provide a framework for monitoring of national educational progress over multiple academic years.
- Performance Standards were aggregated over Classes and Subjects to express overall performance in different schools, Districts, or States, as well as at national level. They enabled answering the questions such as: what is the overall percentage of proficient students at the school (District or State) taken all Class and Subjects together?

The performance levels for NAS were constructed using industry standard procedure that entailed a 2-stage process: (1) development of conceptual definitions of the levels informed by the Class/Subject specific content standards, i.e., measurable learning outcomes and competencies covered at each Class/Subject; and (2) setting cut-points using the NAS 2017 instruments and data.

### 5.4 Assessment of Student Performance at District Level

NAS 2017 was conducted in 701 districts of the country covering all states and UTs. The performance of each district was assessed using DRCs (District Report Cards). For each district, there were 10 report cards developed subject wise (3 for Class III, 3 for Class V and 4 for Class VIII). The DRCs captured overall information about the student performance on learning outcomes in a given district. It further depicts subject specific performance by gender (boys and girls), area (rural and urban), social groups (SC, ST, OBC and general) and school management (government and government-aided). DRC also considers the number of students of different disability types i.e. Locomotor Disability (LD), Visual Impairment (VI), Hearing Impairment (HI), Speech and Language Disability (S&LD), Intellectual Disability (ID) and Other Disability (Oth). DRC thus enabled to envision the interventions required for improving the quality of education at classroom level. The complete district wise report cards are available at [http://www.ncert.nic.in/programmes/NAS/DRC.html](http://www.ncert.nic.in/programmes/NAS/DRC.html).

To understand these District Report Cards, a module was developed, Communication and Understanding of the DRCs, Post NAS Interventions ([www.ncert.nic.in/programmes/NAS/pdf/DRC_report.pdf](http://www.ncert.nic.in/programmes/NAS/pdf/DRC_report.pdf))

### 5.5 Assessment of Student Performance at State Level

The following Research Questions were framed and the analysis plan was developed accordingly:

1. How the performance of students varied in Language, Maths and EVS in Class III and V, and Language, Maths, Science and Social Science in Class VIII?

For each class the following information was produced:

- Computed the means of Percentage-correct scores for the total test at National and State levels. Created a Table for each subject containing State percentage-correct means in alphabetical order (included National means at the top).
- Developed IRT scale for each subject at each class. Centered the scale to 300 with standard deviation of 50. The following options were considered:
vertically moderated scale across class levels, and anchoring the scale to performance levels (contingent to setting performance standards). Calculated means of the IRT scale scores at National and State levels.

- Using the IRT scale scores created a Statewise map of India reporting State learning outcomes against national benchmarks. Used Cohen's D range of +/- 0.20 around the national benchmark as boundaries.

- Computed the mean Percentage-scores for Learning Outcomes (LO) within the subject. Constructed a vertical bar-chart for each LO within the subject demonstrating State means in alphabetical order. (Box-plots were preferred over bar charts). Various options for reporting categories were considered: a) by single LOs, b) by LOs grouped in content categories, and c) by grouping LOs in competency categories.

- Computed and generated report tables and graphs of percentages of students reaching different performance levels. These performance levels were initially based on predetermined Percentage-correct boundaries and in the later version of reports they were based on cut scores determined by standard setting.

2. Is there any significant difference between boys and girls in performance in Language, Maths and EVS in Class III and V, and Language, Maths, Science and Social Science in Class VIII?

   a) Computed means of IRT scale scores for boys and girls at each State and at national level.

   b) Computed Cohen's D for each comparison.

   c) Generated a table with State means for boys and girls, and corresponding Cohen's D, in alphabetical order of States.

   d) Constructed a statewise map of India indicating whether boys or girls perform better or there is no significant difference.

3. Is there any significant difference in students' performance belonging to rural and urban schools?

   a) Computed means of IRT scale scores for urban and rural schools at each State and at national level.

   b) Computed Cohen's D for each comparison.

   c) Generated a table with State means for rural and urban schools, and corresponding Cohen's D, in alphabetical order of States.

   d) Constructed a statewise map of India indicating whether rural or urban schools perform better or there is no significant difference.

4. How does the performance of the students varies in Language, Maths and EVS in Class III and V, and Language, Maths, Science and Social Science in Class VIII across social groups?

   a) Computed means of IRT scale scores for social groups at each State.

   b) Computed ANOVA to test the differences between social groups.

   c) Generated a table with State means for social groups, and corresponding significance levels, in alphabetical order of States.

5. How does the performance of the students varies in Language, Maths and EVS in Class III and V, and Language, Maths, Science and Social Science in Class VIII across school managements?

   a) Computed means of IRT scale scores for different types of school management at each State.

   b) Computed ANOVA to test the differences between the different types of schools as per management.

   c) Generated a table with State means for types of school management, and corresponding significance levels, in alphabetical order of States.
In Class III Language, 7 States/UTs performed significantly above the national average, 5 States/UTs performed significantly below and 24 States/UTs showed no significant difference from the national average.

Performance of the Class III students in the Learning Outcomes of Language is significantly low in the following States like: Arunachal Pradesh, Lakshadweep, Uttar Pradesh, Puducherry and Delhi.

*Boundaries around the National Average were constructed using Cohen’s D measure of effect size (Cohen, 1988) equal to +/- 0.20. The differences between National Mean and State Means that are smaller than D=0.20 are considered small and practically insignificant. Similarly, differences between individual State Means that are smaller than D=0.20 can be considered as practically insignificant.
Figure 5.2: Performance of States in Class III: Mathematics

• In Class III Mathematics, 8 States/UTs performed significantly above the national average, 10 States/UTs performed significantly below and 18 States/UTs showed no significant difference from the national average.

• Performance of the Class III students in the Learning Outcomes of Mathematics is significantly low in the following States like: Arunachal Pradesh, Delhi, Punjab, Meghalaya and Haryana.

<table>
<thead>
<tr>
<th>State/UT</th>
<th>Mean</th>
<th>State/UT</th>
<th>Mean</th>
<th>State/UT</th>
<th>Mean</th>
</tr>
</thead>
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<td>Daman &amp; Diu</td>
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<td>318</td>
<td>Sikkim</td>
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<td>318</td>
<td>Haryana</td>
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*Boundaries around the National Average were constructed using Cohen’s D measure of effect size (Cohen, 1988) equal to +/- 0.20. The differences between National Mean and State Means that are smaller than D=0.20 are considered small and practically insignificant. Similarly, differences between individual State Means that are smaller than D=0.20 can be considered as practically insignificant.
In Class III Environmental Studies, 10 States/UTs performed significantly above the national average, 9 States/UTs performed significantly below and 17 States/UTs showed no significant difference from the national average.

Performance of the Class III students in the Learning Outcomes of Environmental Studies is significantly low in the following States like: Arunachal Pradesh, Lakshadweep, Uttar Pradesh, Delhi and Sikkim.

*Boundaries around the National Average were constructed using Cohen's D measure of effect size (Cohen, 1988) equal to +/- 0.20. The differences between National Mean and State Means that are smaller than D=0.20 are considered small and practically insignificant. Similarly, differences between individual State Means that are smaller than D=0.20 can be considered as practically insignificant.
In Class V Language, 7 States/UTs performed significantly above the national average, 11 States/UTs performed significantly below and 18 States/UTs showed no significant difference from the national average.

Performance of the Class V students in the Learning Outcomes of Language is significantly low in the following States like: Arunachal Pradesh, Meghalaya, Sikkim, Uttar Pradesh and Puducherry.

*Boundaries around the National Average were constructed using Cohen’s D measure of effect size (Cohen, 1988) equal to +/- 0.20. The differences between National Mean and State Means that are smaller than D=0.20 are considered small and practically insignificant. Similarly, differences between individual State Means that are smaller than D=0.20 can be considered as practically insignificant.
**Figure 5.5: Performance of States in Class V: Mathematics**

- In Class V Mathematics, 8 States/UTs performed significantly above the national average, 11 States/UTs performed significantly below and 17 States/UTs showed no significant difference from the national average.
- Performance of the Class V students in the Learning Outcomes of Mathematics is significantly low in the following States like: Arunachal Pradesh, Sikkim, Meghalaya, Delhi and Daman & Diu.

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*Boundaries around the National Average were constructed using Cohen’s D measure of effect size (Cohen, 1988) equal to +/- 0.20. The differences between National Mean and State Means that are smaller than D=0.20 are considered small and practically insignificant. Similarly, differences between individual State Means that are smaller than D=0.20 can be considered as practically insignificant.
In Class V Environmental Studies, 10 States/UTs performed significantly above the national average, 10 States/UTs performed significantly below and 16 States/UTs showed no significant difference from the national average.

Performance of the Class V students in the Learning Outcomes of Environmental Studies is significantly low in the following States like: Arunachal Pradesh, Sikkim, Meghalaya, Lakshadweep and Daman & Diu.

**Figure 5.6: Performance of States in Class V: Environmental Studies**

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*Boundaries around the National Average were constructed using Cohen’s D measure of effect size (Cohen, 1988) equal to +/- 0.20. The differences between National Mean and State Means that are smaller than D=0.20 are considered small and practically insignificant. Similarly, differences between individual State Means that are smaller than D=0.20 can be considered as practically insignificant.*
In Class VIII Language, 5 States/UTs performed significantly above the national average, 12 States/UTs performed significantly below and 19 States/UTs showed no significant difference from the national average.

Performance of the Class VIII students in the Learning Outcomes of Language is significantly low in the following States like: Nagaland, Jammu & Kashmir, Puducherry, Arunachal Pradesh and Mizoram.

*Boundaries around the National Average were constructed using Cohen’s D measure of effect size (Cohen, 1988) equal to +/- 0.20. The differences between National Mean and State Means that are smaller than $D=0.20$ are considered small and practically insignificant. Similarly, differences between individual State Means that are smaller than $D=0.20$ can be considered as practically insignificant.
**Figure 5.8: Performance of States in Class VIII: Mathematics**

- In Class VIII Mathematics, 7 States/UTs performed significantly above the national average, 19 States/UTs performed significantly below and 10 States/UTs showed no significant difference from the national average.

- Performance of the Class VII students in the Learning Outcomes of Mathematics is significantly low in the following States like: Puducherry, Sikkim, Daman & Diu, Punjab and Delhi.

The boundaries around the National Average were constructed using Cohen’s D measure of effect size (Cohen, 1988) equal to +/- 0.20. The differences between National Mean and State Means that are smaller than D=0.20 are considered small and practically insignificant. Similarly, differences between individual State Means that are smaller than D=0.20 can be considered as practically insignificant.

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</table>
In Class VIII Science, 8 States/UTs performed significantly above the national average, 15 States/UTs performed significantly below and 13 States/UTs showed no significant difference from the national average.

Performance of the Class VIII students in the Learning Outcomes of Science is significantly low in the following States like: Puducherry, Lakshadweep, Nagaland, Daman & Diu and Delhi.

**State/UT** | **Mean** | **State/UT** | **Mean** | **State/UT** | **Mean**
---|---|---|---|---|---
Rajasthan | 326 | Madhya Pradesh | 274 | Punjab | 257 |
Jharkhand | 302 | Himachal Pradesh | 273 | Tamil Nadu | 256 |
Karnataka | 297 | Manipur | 272 | A & N Islands | 254 |
Dadra & Nagar Haveli | 296 | Kerala | 271 | Meghalaya | 252 |
Gujarat | 295 | West Bengal | 269 | Mizoram | 250 |
Chandigarh | 292 | Haryana | 268 | Arunachal Pradesh | 250 |
Assam | 289 | Maharashtra | 266 | Delhi | 248 |
Andhra Pradesh | 286 | Tripura | 266 | Daman & Diu | 248 |
Uttarakhand | 281 | Uttar Pradesh | 266 | Nagaland | 247 |
Odisha | 277 | Telangana | 259 | Lakshadweep | 245 |
Bihar | 277 | Goa | 258 | Puducherry | 242 |
Chhattisgarh | 275 | Jammu & Kashmir | 258 | Sikkim | 257 |
**National Mean** | **274** |**Boundaries around the National Average were constructed using Cohen’s D measure of effect size (Cohen, 1988) equal to +/- 0.20. The differences between National Mean and State Means that are smaller than D=0.20 are considered small and practically insignificant. Similarly, differences between individual State Means that are smaller than D=0.20 can be considered as practically insignificant.**
In Class VIII Social Science, 8 States/UTs performed significantly above the national average, 17 States/UTs performed significantly below and 11 States/UTs showed no significant difference from the national average.

Performance of the Class VIII students in the Learning Outcomes of Social Science is significantly low in the following States like: Puducherry, Lakshadweep, Tamil Nadu, Mizoram and Daman & Diu.

*Boundaries around the National Average were constructed using Cohen’s D measure of effect size (Cohen, 1988) equal to +/- 0.20. The differences between National Mean and State Means that are smaller than D=0.20 are considered small and practically insignificant. Similarly, differences between individual State Means that are smaller than D=0.20 can be considered as practically insignificant.
**Figure 5.11: Performance of States by Gender in Class III: Language**

- In Class III Language, girls performed significantly better than boys in 18 States/UTs, no significant difference between the performance of girls and boys was observed in 18 States/UTs.

- Performance of the Class III girls in the Learning Outcomes of Language is significantly higher in the following States like: Andhra Pradesh, Karnataka, West Bengal, Kerala and Assam.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen’s D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
Figure 5.12: Performance of States by Gender in Class III: Mathematics

- In Class III Mathematics, girls performed significantly better than boys in 6 States/UTs, boys performed significantly better than girls in 5 States/UTs, and no significant difference between the performance of girls and boys was observed in 25 States/UTs.

- Performance of the Class III girls in the Learning Outcomes of Mathematics is significantly higher in the following States like: Karnataka, Kerala, Assam, Gujarat, and Maharashtra.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
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* Statistically significant at p<0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen’s D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.

Figure 5.13: Performance of States by Gender in Class III: Environmental Studies

- In Class III Environmental Studies, girls performed significantly better than boys in 15 States/UTs, no significant difference between the performance of girls and boys was observed in 21 States/UTs.
- Performance of the Class III girls in the Learning Outcomes of Environmental Studies is significantly higher in the following States like: Kerala, Karnataka, Andhra Pradesh, West Bengal and Assam.
### Figure 5.14: Performance of States by Gender in Class V: Language

- In Class V Language, girls performed significantly better than boys in 16 States/UTs, boys performed significantly better than girls in 1 State and no significant difference between the performance of girls and boys was observed in 19 States/UTs.

- Performance of the Class V girls in the Learning Outcomes of Language is significantly higher in the following States like: Kerala, Karnataka, Maharashtra, Gujarat and Jharkhand.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen’s D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class V Mathematics, girls performed significantly better than boys in 6 States/UTs, boys performed significantly better than girls in 1 State and no significant difference between the performance of girls and boys was observed in 29 States/UTs.

Performance of the Class V girls in the Learning Outcomes of Mathematics is significantly higher in the following States like: Karnataka, Jharkhand, Gujarat, Maharashtra and Tamil Nadu.

* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
**Figure 5.16: Performance of States by Gender in Class V: Environmental Studies**

- In Class V Environmental Studies, girls performed significantly better than boys in 12 States/UTs, boys performed significantly better than girls in 2 States/UTs, and no significant difference between the performance of girls and boys was observed in 22 States/UTs.

- Performance of the Class V girls in the Learning Outcomes of Environmental Studies is significantly higher in the following States like: Kerala, Karnataka, Jharkhand, Assam and Gujarat.

### Table 5.11: Performance of States by Gender in Class V: Environmental Studies

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* Statistically significant at p<0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen’s D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
**Analysis**

In Class VIII Language, girls performed significantly better than boys in 18 States/UTs, boys performed significantly better than girls in 4 States/UTs and no significant difference between the performance of girls and boys was observed in 14 States/UTs.

Performance of the Class VIII girls in the Learning Outcomes of Language is significantly higher in the following States like: Gujarat, Kerala, Maharashtra, Karnataka and Chandigarh.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen’s D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class VIII Mathematics, girls performed significantly better than boys in 9 States/UTs, boys performed significantly better than girls in 3 States/UTs and no significant difference between the performance of girls and boys was observed in 24 States/UTs.

Performance of the Class VIII girls in the Learning Outcomes of Mathematics is significantly higher in the following States like: Jharkhand, Karnataka, Gujarat, Madhya Pradesh and Maharashtra.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
Analysis

**Figure 5.19: Performance of States by Gender in Class VIII: Science**

- In Class VIII Science, girls performed significantly better than boys in 4 States/UTs, boys performed significantly better than girls in 9 States/UTs and no significant difference between the performance of girls and boys was observed in 23 States/UTs.

- Performance of the Class VIII girls in the Learning Outcomes of Science is significantly higher in the following States like: Karnataka, Gujarat, Andhra Pradesh and Tamil Nadu.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen’s D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class VIII Social Science, girls performed significantly better than boys in 11 States/UTs, boys performed significantly better than girls in 4 States/UTs and no significant difference between the performance of girls and boys was observed in 21 States/UTs.

Performance of the Class VIII girls in the Learning Outcomes of Social Science is significantly higher in the following States like: Gujarat, Chandigarh, Karnataka, Andhra Pradesh and Haryana.

- Statistically significant at p<0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.

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* Statistically significant at p<0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
Figure 5.21: Performance of States by School Location in Class III: Language

- In Class III Language, urban schools performed significantly better than rural schools in 11 States/UTs, rural schools performed significantly better than urban schools in 11 States/UTs and no significant difference between the performance of urban and rural schools was observed in 14 States/UTs.

- Performance of the rural students of Class III in the Learning Outcomes of Language is significantly higher in the following States like: Andhra Pradesh, Karnataka, Uttarakhand, Nagaland and Maharashtra.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen’s D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class III Mathematics, urban schools performed significantly better than rural schools in 12 States/UTs, rural schools performed significantly better than urban schools in 10 States/UTs and no significant difference between the performance of urban and rural schools was observed in 14 States/UTs.

Performance of the rural students of Class III in the Learning Outcomes of Mathematics is significantly higher in the following States like: Karnataka, Andhra Pradesh, Uttarakhand, Maharashtra and Himachal Pradesh.

* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class III Environmental Studies, urban schools performed significantly better than rural schools in 10 States/UTs, rural schools performed significantly better than urban schools in 9 States/UTs and no significant difference between the performance of urban and rural schools was observed in 17 States/UTs.

Performance of the rural students of Class III in the Learning Outcomes of Environmental Studies is significantly higher in the following States like: Karnataka, Andhra Pradesh, Uttarakhand, Maharashtra and Himachal Pradesh.

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* Statistically significant at p<0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class V Language, urban schools performed significantly better than rural schools in 13 States/UTs, rural schools performed significantly better than urban schools in 10 States/UTs and no significant difference between the performance of urban and rural schools was observed in 13 States/UTs.

Performance of the rural students of Class V in the Learning Outcomes of Language is significantly higher in the following States like: Kerala, Karnataka, Maharashtra, Nagaland and Chhattisgarh.

* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen’s D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class V Mathematics, urban schools performed significantly better than rural schools in 5 States/UTs, rural schools performed significantly better than urban schools in 16 States/UTs and no significant difference between the performance of urban and rural schools was observed in 15 States/UTs.

Performance of the rural students of Class V in the Learning Outcomes of Mathematics is significantly higher in the following States like: Karnataka, Kerala, Assam, Uttarakhand and Delhi.

* Statistically significant at $p<0.05$; ** Statistically significant at $p<0.01$. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than $D=0.20$ is considered small and practically irrelevant.
In Class V Environmental Studies, urban schools performed significantly better than rural schools in 8 States/UTs, rural schools performed significantly better than urban schools in 14 States/UTs and no significant difference between the performance of urban and rural schools was observed in 14 States/UTs.

Performance of the rural students of Class V in the Learning Outcomes of Environmental Studies is significantly higher in the following States like: Kerala, Karnataka, Uttarakhand, Assam and Odisha.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class VIII Language, urban schools performed significantly better than rural schools in 19 States/UTs, rural schools performed significantly better than urban schools in 6 States/UTs and no significant difference between the performance of urban and rural schools was observed in 11 States/UTs.

Performance of the rural students of Class VIII in the Learning Outcomes of Language is significantly higher in the following States like: Gujarat, Chandigarh, Karnataka, Uttarakhand and Andhra Pradesh.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen’s D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class VIII Mathematics, urban schools performed significantly better than rural schools in 4 States/UTs, rural schools performed significantly better than urban schools in 15 States/UTs and no significant difference between the performance of urban and rural schools was observed in 17 States/UTs.

Performance of the rural students of Class VIII in the Learning Outcomes of Mathematics is higher significantly in the following States like: Rajasthan, Jharkhand, Karnataka, Andhra Pradesh and Gujarat.

### Figure 5.28: Performance of States by School Location in Class VIII: Mathematics

* No significant difference between Rural and Urban
* Rural perform significantly better than Urban
* Urban perform significantly better than Rural

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class VIII Science, urban schools performed significantly better than rural schools in 8 States/UTs, rural schools performed significantly better than urban schools in 15 States/UTs and no significant difference between the performance of urban and rural schools was observed in 13 States/UTs.

Performance of the rural students of Class VIII in the Learning Outcomes of Science is significantly higher in the following States like: Rajasthan, Karnataka, Jharkhand, Gujarat and Andhra Pradesh.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class VIII Social Science, urban schools performed significantly better than rural schools in 10 States/UTs, rural schools performed significantly better than urban schools in 12 States/UTs and no significant difference between the performance of urban and rural schools was observed in 14 States/UTs.

Performance of the rural students of Class VIII in the Learning Outcomes of Social Science is significantly higher in the following States like: Rajasthan, Gujarat, Jharkhand, Karnataka and Andhra Pradesh.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class III Language, government aided schools performed significantly better than government schools in 7 States/UTs, government schools performed significantly better than government aided schools in 9 States/UTs and no significant difference between the performance of government and government aided schools was observed in 20 States/UTs.

Performance of the students of government schools of Class III in the Learning Outcomes of Language is significantly higher in the following States like: Andhra Pradesh, Karnataka, Rajasthan, Kerala and Assam.

* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
• In Class III Mathematics, government aided schools performed significantly better than government schools in 5 States/UTs, government schools performed significantly better than government aided schools in 12 States/UTs and no significant difference between the performance of government and government aided schools was observed in 19 States/UTs.

• Performance of the students of government schools of Class III in the Learning Outcomes of Mathematics is significantly higher in the following States like: Andhra Pradesh, Kerala, Rajasthan, Assam and Telangana.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class III Environmental Studies, government aided schools performed significantly better than government schools in 10 States/UTs, government schools performed significantly better than government aided schools in 9 States/UTs and no significant difference between the performance of government and government aided schools was observed in 17 States/UTs.

Performance of the students of government schools of Class III in the Learning Outcomes of Environmental Studies is significantly higher in the following States like: Kerala, Karnataka, Rajasthan, Andhra Pradesh and Assam.

* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen’s D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class V Language, government aided schools performed significantly better than government schools in 9 States/UTs, government schools performed significantly better than government aided schools in 9 States/UTs and no significant difference between the performance of government and government aided schools was observed in 18 States/UTs.

Performance of the students of government schools of Class V in the Learning Outcomes of Language is significantly higher in the following States like: Kerala, Karnataka, Chandigarh, Gujarat and Assam.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen’s D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
• In Class V Mathematics, government aided schools performed significantly better than government schools in 7 States/UTs, government schools performed significantly better than government aided schools in 13 States/UTs and no significant difference between the performance of government and government aided schools was observed in 16 States/UTs.

• Performance of the students of government schools of Class V in the Learning Outcomes of Mathematics is significantly higher in the following States like: Karnataka, Kerala, Chandigarh, Assam and Gujarat.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen’s D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class V Environmental Studies, government aided schools performed significantly better than government schools in 7 States/UTs, government schools performed significantly better than government aided schools in 13 States/UTs and no significant difference between the performance of government and government aided schools was observed in 16 States/UTs.

- Performance of the students of government schools of Class V in the Learning Outcomes of Environmental Studies is significantly higher in the following States like: Kerala, Karnataka, Chandigarh, Assam and Gujarat.

### Table: Performance of States by School Management in Class V: Environmental Studies

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen’s D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class VIII Language, government aided schools performed significantly better than government schools in 18 States/UTs, government schools performed significantly better than government aided schools in 2 States/UTs and no significant difference between the performance of government and government aided schools was observed in 16 States/UTs.

Performance of the students of government schools of Class VIII in the Learning Outcomes of Language is significantly higher in the following States like Kerala and West Bengal.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class VIII Mathematics, government aided schools performed significantly better than government schools in 9 States/UTs, government schools performed significantly better than government aided schools in 12 States/UTs and no significant difference between the performance of government and government aided schools was observed in 15 States/UTs.

Performance of the students of government schools of Class VIII in the Learning Outcomes of Mathematics is significantly higher in the following States like: Jharkhand, Andhra Pradesh, Kerala, Gujarat and Bihar.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
In Class VIII Science, government aided schools performed significantly better than government schools in 10 States/UTs, government schools performed significantly better than government aided schools in 12 States/UTs and no significant difference between the performance of government and government aided schools was observed in 14 States/UTs.

Performance of the students of government schools of Class VIII in the Learning Outcomes of Science is significantly higher in the following States like: Jharkhand, Kerala, Gujarat, Andhra Pradesh and Uttarakhand.

* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen’s D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
Figure 5.40: Performance of States by School Management in Class VIII: Social Science

• In Class VIII Social Science, government aided schools performed significantly better than government schools in 8 States/UTs, government schools performed significantly better than government aided schools in 9 States/UTs and no significant difference between the performance of government and government aided schools was observed in 19 States/UTs.

• Performance of the students of government schools of Class VIII in the Learning Outcomes of Social Science is significantly higher in the following States like: Gujarat, Jharkhand, Chandigarh, Andhra Pradesh and Uttarakhand.

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* Statistically significant at p< 0.05; ** Statistically significant at p<0.01. The sizes of statistically significant differences are expressed by Cohen's D (Cohen, 1988). The size of difference that is lesser than D=0.20 is considered small and practically irrelevant.
### Table 5.1: Performance of States by Social Groups in Class III: Language

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* Inadequate sample, significant difference cannot be computed.
### Table 5.2: Performance of States by Social Groups in Class III: Mathematics

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* Inadequate sample, significant difference cannot be computed
Table 5.3: Performance of States by Social Groups in Class III: Environmental Studies

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* Inadequate sample, significant difference cannot be computed
Table 5.4: Performance of States by Social Groups in Class V: Language

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* Inadequate sample, significant difference cannot be computed
Table 5.5: Performance of States by Social Groups in Class V: Mathematics

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* Inadequate sample, significant difference cannot be computed.
Table 5.6: Performance of States by Social Groups in Class V: Environmental Studies

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* Inadequate sample, significant difference cannot be computed
### Table 5.7: Performance of States by Social Groups in Class VIII: Language

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* Inadequate sample, significant difference cannot be computed
### Table 5.8: Performance of States by Social Groups in Class VIII: Mathematics

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* Inadequate sample, significant difference cannot be computed
### Table 5.10: Performance of States by Social Groups in Class VIII: Social Science

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5.6 Assessment of Student Performance at National Level

Participation by Gender, Location, School Management, and Social Groups in Classes III, V and VIII

The diagrams below show the participation sample percentage in terms of Gender, Location, School Management and Social Groups at national level. The participation was nearly equal for both boys and girls. The participation was skewed in favor of rural areas. The participation of government school was nearly four times than that of government aided school. The participation was a cumulative representation of four major social groups namely SC, ST, OBC and General.

Figure 5.41: Participation by Gender

- Boys: 52%
- Girls: 48%

Figure 5.42: Participation by Location

- Rural: 81%
- Urban: 19%

Figure 5.43: Participation by School Management

- Government: 17%
- Government aided: 83%

Figure 5.44: Participation by Social Groups

- SC: 18%
- ST: 22%
- OBC: 42%
- General: 18%

The graph below depicts the performance of the students in the different Classes and in different Subjects. It can be observed that Class III students performed better than the Overall national average whereas Class V performed at par with the Overall national average however Class VIII performed significantly lower than the Overall national average. Thus it can be inferred that with increasing grades the national performance is going down.

Figure 5.45: National Performance: Class wise and Subject wise

- Language: 336
- Maths: 321
- Env Studies: 321
- Language: 319
- Maths: 310
- Env Studies: 310
- Language: 307
- Maths: 269
- Science: 274
- Soc Science: 278

Overall National Average: 303
The tables below show the national level class wise and subject wise low performing learning outcomes for class III, V and VIII respectively.

**Table 5.11: Subject wise Low Performing Learning Outcomes in Class III**

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<th>Subject</th>
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<tbody>
<tr>
<td>Language</td>
<td>• Reads small text with comprehension i.e. identifies main ideas, details, sequence and draws conclusion</td>
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</table>
| Mathematics           | • Estimates and measures length and distance using standard units like centimeters or meters and identifies relationship  
                         • Fills a given region leaving no gaps using a tile of a given shape  
                         • Extends patterns in simple shapes and numbers                                                                                                         |
| Environmental Studies | • Observes rules in games (local, indoor, outdoor)  
                         • Records observations, experiences, information on objects/activities/places visited in different ways and predicts patterns etc.  
                         • Identifies simple features (eg. movement at places found/kept, eating habits, and sounds) of animals and birds in the immediate surroundings. |

**Table 5.12: Subject wise Low Performing Learning Outcomes in Class V**

<table>
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<tr>
<td>Language</td>
<td>• Reads and comprehends independently story books, news items/headlines, advertisements etc.</td>
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| Mathematics           | • Estimates the volume of a solid body in known units  
                         • Identifies and forms equivalent fraction of a given fraction  
                         • Applies operations of numbers in daily life situations                                                                                                         |
| Environmental Studies | • Establishes linkages among terrain, climate resources (food, water, shelter, livelihood) and cultural life (eg. life in distant/difficult areas like hot/cold deserts)  
                         • Groups objects, materials, activities for features/properties such as shape, taste, colour, texture, sounds, traits etc.  
                         • Guesses (properties, conditions of phenomena), estimates spatial quantities (distance, area, volume, weight) and time in simple standard units and verifies using simple tools/setups |
<table>
<thead>
<tr>
<th>Subject</th>
<th>Learning Outcomes</th>
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<tbody>
<tr>
<td><strong>Language</strong></td>
<td>• Reads textual/non textual material with comprehension and identifies the details, characters, main idea, and sequence of ideas and events while reading</td>
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</table>
| **Mathematics** | • Finds surface area and volume of cuboidal and cylindrical objects  
• Generalises properties of addition and subtraction, multiplication and division of rational numbers through patterns  
• Finds out approximate area of closed shapes by using units square grid/graph sheets  
• Solves problems related to conversion of percentage to fraction and decimals and vice versa  
• Arranges given/collectiond information in the form of table, pictograph and bar graph and interprets them  
• Uses exponential form of numbers to simplify problems involving multiplication and division of large numbers |
| **Science**  | • Conducts simply investigation to seek answers to queries  
• Explains processes and phenomenon  
• Plots and interprets graphs  
• Constructs models using materials from surroundings and explains their working |
| **Social Science** | • Describes the functioning of rural and urban local government bodies in sectors like health and education  
• Analyse the decline of pre existing urban centers and handicraft industries and the development of new urban centers and industries in india during the colonial period  
• Locates important historical sites, places on outline map of india.  
• Locates distribution of important minerals, e.g. coal and mineral oil on the world map  
• Draws interrelationship between types of farming and development in different regions of the world  
• Applies the knowledge of the fundamental rights to find out about their violation, protection and promotion in a given situation  
• Identifies the role of government in providing public facilities such as water, sanitation, road, electricity etc. and recognizes their availability |
Girls perform statistically higher, but the differences are extremely small and practically negligible.

**Figure 5.46: Performance of Students by Gender**

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Girls perform statistically higher, but the differences are extremely small and practically negligible.
Urban students perform statistically higher (except in Language), but the differences are extremely small and practically insignificant.

Urban students perform statistically higher in Language, and rural in Maths and EVS, but the differences are extremely small/negligible.

Urban students perform statistically higher in Language, and rural in Maths and Sciences, the differences are small.
Government aided schools perform statistically higher, the differences are small.

Government aided schools perform statistically higher in Language, and Government in Maths, Science and Social Science, the differences are very small.
In Class III general group performs the best in all subjects, followed by OBC, whereas SC and ST are the lowest in all subjects.

Although the differences between groups are statistically significant, they are extremely small and practically negligible.

In Class V general group performs the best in Language and OBC in Mathematics and EVS, whereas SC and ST are the lowest in all subjects.

Although the differences between groups are statistically significant, they are very small with low practical relevance.

In Class VIII general group performs the best in Language and OBC in Mathematics, Science, and Social Science, whereas SC and ST are the lowest in most subjects.

Although the differences between groups are statistically significant, they are very small with low practical relevance.
5.7 Item Parameters

Item Parameter is a fundamental concept that is used to judge the quality of an item within both Classical Test Theory (CTT) as well as in Item Response Theory (IRT).

The tables below show the results of the analysis explained in this Chapter. The tables explain the difficulty values, the discrimination index, differential item functioning, the distractor analysis, the reliability and validity of the items and tests used in NAS 2017.

Description of the variables depicted in the tables (5.14 to 5.23) is as follows:

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<tr>
<th>Variables</th>
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<td>Form number</td>
</tr>
<tr>
<td>P</td>
<td>Item positioning</td>
</tr>
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<td>Total number of respondents</td>
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<tr>
<td>pval</td>
<td>Probability value</td>
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<td>itcor</td>
<td>Item correlation</td>
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<td>Percentage of responses to option A</td>
</tr>
<tr>
<td>B</td>
<td>Percentage of responses to option B</td>
</tr>
<tr>
<td>C</td>
<td>Percentage of responses to option C</td>
</tr>
<tr>
<td>D</td>
<td>Percentage of responses to option D</td>
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<td>B_pbc</td>
<td>Percent correct on option B (positive value means correct answer)</td>
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<td>C_pbc</td>
<td>Percent correct on option C (positive value means correct answer)</td>
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<td>D_pbc</td>
<td>Percent correct on option D (positive value means correct answer)</td>
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### Table 5.14: Item Parameters Language Class III

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Tables show the values of reliability using Cronbach's Alpha and Spearman-Brown Coefficient. It shows that the statistical consistency between the items is higher and all the items have high covariances.
Table 5.15: Item Parameters Mathematics Class III

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Tables show the values of reliability using Cronbach’s Alpha and Spearman-Brown Coefficient. It can be said that the reliability of the items of Mathematics Class III is moderately high.
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In terms of reliability, all the items of Environmental Studies in Class III are significantly consistent, i.e. the outcome is more reliable.
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Results show that all the items of Language in Class V are significantly consistent and have high covariances.

The values of reliability using Cronbach’s Alpha and Spearman-Brown Coefficient shows that the reliability of the items of Language Class V is moderately high.
Table 5.18: Item Parameters Mathematics Class V

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Table 5.18.1: Reliability Statistics Set A

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Spearman-Brown Coefficient

Equal Length .763
Unequal Length .764

Table 5.18.2: Reliability Statistics Set B

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Spearman-Brown Coefficient

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Unequal Length .789

Mathematics items for Class V are significantly correlated and share high covariances.

Results show that the reliability of the items of Mathematics in Class V is moderately high.
Table 5.19: Item Parameters Environmental Studies Class V

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Table 5.19.1: Reliability Statistics Set A

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In terms of reliability, all the items of Environmental Studies in Class V are significantly consistent, i.e. the outcome is more reliable using both Cronbach’s Alpha and Spearman-Brown Coefficient.
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Table 5.20.1: Reliability Statistics Set A

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Tables show the values of reliability using Cronbach's Alpha and Spearman-Brown Coefficient. It shows that the statistical consistency between the items is higher and all the items have high covariances.
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Table 5.22.1: Reliability Statistics Set A

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From the results, it can be said that the reliability of the items of Science Class VIII is moderately high.
Table 5.23: Item Parameters Social Science Class VIII

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Table 5.23.1: Reliability Statistics Set A

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Spearman-Brown Coefficient

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Spearman-Brown Coefficient

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From the results, it can be said that the reliability of the items of Social Science Class VIII is moderately high.
6. Standard Setting and Key Findings of Students’ Performance Result

The main purpose of setting performance standards for NAS is to define the evaluation framework for educational assessment programs. The system of performance standards substantially improves the interpretability of assessment results and provides a framework for defining national learning targets and for monitoring and promoting educational progress towards these targets at institutional, regional and national levels.
NCERT’s vision for providing maximally useful assessment-based support to the States and District level, required the setting of performance standards, i.e., the development of conceptual and operational definitions of student performance levels. The conceptual definitions of performance standards address all measurable aspects of curriculum and are not limited to the class-specific content scope of NAS, whereas the operational definitions (cut scores) are derived from the actual assessment instruments.

### 6.1 Setting Performance Standards

The performance levels were constructed in a 2-stage process: (1) Setting performance levels which entails the development of conceptual definitions of the levels informed by the subject/class specific content standards, i.e., learning outcomes and competencies covered by curriculum; and (2) Setting cut scores using the 2017 NAS instruments and data.

**Setting Performance Levels**

The procedure for conceptualizing performance levels entailed: deciding on the number and purpose of performance levels, choosing their labels and developing general and specific descriptions of each level (known as Performance Level Descriptors or PLDs (refer Appendix G), e.g. what should students know and be able to do in Mathematics Class V to be considered as “proficient”). This procedure is based on information drawn from official documentation on national learning standards and curricula (http://www.ncert.nic.in/departments/nie/dee/publication/print_material.html). The procedure for setting performance levels employed a focused group method to solicit the opinions and judgements of field experts (teachers, supervisors, curriculum experts). Figure 6.1 summarizes the process of setting conceptual definitions of performance levels.

**Table 6.1: General performance level descriptors**

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<th>Below basic</th>
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<th>Proficient</th>
<th>Advanced</th>
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<tr>
<td>• Learners at this level are at the early stages of development regarding the curriculum standards.</td>
<td>• Learners at this level demonstrate a minimum level of skills related to the curriculum learning outcomes.</td>
<td>• Learners at this level have acquired most of the learning outcomes and skills required by the curriculum. They can work independently with minimum supervision.</td>
<td>• Learners at this level display exceptional mastery of the learning content as prescribed by the curriculum and beyond. They are independent with high analytical, reflective and critical thinking.</td>
</tr>
<tr>
<td>• They have not achieved sufficient knowledge and skills to be considered minimally successful regarding curriculum demands.</td>
<td>• They can follow simple instructions and apply simple rules to achieve expected performance.</td>
<td>• They have a systematic methodology to solve problems.</td>
<td>• They can connect and integrate concepts and ideas to create new knowledge/meaning and solve complex problems.</td>
</tr>
<tr>
<td>• They need guidance at every stage of learning. They can make little judgement and need a lot of encouragement and guidance.</td>
<td>• They have some good ideas which often lack coherence. They need guidance at many stages of learning.</td>
<td>• They can communicate their ideas clearly. They can also connect different ideas and create meaning with minimum guidance and supervision.</td>
<td>• They communicate information with the highest level of creativity and coherence as well as make sound judgements.</td>
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An important step taken during the process was to ensure the vertical alignment (i.e., across the targeted Classes) of the performance level descriptors. For this activity, the panel lists compared the Performance Level Descriptors for each level across Classes to ensure that there is a logical progression as students move from one Class to the next. Once this activity was completed and the panelists were satisfied with the progression across Classes, the general and specific performance level descriptors were officially approved by the NCERT and the representatives of the Education Offices of the States/UTs present at the workshop.

Setting Cut Scores

After completing the setting performance standards procedure, the setting cut scores procedure was carried out. This is a procedure for establishing cut scores on operational tests to be used for the classification of student outcomes into predefined levels. The procedure was based on subject expert judgements taking into consideration the experts' understanding of the performance level definitions, experience solving the tests and experience in evaluating student performance.

The process of setting cut scores is an iterative method that takes typically three rounds of judgements. After each round, feedback is presented to the experts to help them refine each judgement task. Feedback consists of agreement data which is the degree to which judgements of different experts are homogeneous and impact data which is the percentage of students that can be classified in each performance level based on cut scores proposed in a round. After presenting feedback, the experts have discussions about the reasonableness of the agreement and impact data and proceed to another round of judgements based on their discussion and feedback. Figure 6.2 summarizes the process of Setting Cut Scores.

Figure 6.2: The Process of Setting Cut Scores

For NAS 2017 the Bookmark method (Lewis, Mitzel, & Green, 1996) was utilized. In the Bookmark approach, items in a test are ordered by difficulty (using the IRT b-parameter) from easiest to hardest. Panelists placed a “bookmark” in the “ordered item booklet” in such a way that a student at the threshold of a performance level would be expected to respond successfully to the items prior to the bookmark and unsuccessfully to the items that follow taking into consideration the specific performance level descriptors. The ranges of items represented operational definitions of performance levels and their meaning was maintained across different test forms through test equating procedures. Figure 6.3 exemplifies the way the ordered item booklet looked after identifying the cut scores.

Figure 6.3: Ordered item booklet with cut scores.

After the panelists had submitted their individual cut scores, agreement data and impact data was presented after each round. Agreement data showed the spread of the individual cut scores presented by each judge, this information was helpful during discussion as it helped panelists make better judgements in future rounds. Figure 6.4 shows an example of agreement data for Mathematics Class III after the second round of judgements. Note the proposed cut scores were 263 for Basic, 315 for Proficient and 347 for Advanced.

Figure 6.4: Example of Feedback: Agreement Data After Round 2 for Mathematics Class III
After showing the proposed cut scores for the round, impact data was shown to help panel lists understand how students will be distributed among the four performance levels if the cut scores they proposed were to be final. Impact data is represented as the percentage of students classified within each performance level. Figure 6.5 shows the impact data for round 2 for Mathematics Class III. The data shows that, if the cut-scores shown in Figure 6.4 were to be used, 13% of students would be classified as Below Basic, 34% as Basic, 22% as Proficient and 31% as Advanced.

Figure 6.5: Example of Feedback: Impact Data After Round 2 Mathematics Class III

After rounds 2 and 3, additional feedback data was presented: cut score trends across rounds and impact data across rounds. This type of feedback provided information about how the cut scores varied after each round. Figure 6.6 shows the trends of the proposed cut scores for each of the 3 rounds. It can be observed that all of the cut scores decreased from round 1 to round 2 and increased slightly for Advanced from round 2 to round 3.

Figure 6.6: Example of Feedback: Cut Score Trend by Rounds for Mathematics Class III

After completing all rounds, a final moderation round was conducted to fine-tune the cut scores. During this stage, vertical and horizontal alignment was conducted by showing the percentage of students in each performance level for each test, side by side, across subject and across Classes, and then adjusting the cut scores. Figure 6.8 and Figure 6.9 shows the impact data presented to panelists during the final horizontal and vertical moderation.

Figure 6.7: Example of Feedback: Impact Data by Rounds for Mathematics Class III

Figure 6.8: Example of Impact Data Across Subjects Within Class III for Horizontal Moderation
The cut scores were made official after the review and approval by NCERT and the representatives of the Education Offices of States/UTs. With these final cut scores, it was possible to produce NAS results based on performance levels. Table 6.2 shows the cut scores for each test for NAS and the results are presented in further sections of this document.

### 6.2 Overall National Performance Results for NAS 2017

Student performance can be expressed as a percentage of students classified in each performance level. The following graphs and tables show the NAS 2017 results at overall national level and disaggregated by gender, school location, school management and social groups. Table 6.3 and Figure 6.10 show the NAS results at the national level.

#### Table 6.2: Final cut scores for NAS tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Basic</th>
<th>Proficient</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class III Language</td>
<td>285</td>
<td>339</td>
<td>395</td>
</tr>
<tr>
<td>Class III Mathematics</td>
<td>263</td>
<td>315</td>
<td>375</td>
</tr>
<tr>
<td>Class III Environmental Studies</td>
<td>268</td>
<td>315</td>
<td>370</td>
</tr>
<tr>
<td>Class V Language</td>
<td>264</td>
<td>320</td>
<td>383</td>
</tr>
<tr>
<td>Class V Mathematics</td>
<td>261</td>
<td>315</td>
<td>375</td>
</tr>
<tr>
<td>Class V Environmental Studies</td>
<td>260</td>
<td>306</td>
<td>370</td>
</tr>
<tr>
<td>Class VIII Language</td>
<td>255</td>
<td>320</td>
<td>370</td>
</tr>
<tr>
<td>Class VIII Mathematics</td>
<td>225</td>
<td>275</td>
<td>340</td>
</tr>
<tr>
<td>Class VIII Science</td>
<td>228</td>
<td>275</td>
<td>333</td>
</tr>
<tr>
<td>Class VIII Social Science</td>
<td>236</td>
<td>298</td>
<td>338</td>
</tr>
</tbody>
</table>

#### Table 6.3: Percentage of students at each performance level (National results)

<table>
<thead>
<tr>
<th>Classes</th>
<th>Subjects</th>
<th>Below Basic</th>
<th>Basic</th>
<th>Proficient</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class III</td>
<td>Language</td>
<td>18.0%</td>
<td>34.8%</td>
<td>32.1%</td>
<td>15.1%</td>
</tr>
<tr>
<td></td>
<td>Math</td>
<td>12.8%</td>
<td>34.3%</td>
<td>36.7%</td>
<td>16.2%</td>
</tr>
<tr>
<td></td>
<td>EVS</td>
<td>14.3%</td>
<td>30.1%</td>
<td>40.7%</td>
<td>14.9%</td>
</tr>
<tr>
<td></td>
<td>Class III Combined</td>
<td>15.0%</td>
<td>33.1%</td>
<td>36.5%</td>
<td>15.4%</td>
</tr>
<tr>
<td>Class V</td>
<td>Language</td>
<td>15.0%</td>
<td>38.7%</td>
<td>34.5%</td>
<td>11.8%</td>
</tr>
<tr>
<td></td>
<td>Math</td>
<td>18.0%</td>
<td>38.5%</td>
<td>30.9%</td>
<td>12.7%</td>
</tr>
<tr>
<td></td>
<td>EVS</td>
<td>17.1%</td>
<td>31.7%</td>
<td>38.0%</td>
<td>13.2%</td>
</tr>
<tr>
<td></td>
<td>Class V Combined</td>
<td>16.7%</td>
<td>36.3%</td>
<td>34.5%</td>
<td>12.6%</td>
</tr>
<tr>
<td>Class VIII</td>
<td>Language</td>
<td>14.8%</td>
<td>46.9%</td>
<td>26.8%</td>
<td>11.5%</td>
</tr>
<tr>
<td></td>
<td>Math</td>
<td>17.9%</td>
<td>42.6%</td>
<td>29.0%</td>
<td>10.5%</td>
</tr>
<tr>
<td></td>
<td>Science</td>
<td>18.5%</td>
<td>37.2%</td>
<td>28.9%</td>
<td>15.3%</td>
</tr>
<tr>
<td></td>
<td>Social Science</td>
<td>19.8%</td>
<td>47.3%</td>
<td>19.0%</td>
<td>13.9%</td>
</tr>
<tr>
<td></td>
<td>Class VIII Combined</td>
<td>17.8%</td>
<td>43.5%</td>
<td>25.9%</td>
<td>12.8%</td>
</tr>
<tr>
<td>All Classes &amp; Subjects Combined</td>
<td>NAS</td>
<td>16.6%</td>
<td>38.2%</td>
<td>31.7%</td>
<td>13.5%</td>
</tr>
</tbody>
</table>
6.3 National Results by Gender

The following figures span out the national results of students in different subjects by gender.

- **Figure 6.11: Class III National Results by Gender**
- **Figure 6.12: Class V National Results by Gender**
- **Figure 6.13: Class VIII National Results by Gender**

6.4 National Results by School Location

The following figures span out the national results of students in different subjects by school location.

- **Figure 6.14: Class III National Results by School Location**
- **Figure 6.15: Class V National Results by School Location**
- **Figure 6.16: Class VIII National Results by School Location**
6.5 National Results by School Management

The following figures span out the national results of students in different subjects by school management.

Figure 6.17: Class III National Results by School Management

Figure 6.18: Class V National Results by School Management

Figure 6.19: Class VIII National Results by School Management

6.6 National Results by Social Groups

The following figures span out the national results of students in different subjects by social groups.

Figure 6.20: Class III National Results by Social Groups

Figure 6.21: Class V National Results by Social Groups

Figure 6.22: Class VIII National Results by Social Groups
6.7 State Results by Each Class and Subject

In Class III, overall achievement of students within the performance level Basic is higher (35%) than the achievement of students on other performance levels i.e. Below Basic (18%), Proficient (32%) and Advanced (15%), for the subject Language (as shown in Figure 6.23).

**Figure 6.23: Language Class III (LA03) State Results by Performance Levels**
In Class III, overall achievement of students within the performance level Proficient is higher (37%) than the achievement of students on other performance levels i.e. Below Basic (13%), Basic (34%) and Advanced (16%), for the subject Mathematics (as shown in Figure 6.24).

**Figure 6.24: Mathematics Class III (MA03) State Results by Performance Levels**
In Class III, overall achievement of students within the performance level Proficient is higher (41%) than the achievement of students on other performance levels i.e. Below Basic (14%), Basic (30%) and Advanced (15%), for the subject Environmental Studies (as shown in Figure 6.25).

Figure 6.25: Environmental Studies Class III (EV03) State Results by Performance Levels
In Class V, overall achievement of students within the performance level Basic is higher (39%) than the achievement of students on other performance levels i.e. Below Basic (15%), Proficient (35%) and Advanced (12%), for the subject Language (as shown in Figure 6.26).

**Figure 6.26: Language Class V (LA05) State Results by Performance Levels**

<table>
<thead>
<tr>
<th>State</th>
<th>LA05 PL Results by States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karnataka</td>
<td>5 23</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>8 29</td>
</tr>
<tr>
<td>Kerala</td>
<td>7 23</td>
</tr>
<tr>
<td>Chandigarh</td>
<td>6 30</td>
</tr>
<tr>
<td>Uttarakhand</td>
<td>6 33</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>9 31</td>
</tr>
<tr>
<td>Dadra &amp; Nagar Haveli</td>
<td>8 33</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>8 38</td>
</tr>
<tr>
<td>Assam</td>
<td>11 36</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>10 37</td>
</tr>
<tr>
<td>Gujarat</td>
<td>12 38</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>13 38</td>
</tr>
<tr>
<td>National</td>
<td>15 39</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>12 42</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>16 38</td>
</tr>
<tr>
<td>Manipur</td>
<td>12 42</td>
</tr>
<tr>
<td>Tripura</td>
<td>13 42</td>
</tr>
<tr>
<td>West Bengal</td>
<td>17 38</td>
</tr>
<tr>
<td>Bihar</td>
<td>14 41</td>
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<tr>
<td>Telangana</td>
<td>15 43</td>
</tr>
<tr>
<td>Chhattisgarh</td>
<td>13 46</td>
</tr>
<tr>
<td>Haryana</td>
<td>16 43</td>
</tr>
<tr>
<td>Goa</td>
<td>15 45</td>
</tr>
<tr>
<td>Jammu and Kashmir</td>
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</tr>
<tr>
<td>Nagaland</td>
<td>16 46</td>
</tr>
<tr>
<td>Punjab</td>
<td>17 47</td>
</tr>
<tr>
<td>Andaman &amp; Nicobar Islands</td>
<td>19 45</td>
</tr>
<tr>
<td>Uttarakhand</td>
<td>27 39</td>
</tr>
<tr>
<td>Odisha</td>
<td>19 46</td>
</tr>
<tr>
<td>Lakshadweep</td>
<td>17 50</td>
</tr>
<tr>
<td>Delhi</td>
<td>19 48</td>
</tr>
<tr>
<td>Daman &amp; Diu</td>
<td>21 47</td>
</tr>
<tr>
<td>Mizoram</td>
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</tr>
<tr>
<td>Puducherry</td>
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<tr>
<td>Sikkim</td>
<td>18 56</td>
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<td>Meghalaya</td>
<td>21 54</td>
</tr>
<tr>
<td>Arunachal Pradesh</td>
<td>31 48</td>
</tr>
</tbody>
</table>

Percentage of students

- Below Basic
- Basic
- Proficient
- Advanced
In Class V, overall achievement of students within the performance level Basic is higher (39%) than the achievement of students on other performance levels i.e. Below Basic (18%), Proficient (31%) and Advanced (13%), for the subject Mathematics (as shown in Figure 6.27).

**Figure 6.27: Mathematics Class V (MA05) State Results by Performance Levels**
In Class V, overall achievement of students within the performance level Proficient is higher (38%) than the achievement of students on other performance levels i.e. Below Basic (17%), Basic (32%) and Advanced (13%), for the subject Environmental Studies (as shown in Figure 6.28).

**Figure 6.28: Environmental Studies Class V (EV05) State Results by Performance Levels**
In Class VIII, overall achievement of students within the performance level Basic is higher (47%) than the achievement of students on other performance levels i.e. Below Basic (15%), Proficient (27%) and Advanced (11%), for the subject Language (as shown in Figure 6.29).

**Figure 6.29: Language Class VIII (LA08) State Results by Performance Levels**

<table>
<thead>
<tr>
<th>State</th>
<th>Below Basic</th>
<th>Basic</th>
<th>Proficient</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rajasthan</td>
<td>8</td>
<td>38</td>
<td>33</td>
<td>21</td>
</tr>
<tr>
<td>Gujarat</td>
<td>10</td>
<td>39</td>
<td>31</td>
<td>20</td>
</tr>
<tr>
<td>Kerala</td>
<td>7</td>
<td>43</td>
<td>34</td>
<td>16</td>
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<tr>
<td>Maharashtra</td>
<td>10</td>
<td>42</td>
<td>32</td>
<td>16</td>
</tr>
<tr>
<td>Karnataka</td>
<td>8</td>
<td>45</td>
<td>33</td>
<td>14</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>10</td>
<td>46</td>
<td>30</td>
<td>16</td>
</tr>
<tr>
<td>Dadra &amp; Nagar Haveli</td>
<td>11</td>
<td>45</td>
<td>31</td>
<td>14</td>
</tr>
<tr>
<td>Chandigarh</td>
<td>9</td>
<td>49</td>
<td>28</td>
<td>13</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>9</td>
<td>50</td>
<td>32</td>
<td>9</td>
</tr>
<tr>
<td>Goa</td>
<td>12</td>
<td>48</td>
<td>28</td>
<td>11</td>
</tr>
<tr>
<td>Uttarakhand</td>
<td>13</td>
<td>47</td>
<td>29</td>
<td>11</td>
</tr>
<tr>
<td>National</td>
<td>15</td>
<td>47</td>
<td>27</td>
<td>11</td>
</tr>
<tr>
<td>Bihar</td>
<td>14</td>
<td>48</td>
<td>27</td>
<td>11</td>
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<tr>
<td>Andhra Pradesh</td>
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<td>27</td>
<td>10</td>
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<tr>
<td>Tamil Nadu</td>
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<td>Haryana</td>
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<td>27</td>
<td>8</td>
</tr>
<tr>
<td>West Bengal</td>
<td>18</td>
<td>47</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>Chhattisgarh</td>
<td>16</td>
<td>49</td>
<td>26</td>
<td>9</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>19</td>
<td>47</td>
<td>24</td>
<td>10</td>
</tr>
<tr>
<td>Tripura</td>
<td>17</td>
<td>51</td>
<td>25</td>
<td>8</td>
</tr>
<tr>
<td>Odisha</td>
<td>17</td>
<td>51</td>
<td>25</td>
<td>7</td>
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<tr>
<td>Delhi</td>
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<td>54</td>
<td>24</td>
<td>7</td>
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<tr>
<td>Punjab</td>
<td>15</td>
<td>54</td>
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<tr>
<td>Uttar Pradesh</td>
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</tr>
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<td>Assam</td>
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<td>54</td>
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</tr>
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<td>Telangana</td>
<td>17</td>
<td>54</td>
<td>22</td>
<td>7</td>
</tr>
<tr>
<td>Daman &amp; Diu</td>
<td>19</td>
<td>52</td>
<td>24</td>
<td>5</td>
</tr>
<tr>
<td>Andaman &amp; Nicobar Islands</td>
<td>20</td>
<td>54</td>
<td>19</td>
<td>7</td>
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<tr>
<td>Manipur</td>
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<td>54</td>
<td>19</td>
<td>6</td>
</tr>
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<td>Sikkim</td>
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<td>58</td>
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<td>5</td>
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<td>Lakshadweep</td>
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<td>54</td>
<td>17</td>
<td>5</td>
</tr>
<tr>
<td>Arunachal Pradesh</td>
<td>32</td>
<td>49</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>Mizoram</td>
<td>23</td>
<td>59</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Jammu And Kashmir</td>
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<td>49</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Puducherry</td>
<td>32</td>
<td>53</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>Nagaland</td>
<td>38</td>
<td>47</td>
<td>11</td>
<td>4</td>
</tr>
</tbody>
</table>
In Class VIII, overall achievement of students within the performance level Basic is higher (43%) than the achievement of students on other performance levels i.e. Below Basic (18%), Proficient (29%) and Advanced (10%), for the subject Mathematics (as shown in Figure 6.30).

**Figure 6.30: Mathematics Class VIII (MA08) State Results by Performance Levels**

<table>
<thead>
<tr>
<th>State</th>
<th>Below Basic</th>
<th>Basic</th>
<th>Proficient</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rajasthan</td>
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<td>23</td>
<td>42</td>
<td>27</td>
</tr>
<tr>
<td>Jharkhand</td>
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<td>22</td>
<td>40</td>
<td>18</td>
</tr>
<tr>
<td>Karnataka</td>
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<td>36</td>
<td>14</td>
</tr>
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<td>Kerala</td>
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</tr>
<tr>
<td>Arunachal Pradesh</td>
<td>22</td>
<td>58</td>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>Goa</td>
<td>22</td>
<td>59</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>Meghalaya</td>
<td>22</td>
<td>59</td>
<td>17</td>
<td>2</td>
</tr>
<tr>
<td>Andaman &amp; Nicobar Islands</td>
<td>26</td>
<td>56</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>Nagaland</td>
<td>26</td>
<td>57</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>Punjab</td>
<td>30</td>
<td>54</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>Delhi</td>
<td>27</td>
<td>58</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>Lakshadweep</td>
<td>18</td>
<td>68</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>Sikkim</td>
<td>28</td>
<td>60</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Daman &amp; Diu</td>
<td>27</td>
<td>61</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Puducherry</td>
<td>25</td>
<td>65</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

Percentage of students

- Below Basic
- Basic
- Proficient
- Advanced
In Class VIII, overall achievement of students within the performance level Basic is higher (37%) than the achievement of students on other performance levels i.e. Below Basic (19%), Proficient (29%) and Advanced (15%), for the subject Science (as shown in Figure 6.31).

Figure 6.31: Science Class VIII (SC08) State Results by Performance Levels
In Class VIII, overall achievement of students within the performance level Basic is higher (47%) than the achievement of students on other performance levels i.e. Below Basic (20%), Proficient (19%) and Advanced (14%), for the subject Social Science (as shown in Figure 6.32).

**Figure 6.32: Social Science Class VIII (SS08) State Results by Performance Levels**

![Social Science Class VIII (SS08) State Results by Performance Levels](135x79 to 459x691)
6.8 State Results Combined by Class and Subject

In Class III, overall performance of students in all the three subjects i.e. Language, Mathematics, Environmental Studies classified within the performance level proficient is comparable (36%) to that of performance level Basic (33%) which is greater than Below Basic (15%) and Advanced (15%) performance levels respectively (as shown in Figure 6.33).

Figure 6.33: Combined Results by Performance Levels for Class III
In Class V, overall performance of students in all the three subjects i.e. Language, Mathematics, Environmental Studies classified within the performance level Basic is comparable (36%) to that of performance level proficient (34%) which is greater than Below Basic (17%) and Advanced (13%) performance levels respectively (as shown in Figure 6.34).

**Figure 6.34: Combined Results by Performance Levels for Class V**
In Class VIII, overall performance of students in all the four subjects i.e. Language, Mathematics, Science and Social Science classified within the performance level Basic (44%) is greater than performance level proficient (26%), Below Basic (18%) and Advanced (13%) respectively (as shown in Figure 6.35).

**Figure 6.35: Combined Results by Performance Levels for Class VIII**

![Combined Results by Performance Levels for Class VIII](image-url)
6.9 Key Findings of Students’ Performance

This section presents major findings of student performance in NAS 2017. The results of student performance can be expressed in two major ways: by means of Scale Scores (SS), which are based on Item Response Theory (IRT) scaling and by means of Performance Levels (PL), which are determined by the process of setting performance standards.

The reporting IRT scale is designed in a way that sets the range of student scores between 100 and 500; it is centered to the overall mean of 300, with dispersion set to standard deviation of 50. Student scores are computed using the specific IRT method that is based on the pattern of student responses giving higher credits to correct answers on more difficult and more discriminative items.

The performance standards scale is designed to report student performance in four major performance levels: Advanced, Proficient, Basic and Below Basic. These PLs are based on conceptual and operational definitions developed by the team of national experts during the standard setting workshop. Conceptual definitions are referring to competencies, knowledge, and skills that students are expected to demonstrate at each PL, and operational definitions are given by cut scores on each test scale that are used for classification of student achievement into the 4 performance levels. Although the specific definitions are developed for each class and subject, the general meaning of PLs is the same across all subjects and classes, which makes the PL scale suitable for aggregating student results to express combined performance within a class or across all subjects and classes.

6.10 Student Performance Results – National

Student results on NAS 2017 are evaluated on the total of 10 tests (in Class III: Language, Mathematics and EVS; in Class V: Language, Mathematics and EVS; and in Class VIII: Language, Mathematics, Science and Social Science). National averages for reporting IRT scale vary between 336 for Language Class III, and 269 for Mathematics Class VIII. It can be observed that subjects in higher classes pose a greater challenge to students, the national average scores in Class III being between 321 and 336, in Class V they are 310 to 319, whereas in Class VIII the national averages are between 269 and 307. It can be also observed that Language poses a lesser challenge than other subjects in all classes.

Student results on NAS 2017 in terms of performance standards are expressed by the percentage of students attaining each performance level. Since the targeted levels are Proficient and above, student performance is commonly expressed by a simple index – the percentage of students attaining the two top levels (Proficient and Advanced). The NAS 2017 national results expressed in terms of performance standards give similar, but slightly different insights (Figure 6.36) compared to scale scores.

**Figure 6.36: Percentage of students in each performance level (National results)**

The same as in SS metrics, based on PL metrics it can be also observed that higher classes pose a stronger challenge – in Class VIII overall 39% of students reached Proficient or above levels, whereas these percentages in Classes V and III are 47% and 52%, respectively. On the other hand, PL metrics does not indicate that Language poses lesser challenge than other subjects, on contrary, evaluated against performance standards set by national experts, it appears that it is rather difficult to attain targeted performance levels in Language in all classes (percentages of students reaching Proficient and above in Language in Classes III, V, and VIII are 47%, 46%, and 38%, respectively).

When looking at the overall national performance across all subjects and classes, the aggregated percentages of students demonstrating achievement at different levels are the following: Advanced 13.5%,
Proficient 31.7%, Basic 38.2% and Below Basic 16.6%. Thus, there is a total of 45.2% of students achieving the targeted performance levels (Proficient and Advanced), which leaves overall 54.8% of students that need improvements (Basic and Below Basic) as they are achieving below the desired levels. For the policy makers’ orientation, it is important to note that the percentage of students that need improvement considerably vary between subjects and grades, thus, designing actions should be based on subject/class specific results.

National performance was also analyzed by student groups (gender, school management, location and social group) and the following results can be highlighted:

- **Gender**: Although girls perform slightly higher than boys in most of tests, the differences are very small and practically negligible. This finding demonstrates that there is gender equity in India.

- **Location**: Differences between urban and rural students are virtually non-existing in Class III, however, they become statistically significant in Class V and even stronger in Class VIII, indicating that urban students are higher performing in Language, whereas in Math, EVS, Science and Social Science performance in rural areas is significantly higher than in urban areas.

- **School management**: In Class III the Government aided schools perform higher than the government schools in all subjects, however, in Classes V and VIII the Government schools are outperforming the Government aided schools in all subjects but Language where the Government aided schools still perform higher.

- **Social groups**: General and OBC groups are performing slightly higher than other two social groups (SC and ST) in most of tests, but the differences are small with relatively low practical relevance.

### 6.11 Student Performance Results – by States

The highest performing states are Rajasthan, Karnataka, Chandigarh, Andhra Pradesh, Dadra & Nagar Haveli, Jharkhand, Kerala, Assam, Gujarat and Uttarakhand. These states have between 67% and 54% of students that are reaching desired performance levels of Proficient and above.

The states that perform substantially below the national average are Arunachal Pradesh, Lakshadweep, Puducherry, Sikkim, Meghalaya, Delhi and Daman & Diu. These States have about three quarters (70% to 76%) of students that are not reaching targeted levels of proficiency, so a higher attention should be placed for improving student performance. Although the combined results provide orientation to the overall performance, policy maker actions should be guided by results by each subject or even disaggregated by competencies or learning outcomes.

State highlights by student groups:

- **Gender equity** is present in all states, the differences between boys and girls are either statistically or practically insignificant.

- **School location**: Performance in Maths, EVS, Science and Social Science is superior in rural schools in most of states, whereas performance in Language is usually higher in urban areas in most of states.

- **School management**: Government aided schools perform better in most of states in Class III, however in Class V and Class VIII in most states Government schools perform better in all subjects except Language in most of states. Performance in Language is superior in Government aided schools in most of states.

- **Social group**: In nearly one quarter of all states the differences between social groups are not significant, whereas in most of states General and OBC groups perform significantly higher, but the differences are relatively small.
7. Association of Background Variables

The relationship between learning achievement of students and variables related to student's home background and school were analyzed by using different statistical technique. This chapter discusses the association of the different contextual variables with the achievement of the students.
7.1 Association Results for Class III: Student Profile

The given section details the association results regarding various student related variables.

**Below Poverty Line (BPL)**

Table 7.1: Association Results—Below Poverty Line

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Below Poverty Line</td>
<td>-3.6</td>
<td>-2.8</td>
</tr>
</tbody>
</table>

In Class III, V and VIII, students belonging to Below Poverty Line had statistically significant lower achievement compared to other students.

**Education of Mother**

Table 7.2: Association Results—Education of Mother

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Educated vs. illiterate</td>
<td>12.7</td>
<td>11.5</td>
</tr>
</tbody>
</table>

In Class III, V and VIII there is statistically significant positive association between student achievement and their mother’s education level. When compared to students having illiterate mother, those who had educated mothers demonstrate substantially higher achievement.

**Like coming to School**

Table 7.3: Association Results—Likes coming to school

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Like coming to school</td>
<td>10.2</td>
<td>10.3</td>
</tr>
</tbody>
</table>

In Class III, V and VIII there is statistically significant positive association between the students’ liking to come to school and their achievement on NAS. This association can be also considered as practically significant.

**Games period Activity**

Table 7.4: Association Results—Games period activity

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Go out &amp; play vs. sit in class</td>
<td>6.0</td>
<td>7.6</td>
</tr>
</tbody>
</table>

In Class III, V and VIII students who go out and play during games period had significantly higher achievement than students who remain sitting in the class.

**Difficulty to travel to school**

Table 7.5: Association Results—Find Difficult to travel to school

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Difficult to travel to school</td>
<td>-4.6</td>
<td>-4.0</td>
</tr>
</tbody>
</table>

Class III, V and VIII students’ expression of difficulty to travel to school is significantly negatively associated with their achievement on NAS.
### Student Absence over 10 days

**Table 7.6: Association Results–Student Absence over 10 days**

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>More than twice vs. never</td>
<td>-11.8</td>
<td>-13.8</td>
</tr>
</tbody>
</table>

Class III, V and VIII students who reported absence over 10 days i.e. more than twice had significantly lower achievement than students who were never absent. The size of the difference can be considered as practically significant.

### Language spoken at Home

**Table 7.7: Association Results–Language spoken at home**

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Same as used by teacher</td>
<td>5.1</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Class III, V and VIII students whose language spoken at home is the same as used by the teacher had significantly higher achievement than students whose language spoken at home is different than used by their teachers.

### Able to understand what the teacher says

**Table 7.8: Association Results–Able to understand teacher**

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Able to understand teacher</td>
<td>15.4</td>
<td>14.7</td>
</tr>
</tbody>
</table>

Class III, V and VIII students who reported they were able to understand what the teacher says are likely to perform better than those who are not able to understand what the teacher says. The results show that the students who reported they were able to understand what the teacher says in class had significantly higher achievement than students who reported they could not understand what the teacher says. The size of this association can be considered having a substantial practical relevance.

### Number of siblings

**Table 7.9: Association Results–Number of siblings**

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Number of siblings: Two/three</td>
<td>-6.5</td>
<td>-7.0</td>
</tr>
</tbody>
</table>

In Class III and V the number of siblings a student has is likely to affect the amount of attention which his or her parents can accord. It is also likely to affect the amount of resources available to each child. The results show that students having two to three siblings had negative association with their achievement on NAS (compared to those who have none). In class VIII the number of siblings a student has is likely to affect the amount of attention which his or her parents can accord. It is also likely to affect the amount of resources available to each child. Here the results show that students having two to three siblings had a significant association with their achievement on NAS.
Attended pre-primary classes/Anganwadi

Table 7.10: Association Results—Attended pre-primary classes/Anganwadi

<table>
<thead>
<tr>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Attended pre-primary classes/ Anganwadi</td>
<td>4.2</td>
</tr>
</tbody>
</table>

Class III and V students who attended pre-primary classes/Anganwadi had significantly higher achievement than students who did not attend pre-primary classes/Anganwadi. Class VIII students who attended pre-primary classes/Anganwadi had significantly lower achievement than students who did not attend pre-primary classes/Anganwadi.

Discusses and shares the Lessons at Home

Table 7.11: Association Results—Discusses the Lessons at Home

<table>
<thead>
<tr>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Discusses the lessons at home</td>
<td>10.2</td>
</tr>
</tbody>
</table>

Class III, V and VIII students who discuss and share the lessons at home had significantly higher achievement than students who do not discuss or share at home, the lessons taught by the teacher. This association can also be considered as practically significant.

Reads other materials in addition to Textbooks

Table 7.12: Association Results—Reads other materials in addition to Textbooks

<table>
<thead>
<tr>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Reads other materials in addition to textbooks</td>
<td>10.9</td>
</tr>
</tbody>
</table>

Class III, V and VIII students who go through other materials also in addition to textbooks had significantly higher achievement than students who do not read other materials in addition to textbooks. The size of the difference can be considered as practically significant.

Gets help in study at Home

Table 7.13: Association Results—Gets help in study at home

<table>
<thead>
<tr>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Gets help in study at home</td>
<td>7.4</td>
</tr>
</tbody>
</table>

Class III, V and VIII students who get help in study at home had significantly higher achievement than students who do not get help in study at home.

Participates in Classroom Activities

Table 7.14: Association Results—Participates in Classroom Activities

<table>
<thead>
<tr>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Participates in classroom activities</td>
<td>14.3</td>
</tr>
</tbody>
</table>

Class III, V and VIII student's participation in classroom activities is significantly positively associated with their achievement on NAS. The size of this association can be considered having a substantial practical relevance.
Asks questions in the Class

Table 7.15: Association Results–Asks questions in the Class

<table>
<thead>
<tr>
<th>Difference between scale scores</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>12.1</td>
<td>12.0</td>
</tr>
<tr>
<td>V</td>
<td>12.0</td>
<td>12.0</td>
</tr>
<tr>
<td>VIII</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

Class III, V and VIII students who are active in classroom and ask questions to the teacher had significantly higher achievement than students who do not ask questions in the class.

Most liked activity

Table 7.16: Association Results–Most liked activity

<table>
<thead>
<tr>
<th>Difference between scale scores</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>10.4</td>
<td>14.8</td>
</tr>
<tr>
<td>V</td>
<td>9.1</td>
<td>9.1</td>
</tr>
<tr>
<td>VIII</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

Class III, V and VIII students, whose most liked activity is playing sports/games, had higher achievement than students who do not like any physical activities. The association can be also considered as practically significant.

7.2 Association Results for Class III: School Profile

The given section details the information gathered about schools regarding various school related variables.

Teachers aware about the Learning Outcomes Document

Table 7.17: Association Results– Teachers aware about the LO Document

<table>
<thead>
<tr>
<th>Difference between scale scores</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>16.5</td>
<td>12.5</td>
</tr>
<tr>
<td>V</td>
<td>13.0</td>
<td>13.0</td>
</tr>
<tr>
<td>VIII</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

In Class III, V and VII, teacher’s awareness about the Learning Outcomes document had significantly higher association with achievement of students.

Use of Library

Table 7.18: Association Results– Use of Library

<table>
<thead>
<tr>
<th>Difference between scale scores</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>10.4</td>
<td>12.2</td>
</tr>
<tr>
<td>V</td>
<td>12.1</td>
<td>12.1</td>
</tr>
<tr>
<td>VIII</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

In Class III, V and VIII schools wherein most of the students use the library had significantly higher achievement than those schools wherein very few students use the library.
### School Activities

#### Table 7.19: Association Results – School Activities

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Science Exhibition</td>
<td>2.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Art Club/ Art Activity</td>
<td>3.6</td>
<td>4.7</td>
</tr>
<tr>
<td>Sports Activity</td>
<td>7.5</td>
<td>9.8</td>
</tr>
<tr>
<td>Cultural Activity</td>
<td>8.3</td>
<td>11.2</td>
</tr>
<tr>
<td>School Fair</td>
<td>5.3</td>
<td>5.8</td>
</tr>
</tbody>
</table>

In Class III, V and VIII, school’s participation in various activities like science exhibition, art activity, sports activity, cultural activity and school fair had significantly positive association with the achievement of students.

#### School’s activities affected by Instructional Materials, Teaching Staff, Supporting Staff etc.

#### Table 7.20: Association Results – Activities of School affected by Instructional Materials, Teaching Staff, Supporting Staff etc.

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Lack of Instructional Materials</td>
<td>4.2</td>
<td>4.6</td>
</tr>
<tr>
<td>Lack of Teaching Staff</td>
<td>5.9</td>
<td>5.2</td>
</tr>
<tr>
<td>Lack of Supporting Staff</td>
<td>5.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Lack of Audio Visual Resources</td>
<td>1.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Lack of Library Resources</td>
<td>5.8</td>
<td>5.4</td>
</tr>
<tr>
<td>Lack of Student Discipline</td>
<td>6.8</td>
<td>6.6</td>
</tr>
</tbody>
</table>

In Class III, V and VIII, schools wherein the activities were not at all affected by the shortage of instructional materials, teaching staff, supporting staff, audio-visual resources, library resources and student discipline had significant positive association with the achievement of students.
School Perception

Table 7.21: Association Results – School Perception

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Teacher Satisfaction</td>
<td>17.9</td>
<td>15.2</td>
</tr>
<tr>
<td>Opportunities for professional development</td>
<td>12.1</td>
<td>11.5</td>
</tr>
<tr>
<td>Teachers’ expectation of students’ achievement</td>
<td>16.0</td>
<td>17.4</td>
</tr>
<tr>
<td>Teachers working together to improve achievement</td>
<td>15.0</td>
<td>16.8</td>
</tr>
<tr>
<td>Parental involvement in school activities</td>
<td>10.9</td>
<td>12.8</td>
</tr>
<tr>
<td>Parental support for student’s achievement</td>
<td>10.8</td>
<td>10.8</td>
</tr>
<tr>
<td>Student’s desire to achieve</td>
<td>9.5</td>
<td>9.3</td>
</tr>
<tr>
<td>Student’s absenteeism</td>
<td>-3.3</td>
<td>1.7</td>
</tr>
</tbody>
</table>

In Class III a range of school-related variables as assessed by the Principals were considered. Teacher satisfaction, opportunities for professional development, teacher’s expectation of students’ achievement, their working together to improve achievement, parental support, parental involvement in school activities and students’ desire to do well were found to have positive influence on achievement scores, however, students’ absenteeism had a negative impact on students’ achievement. In class V and VIII a range of school-related variables as assessed by the Principals were considered. Teacher satisfaction, opportunities for professional development, Teacher’s expectation of students’ achievement, their working together to improve achievement, parental support, parental involvement in school activities and students’ desire to do well and students’ absenteeism were found to have significant positive influence on achievement scores.

Frequency of Monitoring

Table 7.22: Association Results – Frequency of Monitoring

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Frequency of monitoring</td>
<td>5.9</td>
<td>9.6</td>
</tr>
</tbody>
</table>

In Class III, V and VIII monitoring of school monthly by the Department of Education in the academic year 2016-17 had significant positive association with students’ achievement.

7.3 Association Results for Class III: Teacher Profile

Teachers are a vital component of the educational process and it is very important to know the characteristics of teachers, the strategies they use in the classroom and their general attitudes towards teaching in schools, etc.

The given section details the association results regarding various teacher related variables.
**Professional Qualification**

Table 7.23: Association Results- Professional Qualification

<table>
<thead>
<tr>
<th>Professional Qualification- B.Ed.</th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Professional Qualification- B.Ed.</td>
<td>6.4</td>
<td>9.4</td>
</tr>
</tbody>
</table>

In Class III, V and VIII, teacher’s professional qualification, i.e.; Secondary Teacher Training (B.Ed.) had significant positive association with students’ attainment.

**Teaching same subject as Highest Degree**

Table 7.24: Association Results- Teaching same subject as Highest Degree

<table>
<thead>
<tr>
<th>Teaching same subject as highest degree</th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Teaching same subject as highest degree</td>
<td>0.7</td>
<td>1.0</td>
</tr>
</tbody>
</table>

In Class III, V and VIII, teachers teaching the same subject that they pursued during their highest degree course had significantly positive impact over students’ attainment.

**Employment Status**

Table 7.25: Association Results- Employment Status

<table>
<thead>
<tr>
<th>Employment Status- Permanent vs. Part time/Contractual</th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment Status- Permanent vs. Part time/Contractual</td>
<td>9.1</td>
<td>9.6</td>
</tr>
</tbody>
</table>

In Class III, V and VIII, teachers having permanent employment status as compared to part time/contractual were positively associated to students’ attainment.

**Learning Outcome document available at school**

Table 7.26: Association Results- LO document available at school

<table>
<thead>
<tr>
<th>LO document available at school</th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO document available at school</td>
<td>11.8</td>
<td>13.2</td>
</tr>
</tbody>
</table>

In Class III, V and VIII, schools wherein learning outcome document was available at school had significant positive association with students’ achievement.

**Interacted with School Management Committee (SMC) in last six months**

Table 7.27: Association Results- Interaction with SMC

<table>
<thead>
<tr>
<th>Interaction with SMC</th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction with SMC</td>
<td>6.3</td>
<td>12.3</td>
</tr>
</tbody>
</table>

In Class III, V and VIII, teacher’s interaction with the SMC members in the last six months had significant positive association with students’ achievement.
### Attitudes and Views

**Table 7.28: Association Results– Attitudes and Views**

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Teachers’ job satisfaction</td>
<td>16.4</td>
<td>14.6</td>
</tr>
<tr>
<td>Understanding school curricular goals</td>
<td>17.8</td>
<td>15.8</td>
</tr>
<tr>
<td>Teacher expectation on student</td>
<td>16.2</td>
<td>14.3</td>
</tr>
<tr>
<td>Parental involvement in school activities</td>
<td>6.0</td>
<td>6.8</td>
</tr>
</tbody>
</table>

In Class III, V and VIII, teachers’ job satisfaction, understanding of curricular goals, parental involvement in school activities and teachers’ expectation for student achievement had a statistically significant relationship with students’ attainment in the school.

### Challenges in the Classroom Transactions

**Table 7.29: Association Results– Challenges in the Classroom Transactions**

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Large class size</td>
<td>-4.2</td>
<td>-5.9</td>
</tr>
<tr>
<td>Classroom indiscipline</td>
<td>-8.4</td>
<td>-9.9</td>
</tr>
<tr>
<td>Absenteeism of students</td>
<td>-6.5</td>
<td>-5.9</td>
</tr>
</tbody>
</table>

In Class III, V and VIII, teachers perceive that large class size, classroom indiscipline and absenteeism of students had negative association with students’ achievement.

### Problems with Facilities

**Table 7.30: Association Results– Problems with Facilities**

<table>
<thead>
<tr>
<th></th>
<th>Difference between scale scores</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
</tr>
<tr>
<td>Lack of instructional materials (Not a problem vs. serious problem)</td>
<td>9.6</td>
<td>9.6</td>
</tr>
<tr>
<td>Work overload (Not a problem vs. serious problem)</td>
<td>5.1</td>
<td>2.7</td>
</tr>
<tr>
<td>Lack of adequate workspace (Not a problem vs. serious problem)</td>
<td>3.5</td>
<td>3.2</td>
</tr>
<tr>
<td>Lack of drinking water (Not a problem vs. serious problem)</td>
<td>4.7</td>
<td>6.1</td>
</tr>
</tbody>
</table>

In Class III and V, teachers were asked about the severity of some possible problems with the school facilities. Teachers considered lack of instructional materials; work overload, lack of adequate workspace and lack of drinking water were not a problem and it showed significant positive association with students’ achievement. Class VIII teachers were asked about the severity of some possible problems with the school facilities. Teachers considered lack of instructional materials, lack of adequate workspace and
lack of drinking water as not a problem and it showed significant positive association with students’ achievement. Whereas, teachers work overload had a significant negative association with students’ achievement.

**Tools and Techniques used in Assessing Students**

Table 7.31: Association Results– Tools and Techniques

<table>
<thead>
<tr>
<th>Difference between scale scores</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
<td>VIII</td>
</tr>
<tr>
<td>Observation (Almost every lesson vs. never)</td>
<td>10.4</td>
<td>12.1</td>
<td>9.0</td>
</tr>
<tr>
<td>Student self-assessment (Almost every lesson vs. never)</td>
<td>11.2</td>
<td>13.6</td>
<td>9.2</td>
</tr>
</tbody>
</table>

In Class III, V and VIII, teachers consider that observation and student self-assessment on almost every lesson had significant positive association with achievement of students.

**Availability of resources to implement the strategies**

Table 7.32: Association Results– Availability of resources to implement the strategies

<table>
<thead>
<tr>
<th>Difference between scale scores</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
<td>VIII</td>
</tr>
<tr>
<td>Peer and group learning (Almost always vs. Not at all)</td>
<td>13.0</td>
<td>13.8</td>
<td>10.4</td>
</tr>
<tr>
<td>Problem solving (Almost always vs. Not at all)</td>
<td>9.9</td>
<td>12.6</td>
<td>8.2</td>
</tr>
</tbody>
</table>

In Class III, V and VIII when the resources for peer and group learning and problem solving to be implemented were almost always available, it showed a statistically significant positive association with the achievement of students.

**Teaching Resources**

Table 7.33: Association Results– Teaching Resources

<table>
<thead>
<tr>
<th>Difference between scale scores</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>III</td>
<td>V</td>
<td>VIII</td>
</tr>
<tr>
<td>Teacher’s Handbook (Regularly vs. Never)</td>
<td>11.5</td>
<td>14.3</td>
<td>12.2</td>
</tr>
<tr>
<td>Educational Kits (Regularly vs. Never)</td>
<td>13.5</td>
<td>17.8</td>
<td>12.0</td>
</tr>
<tr>
<td>Self-prepared TLM (Regularly vs. Never)</td>
<td>10.4</td>
<td>15.4</td>
<td>9.0</td>
</tr>
<tr>
<td>Books other than textbooks (Regularly vs. Never)</td>
<td>10.1</td>
<td>6.8</td>
<td>10.3</td>
</tr>
</tbody>
</table>

In Class III, V and VIII having proper teaching resources is an important adjunct of successful teaching. Teacher’s having a teacher’s handbook, educational kits, self-prepared TLM and books other than textbooks had a statistically significant positive relation with the achievement of students.
7.4 Policy implications of the National Achievement Survey

**Quality of learning:**

While in Class III, nearly 53% children achieved grade appropriate proficiency level, this proportion of children reduced to 47% in Class V and further reduced to 39% children in Class VIII. These cohort of children can solve problem using simple logic, apply simple rules, follow simple instruction and use simple language to express themselves.

*Figure 7.6: Proficient level of learning achievement*

![Chart showing proficiency levels for Class III, V, and VIII]

**Large geographical and social disparities:**

The achievement of boys and girls is at par. Gap in learning achievement exists between southern and northern states of India. For example Southern states such as Kerala, Karnataka and Andhra Pradesh are performing better than northern states like Jammu & Kashmir, Delhi and Punjab. Gaps in learning achievement exist between different districts in the same state. For example in the state of Himachal Pradesh the district Sirmour is performing lowest and brings lower the performance of the state.

**Effective teacher professional development:**

NAS results shows that teacher quality is the most deciding factor that distinguished a high performing education system from a low performing education system. Teacher quality includes here are the teachers ability to engage children in classroom practices, teachers' high expectations from children job satisfaction and their understanding of curricular goals. However, education system in India is struggling with low system capacity to prepare teachers in engaging children in teaching learning process and delivering child-cantered pedagogies scaling up of workable models and utilizing ICT to support teacher for improving teaching learning practices. To improve teaching learning practice and learning outcomes of children must design or develop evidence based teacher development programme.

**Optimizing the utilization of learning resources:**

The learning achievement of schools improved by 12% points when schools use library and laboratory effectively. However, most of the teachers, pointed out that the resources were neither adequate nor utilized optimally due to several reasons. Attractive and quality instruction materials are essential to appropriate utilization of learning resources. Thus, the priority should be given to allocating more fund for the learning resources, guidelines for their optimal utilization and maintenance of library and laboratory for better learning outcomes of children.
7.5 Determinants of high or low level of learning achievement

Students’ learning achievement is influenced by numerous factors such as:

- Socio-economic background
- Context and institutional factors like school, teachers and learning environment

NAS 2017 reiterates that facilitations of students’ learning, teacher quality and institutional resources are the prominent determinants of the learning levels of students. Multiple regression analysis found that students’ attendance, participation in pre-school, their understanding of what teacher says in class and their engagement in the classroom are significantly associated with the learning achievement. School related factors such as functional library, monitoring of the schools by the department of education and participation of school in literary activities influences the learning achievement of students. Similarly, teacher related factors such as their engagement in professional development, peer support and networking, and job satisfaction significantly contribute to learning achievement of students.

Table 7.34: Profiles of HIGH and LOW Performing States

<table>
<thead>
<tr>
<th>10 Highest Performing States (those with over 40% of students in top performing bands)</th>
<th>10 Lowest Performing States (over 35% of students performing in bottom bands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rajasthan</td>
<td>Arunachal Pradesh</td>
</tr>
<tr>
<td>Karnataka</td>
<td>Delhi</td>
</tr>
<tr>
<td>Chandigarh</td>
<td>Puducherry</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>Meghalaya</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>Lakshadweep</td>
</tr>
<tr>
<td>Dadra &amp; Nagar Haveli</td>
<td>Daman &amp; Diu</td>
</tr>
<tr>
<td>Assam</td>
<td>Uttar Pradesh</td>
</tr>
<tr>
<td>Gujarat</td>
<td>Sikkim</td>
</tr>
<tr>
<td>Kerala</td>
<td>Punjab</td>
</tr>
<tr>
<td>Uttarakhand</td>
<td>Nagaland</td>
</tr>
</tbody>
</table>

Evidence from NAS exhibits that teacher quality is the predominant factor that determines the learning level of students. It is observed that teachers’ high expectations on student’s learning, teachers’ understanding of curricular goals and teachers’ job satisfaction are the key factors amongst many factors depicted in the following graphs that mostly influence the learning levels of students. Further, multiple indicators from high and low achieving states were processed to understand what are the key contributing factors that separate out low achieving states from high achieving states. Thus, States and Union territories were grouped as high and low achievers on the basis of criteria enumerated below.

Teachers’ High Expectation of Students’ Achievement:

It is evident from NAS that teachers’ high expectations have a significant effect on student achievement. When a teacher regards students as capable and expects them to do well, it creates a positive environment leading to higher achievement. National Achievement Survey found that in low achieving states, only 28% teachers have high expectations from students, however, in high achieving states 68% teachers have high expectations from their students.
**Teacher's understanding of Curricular Goal:**

Teachers’ understanding of curricular goal is critical to learning achievement of students. It eliminates gaps in classroom instruction and improves students’ engagement, participation and motivation to perform better. This is the first time that the National Achievement survey was linked to learning outcomes which was aligned with curricular goals in each subject in respective grades. It was observed from the NAS data that in low performing states only 26% teachers understood curricular goals however in high achieving states 71% teachers understood the curricular goals.

**Teachers’ Job Satisfaction and Students’ Learning:**

Evidence suggests that teachers who are satisfied with their jobs tend to be more effective in promoting better learning, which could lead to better student performance. Teachers’ job satisfaction is one of the key deciding factors for high or low achievement of students. In low achieving states only one out of 4 teachers are satisfied with their jobs, however, in high achieving states three out of four teachers are satisfied with their jobs.

**School Monitoring by the Department of Education:**

It is observed from the NAS that schools being monitored monthly by the Department of Education acts as a deciding factor for low or high achievement of students in high performing States 44% school are being monitored monthly by Department of Education however in low performing States 30% school are being monitored monthly by Department of Education.

**Schools having a Library:**

Schools having a functional library is a very effective factor in promoting better learning. Results suggest that in high achieving States, 91% schools have a library where as in low achieving States 62% schools have a library.

**School’s Participation in Literary Activities and School Fair:**

Evidence suggests that the schools’ participation in literary activities and school fair motivates students to achieve higher. It is observed from the NAS findings that in low performing States 50% schools participate in literary activities however in high performing States 72% schools participate in literary activities.

**Students Attending Pre-Primary Schools:**

It is observed from the NAS results that students having attended pre-primary schools leads to their higher achievement. In low performing States 60% students have attended pre-primary schools, however, in high performing States 73% students have attended pre-primary schools.

**Students’ Understanding of ‘What Teacher Says?’:**

It is evident from NAS that students’ understanding of what the teacher says in class, acts as a factor to their higher achievement. Results suggest that in high achieving States 88% students understand what the teacher says in class as compared to 79% students in low achieving States.

**Student Participation in Classroom Activities:**

It is observed that students who participate in classroom activities have a higher achievement. Evidence suggests that in low performing States 80% students participate in classroom activities, whereas in high performing States about 88% students participate in classroom activities.

**Student Absenteeism:**

NAS results suggest that students’ absenteeism has a significant effect on student achievement. In low performing States 56% students were present in class in past 10 days, however, in high performing States 65% students were present in class in past 10 days.
The graphical interpretation of the contextual analysis of variables for determining high performing and low performing States/UTs and the factors associated with their performance, is as given below:

**Figure 7.1: High-Low State Profiles by Teacher Background - School Environment**

Teachers having professional qualification, are permanently employed, have six or more years of experience and have attended training programs show higher impact on students' achievement.

Also, teachers’ participation in learning outcomes and their participation in informal dialogues with colleagues to improve teaching have higher association with students' achievement.
Teachers’ expectations on students’ achievement, their understanding of curricular goals, their satisfaction with jibs and availability of learning outcomes document at school show higher affect on the States/UTs where in students are performing better.
When we observe the affect of teachers’ activities on students’ achievement, we see that for most of the teachers’ activities high performing States/UTs are in-line with low performing States/UTs. Teachers’ usage of books other than the text books shows impact on higher performing States/UTs.
School being monitored monthly by the Department of Education, teachers’ collaboration to improve students’ achievement, their high expectations on students’ achievement, their job satisfaction, schools’ participation in literary activities, school fair and school having library have a greater impact on States/UTs where in students’ achievement is higher.
Students' participation in classroom activities, attending pre-primary schools/anganwadi, their understanding of what the teacher says in class, their being present in class and reading books other than the text books have higher impact on the States/UTs where in students are performing better.
8. Reporting and Dissemination

A well designed, stakeholder specific reporting and dissemination strategy is required to make findings of a large scale assessment such as NAS, impact policymaking and in turn, improve teaching learning to achieve the required competencies at each class level. NCERT has taken care to effectively communicate results of NAS 2017 to its different stakeholders enabling them to understand and use the results. This chapter deals with the description of reports and their dissemination strategies.
8.1 NAS Reports

The following reports were developed to communicate results and findings of NAS 2017:

- District Report Cards (DRCs)
- State Learning Reports (SLRs)
- National Report to inform Policy, Practices and Teaching Learning (NPPTL)
- NAS Highlights and Policy Briefs

The above reports have been developed for different audiences, keeping in view the following factors:

- Use of data
- Areas of interest
- Availability of time
- Background interest in assessments
- Technical expertise to understand and use assessment data

**District Report Cards (DRCs)**

Under NAS 2017, for the first time, District was taken as the unit of reporting. Within 2 months of the administration of NAS 2017, District level results, communicated through the DRCs, were put in the public domain (http://www.ncert.nic.in/programmes/NAS/DRC.html).

DRCs were developed with the primary purpose of communicating to Districts, the performance of their students on competencies spelt out on the Learning Outcomes (LOs). DRCs also indicates the LOs on which students performed the lowest and required maximum support.

District level officials were expected to organize sub District level meetings and apprise their block level officials and teachers about the NAS results. They were also expected to contribute towards the design, implementation and monitoring of interventions which in turn would help improve student achievement in the LOs.

To ensure that the above stated support could be tailored to each tested class and subjects, NCERT provided Class and Subject specific DRCs to each district. Each District received a total of 10 DRCs i.e. 3 DRCs each for Classes III and V in Language, Mathematics and EVS and 4 DRCs for classes VIII i.e. in Language, Mathematics, Science and Social Science. Each DRC showed a district’s performance on all LOs tested for a Subject, across both the test booklets.

Each DRC included information on the following heads expressed in either percentage/ numbers:

- Overall learning levels of the district, shown by the overall performance of the District in a subject i.e. a 55% on Science meant that students of a particular district correctly responded to 55% of the items in Science
- Disaggregated learning levels by gender, location, social group and school management, depicted by the percentage of questions which various sub groups for e.g. boys and girls correctly responded to in a subject
- Performance against each of the learning outcomes, reported by student achievement against a particular LO for e.g. a 45% against a LO meant that 45% of the students in a district could correctly answer the questions measuring a particular LO
- Distribution of learning level shown by the range/number of students who correctly responded to questions in a class and a subject. Number of students scoring within each of the following four performance slabs were shown - below 30%; 30-50%, 50-75% and above 75%
- Five learning outcomes on which children required maximal support
### District Report Card: 2017

<table>
<thead>
<tr>
<th>State: Andaman &amp; Nicobar Islands</th>
<th>District: Andamans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class: 3</td>
<td>Subject: EVS</td>
</tr>
<tr>
<td>Schools: 70</td>
<td>Students: 739</td>
</tr>
</tbody>
</table>

#### Participation/Coverage

<table>
<thead>
<tr>
<th>GENDER</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>360</td>
<td>48.71</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>AREA</th>
<th>Rural</th>
<th>Urban</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>518</td>
<td>70.09</td>
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</table>

<table>
<thead>
<tr>
<th>CATEGORY</th>
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<th>ST</th>
<th>OBC</th>
<th>GEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>0</td>
<td>0.00</td>
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<table>
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<th>CWSN</th>
<th>LD</th>
<th>VI</th>
<th>HI</th>
<th>S&amp;LD</th>
<th>ID</th>
<th>Oth</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Management</th>
<th>Government</th>
<th>Government-aided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>%</td>
<td>Number</td>
</tr>
<tr>
<td>686</td>
<td>92.83</td>
<td>53</td>
</tr>
</tbody>
</table>

#### Average Performance of Students in EVS (%)

<table>
<thead>
<tr>
<th>Overall</th>
<th>Gender</th>
<th>Area</th>
<th>Management</th>
<th>Social Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Rural</td>
<td>Urban</td>
</tr>
<tr>
<td>60.18</td>
<td>60.46</td>
<td>59.52</td>
<td>59.95</td>
<td>63.14</td>
</tr>
</tbody>
</table>
### Performance on Learning Outcomes (LOs)

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Description</th>
<th>Average Performance(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E302</td>
<td>Identifies simple features (e.g. movement, at places found/ kept, eating habits, sounds) of animals and birds in the immediate surroundings.</td>
<td>48.04</td>
</tr>
<tr>
<td>E303</td>
<td>Identifies relationships with and among family members</td>
<td>45.98</td>
</tr>
<tr>
<td>E304</td>
<td>Identifies objects, signs (vessels, stoves, transport, means of communication, transport, signboards etc.), places (types of houses/shelters, bus stand, petrol pump etc.) activities (works people do, cooking processes, etc.) at home/school/neighborhoods</td>
<td>62.74</td>
</tr>
<tr>
<td>E305</td>
<td>Describes need of food for people of different age groups, animals/birds, availability of food and water and use of water at home and surroundings</td>
<td>66.24</td>
</tr>
<tr>
<td>E307</td>
<td>Groups objects, birds, animals, features, activities according to differences/similarities using different senses. (e.g. appearance/place of living/ food/ movement/ likes-dislikes/ any other features)</td>
<td>65.53</td>
</tr>
<tr>
<td>E309</td>
<td>Identifies directions, location of objects/places in simple maps using signs/symbols/verbally</td>
<td>54.76</td>
</tr>
<tr>
<td>E310</td>
<td>Guesses properties, estimates quantities of materials/activities in daily life and verifies using symbols/non-standard units</td>
<td>53.18</td>
</tr>
<tr>
<td>E311</td>
<td>Records observations, experiences, information on objects/activities/places visited in different ways and predicts patterns etc.</td>
<td>47.09</td>
</tr>
<tr>
<td>E313</td>
<td>Observes rules in games (local, indoor, outdoor)</td>
<td>36.29</td>
</tr>
<tr>
<td>E314</td>
<td>Voices opinion on good/bad touch, stereotypes for tasks/play/food in family w.r.t gender, misuse/wastage of food and water in family and school.</td>
<td>74.02</td>
</tr>
</tbody>
</table>

### Range of Performance of Students who Answered Correctly

<table>
<thead>
<tr>
<th></th>
<th>Below 30%</th>
<th>30% - 50%</th>
<th>50% - 75%</th>
<th>Above 75%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>81</td>
<td>-175</td>
<td>236.68</td>
<td>285</td>
</tr>
<tr>
<td>%</td>
<td>10.96</td>
<td>23.68</td>
<td>38.57</td>
<td>26.79</td>
</tr>
</tbody>
</table>

### Lowest Performing Learning Outcomes (LOs)

1. Observes rules in games (local, indoor, outdoor) (36.29)
2. Identifies relationships with and among family members (45.98)
3. Records observations, experiences, information on objects/activities/places visited in different ways and predicts patterns etc. (47.09)
4. Identifies simple features (e.g. movement, at places found/ kept, eating habits, sounds) of animals and birds in the immediate surroundings. (48.04)
5. Guesses properties, estimates quantities of materials/activities in daily life and verifies using symbols/non-standard units (53.18)

CSWN:  
LD- Locomotor Disability; VI- Visual Impairment; HI- Hearing Impairment;  
S&LD- Speech and Language Disability; ID- Intellectual Disability; OI- Other Disability.
State Learning Reports (SLRs)

Post the production of the DRCs, a single State Learning Reports (SLRs) was developed for each State (and UTs). Each SLR gave an overview of the State’s performance on all the tested LOs for each class and subject. Based on the SLR results, State level officials were expected to provide academic support towards the District wise implementation of interventions designed to improve student attainment of LOs. (http://www.ncert.nic.in/programmes/NAS/SRC.html)

SCERTs/ SIEs were also expected to provide necessary hand-holding to Districts to plan and design classroom and pedagogical interventions meant to improve student achievement against LOs.

Each SLR provides information on the following points:

- Class wise participation of students/ teachers and school principals in the survey
- Average State/UT achievement by classes and subjects against the National Achievement
- Distribution of student in different achievement levels (0-30%, 30-50%, 50-75%, 75% above) by classes and subjects
- Disaggregated performance in term of gender, location, management and social groups
- Students’ perceptions about coming to school, difficulty in traveling to school, understand what the teacher says in the class etc.
- Teachers’ responses to a few aspects of schools and schooling such as infrastructure; availability of instructional material; classroom assessment practices and parental involvement etc. (school and teacher questionnaires)
- A composite score to indicate the average performance of a district across classes and subjects
- Performance of the LOs in the state

All the results in the SLRs were computed using the Classical Test Theory (CTT) and reported through percentages. Prior to the application of CTT, the entire data set was weighted and achievement tests were validated through checks on difficulty, discrimination, reliability and item functioning across languages.

Snapshot of an exemplar SLR is given below in Figure 8.2.

**Figure 8.2: Snapshot of an exemplar SLR**

**Participation**

<table>
<thead>
<tr>
<th>Class 3</th>
<th>Class 5</th>
<th>Class 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
<td>Students</td>
<td>Schools</td>
</tr>
<tr>
<td>877</td>
<td>180</td>
<td>104</td>
</tr>
<tr>
<td>1589</td>
<td>2524</td>
<td>2180</td>
</tr>
<tr>
<td>877</td>
<td>180</td>
<td>104</td>
</tr>
</tbody>
</table>

**Average Achievement by Classes and Subjects**

<table>
<thead>
<tr>
<th>Class 3</th>
<th>Class 5</th>
<th>Class 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>Mathematics</td>
<td>Language</td>
</tr>
<tr>
<td>10.5</td>
<td>17.9</td>
<td>22.1</td>
</tr>
<tr>
<td>8.7</td>
<td>22.0</td>
<td>21.5</td>
</tr>
<tr>
<td>10.6</td>
<td>20.4</td>
<td>30.0</td>
</tr>
<tr>
<td>48.6</td>
<td>42.1</td>
<td>32.0</td>
</tr>
</tbody>
</table>

**Distribution of Students Achievement by Classes and Subjects**

<table>
<thead>
<tr>
<th>Class 3</th>
<th>Class 5</th>
<th>Class 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>Mathematics</td>
<td>Language</td>
</tr>
<tr>
<td>Above 75%</td>
<td>31.6</td>
<td>37.7</td>
</tr>
<tr>
<td>75% to 50%</td>
<td>36.6</td>
<td>37.4</td>
</tr>
<tr>
<td>50% to 75%</td>
<td>31.6</td>
<td>31.1</td>
</tr>
<tr>
<td>Below 50%</td>
<td>18.1</td>
<td>13.0</td>
</tr>
</tbody>
</table>

**National Report to inform Policy, Practices and Teaching Learning**

National Report to inform Policy, Practices and Teaching Learning (current document) is developed to communicate the results and findings of NAS 2017. This report is meant for reference of researchers/assessment specialists with existing technical understanding of assessments and in large quantitative data sets.

This report provides information on the following aspects of the assessment:

- History and objectives of NAS
- Assessment framework and NAS tools (tests and questionnaires)
- Procedures followed, including sampling, field operations, data analysis and limitations
- Descriptions of student achievement, including differences between subgroups
- Correlation of achievement with background factors
• Proficiency bands for student achievement
• Reporting and dissemination
• Overall summary of findings, recommendations and conclusion

Results in the National Report were computed using the IRT. While, use of CTT bound student achievement within the continuum of 0-100%, IRT enabled achievement to be treated as a latent trait with no limits.

National Report includes the following analysis:
• Representation of achievement in scale scores
• Computation of percentiles
• Computation of achievement proficiency bands
• Association of Background Variables which correlate against achievement
• Achievement shown against proficiency bands

**NAS Highlights and Policy Briefs**

The objective of policy briefing was to report the performance of students in different subjects and classes on specific learning outcomes, along with comparison of average performances between girls and boys, rural and urban children, students studying in government and government aided schools and amongst students belonging to different social backgrounds. Also, it intended to identify the key learning gaps in achievement of LOs and identify the institutional and background factors which affect the learning achievement of students. This briefing is meant for policy makers at the national, state and district levels. This is also meant to enlighten the MPs regarding the status of student learning in various classes in their respective constituencies for better policy making.

**8.2 NAS Dissemination**

NAS reports were disseminated using the following mediums/platforms:
• MHRD and NCERT websites
• Meeting with members of the parliament and discussing the NAS result as well as submission of report pertaining to their constituency
• Sharing of reports with Secretaries and Chief Ministers of 36 States/UTs

**MHRD and NCERT Websites**

All the DRCs and SLRs can be downloaded from the NCERT and MHRD websites. For a month, following the release of the DRCs, the DRCs could also be downloaded from the web application.

**Personal Delivery of Reports to MPs from the Lower and Upper Houses of the Parliament**

NCERT delivered the DRCs to all the MPs. Each of the MP received hard copies of the class and subject wise DRCs of the district which he/she represented. The meetings were an opportunity for the MPs to get acquainted with the health of the education system in the districts which they represent.

**Sharing of NAS Reports with Chief Secretaries and Chief Ministers of 36 States/UTs**

NCERT shared the reports with all the Chief Secretaries and Chief Ministers of 36 States/UTs.

**Workshops Organized for District and State/UT Level Officials**

Several workshops were organized to develop a common understanding on how NAS data will be used in policy, planning and improving pedagogical interventions both at district as well as state level. DRC and SLRs were extensively discussed at these workshops. District and State level workshops were organized by NCERT.

**8.3 District level Workshops**

District level workshops were organized with the following objectives:

• To sensitize the participants on how assessment helps to transform education systems
• To share the experiences of the States/UTs in the conduct of the NAS
• To develop a common understanding on how NAS data will be used in policy, planning and improving pedagogical interventions

These workshops were organized in different regions of the country. Initially, the post NAS intervention workshops were developed at the regional level,
later on at the state level and subsequently at the district and block level with different objectives. At the regional level, workshops were organized to help the state functionaries in developing of their AWPB. The state level interventions were planned at understanding the DRCs and SLRs to devise innovative pedagogical processes to cater to the attainment of the grade specific learning outcomes. The district and the block level interventions helped in formulating differential planning with a roadmap for implementation.

The district level workshops were led by the NCERT. Using copies of DRCs as exemplars, districts were hand held to understand and interpret the DRCs. Apart from modeling ways in which DRCs could be comprehended, the NCERT also resolved several queries of district level officials regarding the use of DRCs.

LOs specific exemplar activities were shared with districts to help them develop pedagogical interventions to improve the attainment of subject specific LOs. These activities included presentation of the following material to the Districts – Class and subject wise LOs, guiding principles of teaching learning processes for attainment of LOs, suggesting pedagogical processes along with their rationale and assessment practices to assess LO attainment.

Using the know-how given by NCERT, Districts had to develop exemplar pedagogical activities and interventions for Subjects and Classes not covered by NCERT. The activities and interventions developed by Districts were reviewed by NCERT and feedback on the same was shared with Districts.

8.4 State/ UT level Workshops

NAS results were extensively discussed during the state level workshops. At every regional State/ UT level workshop, SLRs pertaining to those States/ UTs who attended the workshop were shared by NCERT with the State/ UT representatives. Apart from field questions on the State/ UT specific results, NCERT also explained to the State/ UT officials, ways to use DRC/ SLRs results and carry out District and State/ UT wise differential planning.

NCERT had scheduled district level post NAS workshops to further the understanding of NAS in the different States/ UTs. The agenda for these workshops were:

**DAY 1**

1. Understanding of the District and State Report
2. Working in groups to develop further insights (relating achievement with learning outcomes in the different subjects)
3. Understanding the assessment of the learning Outcomes for Classes III, V, VIII and X as per the report card
4. Working in groups to develop tasks for assessing the attainment of the learning outcomes

**DAY 2**

5. Working with Mathematics kit – Demonstration and interactive session
6. Group work to clarify problems in mathematics kit to further understanding
7. Developing questions in higher order thinking skills to assess the learning outcomes in Mathematics – Demonstration and interactive session
8. Group work to develop assessment tasks in mathematics based on learning outcome to further understanding

**DAY 3**

9. Working with Science kit - Demonstration and interactive session
10. Group work to clarify problems in Science kit to further understanding
11. Developing questions in higher order thinking skills to assess the learning outcomes in Sciences – Demonstration and interactive session
12. Group work to develop assessment tasks in Sciences based on learning outcome to further understanding

All the resource persons present acted as facilitators during the group work.
8.5 NAS Mobile Application

NCERT in collaboration with UNICEF developed a user friendly mobile application (Figure 8.3) for NAS 2017. The application enabled users to run queries on the NAS 2017 data and reported results in a visually appealing manner.

**Figure 8.3: Snapshot of Web Application**

The interventions based on NAS findings have been phased out into:

- Immediate/short term
- Mid term
- Long term

**Immediate/ Short term (Up to March 2018)**

The focus of this phase was to:

- Communicate the District Report Cards, and
- Develop and Implement Pedagogical Interventions to Support Classroom Transaction Based on Learning Outcomes

The above two objectives were realised by conducting training workshops for the State Level Master Trainers (SLMTs) (from Dec to Jan 2018). The objectives of these workshops were:

- Communicate the NAS results as per the District Report Cards (DRCs) in the States/UTs
- Assist States/ UTs to understand the NAS District Report Cards
- Demonstrate the exemplar pedagogical interventions developed by NCERT
- Encourage the Master Trainer’s (SLMTs) to develop other classroom transactions based on the five Learning Outcomes identified in the Districts of the State

The SLMTs further disseminated the understanding of the NAS District Report Cards at the District level (from Jan - Mar 2018). This included:

- Sharing of findings with District level functionaries such as DIETs, DEOs, teachers, head teachers, parents, SMC members and other stakeholders
- Encouraging District Level Master Trainer’s (DLMTs) to develop other classroom transactions based on the five Learning Outcomes identified in the Districts of the State
- Identifying learning gaps and understanding of the same by the teachers in the Districts
- Facilitating by the DLMTs for use of alternative instructional strategies by the teachers in the

8.6 Way Forward

NCERT has developed a comprehensive document on Post NAS Interventions: Communication and Understanding of the DRCs, which explains in detail the ways to interpret and use district level findings and report cards (http://www.ncert.nic.in/programmes/NAS/pdf/DRC_report.pdf). The document also encapsulates the steps which need to be taken up at various levels (National, State, District, Block and School) as a follow up of NAS 2017. Complete details on the same can be taken from the document, Post NAS Interventions: Communication and Understanding of the DRCs.
schools to overcome learning gaps with the support of BRC/CRC) and peer support (e.g. Teacher–Teacher & Student – student support)

- Training of teachers on evolving learning strategies to achieve learning outcomes
- Seeking support from parents or other important members in the community
- Organizing awareness programs for community

**Mid Term Interventions (Up to March 2019)**

The midterm interventions include in its ambit:

- **Development of an Intervention Handbook:** NCERT in collaboration with supporting agencies/ partners is consolidating a final version of the intervention handbook. This is also having a compilation of some of the good exemplary pedagogy materials for achieving Learning Outcomes (LOs) developed by the State, Districts level functionaries and teachers.

- **Use of NAS findings to develop State AWPBs:** NCERT is developing various NAS based indices which are associated with other datasets such as UDISE. Reports are being generated to find associations of the teacher quality index, infrastructure index and State and District fund allocation indices with student achievement. The afore-mentioned stated associations are helping States/UTs in developing evidence based AWPBs.

- **Development of an Item Bank (Dynamic):** Items are being developed for Classes III, V and VIII for all subjects in English and then being translated into other regional languages. Items are being piloted and finalized.

- **Development of ICT based Learning Resources/ Material:**
  - a. ICT based resources are being developed for classroom transactions of LOs
  - b. Existing NCERT’s ICT based learning material are being adapted
  - c. E-content and interactive modules on learning outcomes identified as difficult are being developed. Exemplary resources are also being developed and shared with states for replication in their regional languages and further development in other subject areas
  - d. Role of ICT based interventions are being linked to NAS findings to increase outreach
  - e. Supplementary learning resource materials for students and teachers are being developed
  - f. Material for Orientation of school leaders is being prepared

- **Data Sharing with States/ UTs:** NAS 2017 weighted and scaled data are being shared with States/UTs to help them carry out independent research on variables of interest.

**Long Term Interventions (Up to March 2021)**

The long term interventions specifically focus on:

- Policy implications
- Curriculum Review and Reform

This includes the following:

- NCERT is developing policy briefs for systemic review and reform
- NCERT is coming out with guidelines/suggested practices for teacher education/training and school curriculum review and reform, for e.g. review of curriculum of pre-service teacher education programme
- Review of curriculum of pre-service teacher education programmes
- Review of school curriculum in States/UTs
- Revisiting the curriculum/syllabi and textbooks
- Developing a web based application to address the needs and concerns of teachers, students, and parents.
## Class III Learning Outcomes

### Table A-1: Environmental Studies LOs Class III

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E302</td>
<td>Identifies simple features (e.g. movement, at places found/ kept, eating habits, sounds) of animals and birds in the immediate surroundings.</td>
</tr>
<tr>
<td>E303</td>
<td>Identifies relationships with and among family members</td>
</tr>
<tr>
<td>E304</td>
<td>Identifies objects, signs (vessels, stoves, transport, means of communication, transport, signboards etc.), places (types of houses/shelters, bus stand, petrol pump etc.) activities (works people do, cooking processes, etc.) at home/school/neighborhoods</td>
</tr>
<tr>
<td>E305</td>
<td>Describes need of food for people of different age groups, animals/birds, availability of food and water and use of water at home and surroundings</td>
</tr>
<tr>
<td>E307</td>
<td>Groups objects, birds, animals, features, activities according to differences/similarities using different senses. (e.g. appearance/place of living/food/movement/likes-dislikes/any other features)</td>
</tr>
<tr>
<td>E309</td>
<td>Identifies directions, location of objects/places in simple maps using signs/symbols/verbally</td>
</tr>
<tr>
<td>E310</td>
<td>Guesses properties, estimates quantities of materials/activities in daily life and verifies using symbols/non-standard units</td>
</tr>
<tr>
<td>E311</td>
<td>Records observations, experiences, information on objects/activities/places visited in different ways and predicts patterns etc.</td>
</tr>
<tr>
<td>E313</td>
<td>Observes rules in games (local, indoor, outdoor)</td>
</tr>
<tr>
<td>E314</td>
<td>Voices opinion on good/bad touch, stereotypes for tasks/play/food in family w.r.t gender, misuse/wastage of food and water in family and school.</td>
</tr>
</tbody>
</table>
### Table A-2: Language LOs Class III

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L304</td>
<td>Reads small texts with comprehension i.e., identifies main ideas, details, sequence and draws conclusions</td>
</tr>
<tr>
<td>L312</td>
<td>Reads printed scripts on the classroom walls: poems, posters, charts etc.</td>
</tr>
</tbody>
</table>

### Table A-3: Mathematics LOs Class III

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M301</td>
<td>Reads and writes numbers up to 999 using place value</td>
</tr>
<tr>
<td>M302</td>
<td>Compares numbers up to 999 based on their place values</td>
</tr>
<tr>
<td>M303</td>
<td>Solves simple daily life problems using addition and subtraction of three digit numbers with and without regrouping</td>
</tr>
<tr>
<td>M304</td>
<td>Constructs and uses the multiplication facts (up till 10) in daily life situations</td>
</tr>
<tr>
<td>M305</td>
<td>Analyses and applies an appropriate number operation in the situation/ context</td>
</tr>
<tr>
<td>M306</td>
<td>Explains the meaning of division facts by equal grouping/sharing and finds it by repeated subtraction</td>
</tr>
<tr>
<td>M309</td>
<td>Identifies and makes 2D-shapes by paper folding, paper cutting on the dot grid, using straight lines etc.</td>
</tr>
<tr>
<td>M311</td>
<td>Fills a given region leaving no gaps using a tile of a given shape</td>
</tr>
<tr>
<td>M312</td>
<td>Estimates and measures length and distance using standard units like centimeters or meters &amp; identifies relationships</td>
</tr>
<tr>
<td>M317</td>
<td>Reads the time correctly to the hour using a clock/watch</td>
</tr>
<tr>
<td>M318</td>
<td>Extends patterns in simple shapes and numbers</td>
</tr>
<tr>
<td>M319</td>
<td>Records data using tally marks, represents pictorially and draws conclusions</td>
</tr>
</tbody>
</table>
## Class V Learning Outcomes

**Table A-4: Environmental Studies LOs Class V**

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E403</td>
<td>Identifies relationship with and among family members in extended family</td>
</tr>
<tr>
<td>E410</td>
<td>Records observations/experiences/information for objects, activities, phenomena, places visited in different ways and predicts patterns and activities/phenomena</td>
</tr>
<tr>
<td>E501</td>
<td>Explains the super senses and unusual features (sight, smell, hear, sleep, sound, etc.) and interactions of animals and their responses to light, sound, food etc.</td>
</tr>
<tr>
<td>E503</td>
<td>Describes the interdependence among animals, plants and humans</td>
</tr>
<tr>
<td>E504</td>
<td>Explains the role and functions of different institutions in daily life (Bank, Panchayat, cooperatives, police station, etc.)</td>
</tr>
<tr>
<td>E505</td>
<td>Establishes linkages among terrain, climate, resources (food, water, shelter, livelihood) and cultural life. (e.g. life in distant/difficult areas like hot/cold deserts)</td>
</tr>
<tr>
<td>E506</td>
<td>Groups objects, materials, activities for features/properties such as shape, taste, color, texture, sound, traits etc.</td>
</tr>
<tr>
<td>E507</td>
<td>Traces the changes in practices, customs, techniques of past and present through coins, paintings, monuments, museum etc. and interacting with elders</td>
</tr>
<tr>
<td>E508</td>
<td>Guesses (properties, conditions of phenomena), estimates spatial quantities (distance, area, volume, weight etc.) and time in simple standard units and verifies using simple tools/set ups</td>
</tr>
<tr>
<td>E509</td>
<td>Records observations/experiences/information in an organized manner (e.g. in tables/sketches/bar graphs/pie charts) and predicts patterns in activities/phenomena (e.g. floating, sinking, mixing, evaporation, germination, spoilage) to establish relation between cause and effect.</td>
</tr>
<tr>
<td>E510</td>
<td>Identifies signs, directions, location of different objects/landmarks of a locality/place visited in maps and predicts directions w.r.t. positions at different places for a location</td>
</tr>
<tr>
<td>E512</td>
<td>Voices opinions on issues observed/experienced and relates practices/happenings to larger issues of society</td>
</tr>
<tr>
<td>E513</td>
<td>Suggests ways for hygiene, health, managing waste, disaster/emergency situations and protecting/saving resources</td>
</tr>
</tbody>
</table>

**Table A-5: Language LOs Class V**

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L504</td>
<td>Reads and comprehends independently storybooks, news items/headlines, advertisements etc.</td>
</tr>
<tr>
<td>L508</td>
<td>Reads text with comprehension, locates details and sequence of events</td>
</tr>
<tr>
<td>Learning Outcomes</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>M401</td>
<td>Applies operations of numbers in daily life situations</td>
</tr>
<tr>
<td>M412</td>
<td>Explores the area and perimeter of simple geometrical shapes (triangle, rectangle, square) in terms of given shape as a unit</td>
</tr>
<tr>
<td>M418</td>
<td>Calculates time intervals/duration of familiar daily life events by using forward or backward counting/addition and subtraction</td>
</tr>
<tr>
<td>M421</td>
<td>Represent the collected information in tables and bar graphs and draws inferences from these</td>
</tr>
<tr>
<td>M501</td>
<td>Reads and writes numbers bigger than 1000 being used in her/his surroundings</td>
</tr>
<tr>
<td>M504</td>
<td>Estimates sum, difference, product and quotient of numbers and verifies the same using different strategies like using standard algorithms or breaking a number and then using operation</td>
</tr>
<tr>
<td>M505</td>
<td>Finds the number corresponding to part of a collection</td>
</tr>
<tr>
<td>M506</td>
<td>Identifies and forms equivalent fractions of a given fraction</td>
</tr>
<tr>
<td>M508</td>
<td>Converts fractions into decimals and vice versa</td>
</tr>
<tr>
<td>M509</td>
<td>Classifies angles into right angle, acute angle, obtuse angle and represents the same by drawing and tracing</td>
</tr>
<tr>
<td>M512</td>
<td>Relates different commonly used larger and smaller units of length, weight and volume and converts larger units to smaller units and vice versa</td>
</tr>
<tr>
<td>M513</td>
<td>Estimates the volume of a solid body in known units</td>
</tr>
<tr>
<td>M514</td>
<td>Applies the four fundamental arithmetic operations in solving problems involving money, length, mass, capacity and time intervals</td>
</tr>
<tr>
<td>M515</td>
<td>Identifies the pattern in triangular numbers and square number</td>
</tr>
<tr>
<td>M516</td>
<td>Collects data related to various daily life situations, represents it in tabular form and as bar graphs and interprets it</td>
</tr>
</tbody>
</table>
### Class VIII Learning Outcomes

**Table A-7: Language LOs Class VIII**

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L813</td>
<td>Read textual/non-textual materials with comprehension and identifies the details, characters, main idea and sequence of ideas and events while reading</td>
</tr>
</tbody>
</table>

**Table A-8: Mathematics LOs Class VIII**

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M601</td>
<td>Solves problems involving large numbers by applying appropriate operations</td>
</tr>
<tr>
<td>M606</td>
<td>Solves problems on daily life situations involving addition and subtraction of fractions / decimals</td>
</tr>
<tr>
<td>M620</td>
<td>Finds the perimeter and area of rectangular objects in the surroundings like floor of the classroom, surfaces of a chalk box etc.</td>
</tr>
<tr>
<td>M621</td>
<td>Arranges given/collected information in the form of table, pictograph and bar graph and interprets them</td>
</tr>
<tr>
<td>M702</td>
<td>Interprets the division and multiplication of fractions</td>
</tr>
<tr>
<td>M705</td>
<td>Solves problems related to daily life situations involving rational numbers</td>
</tr>
<tr>
<td>M706</td>
<td>Uses exponential form of numbers to simplify problems involving multiplication and division of large numbers</td>
</tr>
<tr>
<td>M707</td>
<td>Adds/subtracts algebraic expressions</td>
</tr>
<tr>
<td>M710</td>
<td>Solves problems related to conversion of percentage to fraction and decimal and vice versa</td>
</tr>
<tr>
<td>M717</td>
<td>Finds the approximate area of closed shapes by using unit square grid/graph sheet</td>
</tr>
<tr>
<td>M719</td>
<td>Finds various representative values for simple data from her/his daily life contexts like mean, median and mode</td>
</tr>
<tr>
<td>M721</td>
<td>Interprets data using bar graph</td>
</tr>
<tr>
<td>M801</td>
<td>Generalizes properties of addition, subtraction, multiplication and division of rational numbers through patterns</td>
</tr>
<tr>
<td>M802</td>
<td>Finds rational numbers between two given rational numbers</td>
</tr>
<tr>
<td>M803</td>
<td>Proves divisibility rules of 2, 3, 4, 5, 6, 9 and 11</td>
</tr>
<tr>
<td>M804</td>
<td>Finds squares, cubes, square roots and cube roots of numbers using different methods</td>
</tr>
<tr>
<td>M808</td>
<td>Uses various algebraic identities in solving problems of daily life</td>
</tr>
<tr>
<td>M812</td>
<td>Verifies properties of parallelogram and establishes the relationship between them through reasoning</td>
</tr>
<tr>
<td>M818</td>
<td>Finds surface area and volume of cuboidal and cylindrical object</td>
</tr>
<tr>
<td>M819</td>
<td>Draws and interprets bar charts and pie charts</td>
</tr>
</tbody>
</table>
## Table A-9: Science LOs Class VIII

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCI703</td>
<td>Classifies materials and organisms based on properties/characteristics</td>
</tr>
<tr>
<td>SCI704</td>
<td>Conducts simple investigation to seek answers to queries</td>
</tr>
<tr>
<td>SCI705</td>
<td>Relates processes and phenomenon with causes</td>
</tr>
<tr>
<td>SCI708</td>
<td>Measures and calculates e.g., temperature; pulse rate; speed of moving objects; time period of a simple pendulum, etc.</td>
</tr>
<tr>
<td>SCI710</td>
<td>Plots and interprets graphs</td>
</tr>
<tr>
<td>SCI711</td>
<td>Constructs models using materials from surroundings and explains their working</td>
</tr>
<tr>
<td>SCI801</td>
<td>Differentiates materials, organism and processes</td>
</tr>
<tr>
<td>SCI804</td>
<td>Relates processes and phenomenon with causes</td>
</tr>
<tr>
<td>SCI805</td>
<td>Explains processes and phenomenon</td>
</tr>
<tr>
<td>SCI807</td>
<td>Measures angles of incidence and reflection, etc.</td>
</tr>
<tr>
<td>SCI811</td>
<td>Applies learning of scientific concepts in day-to-day life</td>
</tr>
<tr>
<td>SCI813</td>
<td>Makes efforts to protect environment</td>
</tr>
<tr>
<td>Learning Outcomes</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>SST605</td>
<td>Identifies latitudes and longitudes, e.g., poles, equator, tropics, States/UTs of India and other neighboring countries on globe and the world map</td>
</tr>
<tr>
<td>SST610</td>
<td>Locates important historical sites, places on an outline map of India.</td>
</tr>
<tr>
<td>SST625</td>
<td>Describes functioning of rural and urban local government bodies in sectors like health and education</td>
</tr>
<tr>
<td>SST703</td>
<td>Explains preventive actions to be undertaken in the event of disasters</td>
</tr>
<tr>
<td>SST704</td>
<td>Describes formation of landforms due to various factors</td>
</tr>
<tr>
<td>SST722</td>
<td>Explains the significance of equality in democracy</td>
</tr>
<tr>
<td>SST726</td>
<td>Describes the process of election to the legislative assembly</td>
</tr>
<tr>
<td>SST731</td>
<td>Explains the functioning of media with appropriate examples from newspapers</td>
</tr>
<tr>
<td>SST733</td>
<td>Differentiates between different kinds of markets</td>
</tr>
<tr>
<td>SST734</td>
<td>Traces how goods travel through various market places</td>
</tr>
<tr>
<td>SST802</td>
<td>Describes major crops, types of farming and agricultural practices in her/his own area/state</td>
</tr>
<tr>
<td>SST805</td>
<td>Locates distribution of important minerals e.g. coal and mineral oil on the world map</td>
</tr>
<tr>
<td>SST807</td>
<td>Justifies judicious use of natural resources</td>
</tr>
<tr>
<td>SST809</td>
<td>Draws interrelationship between types of farming and development in different regions of the world</td>
</tr>
<tr>
<td>SST810</td>
<td>Distinguishes the modern period from the medieval and the ancient periods through the use of sources</td>
</tr>
<tr>
<td>SST815</td>
<td>Explains the origin, nature and spread of the revolt of 1857 and the lessons learned from it.</td>
</tr>
<tr>
<td>SST816</td>
<td>Analyses the decline of pre-existing urban centers and handicraft industries and the development of new urban centers and industries in India during the colonial period</td>
</tr>
<tr>
<td>SST818</td>
<td>Analyses the issues related to caste, women, widow remarriage, child marriage, social reforms and the laws and policies of colonial administration towards these issues</td>
</tr>
<tr>
<td>SST823</td>
<td>Applies the knowledge of the Fundamental Rights to find out about their violation, protection and promotion in a given situation</td>
</tr>
<tr>
<td>SST827</td>
<td>Describes the process of making a law. (e.g. Domestic Violence Act, RTI Act, RTE Act)</td>
</tr>
<tr>
<td>SST831</td>
<td>Identifies the role of Government in providing public facilities such as water, sanitation, road, electricity etc., and recognizes their availability</td>
</tr>
<tr>
<td>SST833</td>
<td>Draws bar diagram to show population of different countries/India/states</td>
</tr>
</tbody>
</table>
## Appendix B

**List of Languages in which Test got Translated**

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Medium of Instruction</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Assamese</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>Bengali</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>English</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>Gujarati</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>Garo</td>
<td>15</td>
</tr>
<tr>
<td>6</td>
<td>Hindi</td>
<td>16</td>
</tr>
<tr>
<td>7</td>
<td>Kannada</td>
<td>17</td>
</tr>
<tr>
<td>8</td>
<td>Khasi</td>
<td>18</td>
</tr>
<tr>
<td>9</td>
<td>Konkani</td>
<td>19</td>
</tr>
<tr>
<td>10</td>
<td>Marathi</td>
<td>20</td>
</tr>
<tr>
<td>11</td>
<td>Malayalam</td>
<td>21</td>
</tr>
<tr>
<td>12</td>
<td>Manipuri</td>
<td>22</td>
</tr>
<tr>
<td>13</td>
<td>Mizo</td>
<td>23</td>
</tr>
<tr>
<td>14</td>
<td>Odia</td>
<td>24</td>
</tr>
<tr>
<td>15</td>
<td>Punjabi</td>
<td>25</td>
</tr>
<tr>
<td>16</td>
<td>Tamil</td>
<td>26</td>
</tr>
<tr>
<td>17</td>
<td>Telugu</td>
<td>27</td>
</tr>
<tr>
<td>18</td>
<td>Urdu</td>
<td>28</td>
</tr>
<tr>
<td>19</td>
<td>Bodo</td>
<td>29</td>
</tr>
<tr>
<td>20</td>
<td>Kokborok</td>
<td>30</td>
</tr>
</tbody>
</table>
Appendix C

Sample Forms 1, 2 & 3
Example 1: State/UT desired target population using fictitious scenario

SAMPLING FORM 1
State/UT desired target population

State or union territory: State A
Person completing this form: [a] 212350

1. Specify the medium(s) of instruction for your state or union territory desired target population:
   Hindi and English

2. Total state or union territory enrolment in the target class:

3. Describe any population(s) to be omitted from the state or union territory target class population (if applicable):
   Students taught in a medium of instruction other than Hindi or English

4. Total enrolment omitted from the state or union territory desired target population: [b] 4525
   (corresponding to the omissions listed in the previous item)

5. Total enrolment in the state or union territory desired target population:
   box [a] – box [b] [c] 207825

6. Percentage of coverage in the state or union territory desired target class population:
   box [c] ÷ box [a] [d] 97.86

7. Describe your data source:
   UDISE
SAMPLING FORM 2
State/UT desired target population

State or union territory: State A

Person who completed this form:

1. Total enrolment in the state or union territory desired target population:
   From box [c] on sampling form 1
   \[a\] 207825

2. School-level exclusions:

<table>
<thead>
<tr>
<th>Description of exclusions</th>
<th># of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invalid School Category</td>
<td>0</td>
</tr>
<tr>
<td>&lt;5</td>
<td>21</td>
</tr>
<tr>
<td>Total Exclusion</td>
<td>[b] 21</td>
</tr>
</tbody>
</table>

   Percentage of school-level exclusions:
   \[b\] 0.000101

3. Total enrolment in the state or union territory defined target population:
   box [a] – box [b]
   \[c\] 207804

4. Describe your data source:
   UDISE
SAMPLING FORM 3

Stratification

State or union territory: State A

Person who completed this form:

Explicit stratification
1. List and describe the variables used for explicit stratification:

<table>
<thead>
<tr>
<th>Explicit stratification variables</th>
<th># of levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>District</td>
<td>1</td>
</tr>
</tbody>
</table>

2. Total number of explicit strata: 1

Implicit stratification
3. List the implicit variables by order of importance and describe their levels:

<table>
<thead>
<tr>
<th>Implicit stratification variables (List by order of importance)</th>
<th># of levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block</td>
<td>12</td>
</tr>
<tr>
<td>Area</td>
<td>2</td>
</tr>
<tr>
<td>Management</td>
<td>2</td>
</tr>
<tr>
<td>Type of school</td>
<td>3</td>
</tr>
<tr>
<td>Medium of instruction</td>
<td>2</td>
</tr>
</tbody>
</table>

4. Total number of implicit strata: 288
Appendix D

Procedure for IRT Scaling of NAS

For the IRT calibration of NAS 2017 data, multiple options were considered related to the choice of IRT models, method for computing scale scores, selection of language used for calibration, IRT software, and characteristics of reporting scale (e.g., range, center point, and standard deviation).

Regarding the choice of IRT model, considering the nature of NAS items, the choice was narrowed to either the one-parameter logistic (1-PL) or two-parameter logistic (2-PL) model as most frequently used IRT models in the practice of educational assessment. The decision about the IRT model to be used for calibration of NAS data was informed by the following evidence:

- Fit between the provisions of the theoretical model and empirical data is considered as one of the major criteria for making decisions about models to be used in practice. No mathematical model can perfectly describe natural phenomena; however, mathematical models can be tested for their fit to empirically collected data, and those that demonstrate better fit can be considered as more fruitful in describing nature (J.P. Box: “All the models are wrong, but some are useful.”).
- Convergence between models stemming from different conceptual domains can be considered another criterion for the selection of models, for example, convergence between IRT and CTT models of measurement, including reasonableness, common sense, and logical acceptability.

Regarding the selection of language data, two main options were considered: 1) conducting calibration on one selected language (considering English or Hindi), or 2) conducting calibration on a random sample of cases from the entire data file so that each language would be proportionally represented.

In order to supply evidence that will inform the decisions described above, two NAS 2017 tests (Mathematics Class III and Reading Class V) were calibrated under both IRT models (1-PL and 2-PL) using three different samples of students: 1) students taking the English version, 2) students taking the Hindi version, and 3) 10% randomly selected students from the complete data set of all language versions of the test.

Each NAS tests is designed in two forms of 15 items with 5 items that are common between forms. This makes a total of 25 unique items, which were calibrated concurrently in order to place both forms onto the same scale. Thus, 12 calibrations were carried out on 25 items from two NAS tests, using two IRT models, and three different language samples of students (presented in Table 1).

Table D-1: Overview of Calibrations

<table>
<thead>
<tr>
<th>Language Sample</th>
<th>Math Class III</th>
<th>NAS Test</th>
<th>Reading Class V</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>1-PL</td>
<td>2-PL</td>
<td>1-PL</td>
</tr>
<tr>
<td>Hindi</td>
<td>1-PL</td>
<td>2-PL</td>
<td>1-PL</td>
</tr>
<tr>
<td>All (10%)</td>
<td>1-PL</td>
<td>2-PL</td>
<td>1-PL</td>
</tr>
</tbody>
</table>

The results of testing model-data fit obtained for each test, sample, and IRT model are presented in Table 2. As can be seen, the values of Chi-square, which represent differences between frequencies based on the model and
frequencies observed in data, are substantially lower for the 2-PL model. Thus, it can be concluded that the 2-PL model consistently demonstrates better model-data fit in both calibrated tests across all three language samples.

Table D-2: Overview of Calibrations

<table>
<thead>
<tr>
<th>Test</th>
<th>Language Sample</th>
<th>1-PL</th>
<th>2-PL</th>
<th>Difference 1-PL vs 2-PL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math Class III</td>
<td>English</td>
<td>16352.01</td>
<td>13621.08</td>
<td>2730.93</td>
</tr>
<tr>
<td></td>
<td>Hindi</td>
<td>16491.02</td>
<td>12730.55</td>
<td>3760.48</td>
</tr>
<tr>
<td></td>
<td>All (10%)</td>
<td>15511.89</td>
<td>12542.65</td>
<td>2969.24</td>
</tr>
<tr>
<td>Reading Class V</td>
<td>English</td>
<td>19442.90</td>
<td>13492.29</td>
<td>5950.60</td>
</tr>
<tr>
<td></td>
<td>Hindi</td>
<td>15607.12</td>
<td>10405.92</td>
<td>5201.21</td>
</tr>
<tr>
<td></td>
<td>All (10%)</td>
<td>14269.86</td>
<td>10589.65</td>
<td>3680.21</td>
</tr>
</tbody>
</table>

Factor analyses of items from these two tests were carried out using different language samples. A general observation from these factor analyses is that the number of meaningful factors extracted was always one (proving uni-dimensionality of data), and that factor loadings (associations of items with the measured latent construct) obtained on different language samples were highly similar (this corresponds to the result of IRT calibration showing that discrimination parameters were similar between language samples). Another similarity with IRT analysis, the differences observed in item means in the Reading Class V test suggest that the English version of the test might be more challenging.

Based on obtained results of model-data fit, and alignment between item parameters stemming from IRT and CTT concepts of measurement, it was decided that the 2-PL IRT model will be used for calibrations and the creation of the IRT scale for NAS 2017 and further assessment cycles.

Regarding the choice of language data used for calibration, minor or negligible differences in item parameters obtained on different language samples for the Math Class III test were observed. On the other hand, differences between difficulty parameters for the Reading Class V tests are substantial, suggesting that the English version of the test poses a greater challenge than versions in other languages. Thus, regarding the language sample, it was decided that the sample of all cases will be used for calibrations allowing each language to be proportionately represented.

Regarding the IRT calibration method, estimation of the student ability scores, and characteristics of the reporting scale (e.g., range and anchor points), based on extensive evidence of the construction and utilization of IRT scales, the following options were accepted:

- Reporting scale for NAS 2017 will be constructed using IRT calibration with the distribution of item difficulty centered to zero, which leaves the distribution of student ability estimates to be determined based on difficulty posed by each test.
- For estimation of student ability scores will be carried out by IRT pattern-scoring method using a Weighted Maximum Likelihood (WML) algorithm. A general characteristic of IRT ability estimation is that person score estimates are independent of any particular set of items (test-free scores), and, provided that the parameters of the two forms are placed on the same scale, the scores on the two forms obtained by pattern-scoring are directly comparable. The IRT scores (ability estimates) are initially generated in logit metrics, but they are linearly converted into a meaningful and publicly communicable scale that facilitates score interpretation.
- Linear transformation from the logit scale (LS) to the reporting Scale Score (SS) will be done by specifying a linear transformation function that sets the reporting scale to the desired mean and standard deviation. The
mean of the reporting scale was set to 300 and standard deviation to 50, with a range 100-500, so the linear transformation from LS to SS was done using the following expression:

\[ SS = 300 + 50 \times LS \]

In such a case of simple transformation, the cut scores obtained through setting performance standards have different value for each test.

Regarding IRT software, it was agreed to use a versatile software package that can run multi-parameter models and that can be used for estimating ability scores, as well as for future equating purposes. Specifically, it was agreed to use PARSCALE for Windows version 4.1.

PARSCALE (Muraki & Bock, 1996) is a program that performs estimation of item parameters and test scoring under a variety of IRT models. It allows for the inclusion of different item types, and consequently different IRT models, into the framework of the same analysis. This unique feature makes it especially useful for the calibration of educational tests, which typically consist of various item formats (e.g., multiple choice, short answer, open-ended, and writing prompt items). Further, it allows parameters for some items to be specified to fixed values defining the metrics to which the parameters of other items will be estimated. This feature is especially useful for equating designs that employ anchor items.

The program can estimate parameters under the 1P, 2P, and 3P models for dichotomous items, and for polytomous items it can apply the graded response model, a rating scale version of the graded response model, the partial credit model, and the generalized partial credit model. It can also perform the multigroup item calibration offering testing for the rater’s effect, the differential item functioning, and the trend.

The PARSCALE offers abundant output providing a large number of classical and IRT statistics. For example, for any model, it allows the computation of item information at numerous theta points and saves the values into an external text file. It also provides advanced chi-square item and test fit statistics. All these features make this program extremely useful in the development and psychometric analyses of educational tests.
Appendix E

Weighting Procedure

The following technical steps were carried out to obtain the final sampling weights:

1. Matching the research file (containing the scores in both Pct-correct and IRT metrics) with the sampling frame to obtain school enrolment information. For schools that did not match with sampling frame the average school enrolment in the corresponding district was imputed.

2. Computing School Probability defined as the ratio between the number of participating students in the school (actual number of students in data) and the MOS (measure of size or enrolment) in corresponding school.

3. Computing School Weight defined as a ratio: 1/School Probability.

4. Computing the representation of each district in the state population (district enrolment /state enrolment), and the representation of each district in the state sample (district participation/state participation).

5. Computing District Weight as the following ratio: district representation in the population/district representation in the sample.

6. Calculating representation of each state in the national population (state enrolment/national enrolment) and the representation of each state in the national sample (state participation/national participation).

7. Computing State Weight as the following ratio: state representation in the population/state representation in the sample.

8. Trimming all 3 weights based on (median * 4) range.

9. Calculating the Total Weight as a product of the three trimmed weights (school, district, and state).

10. Trimming the Total Weight based on (median * 4) range.

11. Calculating the final Proportional Total Weight by dividing the trimmed Total Weight by its mean. This procedure centers the weight distribution of the total sample to 1, which avoids increasing of Type I error in statistical tests.

All the statistical procedures were carried out using the final sampling weights.
### Appendix F

#### Results for Class III Subjects by States

**Table F-3: Weighted Means, N-counts, Standard Deviations, and Standard Errors**

<table>
<thead>
<tr>
<th>State</th>
<th>Language III</th>
<th>Mathematics III</th>
<th>Environmental Studies III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>N</td>
<td>SD</td>
</tr>
<tr>
<td>Jammu &amp; Kashmir</td>
<td>332</td>
<td>3498</td>
<td>54</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>341</td>
<td>1620</td>
<td>51</td>
</tr>
<tr>
<td>Punjab</td>
<td>330</td>
<td>6732</td>
<td>55</td>
</tr>
<tr>
<td>Chandigarh</td>
<td>354</td>
<td>1071</td>
<td>52</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>347</td>
<td>3315</td>
<td>54</td>
</tr>
<tr>
<td>Haryana</td>
<td>329</td>
<td>11907</td>
<td>53</td>
</tr>
<tr>
<td>Delhi</td>
<td>316</td>
<td>17382</td>
<td>53</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>358</td>
<td>20012</td>
<td>50</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>314</td>
<td>109063</td>
<td>64</td>
</tr>
<tr>
<td>Bihar</td>
<td>336</td>
<td>112062</td>
<td>53</td>
</tr>
<tr>
<td>Sikkim</td>
<td>325</td>
<td>154</td>
<td>50</td>
</tr>
<tr>
<td>Arunachal Pradesh</td>
<td>307</td>
<td>1281</td>
<td>53</td>
</tr>
<tr>
<td>Nagaland</td>
<td>345</td>
<td>1194</td>
<td>57</td>
</tr>
<tr>
<td>Manipur</td>
<td>341</td>
<td>1293</td>
<td>52</td>
</tr>
<tr>
<td>Mizoram</td>
<td>337</td>
<td>395</td>
<td>48</td>
</tr>
<tr>
<td>Tripura</td>
<td>336</td>
<td>2955</td>
<td>54</td>
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## Results for Class V Subjects by States

### Table F-4: Weighted Means, N-counts, Standard Deviations, and Standard Errors

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| National Mean     | 319        | 68798               | 59            | 0.1                 | 310                    | 682995              | 57            | 0.1   |
Results for Class VIII Subjects by States

Table F-5: Weighted Means, N-counts, Standard Deviations, and Standard Errors

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Appendices

Combined Results for Classes by States
Table F-6: Weighted Means, N-counts, Standard Deviations, and Standard Errors

State

Class III

Class V

Class VIII

Mean

N

SD

SE

Mean

N

SD

Jammu & Kashmir

320

3480

52

0.9

311

1949

54

Himachal Pradesh

328

1615

49

1.2

314

1395

50

Punjab

315

6686

50

0.6

299

9602

Chandigarh

345

1070

51

1.6

339

Uttarakhand

337

3310

50

0.9

331

Haryana

317

11843

50

0.5

Delhi

306

17296

50

0.4

Rajasthan

345

20001

49

Uttar Pradesh

308

109543

Bihar

324

111262

Sikkim

313

154

48

Arunachal Pradesh

299

1274

50

Nagaland

334

1193

53

Manipur

334

1292

Mizoram

328

395

Tripura

326

Meghalaya

315

Assam

SE

All Classes

Mean

N

SD

SE

Mean

N

SD

SE

1.2

262

2373

52

1.1

296

2578

52

1.0

1.3

280

2364

46

0.9

300

1849

47

1.1

51

0.5

264

12007

44

0.4

285

9689

47

0.5

1243

58

1.7

297

1332

57

1.6

322

1227

56

1.6

2561

55

1.1

284

4463

52

0.8

309

3547

52

0.9

301

12144

52

0.5

275

13087

49

0.4

295

12431

50

0.4

294

19185

48

0.3

262

19076

40

0.3

284

18574

46

0.3

0.3

341

20346

55

0.4

321

16137

61

0.5

335

18559

55

0.4

58

0.2

300

86062

59

0.2

273

97007

59

0.2

292

97484

59

0.2

50

0.2

312

108426

52

0.2

287

95556

55

0.2

307

104129 52

0.2

3.8

287

380

41

2.1

264

406

40

2.0

279

322

42

2.3

1.4

282

998

46

1.5

260

998

45

1.4

280

1081

47

1.4

1.5

305

808

54

1.9

256

478

45

2.0

306

791

51

1.8

50

1.4

319

763

55

2.0

277

530

51

2.2

315

829

52

1.8

47

2.4

299

361

42

2.2

262

318

39

2.2

295

354

43

2.3

2933

52

1.0

309

2563

52

1.0

272

3082

46

0.8

299

2881

50

0.9

3407

51

0.9

288

2349

46

0.9

262

2435

42

0.8

289

2701

46

0.9

339

20242

53

0.4

327

15969

53

0.4

291

23698

54

0.3

314

20343

53

0.4

West Bengal

342

30856

54

0.3

308

69583

58

0.2

274

57713

52

0.2

299

53217

55

0.2

Jharkhand

332

28899

52

0.3

324

28157

55

0.3

305

24859

57

0.4

320

27060

54

0.3

Odisha

318

23357

47

0.3

312

24400

54

0.3

281

23821

54

0.4

301

23855

52

0.3

Chhattisgarh

321

11871

48

0.4

304

15439

50

0.4

279

16659

52

0.4

297

14857

51

0.4

Madhya Pradesh

325

36543

49

0.3

307

32087

57

0.3

280

44368

56

0.3

300

38336

54

0.3

Gujarat

334

32338

51

0.3

320

38343

54

0.3

302

32904

56

0.3

317

34366

54

0.3

Daman & Diu

318

106

49

4.8

293

131

48

4.2

260

126

39

3.5

286

122

45

4.1

Dadra & Nagar Haveli

333

190

49

3.6

328

234

52

3.4

299

281

55

3.3

315

240

53

3.4

Maharashtra

333

62460

52

0.2

311

80357

55

0.2

281

89111

51

0.2

302

78489

53

0.2

Andhra Pradesh

347

13358

47

0.4

332

14735

59

0.5

293

25296

58

0.4

314

18546

56

0.4

Karnataka

349

23013

50

0.3

344

21796

54

0.4

300

36814

54

0.3

322

28168

53

0.3

Goa

321

912

45

1.5

300

1473

45

1.2

270

974

42

1.4

295

1105

44

1.3

Lakshadweep

308

7

42

15.6

293

54

43

5.8

257

28

39

7.3

281

30

41

7.6

Kerala

345

17944

50

0.4

344

22603

67

0.4

286

35570

47

0.2

313

26392

54

0.3

Tamil Nadu

321

33871

45

0.2

307

36146

49

0.3

267

53250

43

0.2

290

42305

45

0.2

Puducherry

313

239

44

2.8

299

279

47

2.8

251

634

37

1.5

272

409

41

2.0

A & N Islands

321

164

49

3.8

305

202

52

3.6

263

245

44

2.8

289

208

47

3.3

Telangana

333

11400

51

0.5

311

13030

54

0.5

271

18536

48

0.4

296

14743

50

0.4

National Mean

326

644525

53

0.1

313

686153

57

0.1

282

756539

55

0.1

303

701819 55

0.1

201


Appendix G

Specific Performance Level Descriptors and Percentages of Students at Each Level

Specific Performance Level Descriptors for Language, Class III: Advanced, Proficient, Basic and Below Basic

Table G-1: Specific Performance Level Descriptors for Language, Class III: Advanced

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listening and Speaking</td>
<td>Listen, comprehend, analyse critically and respond on their own with clarity of expression to instructions, commands, announcements using creative thinking. Listen, comprehend unfamiliar text such as short passages, poems and stories and express in their own words with proper pronunciation and intonation.</td>
</tr>
<tr>
<td>Reading Aloud</td>
<td>Read familiar and unfamiliar text aloud with proper pronunciation, stress and pause, appropriate speed with critical comprehension and reflection.</td>
</tr>
<tr>
<td>Silent Reading</td>
<td>Read familiar and unfamiliar text such as wall posters, pictures, charts and comprehend the details of main idea and draws logical conclusions after critical appreciation of the text. Read, analyze and infer logical details based on comprehension and reflect on the text.</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>Familiar with at least 250 words in active vocabulary and able to use in day to day expression in sentences.</td>
</tr>
<tr>
<td>Writing</td>
<td>Write 5-6 sentences on a given topic/own experience with appropriate diction, grammatical accuracy and with creative expression.</td>
</tr>
</tbody>
</table>

Table G-2: Specific Performance Level Descriptors for Language, Class III: Proficient

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listening and Speaking</td>
<td>Listen, comprehend, analyse and respond to instructions, commands, announcements on their own. Listen and comprehend familiar short texts such as stories, poems and express their opinions in their own words. Participate in peer interaction and respond appropriately.</td>
</tr>
<tr>
<td>Reading Aloud</td>
<td>Read familiar and unfamiliar text aloud with proper pronunciation, stress and pause, appropriate speed with comprehension.</td>
</tr>
<tr>
<td>Silent Reading</td>
<td>Read text such as wall posters, pictures, charts and comprehend the details of main idea and draw logical conclusions of the text. Read, analyse and infer logical details based on comprehension.</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>Have adequate active vocabulary and apply them in known familiar situations.</td>
</tr>
<tr>
<td>Writing</td>
<td>Write sentences on a given topic/own experience with appropriate diction, grammatical accuracy.</td>
</tr>
<tr>
<td>Competency</td>
<td>Specific Performance Level Descriptors</td>
</tr>
<tr>
<td>-------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| **Listening and Speaking** | Listen to instructions, commands, announcements and comprehend on their own / and respond with the support of teacher.  
Listen and comprehend very short familiar text and respond with the support of teacher. |
| **Reading Aloud**        | Read familiar text aloud with proper pronunciation, stress and pause but without appropriate speed and literal comprehension. |
| **Silent Reading**       | Read familiar text and comprehend the details of main idea and draws logical conclusions based on literal comprehension.  
Read and locate central idea of the text. |
| **Vocabulary**           | Familiar with at least 100 words in active vocabulary but unable to use in day to day expression in sentences.   |
| **Writing**              | Write 2-3 sentences on a familiar given topic with simple diction. |

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
</table>
| **Listening and Speaking** | Listen but unable to comprehend instructions, commands, announcements even with the continuous support of teacher.  
Listen but unable to comprehend short familiar text and respond even with the support of teacher. |
| **Reading Aloud**        | Unable to read familiar text aloud with proper pronunciation, stress and pause without appropriate speed and literal comprehension. |
| **Silent Reading**       | Unable to read familiar text and comprehend.  
Unable to read and locate central idea of the text. |
| **Vocabulary**           | Unable to be familiar with at least 100 words in active vocabulary and use in day to day expression in sentences.   |
| **Writing**              | Unable to write a complete sentence on a familiar topic. |
### Specific Performance Level Descriptors for Language, Class V: Advanced, Proficient, Basic and Below

#### Basic

Table G-5: Specific Performance Level Descriptors for Language, Class V: Advanced

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
</table>
| Listening and Speaking | - Listen to oral questions, audio tapes, news, announcements, comprehend and analyse critically and respond independently with creative thinking and clarity of expression.  
- Listen, comprehend unfamiliar text such as short passages, poems, riddles, rules of games and stories and express coherently in their own words with proper pronunciation, stress, pause and intonation.  
- Conduct role plays, interviews with strangers, narrate incidents giving details in sequential order with connected ideas.  
- Appreciate verbally the visual descriptions such as posters, cartoons, hoardings, advertisements along with drawing logical inferences. |
| Reading Aloud    | - Read aloud familiar and unfamiliar text with proper pronunciation, stress and pause, appropriate speed with critical comprehension.  
- Guess meaning and verify by consulting dictionary to find meaning of familiar but passive vocabulary. |
| Silent Reading   | - Read familiar and unfamiliar texts such as letters, newspapers, articles and comprehend the details of main idea and draws logical conclusions after critical appreciation of the text.  
- Read, analyse and infer logical details based on comprehension and reflect on the complexity of the text material. |
| Vocabulary       | - Familiar with at least 500 words in active vocabulary and able to use in day to day expression in sentences. |
| Writing          | - Write a paragraph on a given topic/own experience with appropriate diction, grammatical accuracy and with creative expression.  
- Write short stories, profiles, descriptions, informal letters, poems, riddles, slogans with creative expressions using linkers/punctuation marks. |
**Table G-6: Specific Performance Level Descriptors for Language, Class V: Proficient**

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listening and Speaking</td>
<td>Listen to questions, audio tapes, news, announcements, comprehend and respond independently. Listen, comprehend only simple text such as short passages, poems, riddles, rules of games and stories and express coherently in their own words with proper pronunciation, stress, pause and intonation. Conduct role plays, interviews with familiar groups, narrates incidents giving details in sequential order. Appreciate verbally the visual descriptions such as posters, cartoons, hoardings, advertisements and respond to them in their own words.</td>
</tr>
<tr>
<td>Reading Aloud</td>
<td>Read aloud familiar text with proper pronunciation, stress and pause, appropriate speed with analytical comprehension. Consult dictionary to find meaning of unfamiliar words.</td>
</tr>
<tr>
<td>Silent Reading</td>
<td>Read text and comprehend the details of main idea and infer logical conclusions. Read, locate central idea and infer logical conclusions based on comprehension.</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>Have adequate active vocabulary and apply them in new situations.</td>
</tr>
<tr>
<td>Writing</td>
<td>Write a paragraph on a given topic/own experience with verbal/visual cues using correct diction and grammatical accuracy. Write descriptions, informal letters, poems, riddles in a coherent manner.</td>
</tr>
</tbody>
</table>

**Table G-7: Specific Performance Level Descriptors for Language, Class V: Basic**

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listening and Speaking</td>
<td>Listen to oral questions, audio tapes, news, announcements, comprehend and respond with some external support. Listen, comprehend only familiar text such as short passages, poems, riddles, rules of games and stories and manage to express in their own words. Participate in role plays, interviews with familiar groups with the peer support, participate in narrating activities with the peer group. Respond verbally to the visual descriptions such as posters, cartoons, hoardings, advertisements with the peer support.</td>
</tr>
<tr>
<td>Reading Aloud</td>
<td>Read aloud familiar text with proper pronunciation, stress and pause with less speed and literal comprehension. Consult dictionary to find reinforce the meaning of familiar words with the help of peer support.</td>
</tr>
<tr>
<td>Silent Reading</td>
<td>Read familiar text and comprehend the details of main idea and infer logical conclusions based on literal comprehension. Read and locate central idea of the text.</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>Familiar with at least 250 words in active vocabulary but unable to use in day to day expression in sentences.</td>
</tr>
<tr>
<td>Writing</td>
<td>Write a paragraph on a given topic with verbal /visual cues and peer support. Write only short stories and descriptions, informal letters in a coherent manner.</td>
</tr>
</tbody>
</table>
Table G-8: Specific Performance Level Descriptors for Language, Class V: Below Basic

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listening and Speaking</td>
<td>Unable to comprehend and respond to simple oral questions. Listen but unable to comprehend even familiar text such as short passages, poems, riddles, games and stories and express in their own words. Find difficult to conduct interviews with familiar groups even with the peer support, unable to narrate activities with the peer group support. Unable to respond verbally to the visual descriptions even with the teacher / peer support.</td>
</tr>
<tr>
<td>Reading Aloud</td>
<td>Unable to read aloud familiar text with proper pronunciation, stress and pause with less speed and literal comprehension. Unable to consult dictionary to find the meaning of familiar words even with the help of teacher support.</td>
</tr>
<tr>
<td>Silent Reading</td>
<td>Unable to read familiar text and comprehend. Unable to read and locate central idea of the text.</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>Unable to be familiar with at least 250 words in active vocabulary and use in day to day expression in sentences.</td>
</tr>
<tr>
<td>Writing</td>
<td>Unable to write a paragraph on a given topic. Unable to write short stories and descriptions.</td>
</tr>
</tbody>
</table>
**Specific Performance Level Descriptors for Language, Class VIII: Advanced, Proficient, Basic and Below Basic**

**Table G-9: Specific Performance Level Descriptors for Language, Class VIII: Advanced**

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Listening and Responding (Oral and Written)</strong></td>
<td>Listen to news, announcements, speeches, debates, discussions, running commentaries, comprehend and analyze critically and respond independently with clarity of expression using creative thinking. Conduct interviews with people of various professions using various language elements like polite expressions, offers, requests. Narrate incidents, recite poems, practice dialogues, make announcements, compere for school programmers using proper pronunciation, stress, intonation and voice modulation. Appreciate verbally the print text such as stories, anecdotes, travelogue, biography advertisements along with drawing logical inferences.</td>
</tr>
<tr>
<td><strong>Reading</strong></td>
<td>Read familiar and unfamiliar text such as supplementary reader, story books, science fiction, biography with appropriate speed with critical comprehension. Consult dictionary, thesaurus, encyclopedia to find meaning of unfamiliar words, phrases and other information across curriculum. Read, analyze and infer logical details based on comprehension and reflect on the text material such as stories, articles, editorials, sports articles, advertisements, etc.</td>
</tr>
<tr>
<td><strong>Vocabulary</strong></td>
<td>Familiar with at least 1000 words in active vocabulary and able to use in day to day expression in sentences.</td>
</tr>
<tr>
<td><strong>Writing</strong></td>
<td>Write a paragraph, character sketch of a story/play, write ups using online and offline resources on a given topic/own experience, with appropriate diction, grammatical accuracy and with creative expression and extrapolation. Write descriptions, short stories, formal/ informal letters, script, poems, book review with creative expression.</td>
</tr>
</tbody>
</table>
### Table G-10: Specific Performance Level Descriptors for Language, Class VIII: Proficient

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
</table>
| **Listening and Responding (Oral and Written)** | - Listen to news, announcements, comprehend and respond independently, listen to debates, discussions and involve actively in them.  
  - Conduct interviews with familiar groups, narrates incidents /descriptions giving details in sequential order.  
  - Narrate incidents; recite poems using proper pronunciation and voice modulation. Appreciate verbally the authentic text such as stories, anecdotes, advertisements and respond to them in their own words. |
| **Reading**                                     | - Read text with appropriate speed with analytical comprehension and reflection. Consult dictionary, Encyclopedia, thesaurus to find meaning of unfamiliar words, phrases and other information across curriculum.  
  - Read, locate central idea and infer logical conclusions based on comprehension and give critical appreciation. |
| **Vocabulary**                                  | Have rich active vocabulary and apply them in new situations.                                                                                                                                                                          |
| **Writing**                                     | - Write a paragraph, character sketch of a story/play using offline resources on a given topic/own experience with appropriate diction, grammatical accuracy.  
  - Write short stories, formal/ informal letters, descriptions in a coherent manner.                                                                                                                                                   |

### Table G-11: Specific Performance Level Descriptors for Language, Class VIII: Basic

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
</table>
| **Listening and Responding (Oral and Written)** | - Listen to news and announcements, comprehend and respond with some external support.  
  - Conduct interviews with familiar groups with the peer support, participate in narrating activities with the peer group.  
  - Narrate incidents, recite poems using proper pronunciation and voice modulation with repeated practice.  
  - Respond verbally to the print text such as stories, anecdotes, advertisements with the peer support. |
| **Reading**                                     | - Read familiar text with less speed and literal comprehension with peer group support. Consult dictionary to find the meaning of unfamiliar words with the help of peer support.  
  - Read and locate central idea of the unfamiliar text.                                                                                                                                                                             |
| **Vocabulary**                                  | Familiar with at least 700 words in active vocabulary but unable to use in day to day expression in sentences.                                                                                                                                                                      |
| **Writing**                                     | - Write a paragraph, character sketch of a story/play on a given topic with appropriate grammatical accuracy with peer group and teacher support.  
  - Write only descriptions, short stories, informal letters in a coherent manner.                                                                                                                                                  |
Table G-12: **Specific Performance Level Descriptors for Language, Class VIII: Below Basic**

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listening and Responding (Oral and Written)</td>
<td>Listen to news and announcements but unable to comprehend and respond to those audio deliveries. Find difficult to conduct interviews with familiar groups even with the peer support, unable to narrate activities with the peer group support. Unable to narrate incidents, recite poems even with repeated practice. Unable to respond verbally to the print text even with the teacher / peer support.</td>
</tr>
<tr>
<td>Reading</td>
<td>Unable to read familiar text even with less speed and literal comprehension even with peer group support. Unable to consult dictionary to find the meaning of unfamiliar words even with the help of teacher support. Unable to read and locate central idea of the unfamiliar text.</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>Unable to be familiar with at least 700 words in active vocabulary and use in day to day expression in sentences.</td>
</tr>
<tr>
<td>Writing</td>
<td>Unable to write a paragraph, character sketch of a story/play on a given topic. Unable to write descriptions, short stories and informal letters.</td>
</tr>
</tbody>
</table>

**Specific Performance Level Descriptors for Mathematics, Class III: Advanced, Proficient, Basic and Below Basic**

Table G-13: **Specific Performance Level Descriptors for Mathematics, Class III: Advanced**

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptual Understanding and Procedural Knowledge</td>
<td>Can expand &amp; write beyond three digit numbers in expanded form. Can read &amp; write Numbers beyond three digit. Can find before, and after numbers, in addition to missing numbers between two numbers beyond three digit. Can construct the multiplication tables 2 to 10. Division by algorithm. Identifying the chronological order of days/dates in a week/month.</td>
</tr>
<tr>
<td>Mathematical Visualization and Communication</td>
<td>Arrange, analyze and group the data in particular order to draw conclusion. Can use &lt;, &gt; &amp; = to compare numbers.</td>
</tr>
<tr>
<td>Mathematical Reasoning</td>
<td>Can represent the data in the pictorial form. Identifying the magic square … in the Calendar.</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>Can solve complex problems related to all four fundamental operations such as addition, subtraction, Multiplication and Division correctly. Can solve problems related to additions vertically &amp; horizontally for any number of digits.</td>
</tr>
<tr>
<td>Application</td>
<td>Can apply 4 fundamental operations on three digit in their daily life situations. Analyze &amp; arrange the data to draw conclusion. Identifying the magic square … in the Calendar. Sequences the events chronologically.</td>
</tr>
</tbody>
</table>
### Table G-14: Specific Performance Level Descriptors for Mathematics, Class III: Proficient

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
</table>
| Conceptual Understanding and Procedural Knowledge | - Can expand three digit number in the expanded form.  
- Can explain place value & face value of a digit in the given number.  
- Can read & write directly three digit number.  
- Can find before, and after numbers, in addition to missing numbers between two numbers up to three digit.  
- Can multiply two digit by single digit.  
- Division by repeated subtraction.  
- Duration of days & time concerned. |
| Mathematical Visualization and Communication    | - Can record data using tally marks and can tabulate the data.  
- Identify the smaller and greater number up to three digit numbers.  
- Identify and write in correct form of date, month & year. |
| Mathematical Reasoning                          | - Interpret the data.  
- Identifying the magical relations in numbers in a calendar. |
| Problem Solving                                 | - Can solve problems related to four fundamental operations to their Grade.  
- Can solve problems related to additions vertically & horizontally. |
| Application                                      | - Can apply Addition, subtraction & multiplication on three digit in their daily life situations.  
- Arrange the collected data.  
- Identifying the magical relations in numbers in a calendar.  
- Sequences the events chronologically. |

### Table G-15: Specific Performance Level Descriptors for Mathematics, Class III: Basic

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
</table>
| Conceptual Understanding and Procedural Knowledge | - Can read & write 3 digit numbers by counting objects in hundreds, tens & ones.  
- Can round the given numbers in 10s and 100s.  
- Grouping pictures to get number.  
- Can find before and after numbers up to three digit.  
- Can construct the multiplication tables 2 to 10 by repeated addition.  
- Division by grouping pictures.  
- Reads a calendar to find a particular day and date. |
| Mathematical Visualization and Communication    | Collection of the data for tabulating such using tally marks.  
- Identify the smaller and greater number up to two digit numbers. |
| Mathematical Reasoning                          | Collecting tally marks (By Grouping).  
- Reads a calendar to find a particular day/date. |
| Problem Solving                                 | Can solve problems related to fundamental operations such as +, - and some to extent x & ÷ to two digit numbers.  
- Can solve problems related to additions vertically & horizontally of two-digit numbers.  
- Can solve addition, subtraction problems in different situations presented through the pictures and stories. |
| Application                                      | Can apply addition & subtraction on two digit in their daily life situations.  
- Record the data in tabular form.  
- Reads a calendar to find a particular day/date. |
### Table G-16: Specific Performance Level Descriptors for Mathematics, Class III: Below Basic

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptual Understanding and Procedural Knowledge</td>
<td>Unable to read &amp; write 3 digit numbers by counting objects in hundreds, tens &amp; ones.</td>
</tr>
<tr>
<td></td>
<td>Unable to round the given numbers in 10s and 100s.</td>
</tr>
<tr>
<td></td>
<td>Unable to find before and after numbers up to three digit.</td>
</tr>
<tr>
<td></td>
<td>Unable to construct the multiplication tables 2 to 10 by repeated addition.</td>
</tr>
<tr>
<td></td>
<td>Unable to read calendar to find a particular day and date.</td>
</tr>
<tr>
<td>Mathematical Visualization and Communication</td>
<td>Unable to collect the data for tabulating such using tally marks.</td>
</tr>
<tr>
<td></td>
<td>Unable to identify the smaller and greater number up to two digit numbers.</td>
</tr>
<tr>
<td>Mathematical Reasoning</td>
<td>Unable to collect tally marks (By Grouping).</td>
</tr>
<tr>
<td></td>
<td>Unable to read a calendar to find a particular day/date.</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>Unable to solve problems related to fundamental operations such as +, - and some to extent x &amp; ÷ to two digited numbers.</td>
</tr>
<tr>
<td></td>
<td>Unable to solve problems related to additions vertically &amp; horizontally of two-digit numbers.</td>
</tr>
<tr>
<td></td>
<td>Unable to solve addition, subtraction problems in different situations presented through the pictures and stories.</td>
</tr>
<tr>
<td>Application</td>
<td>Unable to find time from clock.</td>
</tr>
</tbody>
</table>

### Table G-17: Specific Performance Level Descriptors for Mathematics, Class V: Advanced

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptual Understanding and Procedural Knowledge</td>
<td>Fractions and Decimal fractions: Approximation of the area of irregular geometrical shapes using grid paper by counting squares and their fraction part.</td>
</tr>
<tr>
<td></td>
<td>Draws and traces the acute, right and obtuse angles. Shapes: Makes cube, cuboids', cylinder, and cone using nets.</td>
</tr>
<tr>
<td></td>
<td>Estimates the length, weights, and volume (capacity) and verifies using standard units. Make conclusions and make predictions based on the trends of the data.</td>
</tr>
<tr>
<td></td>
<td>Solves word problems related to four fundamental operations.</td>
</tr>
<tr>
<td>Mathematical Visualization and Communication</td>
<td>Estimates the results by performing four operations using different strategies and verifies with standard algorithm. Generates triangular numbers and square numbers and makes an attempt to explore other number patterns.</td>
</tr>
<tr>
<td>Mathematical Reasoning</td>
<td>Explore the principles behind Square and triangular numbers.</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>Generates the different numbers from the given digits (More than four digits) and makes series of numbers; then arranges in ascending and descending order. Can use different operations, depend upon the context and solves the problems in multiple ways.</td>
</tr>
<tr>
<td>Application</td>
<td>Fractions and Decimal fractions: compares and then Quantifies the things around him using the concept of fraction towards accuracy. Angles and Shapes: Observes the different shapes in the immediate surroundings and explores the different angles hidden in them.</td>
</tr>
</tbody>
</table>
Table G-18: **Specific Performance Level Descriptors for Mathematics, Class V: Proficient**

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptual Understanding and Procedural Knowledge</td>
<td>Reads and writes numbers bigger than four digit numbers. Compares the numbers by interchanging the digits. Identifies and generates equivalent fractions and represents in pictorial form. Studies the characteristics of different shapes like edges, angles, faces, vertices, its moment (rolling/static). Explores the shapes of 2-D having characteristics like rotation, reflection, symmetry characteristics such as alphabets, numerals, drawings and shapes. Estimates and verifies by measuring the length, weight, volume in non-standard units. Interprets the data and graphs and make conclusions. Performs addition and subtraction of more than 4-digit numbers. Multiplication and division of more than four digit numbers with at least 2-digit numbers. The above operations have to be done with reasonable speed and accuracy.</td>
</tr>
<tr>
<td>Mathematical Visualization and Communication</td>
<td>Draws and traces the acute, right and obtuse angles. Shapes: Makes cube, cuboids', cylinder, and cone using nets.</td>
</tr>
<tr>
<td>Mathematical Reasoning</td>
<td>Identifies triangular and square numbers.</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>Uses the number more than four digits in census, banking transaction, economic statistics etc. Can identify the numbers and identify the different relations and select the apt operation to solve the problem.</td>
</tr>
<tr>
<td>Application</td>
<td>Fractions and Decimal fractions: Extends the idea of fractions in different contexts like lengths, area, volume, weights, currency. Decimal Fraction: Applies the concept of decimal fractions for conversions of different units of measures. Measurements: Applies four fundamental operations in solving problems involving length, mass, capacity, time intervals and money.</td>
</tr>
</tbody>
</table>
### Table G-19: Specific Performance Level Descriptors for Mathematics, Class V: Basic

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
</table>
| **Conceptual Understanding and Procedural Knowledge** | Reads and writes 4-digit numbers. Compares the numbers of four digits and arranges in ascending and descending order by using place value.  
Represents equal parts from the whole into fraction form and vice-versa.  
Identifies equivalent fractions. Converts fractions into decimals and vice versa.  
Classifies angles into right angle, acute and obtuse angles. Shapes: Sorting and classifying similar shapes of 2-D and 3-D and naming them.  
Relates different commonly used larger and smaller non-standard and standard units of different measures (length, weight, volume) and their inter-conversion.  
Collects the data related to various daily life situations & classifies in tabular form and represents the data in bar graphs.  
Performs addition and subtraction of 4-digit numbers (with/without carry forward and borrowing). Multiplication and division of 4-digit numbers with at least 2-digit numbers using standard algorithm. |
| **Mathematical Visualization and Communication** | Draws right and obtuse angles and makes cubes, cuboids, cylinder and cone using nets.                                                                                     |
| **Mathematical Reasoning**              | Understand triangular and square numbers                                                                                                                                 |
| **Problem Solving**                     | Can identify the numbers, but fail to identify the different relations and cannot select the apt operation to solve the problem.                                           |

### Table G-20: Specific Performance Level Descriptors for Mathematics, Class V: Below Basic

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
</table>
| **Conceptual Understanding and Procedural Knowledge** | Does not have the knowledge of place value.  
Does not have the number sense and not able to make equal parts.                                                                                     |
| **Mathematical Visualization and Communication** | Unable to draw right and obtuse angles and makes cubes, cuboids, cylinder and cone using nets.                                                                 |
| **Mathematical Reasoning**              | Unable to understand triangular and square numbers                                                                                                                                 |
| **Problem Solving**                     | Unable to number sense and make equal parts.                                                                                                                                 |
| **Application**                         | Unable to apply the concept of decimal fractions for conversations of different units of measures and fundamental operations in solving problems involving length, mass, capacity, time, intervals and money. |
Specific Performance Level Descriptors for Mathematics, Class VIII: Advanced, Proficient, Basic and Below Basic

### Table G-21: Specific Performance Level Descriptors for Mathematics, Class VIII: Advanced

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptual Understanding and Procedural Knowledge</td>
<td>Applies properties of rational numbers in real life situations.</td>
</tr>
<tr>
<td>Mathematical Visualization and Communication</td>
<td>Use and able to justify the mathematical terms (simple &amp; compound interest, profit loss, Percentage of students and proportions), geometrical shapes in communication and represents in the form of graphs and symbols.</td>
</tr>
<tr>
<td>Mathematical Reasoning</td>
<td>Applies multiple reasoning methods to solve complex problems based on algebra, geometry and mensuration.</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>Able to solve equations reducible to linear forms. Able to solve complex real life problems. Able to solve difficult problems based on direct and indirect proportions related to real life situations.</td>
</tr>
<tr>
<td>Application</td>
<td>Able to find mean, median and mode of ungrouped data and understand its appropriateness. Able to solve word problems based on algebraic expressions. Able to perform and justify alternate solution, models, verification of algebraic expressions, derivation of formulas using different activities. They are able to correlate theoretical knowledge with activities.</td>
</tr>
</tbody>
</table>

### Table G-22: Specific Performance Level Descriptors for Mathematics, Class VIII: Proficient

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptual Understanding and Procedural Knowledge</td>
<td>Derives properties of rational numbers.</td>
</tr>
<tr>
<td>Mathematical Visualization and Communication</td>
<td>Identifies and uses the mathematical terms (simple &amp; compound interest, profit loss, Percentage of students and proportions), geometrical shapes in communication and represents in the form of graphs and symbols.</td>
</tr>
<tr>
<td>Mathematical Reasoning</td>
<td>Applies multiple reasoning methods to solve complex problems based on algebra, geometry and mensuration.</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>Able to solve linear equations having variables on both sides. Able to solve word problems. Able to solve easy problems based on direct proportions.</td>
</tr>
<tr>
<td>Application</td>
<td>Able to find mean, median and mode of ungrouped large data. Able to deal with all four operations (addition, subtraction, multiplication and division) on algebraic expressions. Able to understand and perform alternate solution, verification of algebraic expressions, derivation of formulas using activity methods and tools.</td>
</tr>
</tbody>
</table>
### Table G-23: Specific Performance Level Descriptors for Mathematics, Class VIII: Basic

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptual Understanding and Procedural Knowledge</td>
<td>Understands basic operations on rational numbers.</td>
</tr>
<tr>
<td>Mathematical Visualization and Communication</td>
<td>Identifies the basic mathematical terms (profit, loss, Percentage of students and proportions), geometrical shapes in communication.</td>
</tr>
<tr>
<td>Mathematical Reasoning</td>
<td>Applies reasoning method to solve simple problems based on algebra, geometry and mensuration.</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>Able to solve simple linear equations. May also solve easy problems based on direct proportions.</td>
</tr>
<tr>
<td>Application</td>
<td>Able to find mean, median and mode of simple ungrouped data. Able to add and subtract simple algebraic expressions. Able to understand alternate solution and derivation of formulas using activity methods and tools.</td>
</tr>
</tbody>
</table>

### Table G-24: Specific Performance Level Descriptors for Mathematics, Class VIII: Below Basic

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptual Understanding and Procedural Knowledge</td>
<td>Finds difficulty in understanding rational Numbers.</td>
</tr>
<tr>
<td>Mathematical Visualization and Communication</td>
<td>Finds difficulty in identifying basic mathematical terms.</td>
</tr>
<tr>
<td>Mathematical Reasoning</td>
<td>Not able to specify reason even for simple problems.</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>Not able to solve simple linear equations.</td>
</tr>
<tr>
<td>Application</td>
<td>Faces difficulty in finding mean of very simple and small sized ungrouped data. Able to add and subtract simple algebraic expressions with the constant help of teacher. Not able to understand the equivalence between theory and activity. They fear to deal with tools.</td>
</tr>
</tbody>
</table>
### Specific Performance Level Descriptors for Environmental Studies, Class III: Advanced, Proficient, Basic and Below Basic

#### Table G-25: Specific Performance Level Descriptors for Environmental Studies, Class III: Advanced

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify, Recognize, distinguish, Classify (Symbols, diagrams, visuals etc.)</td>
<td>Identifies and describe parts of plants. Identify Claws and beaks of birds. Identifies complex relationship. Describe and identifies component of food. Differentiate types of family (Nuclear, large and joint). Need of food for different age-group/ web of life. Classify conservation/harvesting of water. Understand the process of simple purification eg. (boiling filtering).</td>
</tr>
<tr>
<td>Describe, Explain, Discuss.</td>
<td>Connect experiences of the child with the daily life/culture.</td>
</tr>
<tr>
<td>Relate process and phenomenon, establish cause and relationships.</td>
<td>Understand the process of sowing of crops according to season.</td>
</tr>
<tr>
<td>Demonstrate. Illustrate, Design, Simple experiments, perform investigations, Construct simple models, draw and label diagrams, flowcharts etc.</td>
<td>Conduct experiment on germination and record the process. Records the different features of plant animals seasons and occupation. Understand the measurement of water. Identify wet/ dry, hard/soft touch, primary and secondary colors.</td>
</tr>
<tr>
<td>Interpret information, graphs, charts etc, pose questions, express opinions, measures and calculates physical quantities.</td>
<td>Identify different type of houses according to different climate.</td>
</tr>
<tr>
<td>Analyze, evaluate draw conclusions, generalize, justify.</td>
<td>Comprehend analytically understand water cycle.</td>
</tr>
<tr>
<td>Find solutions to daily life problems, apply scientific concepts knowledge to daily life.</td>
<td>Draw and paste objects related to present and past.(Cloth, vessels, games played, communications. Distinguish between good and bad habits.</td>
</tr>
<tr>
<td>Respect for human dignity, rights, gender, human values, concern for life, including the environmental concerns.</td>
<td>Voices opinion on good and bad touch.</td>
</tr>
</tbody>
</table>
### Table G-26: Specific Performance Level Descriptors for Environmental Studies, Class III: Proficient

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
</table>
| Identify, Recognize, distinguish, Classify (Symbols, diagrams, visuals etc.) | Identifies the places and eating habits of animal, birds and human being.  
Differentiate the sound of birds and animals.  
Describe roles of family members, family influences and need for living together.  
Identifies types of food.  
Share the names of sources of water.                                                                                                                                                   |
| Describe, Explain, Discuss.                                                 | Express the names of sound and co-relation with animals and differentiate animals with their sizes and movements.                                                                                                                                 |
| Relate process and phenomenon, establish cause and relationships.           | Uses of plants, cycle of seasons, leaving habits of human being.                                                                                                                                                                    |
| Demonstrate. Illustrate, Design, Simple experiments, perform investigations, Construct simple models, draw and label diagrams, flowcharts etc. | Classify the seeds and leaves, occupations, seasons, plants, animals etc.  
 Measures the quantity of water and liquids with simple objects.  
Classify plants/ animals based on their feature.  
Collect the materials and record the observations.                                                                                                                                       |
| Interpret information, graphs, charts etc, pose questions, express opinions, measures and calculates physical quantities. | Differentiate between home and house.  
Describe the parts of houses.  
Draw the picture of house.                                                                                                                                                                     |
| Analyze, evaluate draw conclusions, generalize, justify.                  | Identify the reasons for scarcity of water.  
Draw a picture of seasons, food, plant and trees.                                                                                                                                                                                     |
| Find solutions to daily life problems, apply scientific concepts knowledge to daily life. | Differentiate between objects and activities of present and past.  
Cleanliness of its surrounding.                                                                                                                                                                                                               |
| Respect for human dignity, rights, gender, human values, concern for life, including the environmental concerns. | Sensitize about protection of plants, birds, animals and human beings.  
Sensitize about good and bad touch.  
Respect for elderly, differently abled and diverse family.                                                                                                                                |
### Table G-27: Specific Performance Level Descriptors for Environmental Studies, Class III: Basic

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify, Recognize, distinguish, Classify (Symbols, diagrams, visuals etc.)</td>
<td>Identify and describe part of plants. Child will observe and identify simple features of birds, plants and animals. Identify relationship with and among family members voices opinion on general food habits. Aware about need and uses of water. Differentiate between plants-trees/birds-animals/ family and friends. Aware about personal hygiene. Differentiate between plants, trees, birds, animals, families and friends. Identify dry/wet, hard/soft, touch primary and secondary colours.</td>
</tr>
<tr>
<td>Describe, Explain, Discuss.</td>
<td>Produce different sounds of animals/birds, size and movements. Express own ideas and share views in different ways about placed visited/objects.</td>
</tr>
<tr>
<td>Relate process and phenomenon, establish cause and relationships.</td>
<td>Knowledge of plants and types of seasons.</td>
</tr>
<tr>
<td>Demonstrate. Illustrate, Design, Simple experiments, perform investigations, Construct simple models, draw and label diagrams, flowcharts etc.</td>
<td>Collect the seeds, leaves etc. Collection of pictures of different occupation, seasons, plants, animals etc. Differentiate between plants, trees, birds, animals, families and friends. Identify dry/wet, hard/soft, touch primary and secondary colours.</td>
</tr>
<tr>
<td>Interpret information, graphs, charts etc, pose questions, express opinions, measures and calculates physical quantities.</td>
<td>Aware about family.</td>
</tr>
<tr>
<td>Analyze, evaluate draw conclusions, generalize, justify.</td>
<td>Aware about water and its uses, seasons, types of food, difference between plant and trees and different professions.</td>
</tr>
<tr>
<td>Find solutions to daily life problems, apply scientific concepts knowledge to daily life.</td>
<td>Understand the Sources of cooking food and cooking vessels. Aware about personal hygiene.</td>
</tr>
<tr>
<td>Respect for human dignity, rights, gender, human values, concern for life, including the environmental concerns.</td>
<td>Aware about living things and gender. Classify birds and animal on the basis of habitat and eating habits. Awareness on global warming, bio degradable or non-bio degradable.</td>
</tr>
</tbody>
</table>
### Table G-28: Specific Performance Level Descriptors for Environmental Studies, Class III: Below Basic

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify, Recognize, distinguish, Classify (Symbols, diagrams, visuals etc.)</td>
<td>Unable to identify and describe part of plants. Unable to identify claws and beak of birds. Child will not able to observe and identify simple features of birds, plants and animals. Unable to identify relationship with and among family members voices opinion on general food habits. Not aware about need and uses of water. Not aware about the size of vessels. Unable to differentiate between plants-trees/birds-animals/ family and friends. Not aware about personal hygiene. Not aware about present activities, means of transportation etc.</td>
</tr>
<tr>
<td>Describe, Explain, Discuss.</td>
<td>Unable to Produce different sounds of animals/birds, size and movements. Unable to express own ideas and share views in different ways about placed visited/objects.</td>
</tr>
<tr>
<td>Relate process and phenomenon, establish cause and relationships.</td>
<td>No knowledge of plants and types of seasons.</td>
</tr>
<tr>
<td>Demonstrate, Illustrate, Design, Simple experiments, perform investigations, Construct simple models, draw and label diagrams, flowcharts etc.</td>
<td>Unable to collect the seeds, leaves etc. Unable to collect of pictures of different occupation, seasons, plants, animals etc. Unable to differentiate between plants, trees, birds, animals, families and friends. Unable to identify dry/wet, hard/soft, touch primary and secondary colours.</td>
</tr>
<tr>
<td>Interpret information, graphs, charts etc, pose questions, express opinions, measures and calculates physical quantities.</td>
<td>Not aware about family.</td>
</tr>
<tr>
<td>Analyze, evaluate draw conclusions, generalize, justify.</td>
<td>Not aware about water and its uses, seasons, types of food, difference between plant and trees and different professions.</td>
</tr>
<tr>
<td>Find solutions to daily life problems, apply scientific concepts knowledge to daily life.</td>
<td>Unable to understand the Sources of cooking food and cooking vessels. Aware about personal hygiene.</td>
</tr>
<tr>
<td>Respect for human dignity, rights, gender, human values, concern for life, including the environmental concerns.</td>
<td>Not aware about living things and gender. Unable to classify birds and animal on the basis of habitat and eating habits. No awareness on global warming, bio degradable or non-bio degradable.</td>
</tr>
</tbody>
</table>
## Specific Performance Level Descriptors for Environmental Studies, Class V: Advanced, Proficient, Basic and Below Basic

### Table G-29: Specific Performance Level Descriptors for Environmental Studies, Class V: Advanced

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify, Recognize, distinguish, Classify (Symbols, diagrams, visuals etc.)</td>
<td>Identifies the similarities and differences- signs, directions, location of different places and applies its in daily life. Classifies and compares the objects, materials and living organisms as per their features and properties such as taste, size, shapes, color, traits and landforms. Explain as well as Correlates the concepts and logical information from various themes- types of terrain, climate, resources and cultural life. Compares and justifies the need and importance of saving natural resources- water, fuel, food. Establishes the relation between cause and effects- urbanization, population. Critically explains the interdependence between various organisms of environment animal, plants and humans. Identifies the similarities and differences- signs, directions, location of different places and applies its in daily life. Classifies and compares the objects, materials and living organisms as per their features and properties such as taste, size, shapes, color, traits and landforms. Sources of sound.</td>
</tr>
<tr>
<td>Describe, Explain, Discuss.</td>
<td>Observes and narrates various elements from immediate surroundings in details- germination, evaporation, floating, sinking. Is able to read pictures, collect information and narrate it. Understand various changes in environment in daily life. Records the experiences and information in the form of tables and diagrams. Explain as well as Correlates the concepts and logical information from various themes- types of terrain, climate, resources and cultural life. Compares and justifies the need and importance of saving natural resources- water, fuel, food. Establishes the relation between cause and effects- urbanization, population. Critically explains the interdependence between various organisms of environment animal, plants and humans.</td>
</tr>
<tr>
<td>Relate process and phenomenon, establish cause and relationships.</td>
<td>Makes an effort to find out the reasons- migration of families, different food habits. Scientific phenomenon- breathing process, spoilage of foods, germination of seeds.</td>
</tr>
<tr>
<td>Demonstrate. Illustrate, Design, Simple experiments, perform investigations, Construct simple models, draw and label diagrams, flowcharts etc.</td>
<td>Develop skills through the interaction with the natural and social environment- waste management, health &amp; hygiene. Explore ways and means for environment cause. Performs experiments and make models, charts as instructed, can accurately label diagrams, charts.</td>
</tr>
<tr>
<td>Interpret information, graphs, charts etc, pose questions, express opinions, measures and calculates physical quantities.</td>
<td>Records the experiences and information in the form of tables, diagrams and graphs and interprets the results. Able to read map of India and Can locate places- states of India and tell directions.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Analyze, evaluate draw conclusions, generalize, justify.</td>
<td>Analyse and justify causes of situation/ events – Earthquake, need for conservation of resources. Make assumptions and inferences – distance, area, volume, weight length and time. Concerned about environmental issues. Sensitive towards the needs of saving resources like water and non-renewable sources of energy like petrol. Make assumptions and inferences – distance, area, volume, weight length and time.</td>
</tr>
<tr>
<td>Find solutions to daily life problems, apply scientific concepts knowledge to daily life.</td>
<td>Can lead a group if given responsibility. Share things. Understand dignity of labor. Works in team. Understands importance of social values. Is aware of the role and function of different institutions- Bank, Panchayat, Police station etc and applies information in daily life.</td>
</tr>
<tr>
<td>Respect for human dignity, rights, gender, human values, concern for life, including the environmental concerns.</td>
<td>Concerned about environmental issues. Sensitive towards the needs of saving resources like water and non-renewable sources of energy like petrol- health hygiene, managing waste, disaster/ emergency situation and Voices opinion on issues observed/ experienced.</td>
</tr>
</tbody>
</table>
### Table G-30: Specific Performance Level Descriptors for Environmental Studies, Class V: Proficient

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify, Recognize, distinguish, Classify (Symbols, diagrams, visuals etc.)</td>
<td>Identify the similarities and differences—signs, directions, location of different places. Classifies Objects, materials and living organisms as per their features and properties such as taste, size, shapes, color, traits and landforms. Explains the interdependence between various organisms of environment animals, plants and humans.</td>
</tr>
<tr>
<td>Describe, Explain, Discuss.</td>
<td>Observe various elements from immediate surrounding—germination, evaporation, floating, sinking. Is able to read pictures and collect information. Has knowledge about the changes in environment. Records the experiences and information in the form of tables and diagrams to some extent. Explains the given concepts and information from various themes—terrain, climate, resources and cultural life. Understand the need and importance of natural resources—water, fuel, food. Has complete information about the phenomenon—urbanization. Explains the interdependence between various organisms of environment animals, plants and humans.</td>
</tr>
<tr>
<td>Relate process and phenomenon, establish cause and relationships.</td>
<td>Makes an effort to find out the reasons with the motivation of teacher—migration of families, different food habits. Understand the interaction between natural and social environment waste management, health and hygiene. Scientific phenomenon—breathing process, spoilage of foods, germination of seeds.</td>
</tr>
<tr>
<td>Demonstrate. Illustrate, Design, Simple experiments, perform investigations, Construct simple models, draw and label diagrams, flowcharts etc.</td>
<td>Performs simple experiments and make simple models, draw diagrams, charts label it, make posters.</td>
</tr>
<tr>
<td>Interpret information, graphs, charts etc, pose questions, express opinions, measures and calculates physical quantities.</td>
<td>Records the experiences and information in the form of tables and diagrams. Read maps—states of India.</td>
</tr>
<tr>
<td>Analyze, evaluate draw conclusions, generalize, justify.</td>
<td>Understands environmental issues and needs of saving resources like water and non renewable resources of energy. Identify possible causes of situation/events—Earthquake, need for conservation of resources. Identify the spatial quantities and qualities—distance, area, volume, weight and time.</td>
</tr>
<tr>
<td>Respect for human dignity, rights, gender, human values, concern for life, including the environmental concerns.</td>
<td>Suggest ways for environmental issues and needs of saving resources like water and non renewable resources of energy, hygiene health, managing waste, disaster/emergency situation.</td>
</tr>
<tr>
<td>Competency</td>
<td>Specific Performance Level Descriptors</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Identify, Recognize, distinguish, Classify (Symbols, diagrams, visuals etc.)</td>
<td>Identifies the objects, materials organisms as per their features and properties such as taste, size, shapes, color, traits and landforms. Has knowledge but lacks observation. Has some knowledge about environmental changes.</td>
</tr>
<tr>
<td>Describe, Explain, Discuss.</td>
<td>Has information about the concepts and various themes- terrain, climates, natural resources and cultural life. Has knowledge about the natural resources. Has some information about the phenomenon.</td>
</tr>
<tr>
<td>Relate process and phenomenon, establish cause and relationships.</td>
<td>Less curious to find out the reasons of a scientific phenomenon. Is able to understand interdependence between various organisms of environment –animals and plants and humans.</td>
</tr>
<tr>
<td>Demonstrate. Illustrate, Design, Simple experiments, perform investigations, Construct simple models, draw and label diagrams, flowcharts etc.</td>
<td>Performs simple experiments, with the help of teacher. Draws diagrams but cannot label.</td>
</tr>
<tr>
<td>Interpret information, graphs, charts etc, pose questions, express opinions, measures and calculates physical quantities.</td>
<td>Makes an effort to record the experiences and information in the form of tables and diagrams. Read maps – states of India.</td>
</tr>
<tr>
<td>Analyze, evaluate draw conclusions, generalize, justify.</td>
<td>Understanding of environmental issues. Guesses the spatial quantities and qualities – distance, area, volume, weight and time.</td>
</tr>
<tr>
<td>Find solutions to daily life problems, apply scientific concepts knowledge to daily life.</td>
<td>Cannot apply the information about institutions in daily life.</td>
</tr>
<tr>
<td>Respect for human dignity, rights, gender, human values, concern for life, including the environmental concerns.</td>
<td>Understanding of environmental issues, health and hygiene, disaster situations human dignity, rights and gender- conservation of resources, festival of India, life in distant/ difficult areas like hot/ cold deserts.</td>
</tr>
</tbody>
</table>
Table G-32: Specific Performance Level Descriptors for Environmental Studies, Class V: Below Basic

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify, Recognize, distinguish, Classify (Symbols, diagrams, visuals etc.)</td>
<td>Unable to identify the objects, materials organisms as per their features and properties such as taste, size, shapes, color, traits and landforms. Has knowledge but lacks observation. Has some knowledge about environmental changes.</td>
</tr>
<tr>
<td>Describe, Explain, Discuss.</td>
<td>Does not have information about the concepts and various themes-terrain, climates, natural resources and cultural life. Has no knowledge about the natural resources. Has no information about the phenomenon.</td>
</tr>
<tr>
<td>Relate process and phenomenon, establish cause and relationships.</td>
<td>Not curious to find out the reasons of a scientific phenomenon. Is unable to understand interdependence between various organisms of environment –animals and plants and humans.</td>
</tr>
<tr>
<td>Demonstrate. Illustrate, Design, Simple experiments, perform investigations, Construct simple models, draw and label diagrams, flowcharts etc.</td>
<td>Unable to perform simple experiments, with the help of teacher. Draws diagrams but cannot label.</td>
</tr>
<tr>
<td>Interpret information, graphs, charts etc, pose questions, express opinions, measures and calculates physical quantities.</td>
<td>Unable to record the experiences and information in the form of tables and diagrams. Read maps – states of India with effort.</td>
</tr>
<tr>
<td>Analyze, evaluate draw conclusions, generalize, justify.</td>
<td>No understanding of environmental issues. Not guesses the spatial quantities and qualities – distance, area, volume, weight and time.</td>
</tr>
<tr>
<td>Find solutions to daily life problems, apply scientific concepts knowledge to daily life.</td>
<td>Cannot apply the information about institutions in daily life.</td>
</tr>
<tr>
<td>Respect for human dignity, rights, gender, human values, concern for life, including the environmental concerns.</td>
<td>No understanding of environmental issues, health and hygiene, disaster situations human dignity, rights and gender- conservation of resources, festival of India, life in distant/difficult areas like hot/cold deserts.</td>
</tr>
</tbody>
</table>
Specific Performance Level Descriptors for Science, Class VIII: Advanced, Proficient, Basic and Below Basic

Table G-33: Specific Performance Level Descriptors for Science, Class VIII: Advanced

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify, Recognize, distinguish, Classify (Symbols, diagrams, visuals etc.)</td>
<td>Use of microbes in Bio technology</td>
</tr>
<tr>
<td></td>
<td>Phases of the moon, Constellations</td>
</tr>
<tr>
<td></td>
<td>Modern agriculture practices (Green, White revolution)</td>
</tr>
<tr>
<td></td>
<td>Metals and nonmetals – chemical properties and reactions.</td>
</tr>
<tr>
<td></td>
<td>Structure of cell organelles, increase in surface area</td>
</tr>
<tr>
<td></td>
<td>oviparous and viviparous reproduction in plants</td>
</tr>
<tr>
<td></td>
<td>Electrolytic and metallic conductors</td>
</tr>
<tr>
<td></td>
<td>Distinguish different types of sound. Produce different types of sound using the same source</td>
</tr>
<tr>
<td>Describe, Explain, Discuss</td>
<td>Understand virus, reproduction in microbes</td>
</tr>
<tr>
<td>Relate process and phenomenon, establish cause and relationships</td>
<td>Hormone secretion and role of Pituitary gland in other human system and their reactions.</td>
</tr>
<tr>
<td></td>
<td>Refining/distillation and use of by products</td>
</tr>
<tr>
<td></td>
<td>Effects of deforestation - global warming/ greenhouse effect</td>
</tr>
<tr>
<td></td>
<td>Uses advantages and disadvantages of friction in day to day life</td>
</tr>
<tr>
<td></td>
<td>Ionization / Oxidation, reduction and products of electrolysis</td>
</tr>
<tr>
<td>Demonstrate. Illustrate, Design, Simple experiments, perform investigations, construct simple models, draw and label diagrams, flowcharts etc.</td>
<td>Models given in text book</td>
</tr>
<tr>
<td></td>
<td>Model to be made as per raw materials provided.</td>
</tr>
<tr>
<td>Interpret information, graphs, charts etc., pose questions, express opinions, measures and calculates physical quantities</td>
<td>Laws of reflection</td>
</tr>
<tr>
<td></td>
<td>Observation and data collection</td>
</tr>
<tr>
<td></td>
<td>Solving problems related to reflection and refraction</td>
</tr>
<tr>
<td></td>
<td>Drawing and interpretation of graphs</td>
</tr>
<tr>
<td>Analyze, evaluate draw conclusions, generalize, justify</td>
<td>Understands formation of acid rain and effects</td>
</tr>
<tr>
<td>Find solutions to daily life problems, apply scientific concepts knowledge to daily life.</td>
<td>Uses of particular metals and nonmetals in our daily life, electroplating</td>
</tr>
<tr>
<td></td>
<td>Knows what to grow endemic species</td>
</tr>
<tr>
<td></td>
<td>Cloning</td>
</tr>
<tr>
<td></td>
<td>Causes of heating effects/ making of wires/materials which causes heating effect</td>
</tr>
<tr>
<td>Respect for human dignity, rights, gender, human values, concern for life, including the environmental concerns</td>
<td>Afforestation</td>
</tr>
<tr>
<td></td>
<td>Simple methods of conservation of flora and fauna</td>
</tr>
</tbody>
</table>
### Table G-34: Specific Performance Level Descriptors for Science, Class VIII: Proficient

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
</table>
| Identify, Recognize, distinguish, Classify (Symbols, diagrams, visuals etc.) | - Micro organisms (bacteria, Fungi, Protozoa, algae and virus as per use and harmfulness.  
- Celestial objects  
- Agriculture practices, Rabi, Kharif crops and natural and Chemical fertilizers.  
- Metals and nonmetals – Physical and Chemical properties.  
- Functions and structure of cell organelles.  
- Embryonic development  
- Materials of conductors and insulators  
- Need for a medium for sound propagation                                                                                                                                 |
| Describe, Explain, Discuss                                                  | - Major groups of microbes and reproduction methods                                                                                                                                                                                   |
| Relate process and phenomenon, establish cause and relationships            | - Puberty, role of hormones and sex determination  
- Uses of petroleum products obtained from distillation  
- Conservation of forests, wild life. Biosphere reserves-its flora and fauna. Wild life sanctuaries, Deforestation, its causes. Effects of deforestation- (soil erosion, desertification)  
- Causes and consequences of friction, Reduce and increase friction  
- Can conduct activity on electrolysis                                                                                                                                                                                               |
| Demonstrate, Illustrate, Design, Simple experiments, perform investigations, construct simple models, draw and label diagrams, flowcharts etc. | - Models to show force exerted by liquids and gases as per knowledge                                                                                                                                                                |
| Interpret information, graphs, charts etc., pose questions, express opinions, measures and calculates physical quantities | - Measure angle of incidence and reflection/refractive index  
- Measure angle of incidence and reflection/refractive index  
- Growth of plants and animals                                                                                                                                                                                                       |
| Analyze, evaluate draw conclusions, generalize, justify                   | - Understands global warming, greenhouse effect                                                                                                                                                                                      |
| Find solutions to daily life problems, apply scientific concepts knowledge to daily life. | - Has knowledge of characteristics /uses of metals and non-metals  
- Protects flora and Fauna  
- Sexual reproduction in plants, pollination  
- Use of conductor and nonconductors/ heating effects and Conductor/ insulators                                                                                                                                                       |
| Respect for human dignity, rights, gender, human values, concern for life, including the environmental concerns | - Consequences of over extraction of coal and petroleum  
- Protects flora and Fauna: save, reuse energy and water, reforestation                                                                                                                                                             |
### Table G-35: Specific Performance Level Descriptors for Science, Class VIII: Basic

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify, Recognize, distinguish, Classify (Symbols, diagrams, visuals etc.)</td>
<td>Microbes as per structure&lt;br&gt;Traditional agricultural methods&lt;br&gt;Metals and nonmetals (Physical properties). Exhaustible and Inexhaustible natural resources&lt;br&gt;Differences between plant and animal cells.&lt;br&gt;Sexual and asexual reproduction&lt;br&gt;Conduction/ bad conductor electricity&lt;br&gt;Sources of sound</td>
</tr>
<tr>
<td>Describe, Explain, Discuss</td>
<td>Information of microbes&lt;br&gt;Electrolysis of simple conducting solutions&lt;br&gt;Laws of reflection&lt;br&gt;Harmful effects of pollutants</td>
</tr>
<tr>
<td>Relate process and phenomenon, establish cause and relationships</td>
<td>Changes in Puberty&lt;br&gt;Formation of Coal and Petroleum and refining of petroleum&lt;br&gt;Deforestation and afforestation&lt;br&gt;Effect of force&lt;br&gt;Knowledge of Electrolysis and electroplating</td>
</tr>
<tr>
<td>Demonstrate, Illustrate, Design, Simple experiments, perform investigations, construct simple models, draw and label diagrams, flowcharts etc.</td>
<td>Models given in text book</td>
</tr>
<tr>
<td>Interpret information, graphs, charts etc., pose questions, express opinions, measures and calculates physical quantities</td>
<td>Solving problems related to reflection and refraction&lt;br&gt;Drawing and interpretation of graphs&lt;br&gt;Laws of reflection&lt;br&gt;Observation and data collection</td>
</tr>
<tr>
<td>Analyze, evaluate draw conclusions, generalize, justify</td>
<td>Conservation of plants and animals&lt;br&gt;Pollution of air and water</td>
</tr>
<tr>
<td>Find solutions to daily life problems, apply scientific concepts knowledge to daily life.</td>
<td>Knowledge of concept</td>
</tr>
<tr>
<td>Respect for human dignity, rights, gender, human values, concern for life, including the environmental concerns</td>
<td>Effects of over mining&lt;br&gt;recycling of biodegradable materials (recycle paper)&lt;br&gt;Afforestation&lt;br&gt;Simple methods of conservation of flora and fauna</td>
</tr>
</tbody>
</table>
### Table G-36: Specific Performance Level Descriptors for Science, Class VIII: Below Basic

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify, Recognize, distinguish, Classify (Symbols, diagrams, visuals etc.)</td>
<td>- Microbes (Fungi and Bacteria) as per structure&lt;br&gt;- Planets&lt;br&gt;- Traditional agricultural methods&lt;br&gt;- Metals and nonmetals (Physical properties).&lt;br&gt;- Plant and animal cells&lt;br&gt;- Definition of conductors and insulator&lt;br&gt;- Sources of sound</td>
</tr>
<tr>
<td>Describe, Explain, Discuss</td>
<td>Information of unicellular organisms</td>
</tr>
<tr>
<td>Relate process and phenomenon, establish cause and relationships</td>
<td>- Definition of Puberty&lt;br&gt;- Formation of fossil fuels&lt;br&gt;- Deforestation and afforestation&lt;br&gt;- Concept of force&lt;br&gt;- Definition of Electrolysis</td>
</tr>
<tr>
<td>Demonstrate, Illustrate, Design, Simple experiments, perform investigations, construct simple models, draw and label diagrams, flowcharts etc.</td>
<td>Models given in specific chapters of text book</td>
</tr>
<tr>
<td>Interpret information, graphs, charts etc., pose questions, express opinions, measures and calculates physical quantities</td>
<td>- Laws of reflection&lt;br&gt;- Data collection skills but lacks interpretation or graph plotting skills.</td>
</tr>
<tr>
<td>Analyze, evaluate draw conclusions, generalize, justify</td>
<td>Basic concept of Pollution</td>
</tr>
<tr>
<td>Find solutions to daily life problems, apply scientific concepts knowledge to daily life.</td>
<td>Lacks knowledge of use of metal and non-metals in daily life</td>
</tr>
<tr>
<td>Respect for human dignity, rights, gender, human values, concern for life, including the environmental concerns</td>
<td>Definition of Afforestation but lacks the knowledge of impact of afforestation on environment.</td>
</tr>
</tbody>
</table>
### Specific Performance Level Descriptors for Social Science, Class VIII: Advanced, Proficient, Basic and Below Basic

**Table G-37: Specific Performance Level Descriptors for Social Science, Class VIII: Advanced**

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map Reading Skills (Identifies &amp; Locates)</td>
<td>Identifies different location on Map of India as well as the capital of neighboring countries</td>
</tr>
<tr>
<td>Classification</td>
<td>Justifies judicious use of natural resources</td>
</tr>
</tbody>
</table>
| Description                         | Describes different major crops and different agricultural practices in a country  
Describes the role of government in regulating economic activities  
Describe the role of government in providing public facilities such as water, sanitation, road, electricity etc. and recognise their availability                                                                                                                                                                                                                     |
| Relate processes and Establish cause & relationship | Relates process of election to parliament, state assembly and local level.  
Establish the cause of forest fire, landslide, industrial disasters and their risk reduction measures with relevant illustrations.                                                                                                                                                                                                                                        |
| Draw Diagram                        | Makes graph using given data and interpret                                                                                                                                                                                                                                                                                                                                                  |
| Distinguish                         | Distinguishes the modern period from the medieval and ancient period using various historical sources with their relation to a particular period or kingdom                                                                                                                                                                                                                                       |
| Explain                             | Explains various historical events and aspects of different periods with illustration                                                                                                                                                                                                                                                                                                           |
| Analyze                             | Analyze emergence of democracy and function of government at all level with examples of other country  
Analyze emergence of democracy and functions of government  
Analyze the causes and consequences of marginalization faced by disadvantaged sections of one's own region                                                                                                                                                                                                                                         |
| Interpret                           | Interprets various Social and Political issues related to caste, women, widow remarriage, child remarriage, social reforms and laws & policies of colonial administration towards these issues.  
Interprets social and political issues in one's own region with reference to the constitution of India                                                                                                                                                                                                                               |
| Problem solving                     | Knowledge about natural calamity, its causes and preventive measures                                                                                                                                                                                                                                                                                                                        |
| Application                         | Knowledge of fundamental rights & duties to find out about their violation, protection, and promotion in a given situation (example child rights)  
Process of making a law e.g. domestic violence act, RTE act, RTI Act.  
Applies how to file a F.I.R                                                                                                                                                                                                                                                                                                  |
### Table G-38: Specific Performance Level Descriptors for Social Science, Class VIII: Proficient

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map Reading Skills (Identifies &amp; Locates)</td>
<td>Identifies districts, states and country location without the help of teacher</td>
</tr>
<tr>
<td>Classification</td>
<td>Classifies the soils, industries and climate</td>
</tr>
</tbody>
</table>
| Description                                     | Describes major crops, types of farming and agricultural practices in the state
Describes the role of government in regulating economic activities
Describe the role of government in providing public facilities such as water, sanitation, road and electricity etc. |
| Relate processes and Establish cause & relationship | Relates process of election to the Lok Sabha and Rajya Sabha
Establish the cause of forest fire, landslide, industrial disasters and their risk reduction measures.                                                                        |
| Draw Diagram                                    | Makes graph using given data                                                                                                                                                                                                            |
| Distinguish                                     | Distinguishes the modern period from the medieval and ancient period using various historical sources such as archaeological and literary                                           |
| Explain                                         | Explains important historical events and aspects of different periods                                                                                                                                                                |
| Analyze                                         | Analyze emergence of democracy and functions of government
Analyze the causes and consequences of marginalization faced by disadvantaged sections of one’s own region                                                                  |
| Interpret                                       | Interprets few important Social and Political issues related to caste, women, widow remarriage, child remarriage, social reforms and laws & policies of colonial administration towards these issues.
Interprets social and political issues in one’s own region with reference to the constitution of India                                                                       |
| Problem solving                                 | Knowledge about natural calamity and its preventive measures                                                                                                                                                                                |
| Application                                     | Knowledge of fundamental rights & duties & raise concern on its violation (example child rights)
Process of making a law e.g domestic violence act, RTE act, RTI Act.                                                                                                             |
<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map Reading Skills (Identifies &amp; Locates)</td>
<td>Identifies own location with the help of teacher</td>
</tr>
<tr>
<td>Classification</td>
<td>Observes and identifies rocks, soils, industries, rivers, season and climate</td>
</tr>
<tr>
<td>Description</td>
<td>Describes major crops of surrounding areas Describes the role of government in economic activities Describe the role of government in providing basic public facilities</td>
</tr>
<tr>
<td>Relate processes and Establish cause &amp; relationship</td>
<td>Relates process of election Establish cause of forest fire, landslide etc.</td>
</tr>
<tr>
<td>Draw Diagram</td>
<td>Reads data</td>
</tr>
<tr>
<td>Distinguish</td>
<td>Distinguishes the modern period from the medieval and ancient period</td>
</tr>
<tr>
<td>Explain</td>
<td>Explains some of the historical events</td>
</tr>
<tr>
<td>Analyse</td>
<td>Analyse democracy and government in simple way</td>
</tr>
<tr>
<td>Interpret</td>
<td>Interprets some of the Social and Political issues related to caste, women, widow remarriage, child remarriage, social reforms and laws &amp; policies of colonial administration towards these issues.</td>
</tr>
<tr>
<td>Problem solving</td>
<td>Knowledge about natural calamity such as earthquake, flood, landslide, cyclone, tsunami etc</td>
</tr>
<tr>
<td>Application</td>
<td>Knowledge of fundamental rights and duties process of making a law</td>
</tr>
</tbody>
</table>
### Table G-40: Specific Performance Level Descriptors for Social Science, Class VIII: Below Basic

<table>
<thead>
<tr>
<th>Competency</th>
<th>Specific Performance Level Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map Reading Skills (Identifies &amp; Locates)</td>
<td>Unable to identify different location on map like state district etc.</td>
</tr>
<tr>
<td>Classification</td>
<td>Unable to observes and identifies natural resources like rocks, soils, industries, rivers, season &amp; climate change.</td>
</tr>
<tr>
<td>Description</td>
<td>Unable to describe major crops of surrounding areas and role of government in economic activities. Unable to describe role of government providing basic facilities.</td>
</tr>
<tr>
<td>Relate processes and Establish cause &amp; relationship</td>
<td>Unable to relate process and establish cause and relationship.</td>
</tr>
<tr>
<td>Draw Diagram</td>
<td>Unable to draw diagram.</td>
</tr>
<tr>
<td>Distinguish</td>
<td>Unable to distinguish the modern period from the medieval and ancient period.</td>
</tr>
<tr>
<td>Explain</td>
<td>Unable to explain historical events.</td>
</tr>
<tr>
<td>Analyse</td>
<td>Analyse democracy and government not proper way.</td>
</tr>
<tr>
<td>Interpret</td>
<td>Interprets some of the social and political issues related to cast, women, widow remarriage, child marriage and unable to interprets social reforms and laws &amp; policies of colonial administrator towards these issues.</td>
</tr>
<tr>
<td>Problem solving</td>
<td>Knowledge about natural calamity such as earthquake, flood, landslide, cyclone, tsunami etc.</td>
</tr>
<tr>
<td>Application</td>
<td>Some knowledge of fundamental rights and duties process of making law.</td>
</tr>
</tbody>
</table>
### Appendix H

**Field Tryout Results, Class III, V and VIII**

#### Table H-1: Field Tryout Result for Class III, EVS

<table>
<thead>
<tr>
<th>Item</th>
<th>Telugu</th>
<th>Tamil</th>
<th>English</th>
<th>Hindi</th>
<th>Bangla</th>
<th>Assamese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item:1</td>
<td>63.42 0.58</td>
<td>28.51 0.01</td>
<td>59.22 0.39</td>
<td>63.16 0.58</td>
<td>53.58 0.39</td>
<td>28.51 0.01</td>
</tr>
<tr>
<td>Item:2</td>
<td>66.67 0.64</td>
<td>77.85 0.25</td>
<td>84.36 0.31</td>
<td>71.69 0.45</td>
<td>57.89 0.25</td>
<td></td>
</tr>
<tr>
<td>Item:3</td>
<td>71.71 0.62</td>
<td>87.06 0.29</td>
<td>29.05 0.39</td>
<td>67.37 0.62</td>
<td>63.80 0.48</td>
<td>29.05 0.29</td>
</tr>
<tr>
<td>Item:4</td>
<td>52.79 0.36</td>
<td>72.15 0.14</td>
<td>74.30 0.41</td>
<td>52.11 0.71</td>
<td>62.84 0.40</td>
<td>52.11 0.14</td>
</tr>
<tr>
<td>Item:5</td>
<td>74.95 0.61</td>
<td>91.01 0.38</td>
<td>85.47 0.29</td>
<td>42.11 0.22</td>
<td>73.39 0.37</td>
<td>42.11 0.22</td>
</tr>
<tr>
<td>Item:6</td>
<td>57.89 0.60</td>
<td>79.14 0.44</td>
<td>33.70 0.31</td>
<td>63.68 0.72</td>
<td>60.84 0.52</td>
<td>33.70 0.31</td>
</tr>
<tr>
<td>Item:7</td>
<td>63.16 0.70</td>
<td>82.82 0.33</td>
<td>76.69 0.50</td>
<td>63.09 0.36</td>
<td>62.99 0.48</td>
<td>23.91 0.35</td>
</tr>
<tr>
<td>Item:8</td>
<td>57.89 0.60</td>
<td>77.85 0.29</td>
<td>29.05 0.39</td>
<td>67.37 0.62</td>
<td>63.80 0.48</td>
<td>29.05 0.29</td>
</tr>
<tr>
<td>Item:9</td>
<td>67.37 0.62</td>
<td>81.60 0.44</td>
<td>54.35 0.24</td>
<td>60.00 0.55</td>
<td>65.83 0.46</td>
<td>54.35 0.24</td>
</tr>
<tr>
<td>Item:10</td>
<td>52.11 0.71</td>
<td>71.17 0.44</td>
<td>68.48 0.36</td>
<td>57.75 0.49</td>
<td>53.78 0.39</td>
<td>28.51 0.01</td>
</tr>
<tr>
<td>Item:11</td>
<td>42.11 0.22</td>
<td>63.19 0.36</td>
<td>54.35 0.47</td>
<td>57.89 0.49</td>
<td>53.78 0.39</td>
<td>28.51 0.01</td>
</tr>
<tr>
<td>Item:12</td>
<td>52.11 0.49</td>
<td>59.51 0.42</td>
<td>59.78 0.26</td>
<td>43.16 0.56</td>
<td>53.64 0.43</td>
<td>43.16 0.26</td>
</tr>
<tr>
<td>Item:13</td>
<td>63.68 0.72</td>
<td>80.98 0.48</td>
<td>71.74 0.42</td>
<td>43.68 0.35</td>
<td>65.02 0.49</td>
<td>43.68 0.35</td>
</tr>
<tr>
<td>Item:14</td>
<td>63.68 0.52</td>
<td>58.90 0.33</td>
<td>70.65 0.28</td>
<td>66.32 0.57</td>
<td>64.89 0.43</td>
<td>58.90 0.28</td>
</tr>
<tr>
<td>Item:15</td>
<td>60.00 0.55</td>
<td>76.69 0.50</td>
<td>52.17 0.52</td>
<td>63.09 0.36</td>
<td>62.99 0.48</td>
<td>52.17 0.36</td>
</tr>
<tr>
<td>Item:16</td>
<td>45.79 0.50</td>
<td>81.21 0.63</td>
<td>34.48 0.26</td>
<td>89.26 0.64</td>
<td>62.69 0.50</td>
<td>34.48 0.26</td>
</tr>
<tr>
<td>Item:17</td>
<td>57.89 0.49</td>
<td>85.91 0.35</td>
<td>22.99 0.34</td>
<td>72.48 0.49</td>
<td>59.82 0.42</td>
<td>22.99 0.34</td>
</tr>
<tr>
<td>Item:18</td>
<td>43.16 0.56</td>
<td>70.47 0.49</td>
<td>56.32 0.34</td>
<td>77.18 0.43</td>
<td>65.78 0.45</td>
<td>43.16 0.34</td>
</tr>
<tr>
<td>Item:19</td>
<td>43.68 0.35</td>
<td>61.74 0.26</td>
<td>25.29 0.36</td>
<td>4.70 -0.14</td>
<td>33.85 0.21</td>
<td>4.70 -0.14</td>
</tr>
<tr>
<td>Item:20</td>
<td>66.32 0.57</td>
<td>88.59 0.60</td>
<td>82.76 0.33</td>
<td>75.00 0.30</td>
<td>78.17 0.45</td>
<td>66.32 0.30</td>
</tr>
<tr>
<td>Item:21</td>
<td>49.47 0.29</td>
<td>63.09 0.36</td>
<td>33.70 0.19</td>
<td>32.64 0.09</td>
<td>39.75 0.23</td>
<td>13.79 0.09</td>
</tr>
<tr>
<td>Item:22</td>
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Table H-3: **Field Tryout Result for Class III, Mathematics**

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* Facility  
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### Table H-10: Field Tryout Result for Class VIII, Social Science

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* Facility
** Item-Rest Cor
## Appendix I

### List of Workshops

**Table I-1: List of Workshops for Item Development and Finalization**

<table>
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<th>S. No.</th>
<th>Name of Workshops conducted for Elementary NAS 2017</th>
<th>Dates</th>
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<tr>
<td>1</td>
<td>Review of Tests Items</td>
<td>28th - 29th April 2017</td>
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<tr>
<td>2</td>
<td>Review &amp; Finalization of Tests Classes III to V</td>
<td>2nd - 4th May 2017</td>
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<tr>
<td>3</td>
<td>Review &amp; Finalization of Tests Classes VI to VIII</td>
<td>2nd - 5th May 2017</td>
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<tr>
<td>4</td>
<td>Sampling Workshop for NAS Classes III, V and VIII</td>
<td>28th June - 7th July 2017</td>
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<tr>
<td>5</td>
<td>Capacity Development of States on NAS</td>
<td>17th - 18th July 2017</td>
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<tr>
<td>6</td>
<td>Finalization of Test Items Classes III, V and VIII, 1st Round</td>
<td>24th - 25th July 2017</td>
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<tr>
<td>7</td>
<td>Finalization of Test Items Classes III, V and VIII, 2nd Round</td>
<td>28th - 29th July 2017</td>
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<td>8</td>
<td>Finalization of Test Items Classes III, V and VIII, 3rd Round</td>
<td>31st July - 1st August 2017</td>
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<td>9</td>
<td>Meeting to Review Progress of NAS &amp; Learning Outcome</td>
<td>2nd August 2017</td>
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<td>10</td>
<td>Finalization and Review of Class VIII test items, 4th Round</td>
<td>10th - 12th August 2017</td>
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<td>11</td>
<td>Review &amp; Finalization of Operational Guideline</td>
<td>10th - 12th August 2017</td>
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<td>Pilot Study of Class VIII Test Items</td>
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<td>13</td>
<td>One on One Vetting of Translated Test Items with States/UTs</td>
<td>15th September-13th October 2017</td>
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<td>14</td>
<td>Development of Material for Short Term Interventions Post NAS</td>
<td>10th - 11th November 2017</td>
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### Table I-2: District Level Workshop Schedule

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<td>Raipur</td>
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<td>2</td>
<td>Madhya Pradesh, Delhi</td>
<td>Bhopal</td>
<td>31st August - 1st September 2017</td>
</tr>
<tr>
<td>3</td>
<td>Assam, Tripura, Manipur, Sikkim</td>
<td>Guwahati</td>
<td>12th - 13th September 2017</td>
</tr>
<tr>
<td>4</td>
<td>Mizoram, Arunachal Pradesh, Meghalaya, Nagaland</td>
<td>Guwahati</td>
<td>14th - 15th September 2017</td>
</tr>
<tr>
<td>5</td>
<td>Punjab, Haryana and Chandigarh</td>
<td>Chandigarh</td>
<td>13th - 14th September 2017</td>
</tr>
<tr>
<td>6</td>
<td>Jammu and Kashmir, Himachal Pradesh and Uttarakhand</td>
<td>Chandigarh</td>
<td>15th - 16th September 2017</td>
</tr>
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<td>7</td>
<td>Odisha, West Bengal</td>
<td>Bhubaneshwar</td>
<td>12th - 13th September 2017</td>
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<tr>
<td>8</td>
<td>Rajasthan, Gujarat, Daman and Diu, Dadra and Nagar Haweli</td>
<td>Gandhinagar</td>
<td>15th - 16th September 2017</td>
</tr>
<tr>
<td>9</td>
<td>Uttar Pradesh</td>
<td>Varanasi</td>
<td>18th - 19th September 2017</td>
</tr>
<tr>
<td>10</td>
<td>Bihar, Jharkhand</td>
<td>Patna</td>
<td>18th - 19th September 2017</td>
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<tr>
<td>11</td>
<td>Tamil Nadu, Kerala, Lakshadweep, A&amp;N Islands, Puducherry</td>
<td>Bengaluru</td>
<td>19th - 20th September 2017</td>
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<td>12</td>
<td>Andhra Pradesh, Telangana, Karnataka</td>
<td>Bengaluru</td>
<td>17th - 18th September 2017</td>
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<td>Andhra Pradesh, Telangana, Karnataka</td>
<td>Bengaluru</td>
<td>17th - 18th September 2017</td>
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References

Project Team

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State Functionaries

State Directorate of Education, SCERTs, SIEs, DIETs, Schools
Examinations

An examination is a formal test of an individual student's knowledge or proficiency in a subject on the curriculum. The results of examinations apply to individual students, enabling them to progress through school or apply for further education or employment. Taken together, examination results provide an overall snapshot of students' performance at the end of a school year of course of learning. Examination results do not indicate the reasons behind high or low achievement of students.

Achievement Surveys

Achievement Surveys provide a measure of learning across a representative sample of students. They allow classification of students at a specific grade level by their ability (what students know and can do) in different subjects on the curriculum. National Achievement Surveys provide a “Health Check” to the education system by analyzing achievement based on a range of background factors (school, home, teachers). They potentially enable policy makers and practitioners to address the challenges to enhance student learning.

NAS for Transforming School Education

National Council of Educational Research and Training
Sri Aurobindo Marg, New Delhi - 110016

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