

Appendix A.1: House-listing

A.1.1. Criteria for houselisting

A village map was created by walking around the village. The objective of making a map was to get an idea of how the village is laid out and to determine the approximate number of houses¹ in the village. Additionally, basic information about the village was also collected.

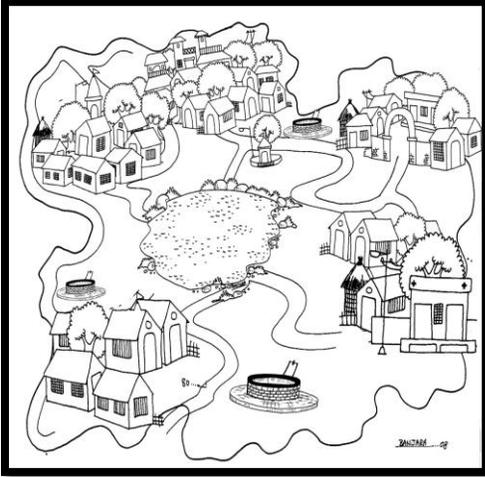


Figure A.1.1: Example of village mapping

In the house listing process the next step was to figure out whether the listing will be done in the entire village or a part of it. In case the population of the selected village was found to be more than 400 houses the village was divided into Hamlet Groups (HGs) based on the following population criterion in Table A.1.1.²

Table A.1.1: Criteria for house listing

Approximate houses of the sample village	No. of HGs to be formed
<400 houses (no HGs)	1
400-599 houses	3
600-799 houses	4
800-999 houses	5
.....and so on (An additional population of 1200 persons or approximately 200 households added an additional HG)	

¹ As a part of the mapping exercise we decided to treat houses as a point of unit because they were easier to determine than households. In other surveys as well for use house as a reference point but survey the households within each house.

²The population cutoffs that NSS uses are much lower. Their minimum cutoff for houselisting is a population of 1200 or 200 households and they add a hamlet for every additional population of 600 or about 100 households. Therefore, the maximum number of households that they list is 200 households. We are doubling that in our houselisting. See Appendix 1 for why this was done.

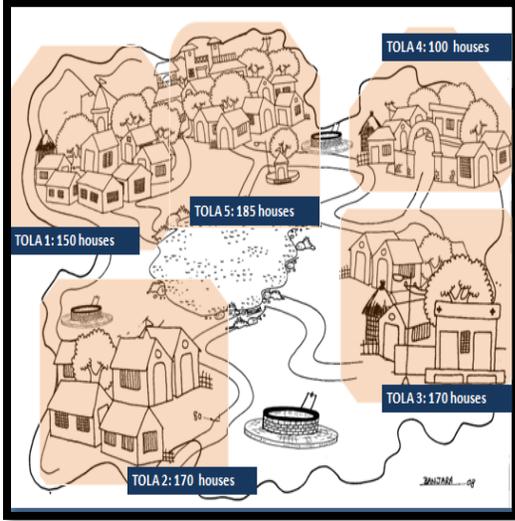


Figure A.1.2: Sub-divisions of a large village

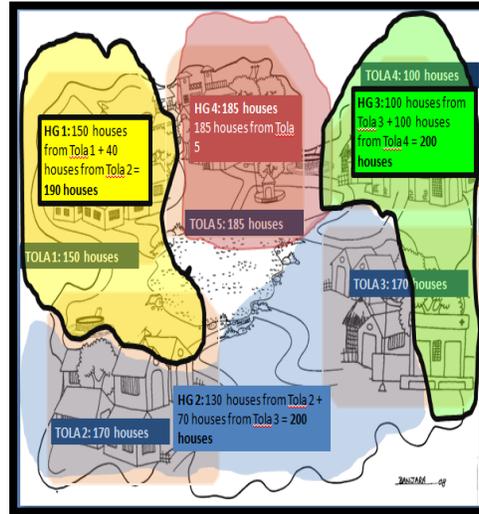
This means that if during the village mapping exercise it was found out that the village had 400 or less than 400 houses, the entire village was house listed. For larger villages, the number of houses was ascertained for each geographical section/natural sub division of the village. It was made sure that even the smaller and un-habitated sections of the village were clustered together with the nearby section, so that no area of the village is left out. The boundaries of these sections were clearly defined using identifiable landmarks like canals, school, temple, etc., so that it would be possible to identify and locate the geographical boundaries of the hamlet-groups to be formed in the village during the house listing process. These divisions were marked on another copy of the village map. These divisions were then serially numbered. Since we had to select two of these sections, they had to be formed into HGs as stated above following the criteria given in Table A.1.1 and Table A.1.2. The maximum percentage share of the houses was selected and one more HG was selected by simple random sampling without replacement (SRSWOR) as explained in Figure A.1.3

Table A.1.2: Calculating the number of HGs to be formed and selected

Tola/ section no. (from Section 2 – Village Map 1)	Estimates no. Of houses
1	150
2	170
3	170
4	100
5	185
Total	775

Total no. of houses in the village	775	=	193.75
No. Of HGs to be formed (as per the criteria)	4		

Figure A.1.3: Formation of HGs



Once HGs were identified all households within the houses that were estimates (including those found to be temporarily locked which can be determined by talking to neighbours, etc.) were listed. The Houselisting exercise was divided into two phases:

Phase 1: In this phase those villages were selected where there were 400 or less than 400 houses according to the census list. Such villages were treated as one HG.

Phase 2: In this phase those villages were selected that had more than 400 houses based on the procedure stated above.

A.1.2. Process of house listing

Given that we were going to list up to a minimum of 400 households in the village we wanted to collect information that was necessary for the final sampling exercise. Therefore, it was imperative for us to collect information on the schooling status of middle school children and children in the age group of 11 to 16 in the village. We also wanted to basic information about the village and document the process of sampling as implemented by the surveyors.

Following information was collected in the house listing exercise:

1. Serial number of the house hold
2. Hamlet name
3. Hamlet group number
4. Name of the respondent
5. Name of the head of the household
6. Household size – Adults (more than 18) and children (18 and less than 18)
7. Resident girls and boys in 6th, 7th, and 8th and resident out of school children in the age group of 11 to 16.

A.2: Baseline survey questionnaires

A2.1: Survey tool development

Table A.2.1 illustrates how questions were modified after piloting. The left column indicates the questions at the pilot stage and the right side, the questions as it currently stands. The details of tool development is in Appendix 2.

In designing the pilot test questionnaires, extensive background research was done and existing questionnaire of other national level studies³ were referred. Subsequent paragraphs summarize the line of thinking that was broadly followed in designing the questionnaires.

Modify questions based on inputs of the pilot: These questionnaires were developed over the course of 18 months and nine rounds of piloting. The main aim of the pilot was to modify questions based on field inputs. The questions were, therefore, often significantly modified with the aim of ensuring that they were capturing the information which that we wanted. Table 1 illustrates how questions were modified after piloting. The left column indicates the questions at the pilot stage and the right side, the questions as it currently stands.

Table A.2.1: Question on social networks at the pilot test stage and the final stage

Pilot test stage	Final stage
<p>Q1. Do you or any members of your household have personal acquaintance with someone who works in any of the following occupations?</p> <p>a. Health Workers- Options: 1: Yes 2: No</p> <p>b. School workers- Options: 1: Yes 2: No</p> <p>c. Government workers (other than doctors and teachers)- Options: 1: Yes 2: No</p> <p>d. Elected members- Options: 1: Yes 2: No</p> <p>e. Political party officials- Options: 1: Yes 2: No</p> <p>f. Police or army personnel- Options: 1: Yes 2: No</p>	<p>Q1. If you have an option to become whatever you want to be (and with all resources), what would you like to be?</p>
	<p>Q2. Do you know anyone who does this work mentioned in Q1 above?</p> <p>Options:</p> <p>1: Yes</p> <p>2: No</p>
	<p>Q3. Who is that person?</p> <p>Options:</p> <p>1: Household member</p> <p>2: Relative</p> <p>3: Neighbor</p> <p>4: Other acquaintance</p>

A major line of enquiry in this study is to capture the role of social networks in influencing mobility aspirations. At the pilot stage, the question is broadly similar to the one in IHDS- II wherein questions are posed directly to the respondent asking if they or someone in their family has personal acquaintance with someone who works in certain occupations. Field experiences suggested that the question were totally inadequate in capturing the information that was sought.

³ For instance; Indian Human Development Survey (IHDS), National Sample Survey (NSS), JPAL-MLP (Mother's Literacy Project), National Family Health Survey (NFHS)

First, it is very difficult to define “acquaintance” in a village setting- for almost every one “knows” everyone else in the village.

Second, for categories as health workers and political party officials, it is difficult to ascertain if the acquaintance that the respondent has in mind has the same background characteristics that is relevant to the study objectives. By health workers, for example, it was meant doctors (with MBBS or equivalent degree in Ayurveda, Homeopathy), nurses or ANM or other health workers working in a (government or private) health centre. We were not interested in pharmacists or those working in medical shops nor were we interested in quacks who may claim to be doctors or be referred to as “doctors” by the villagers. Likewise, it is very difficult to determine whether the political party official that the respondent has acquaintance with is indeed associated with a political party.

Third, in a village setting, family often becomes a fuzzy concept and includes members of the extended household while we were interested only in the immediate nuclear (or joint) household.

The questions were, therefore, revised to make them direct, easy to answer and avoid vagueness.

1. **Corroborate evidence only where necessary:** while both, both the sample child and her either parent were interviewed, some common questions were kept in both their questionnaires, information was corroborated only where necessary such as questions on mobility aspirations were asked to the child herself and her parents. Questions were also asked, on whether children are harassed or bullied to school, to both parents and children because it is a sensitive question to which it is difficult to elicit a “truthful” response and if either the parent or the child responds a “yes”, it will be taken into account at the time of analysis. The rationale behind this strategy is to avoid the confusion that arises at the data cleaning stage with contradictory information between the parent’s and child’s responses and deciding which of the information to choose. Of course, in following this strategy, caution was taken to decide who the best provider of which information is, for example, parents are asked about information on school expenditure while information about schooling experiences are elicited from the sample child herself.
2. **Preference for dichotomous options as answers to survey questions:** In designing the survey tools, the main thrust was to ensure a balance the objectives of the study and the ease with which surveyors could administer and record the information.

Almost all questions at the pilot stage phase required the surveyors to listen to the answers given by the respondent and then record these in terms of the appropriate code category (see left column in Table 2 below). However, it was felt that this placed a lot of expectations on the investigator given their skill sets and time limitations of the survey. Therefore, questions were re-phrased as far as possible into direct ones which could be answered with a dichotomous “yes” or “no” and where relevant we also added a “don’t know” option.

Table A.2.2: Questions on transportation to school at the pilot test stage and the final stage

Pilot test stage	Final stage
<p>Q1. In the last 1 month, did you face any kind of problem in commuting to school? Options: 1: Yes 2: No</p>	<p>Q1. In the <u>last 1 month</u>, have you faced any problem in commuting to school because of irregular transportation, flooded roads, lack of roads, etc.? Options: 1: Yes 2: No</p>
<p>Q2. [If yes in Q1], what kinds of problem did you face on your way to school? Options: 1. There was no regular transportation to school. 2. I have to travel a long distance to reach school. 3. Roads to school were not safe or were desolate. 4. There would be heavy traffic on way to school. 5. I was harassed or teased on way to school. 6. Other, specify below.</p>	<p>Q2. Are streets on the way to the school desolate? Options: 1: Yes 2: No 88: Don't know</p>
<p>Q3. [If option 5 in Q2 above], does this harassment, teasing or bullying happens regularly, sometimes or rarely? Options: 1. Regularly 2. Sometimes 3. Rarely</p>	<p>Q3. In the <u>last 1 month</u>, have you been harassed, teased or bullied on way to the school? Options: 1: Yes, I have been harassed. 2: No, I haven't been harassed. 88: Don't know</p>
	<p>Q4. [If yes in Q3 above], does this harassment, teasing or bullying happens regularly, sometimes or rarely? Options: 1. Regularly 2. Sometimes 3. Rarely</p>

From the pilot it emerged that some of the options- long distance to school and heavy traffic on way to school- in response to the question “*What kinds of problem did you face on your way to school?*” were redundant. Instead children, particularly in Bihar, seem to face problems related to roads being rendered inaccessible due to heavy rains. It also seemed that unless girls were asked directly, they were unlikely to report being harassed on way to school on their own.

The questions were, therefore, re- phrased such that first a broad question was asked on whether the children faced any kinds of problem commuting to school because of irregular transportation, flooded roads, lack of roads. Irrespective of the answer to this first question, the question about desolate roads was asked followed by the question on whether they were ever harassed or bullied on their way to school. Only if children reported that they faced harassment or bullying on way to school, were they asked of its frequency. Thus as compared to the pilot stage the question was re- phrased to make them direct as well as reduced the skip patterns while also ensuring that we were able to collect the necessary information.

3. **Sparing use of the “others” category:** Survey questionnaires usually have an “others” category to record all kinds of miscellaneous responses that are not covered in the other response categories in which the researchers are interested. More often than not, the “others” is not a meaningful analytical category. Therefore, as far as possible and unless there was certainty about whether “others” was an absolutely relevant category, it was dropped from questions.

Table A.2.3: Questions on availability of reading materials at the pilot test stage and the final stage

Pilot test stage	Final stage
Q1. What reading materials are available in the house? Options: Tick (√) all that apply 1. Calendar 2. Religious books 3. Magazines 4. Any book other than text book 5. Newspaper 6. Others (please specify) 7. No print material	Q1. Which of the following reading material does your household have? 1. Calendar- Options: 1: Yes, 2: No 2. Religious books- Options: 1: Yes, 2: No 3. Magazines- Options: 1: Yes, 2: No 4. Any book other than text book Options: 1: Yes, 2: No 5. Newspaper- Options: 1: Yes, 2: No

In this example, questions were modified between pilot and final stage to drop the “others” category. In this example, the “others” category is further rendered meaningless because the category “any book other than textbook” should capture other kinds of print materials in the household.

Second, unlike at the pilot stage where investigators were required to place a tick (√) for whichever options that were applicable, the questions in the final survey tool requires investigators to place a “yes” or “no” against each option. This avoids the problem of guessing whether a blank against a particular category indicates that a “no” or whether the category was inadvertently missed by the surveyor. In the latter instance, surveyors can now be asked to revisit the household to ask the skipped question. Thus, the final survey format ensures that a blank is indeed an “invalid skip”.

4. **Avoidance of “none of the above” category:** “none of the above” category in the final survey tool was also removed as illustrated in Table 3 above. This is to avoid the confusion that often arises at the data cleaning stage when surveyors often mark a “yes” against a relevant category (say, religious text in Table 3) as well as “none of the above” category (or “no print material” in Table 3) and the data analyst has to guess which of the two codes are correct. To avoid this confusion, “none of the above” category will now be created at the analysis stage if all relevant options are marked as negative (or if they are left missing).
5. **Pilot test in local language:** The usual practice is to design pilot questionnaires in English and then subsequently translate them into Hindi at the time of the survey. It was realized, quite early on during the pilot, the importance of having the survey questions in Hindi rather than English. In the absence of questions in Hindi, the surveyors would impromptu translate the question into Hindi while administering the questionnaire. Often such on- the- spot translation would be inaccurate thus rendering meaningless the purpose of the pilot. To avoid such a gap, it was ensured that the survey questionnaires had the questions both in English and Hindi. The added advantage of this strategy was that while testing the questionnaires it could be seen if the questions in Hindi conveyed the same meaning as in English.
6. **In- house translation of survey tools to Hindi and Marathi:** A related point is while it proved time intensive it was found that it better to translate the questionnaires in-house than using the services of specialized translation agencies⁴. A major part of the reason was that these agencies would often translate literally even when such translation made little sense in spoken Hindi and we were better off using the word in English rather than in Hindi. For example, sampled child was translated as “नमूना बच्चा”- though “नमूना” is an accurate translation of sample, in local parlance it is hardly proper to address a child as “नमूना”. The final survey tools use the term “sample child”. Second, the team being well versed with the local language was often better placed to suggest appropriate translation of questions (or terms) from English to Hindi or Marathi such that it can be easily understood by the respondents.

⁴ Though the first draft of all tools were translated by a professional translating agency.

A.2.2 Survey tool administration

Given the nature of our study and our line of inquiries it was important to conduct an extensive training. The training of surveyors was conducted over a period of 7 days with 3 days each dedicated to survey questionnaire, assessment administration and a pilot. Last day was left to discuss the operational plan of the survey.

First 2 days of each training phase focussed on discussing the nuances of each questions in the survey and assessment questionnaire followed

A.3. Assessment Tools

A.3.1: Process of developing assessment tools

Given below are the steps followed in the development of tools of all the assessed subjects:

1. Detailed curriculum mapping of Bihar and Maharashtra textbooks of all subjects (Grades 2-8): This exercise included identifying the important competencies of each grade and related competencies across grades. For instance; in order to solve algebraic equation, the child needs to be familiar with basic operations. This exercise also involved mapping the typology of questions that children are familiar with. The National Curriculum Framework and Assessment sourcebooks were also studied.
2. Analysis of data from other studies: Other studies such as the Annual Status of Education Report, National Achievement Survey and impact evaluation studies' data were analyzed to understand the current learning levels of children in both these states. This helped understand the range of items (within each competency) that the tool should have.
3. Designing items under each competency: Items were designed keeping in mind the familiar formats and the points mentioned above. The grading rubrics were also created for the items.

A 3.2: Assessment tool administration

Given the objectives of the assessment, all children were first given tasks that assess basic skills of reading and arithmetic as qualifying assessments. This was an oral one-on-one assessment. Since the one-on-one basic assessment was going to be done at the household level, each reading tool had four samples to ensure that children didn't pick up the correct responses while other children were being tested. In each tool, the child was marked at his/her highest level. The child was first given the reading tasks and then the arithmetic tasks.

Contingent on their performance on the basic tasks, they were given the pen and paper assessments. This administration process ensured that children who didn't know how to read were not given the pen and paper assessments of Language, English and Science; and children who couldn't do basic arithmetic tasks like 2 digit subtraction and recognizing numbers up to 100 were not given more difficult pen and paper tasks in Math. This helped us understand the actual learning levels of the children. This process also helped significantly reduce the number of children who would randomly pick an option in the Multiple Choice Items (MCIs) because they didn't know how to read in the first place.

Category 1

- All four pen and paper assessments were administered on all those who qualified both the basic oral reading and math test.

Category 2

- Those who only qualified oral reading tool were given only language, English and Science pen and paper assessment.

Category 3

- Those who qualified only oral Math tool were given only the Math pen and paper assessment

Category 4

- Those who did not qualify the oral assessment were not given any pen and paper assessment

A.3.3: Oral test

Reading tool: The qualifying reading tool is an adaptation of the ASER reading tool. Like ASER, it has reading letters, words, a grade 1 level text and a Std. 2 level text. In addition, it also has 2 questions based on the grade 2 level text. Only those children who could read and answer both these questions were given the pen and paper assessments for Language, English and Science.

Math tool: The qualifying Math tool is also an adaptation of the ASER Math tool. The lowest level is number recognition of single digit numbers (1-9), then double-digit number recognition (11-99) and then subtraction. Only those children who could solve 2 subtraction tasks were given the pen and paper Math tool⁵.

Competencies assessed in the oral test: Each Middle School Study assessment tool has the important competencies from primary to middle school grades. Within each competency, a range of easy to difficult items has been assessed. For example, in reading comprehension – a narrative and an informative text was given to the children. And a range of items from direct retrieval type items (easy) to analyze type items (difficult) were given for each text.

Table A.3.1: Levels for the oral reading tool

Level	Proficiency Description
Beginner	Cannot identify even 4 out of the 5 letters
Letter	Can correctly identify 4 out of the 5 letters
Word	Can correctly read 4 out of the 5 words
Paragraph	Can read a paragraph which is a grade 1 level text. The paragraph has 4 sentence and approximately 19 words and it has to be read like one ‘reads a sentence, rather than a string of words’. Can make 2 to 3 mistakes.
Story	Can read a short story which is a grade 2 level text. The story has 8-10 sentences and approximately 60 words. Can make 2 to 3 mistakes.
Comprehension	Can answer 2 basic questions based on the story.

⁵ The Math pen and paper assessment was given to children irrespective of their performance in Reading tasks because the Math pen and paper assessment has items that the children could solve without knowing how to read. Doing otherwise would undermine the validity of the qualifying assessment.

Table A.3.2: Levels for the oral Math tool

Levels	Proficiency Description
Beginner	Cannot even identify 4 of any 5 single-digit numbers
Number Recognition (1-9)	Can identify 4 out of 5 numbers
Number Recognition (11-99)	Can identify 4 out of 5 numbers
Subtraction	Can correctly solve two addition operations (2 by 2 subtraction without borrowing)

A3.4: Pen and paper assessments

The pen and paper assessments were administered to the children who qualified the oral tools. These children were given a maximum of 2 tools on a day, with a break in the middle. There were approximately 5-6 administrators for each assessment in a village. In Bihar, most of the testing took place in schools that gave permission to use their space and in Maharashtra, it happened in other public spaces like community halls.

Given below are tables of specification that describe the following characteristics in all items of the assessments:

- 1. Typology of the item:** the format of the item
- 2. Assessable competency:** the competency on which the children are graded for that item
- 3. Difficulty level:** the level of difficulty of the item relative to each other or relative to the grade
- 4. Cognitive level:** the cognitive domain the item aims at
- 5. Competencies required:** the various competencies required by the children to answer the question correctly. The assessable competency is a sub-set of this category

Table A.3.3: Table of specification - English

Item	Typology	No. of items	Assessable competency	Difficulty level	Cognitive level	Competencies required
1	Short constructed response	4	Letter knowledge	Easy	Recall of letters	Listening and writing the correct letter
2	Short constructed response	4	Spelling, vocabulary	Easy	Phonological comprehension of words	Listening, phonological awareness and writing the correct word (correct spelling)
READING COMPREHENSION (NARRATIVE) TEXT GRADE 4						
3.1	Short constructed response	1	Reading comprehension	Easy	Retrieve	Reading, comprehending, locating a piece of required information from the text and writing the correct response
3.2	MCI	1	Reading comprehension	Easy	Understand and relate	Reading, understanding, inferring and choosing the correct option
3.3	MCI	1	Reading comprehension	Easy	Locate and interpret	Reading, comprehending, linking information provided at different locations of the text, choosing the correct option
3.4	MCI	1	Reading comprehension	Medium	Retrieve	Reading, comprehending, locating a piece of required information from the text, choosing the correct option
3.5	MCI	1	Reading comprehension	Easy	Retrieve	Reading, comprehending, locating a piece of required information from the text, choosing the correct option
3.6	MCI	1	Reading comprehension	Difficult	Interpret and assess	Reading, comprehending, interpreting information, inferring and choosing the correct option
3.7	Short constructed response	1	Reading comprehension	Medium	Integrate	Reading, comprehending, linking information provided at different locations of the text and writing the correct response
3.8	Short constructed response	1	Reading comprehension	Medium	Interpret	Reading, comprehending, interpreting information, inferring and writing the correct response

3.9	Short constructed response	1	Reading comprehension	Medium	Retrieve, analyse and locate	Reading, comprehending, linking information provided at different locations of the text, writing the correct response
3.10	Constructed response	1	Reading comprehension	Medium	Reflect and evaluate	Reading, comprehending, interpreting information, evaluating the entire text, presenting ideas by matching previous experience with the current information given in the text, reflecting and writing the response
3.11	Short constructed response	2	Vocabulary	Medium	Understanding	Reading, comprehending, inferring and writing the correct word
4	Selected response	6	Vocabulary	Medium	Recall	Reading, recognizing, matching the words to correct meaning
5	Selected response	8	Grammar	Medium	Application	Reading, understanding, applying knowledge of grammar rules, filling the right option
6	Constructed response	3	Writing	Difficult	Create	Reading, understanding the picture, describing picture by writing correct sentences (applying previous knowledge of English vocabulary and grammar)
7	Constructed response	4	Writing	Difficult	Understand and apply	Understanding, introspecting and answer the question by writing correct sentences.
Totals		41				

Table A.3.4: Table of specification – Language

Item	Typology	No. of items	Assessable competency	Difficulty level	Cognitive level	Competencies required
READING COMPREHENSION (NARRATIVE) TEXT GRADE 4						
1.1	MCI	1	Reading comprehension	Easy	Retrieve	Reading, comprehending, linking information provided at different locations of the text, writing the correct response
1.2	MCI	1	Reading comprehension	Easy	Interpret	Reading, comprehending, interpreting information, inferring and writing the correct response
1.3	Constructed response	1	Reading comprehension	Easy	Evaluate	Reading, comprehending, interpreting information, evaluating the entire text, inferring and writing the response
1.4	MCI	1	Reading comprehension	Medium	Locate and retrieve	Reading, comprehending, linking information provided at different locations of the text, writing the correct response
1.5	MCI	1	Reading comprehension	Medium	Understand and analyse	Reading, comprehending, interpreting information, inferring and writing the correct response
1.6	Constructed response	1	Reading comprehension	Difficult	Evaluate	Reading, comprehending, interpreting information, evaluating the entire text, inferring and writing the response
1.7	MCI	1	Reading comprehension	Difficult	Interpret	Reading, comprehending, interpreting information, inferring and writing the correct response
1.8	Constructed response	1	Reading comprehension	Difficult	Reflect and evaluate	Reading, comprehending, interpreting information, evaluating the entire text, presenting ideas by matching previous experience with the current information given in the text, reflecting and writing the response

READING COMPREHENSION (INFORMATIVE) TEXT GRADE 5						
2.1	MCI	1	Reading comprehension	Easy	Retrieve	Reading, comprehending, linking information provided at different locations of the text, writing the correct response
2.2	MCI	1	Reading comprehension	Easy	Interpret	Reading, comprehending, interpreting information, inferring and writing the correct response
2.3	MCI	1	Reading comprehension	Medium	Retrieve	Reading, comprehending, linking information provided at different locations of the text, writing the correct response
2.4	MCI	1	Reading comprehension	Medium	Interpret and analyse	Reading, comprehending, interpreting information, inferring and writing the correct response
3	Constructed response	1	Writing	Difficult	Create	Reading, comprehending, imagining, organizing and expressing ideas and writing a story.
4	Selected response	4	Vocabulary	Medium	Recall	Reading, recognizing, matching the words to correct meaning
5	Selected response	4	Vocabulary	Medium	Recall	Reading, understanding, writing the correct opposite words
6	Selected response	4	Grammar	Medium	Application	Reading, understanding, applying knowledge of grammar rules, choosing the right option
7	Selected response	4	Grammar	Medium	Application	Reading, understanding, applying knowledge of grammar rules, filling the right option
8	Selected response	5	Grammar	Medium	Application	Reading, understanding, applying knowledge of punctuation rules, filling the right punctuation mark
Total		34				

Table A.3.5: Table of Specification - Math

Item	Typology	No. of items	Assessable competency	Difficulty	Cognitive level	Competencies required
1	Fill in the Blanks	3	Number comprehension	Easy	Knowing/Recognize	Knowledge of place value
2	Selected response	4	Number comparison	Easy	Knowing/Recognize	Knowledge of place value, using matching and counting strategies,
3	Constructed Response	3	Number Operations	Easy	Knowing/Compute	Carrying out algorithmic procedures of mathematical operations
4	Short response	4	Place value	Medium	Knowing/Compute	Properties of mathematical operators
5	Constructed Response	1	LCM	Easy	Knowing/Compute	Carrying out algorithmic procedures of mathematical operations
6	Constructed Response	1	Arithmetic Word problem	Easy	Applying/Demonstrate	Reading comprehension + Knowledge of algorithmic procedures
7	Constructed Response	1	Arithmetic Word problem	Easy	Applying/Demonstrate	Reading comprehension + Knowledge of algorithmic procedures
8	Constructed Response	1	Arithmetic Word problem	Easy	Applying/Demonstrate	Reading comprehension + Knowledge of algorithmic procedures
9	Short response	3	Number Patterns	Medium	Reasoning/Analyze	Number system concepts
10	Constructed Response	2	Integer Operations	Difficult	Knowing/Compute	Number system concepts + Operations of integers
11	Constructed Response	1	Number Line	Easy	Knowing/Recall	Number system concepts(Integers) + Number line
12	Selected Response	3	Number comparison	Easy	Knowing/Recall	Number system(Integers, Decimals, fractions)
13	Constructed Response	2	Fraction Operations	Difficult	Knowing/Compute	Fractions + Knowledge of algorithmic procedures
14-16	Constructed response	3	Fractions, Decimals, Percentages	Medium	Applying/Demonstrate	Number system(Decimals, fractions, Percentages) + Knowledge of algorithmic procedures

17	Constructed Response	2	Decimal Operations	Difficult	Knowing/ Compute	Decimals + Knowledge of algorithmic procedures
18	Short Response	3	Measuring instruments	Easy	Knowing/ Recall	Names of measuring instruments
19	Selected Response	1	Angles	Easy	Knowing/ Classify	Angles
20	Short response	1	Angles	Easy	Knowing/ Recognize	Names of angles
21-22	Selected response	2	Triangles	Medium	Knowing/ Classify	Types of triangles based on their properties
23	Short response	3	Geometric Shapes and objects	Easy	Knowing/ Recall	Names of basic shapes and objects
24	Short response	3	Unit conversion	Medium	Knowing/ Compute	Units of measurement of length, weight and time + conversion ratio
25	Constructed response	3	Mensuration	Difficult	Applying/ Demonstrate	Computational formulae for area and perimeter of rectangle
26	Constructed Response	1	Ratio	Difficult	Knowing/ Compute	Ratio + Knowledge of algorithmic procedures
27	Constructed Response	1	Unitary method	Difficult	Applying/ Demonstrate	Unitary method
28	Constructed Response	1	Percentage	Difficult	Applying/ Demonstrate	Percentage concepts
29	Short answer	2	Simple equations	Medium	Applying/ Demonstrate	Formulation of simple equations
30	Constructed response	1	Simple Equation	Difficult	Applying/ Demonstrate	Solve simple equations
31	Constructed Response	1	Simple equation	Difficult	Reasoning/ Analyze	Formulate simple equation + solve simple equation
Total		57				

Table A.3.6: Table of Specification - Science

Item	Typology	Topic/Theme	Difficulty	Cognitive Level	Competencies required
1	MCI	Natural Resources and Phenomenon	Easy	Recall/ Recognize	Identify natural resources
2	MCI	Natural Resources and Phenomenon	Easy	Describe	Identify the reason for drought
3	MCI	Natural Resources and Phenomenon	Easy	Describe	Describe the affects of earthquake
4	MCI	Natural Resources and Phenomenon	Medium	Define	Define pollution
5	MCI	Natural Resources and Phenomenon	Medium	Describe	Knows phenomena related to an earthquake
6	MCI	Natural Resources and Phenomenon	Medium	Describe	Define atmosphere
7	MCI	Natural Resources and Phenomenon	Easy	Recall/ Recognize	Identify season
8	MCI	Natural Resources and Phenomenon	Easy	Illustrate with examples	Knows parts of earth's environment
9	MCI	Natural Resources and Phenomenon	Difficult	Interpret	Knows reasons for erosion
10	MCI	Natural Resources and Phenomenon	Medium	Describe	Identify the agents of erosion
11	MCI	Plant/Animals Living World	Medium	Relate	Know about kind of places where different plants grow
12	MCI	Plant/Animals Living World	Easy	Illustrate with examples	Know about biotic and abiotic components of environment
13	MCI	Natural Resources and Phenomenon	Medium	Illustrate with examples	Knows about renewable and non-renewable resource
14	MCI	Natural Resources and Phenomenon	Easy	Relate	Affects of natural phenomenon

15	MCI	Natural Resources and Phenomenon	Medium	Describe	Understands renewable and non-renewable resources
16	MCI	Natural Resources and Phenomenon	Medium	Describe	Understand erosion
17	MCI	Food	Medium	Recall/ Recognize	Knows about components of food
18	MCI	Plant/Animals Living World	Easy	Recall/ Recognize	Knows properties of common plants
19	MCI	Food	Difficult	Describe	Know about components of food
20	MCI	Food	Medium	Recall/ Recognize	Knows about preservation of foods
21	MCI	Food	Medium	Describe	Know about components of food
22	MCI	Food	Medium	Describe	Know about balanced diet
23	MCI	Food	Easy	Define	Understands malnutrition
24	MCI	Food	Medium	Describe	Knows about disease caused by deficiency of nutrients
25	MCI	Food	Easy	Compare/ Contrast/ Classify	Understand nutritional needs
26	MCI	Food	Medium	Explain	Understand nutritional needs
27	MCI	Food	Difficult	Describe	Knows about disease caused by deficiency of nutrients
28	MCI	Food	Medium	Describe	Knows about disease caused by deficiency of nutrients
29	MCI	Food	Difficult	Explain	Understand nutritional needs
30	MCI	Food	Easy	Analyze	Understand nutritional needs

31	MCI	Plant/Animals Living World	Medium	Define	Identify the characteristics of living and nonliving things
32	MCI	Plant/Animals Living World	Easy	Describe	Apply different methods of separation of mixtures
33	MCI	Plant/Animals Living World	Difficult	Illustrate with examples	Knows single celled animals
34	MCI	Plant/Animals Living World	Easy	Illustrate with examples	Knows parts of plants
35	MCI	Plant/Animals Living World	Easy	Define	Know about diversity of living organisms and the habitat where they live
36	MCI	Plant/Animals Living World	Easy	Describe	Know about diversity of living organisms and the habitat where they live
37	MCI	Plant/Animals Living World	Easy	Recall/ Recognize	Knows parts of human body
38	MCI	Plant/Animals Living World	Medium	Compare/ Contrast/ Classify	Knows difference between plants and animals
39	MCI	Plant/Animals Living World	Difficult	Analyze	Knows function of parts of animals
40	MCI	Plant/Animals Living World	Easy	Recall/ Recognize	Knows function of parts of plants
41	MCI	Plant/Animals Living World	Medium	Analyze	Knows function of parts of animals
42	MCI	Plant/Animals Living World	Medium	Relate	Knows function of parts of animals
43	MCI	Plant/Animals Living World	Easy	Interpret	Knows function of parts of animals
44	MCI	Plant/Animals Living World	Medium	Interpret	Understand growth of plants
45	MCI	Plant/Animals Living World	Easy	Recall/ Recognize	Know about the human skeletal system
46	MCI	Water	Easy	Recall/ Recognize	Knows about sources of water

47	MCI	Water	Easy	Explain	Know about the importance and availability of water
48	MCI	Water	Medium	Recall/ Recognize	Know about the importance and availability of water
49	MCI	Natural Resources and Phenomenon	Difficult	Define	Know about the various processes of water cycle
50	MCI	Water	Easy	Describe	Know the causes of water pollution
51	MCI	Water	Medium	Relate	Know the causes of water pollution
52	MCI	Water	Easy	Recall/ Recognize	Knows properties of water
53	MCI	Water	Difficult	Explain	Know about the various processes of water cycle
54	MCI	Water	Medium	Describe	Know about the physical properties of water
55	MCI	Water	Medium	Relate	Know about pollution of water
56	MCI	Water	Easy	Define	Explore more about sources of water
57	MCI	Natural Resources and Phenomenon	Medium	Define	Know about Water cycle
58	MCI	Water	Easy	Relate	Apply different methods of separation of mixtures
59	PT-1	Plant/Animals Living World	Medium	Interpret	Knows function of parts of animals
60	PT-1	Plant/Animals Living World	Medium	Relate	Differentiate between plants and animals
61	PT-1	Plant/Animals Living World	Difficult	Compare/ Contrast/ Classify	Differentiate between plants and animals
62	PT-1	Plant/Animals Living World	Easy	Analyze	Knows function of parts of animals

63	PT-1	Plant/Animals Living World	Medium	Describe	Knows function of parts of animals
64	PT- 2	Natural Resources and Phenomenon	Medium	Relate	Knows factors affecting weather
65	PT- 2	Natural Resources and Phenomenon	Difficult	Interpret	Knows about weather conditions
66	PT- 2	Natural Resources and Phenomenon	Easy	Relate	Identify seasons
67	PT- 2	Natural Resources and Phenomenon	Easy	Relate	Predicts affects of weather conditions
68	PT- 2	Plant/Animals Living World	Medium	Analyze	Knows animal characteristics based on their habitat