Bihar School Assessment
May 2014
Findings & Implications for Action

unicef unite for children

असर ASER Evidence for Action

Working report
Detailed Version
Sept 13, 2014

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Section 1: Background

In April 2014, Bihar Government invited ASER Centre to do a school based assessment of children's learning. There were 2 reasons for doing this:

- The government felt that it would be useful to have an end of year school based assessment.
- The government had been carrying out various interventions (Mission Gunwatta) during 2013-14. End of year assessment would provide data for how far the children had reached.

It was agreed that this would be a joint effort, with ASER Centre/Pratham & Bihar government conducting the assessment in collaboration. Leadership was provided by SCERT. UNICEF gave financial support to Bihar government for this exercise.

What were the objectives of the exercise?

To generate:

- Data on student performance for children in Std 2, 4 and 6. (Other assessments had been done earlier in the year by other agencies for Std 3, 5 and 7 in 2013-14.)
- Cluster-level report cards that could guide CRCCs to improve teaching-learning in their schools.
- Build capacity for doing assessments and make links to go from assessments to action. The trainings at state and district level included classroom sessions and field practice. Each district team graded all the student papers after data collection in the field. This was done so that the district teams gained first hand exposure to children's assessment.

Who designed and developed the tools?

A joint team comprising of members from SCERT Bihar, ASER Centre and Pratham was responsible for developing the tools that were used in this study.

- All recent previous assessments of student academic performance were reviewed – the tools as well as the findings.
- SCERT convened a workshop of resource persons and SCERT faculty + ASER/Pratham members to design & develop tools
- Current Bihar textbooks were also reviewed.
- Once the first round of tools were developed, they were field tested in rural and urban schools. Based on the field testing, revisions were done. SCERT staff and ASER/Pratham teams participated in the field pilots.
- The final tools were vetted by the senior staff at SCERT before being sent for printing.
- Entire process for tool finalization took 10 days.

Where would the assessment be done?

Who was tested and where ?

- Decisions on sampling & choice of target children were taken at a state level meeting of senior officers.
- Sampling was done by district and cluster.
- 2-3 clusters were randomly selected for each district following standard sampling procedures.
- It was decided that the entire field work would be no more than one week – the last week of May.
- Given the time constraints, a total of 25-30 schools were covered in each district. In most cases, this meant 2 clusters but if there was a big cluster then only one was done. All schools in the cluster were covered.
- Aim was to reach all children in all schools in the selected cluster for the classes/grades that had been selected. These were Std 2, 4 and 6 – students who had been in these classes in the 2013-14 school year.

Who would conduct the assessment?

Bihar has 38 districts. Given the time constraints, it was decided that:

- For each district there would be least 60 surveyors. These were DIET students. In districts with no DIETs, the evaluators were CRCCs.
- For each district there were 5 Master Trainers – 3 from Pratham/ASER and 2 from government (DIET faculty or district level govt staff).
- Trainings rolled out in the following way
  - 200 Master trainers were trained for 4 days in Patna.
  - District level training was 4 days in district.
  - Field work and grading in district for 5 days – last week of May (the last week before summer vacations started).
- All field work completed by June 1 2014.
- Total teams involved = ~ 2500 people

  200 Master trainers (5 for each district) + 2280 surveyors (38*60 surveyors)

What was done in the planning & implementation phases ?

The entire project was conducted under the leadership of SCERT

- Decisions on sampling (selected clusters and schools) were adhered to tightly in the field.
- Logistics and transportation arrangements especially for moving test papers and teams to the district and back were facilitated by SCERT and DIETs and district offices.
- All district level trainings were conducted as per schedule and on time including the field work that was part of the training.
- Regardless of the distance of the cluster from the district head quarters, all field teams reached schools in time.
- Monitoring teams from SCERT and ASER/Pratham were also in the field during district level training and data collection to ensure satisfactory quality in the field work.

How was grading done?

Grading of pen and paper tests

Surveyors were asked to grade all Language and Math papers for the school that was allocated to them. They did it each afternoon after field work.

Objective of asking the surveyors to grade

Ensuring that surveyors look carefully at the papers from the school that they surveyed. Help them to see trends/mistakes in the papers or any indication of copying.

Building the capacity of surveyors in undertaking learning assessments.

Helping CRCCs and DIETs understand the process of grading & the need for standardisation.

Assuring quality of grading

Adequate time spent on the process of grading during the state and district trainings. Grading was done under the supervision of District Master Trainers.

For MCQs options selected by children were entered to reduce the grading error.

Answer sheets were handed out to surveyors to grade responses.

For each school, grading of Math papers was rechecked by Master Trainers.

Open-ended/descriptive questions in Std 6 Language paper was graded only by Master Trainers (with the help of model answer sheets)

Who, what, how

Who was tested? What subjects? One-on-one or written?

Total schools surveyed = 1047 (616 primary schools & 431 upper primary schools)
Total clusters surveyed = 79

Grade	One on one test /Oral		Written test	
	Hindi (Reading)	Math	Hindi	Math
Std 2	22,425	22,425	Std 2 children were not given any written test	
Std 4	22467	22465	22,467	22,465
Std 6	17,646	Std 6 children not given this test	17,648	17,640
Total children tested	62,538	44,890	40,115	40,105

The unique feature of this exercise was that all children were given a one-on-one reading test. The older children in Std 4 and 6 also had pen-paper tests in language and maths. Large scale reading assessment indicates the importance of reading as a foundational skill.

Who was present in school in the last week of May?

CHILDREN'S ATTENDANCE								
In schools that were visited	**Std 1**	**Std 2**	**Std 3**	**Std 4**	**Std 5**	**Std 6**	**Std 7**	**Std 8**
Child Enrollment	33117	39481	39561	39706	39436	30632	31385	26736
% Children present on Day 1	56.4	52.7	49.7	49.7	47.9	51.6	48.7	44.1
% Children present on Day 2	58.5	54.4	53.7	53.9	54.8	53.1	50.2	47.1

TEACHERS' ATTENDANCE	
No. of appointed teachers in schools visited	5751
% Teachers present	87.3

This assessment was carried out in the last week of May – the last week before summer vacations were to start. During the first 2-3 days of that week there were heavy rain storms. Anticipation of vacations and bad weather – both may have caused children's attendance in school in this period to be **low**.

Section 2: Reading assessment (oral)

Some introductory thoughts on reading

- It is well accepted that reading is a fundamental and foundational skill. Without learning to read, a child cannot progress successfully through the education system.
- Textbooks and curriculum in India are based on the assumption that children are reading fluently with understanding by the end of their second year in school.
- Many state governments and agencies are embarking on "state level assessments" of student performance in different subjects. All of these assessments including those done at the national level by NCERT are pen-paper tests. However, repeated rounds of the national ASER survey indicate that not all children are reading fluently even by the end of Std 5.
- Thus, the question arises: For children who are not reading fluently, how useful are pen-paper tests work to understand their status.
- The current exercise in Bihar is perhaps the only state level assessment exercise that includes reading as a key element of the assessment. All children being assessed were given reading tasks one-on-one. We hope that this exercise has generated useful data on the links between children's reading ability and their performance on the written tests.

What were children asked to read?

BASIC ASER READING TOOL: HINDI

Story level

Std. II level text

रामपुर में कुछ ज़मीन ख़ाली थी। वहाँ कुछ नहीं उगता था। वहाँ कोई खेलने नहीं जाता था। एक दिन कुछ लोग आये। उन्होंने गाँव के लोगों को बुलाया। सबने मिलकर तय किया कि यहाँ बग़ीचा बनाया जाये। खाद मंगाकर हर तरह के पौधे लगाये गये। सही समय पर पानी दिया गया। आज वहाँ एक सुंदर बग़ीचा है। इसलिए वहाँ सब खेलने जाते हैं।

Para level

Std I level text

बग़ीचे में एक पेड़ है।
पेड़ पर एक तोता रहता है।
तोते का रंग हरा है।
वह लाल टमाटर खाता है।

Letters

Letter level

च

म स

प ग द

ल थ

बच्चे से कोई भी 5 अक्षर पढ़ने को कहें।
कम से कम 4 सही होने चाहिये।

Common simple words

Word level

आग

ताला

गिर पैसा

देश

पानी बूढ़ा

बच्चे से कोई भी 5 शब्द पढ़ने को कहें।
कम से कम 4 सही होने चाहिये।

Children in Std 2, 4 and 6 were all asked to read aloud, so that their reading ability could be assessed.

Each child is asked to read. Each child is marked at the highest level at which he or she could read.

So a child who can read at "para" level can of course read letters and words. But she is marked at the highest level she can read comfortably.

How well can children read?

Children's std refers to the grade in which they were studying in 2013-14 school year: Assessment done in May 2014	% Children reading at different levels by grade		
	Std 2	Std 4	Std 6
Story level (Std 2 level text)	11.8	39.5	61.6
Para level (can read Std 1 level text but cannot read longer level text fluently as yet)	9.2	17.0	18.0
Word level (can read words but not sentences as yet)	11.4	12.3	7.9
Letter level (can recognize letters but not read words yet)	36.0	20.9	9.5
Beginner level (still learning to recognize letters)	31.1	9.8	2.4
Total percentage	**100%**	**100%**	**100%**
Number of children tested	22424	22467	17646

More children in higher classes can read. But data suggests that there needs to be **serious and urgent** focus on building basic reading skills throughout primary and upper primary grades.

How do children's reading ability in May 2014 compare to data from ASER 2013 data from Std 4 ?

Reading level	Std 4 ASER 2013 Sept-Oct	Std 4 May 2014	Std 5 ASER 2013 Sept-Oct
Story	27.4	39.5	41.7
Para	18.3	17	19.7
Word	15.9	12.3	12.5
Letter	24.3	20.9	17.8
Beginner	14.1	9.8	8.3
Total %	100	100	100

These ASER figures are for govt school children only.

First point :

- Children learn to read over time.
- % Children reading at story level (Std 2 level) is higher in May 2014 than in Sept-Oct 2013 (ASER).
- The May figures for reading fall between the figures for Std 4 in Sept-Oct 2013 and for Std 5 in Sept-Oct 2013.

Second point: Remember

(a) ASER is a household sample & May assessment is a school based sample

(b) The assessments are done in different points in time and so there may be natural growth as well.

(c) Attendance in May in school was low.

What about children in Std 6? How well can they read?

% Children : Reading level	Std 6 ASER 2013 Sept-Oct	Std 6 May 2014	Std 7 ASER 2013 Sept-Oct
Story	54	61.6	66.3
Para	18.2	18	15.5
Word	10.2	7.9	7.2
Letter	12.5	9.5	7.8
Beginner	5.2	2.4	3.1
Total %	100	100	100

First point:

For the same cohort, the reading level in May 2014 is higher than that in Sept-Oct 2013.

Second point:

However, the two sources are different (Sept-Oct figures/ASER are from household survey and May figures are from school based assessment). The time period is different so children may have gained in this time. Finally attendance in school was low in May.

All these factors make a direct comparison difficult.

Summary points : Reading

For the past year, in Bihar there has been focus on building reading skills. Special time has been allocated on a daily basis where children in Std 3, 4 and 5 are taught by level rather than by grade. In Std 1 and 2 teachers have received special training.

Both these efforts need to be continued in the 2014-15 school year and strengthened. In Std 1-2 priority should be given to building strong foundations for reading with understanding. For Std 3-5 the focus on building reading skills needs to be sustained and needs to be accompanied by discussions on texts and development of critical thinking skills.

The data from ASER 2013 (Sept-Oct) and the data from the May assessment together point to improvement of basic reading skills over time. However, it would be much better to track the same children over time (especially over the course of one school year) to see how children progress.

If possible we would recommend going back to the same clusters and schools and to the same children in May 2015 and compare with the data of May 2014.

Section 3 : Pen-paper language assessment for Std 4 and Std 6

What was the structure/content of the pen-paper language test for Std 4?

The pen-paper assessment in language had:

- Word recognition tasks: Matching pictures with words (Std 1-2 level question)
- Vocabulary items : Choosing the right word from a list of given words (synonym, antonym etc)
- Reading-comprehension: Questions based on a given passage (short & long)
  - Retrieve fact directly from text
  - Integrate information
  - Make inference
  - Synthesize/summarize

There were two passages – one short 100 words (seen passage) and one long 200 words (unseen passage).

All questions for the Std 4 language assessment had multiple choice format. Every question had 5 options from which the child could choose.

There were 2 samples for the written test. Children sitting next to each other were given different samples.

At the beginning of the language pen-paper test, how to do multiple choice questions was explained at length to children.

Grading was done in every district by the DIET students or CRCCs under the supervision of the master trainers.

Example 1 : Std 4 pen-paper test ..Easy item

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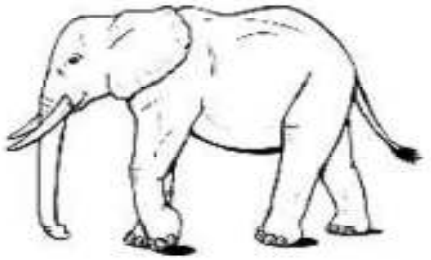
This is an example of a picture-word matching item where the child had to tick the box with the correct option. There were 5 such pictures. This question does not require too much reading.



a) लोमड़ी ☐
b) हाथी ☐
c) भालू ☐
d) शेर ☐
e) उत्तर पता नहीं ☐

Std 4 language pen-paper test		% Children answering questions correctly					
		Std 4 language written test : Of those who can read at different levels, what % can answer this question correctly					
Question type	**Different items**	**All children**	**Std 2 level readers (story) ***	**Std 1 level readers (para) ****	**Word level readers**	**Letter level readers**	**Beginners**
Match a given picture with the correct word from a given list of words (Std 1-2 level question)	Picture 1	**77.6**	89.2	82.6	76.3	66.1	48.8
	Picture 2	**64.6**	74.5	66.1	62.7	55.6	43.6
	Picture 3	**71.5**	86.6	76.1	68.3	55.2	41.8
	Picture 4	**73.4**	86.5	77.6	70.1	60.4	45
	Picture 5	**72.1**	85.4	76.2	69.2	58.3	44.5

**How to read the table: 89.2% of children at story level can do Picture 1 question correctly.*
***82.6% of children at para level can do Picture 1 question correctly. And so on …*

Example 2 : Std 4 pen-paper test ..Vocabulary

In each sample, there were 3 questions for assessing vocabulary. They included completing a sentence with the right word from a list of words (see Q6 below), antonyms (like Q8 below) and synonyms (not shown here). All were MCQ.

Q7. इनमें से कौन-सा शब्द 'इनाम' का समानार्थी/समान अर्थ वाला शब्द है?

- a) संस्कार ☐
- b) निमंत्रण ☐
- c) पुरस्कार ☐
- d) पकवान ☐
- e) उत्तर पता नहीं ☐

Q8. इनमें से कौन-सा शब्द 'निकट' का विलोम/उल्टे अर्थ वाला शब्द है?

- a) ऊपर ☐
- b) नीचे ☐
- c) पास ☐
- d) दूर ☐
- e) उत्तर पता नहीं ☐

% Std 4 children with different outcomes	Synonym task	Antonym task
Blank/Did not write anything	14.7	14
Multiple ticks/ ticked outside box	8.6	10.1
Ticked dont know option	7.7	6.9
Ticked incorrect options	31.8	37
Ticked correct option	37.1	32
Total percentage	100	100

The table above indicates that:

- About one third of all children got the answer correct.
- Another one third ticked on incorrect options

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- Another one third did not attempt, or did not know how to handle MCQ or ticked the option – for "I don't know".

Example 3 : Std 4 pen-paper test ..Reading & comprehension

This is a direct fact retrieval task.

एक दिन जंगल में सभी जानवरों की सभा रखी गई। बरगद के नीचे हाथी, शेर, लोमड़ी, सियार, भालू, बन्दर, हिरण, खरगोश और अजगर सभी आ चुके थे। सबने हाथी को अपना सभापति चुना। सबने अपनी-अपनी परेशानी बताई। मिलकर हल ढूँढने की कोशिश की। खरगोश ने शिकायत की - ''भालू अपने घर का सारा कचरा मेरे बिल के पास फेंक देता है। बन्दर भी केला खाकर छिलका रास्ते में गिरा देता है। सभी जहाँ-तहाँ थूकते रहते हैं। तालाब का पानी भी गंदा हो गया है।'' तभी अचानक आँधी चलने लगी और बारिश शुरू हो गई। सभा अगले दिन तक के लिए रोक दी गई।

Short "seen" passage

खरगोश ने भालू की क्या शिकायत की?

a) वह जहाँ-तहाँ थूकता रहता है। ☐

b) वह तालाब का पानी गंदा करता है। ☐

c) वह कचरा खरगोश के बिल के पास फेंक देता है। ☐

d) वह केले का छिलका रास्ते में गिरा देता है। ☐

e) उत्तर पता नहीं ☐

What is needed to do this question correctly?

To do reading and comprehension tasks,

(a) a child needs to be able to read fluently,

(b) understand the text and the questions

(c) be able to extract relevant content from the text

Can children do this task?

- 22,354 Std 4 children took the pen-paper language test.
- Of all the Std 4 children who took the test, **36.3%** children could answer this question correctly.

If a child can read then the chances are higher that s/he can answer this question. But not all children who can read can answer this simple fact retrieval question.

Std 4 : Overall Findings in Language test

No.	Task (Total children tested = 22354)	% Children getting the correct answer
1	Matching a given picture to the right word	over 70%
2	Vocabulary tasks - synonym	37%
3	Vocabulary tasks - antonym	32%
Reading-comprehension: Short seen question (narrative text)		
4	Direct fact retrieval	36.3%
Reading-comprehension: Longer unseen passage (informative text)		
5	Direct fact retrieval	37.3%
6	Integrate information (Fact retrieval from more than one sentence in the text)	28.7%
7	Inference	17.0%
8	Synthesize/summarize	25.9%

Apart from the easy items (matching pictures with words), for all the other questions 1 out of 3 children get correct answers for most questions. Doing tasks other than fact retrieval from the text seems to be difficult for children.

In classroom teaching, more focus needs to be given to discussions with text & critical thinking activities. Such preparation could be included in trainings.

How is the ability to tackle questions in the pen-paper test for language linked to reading?

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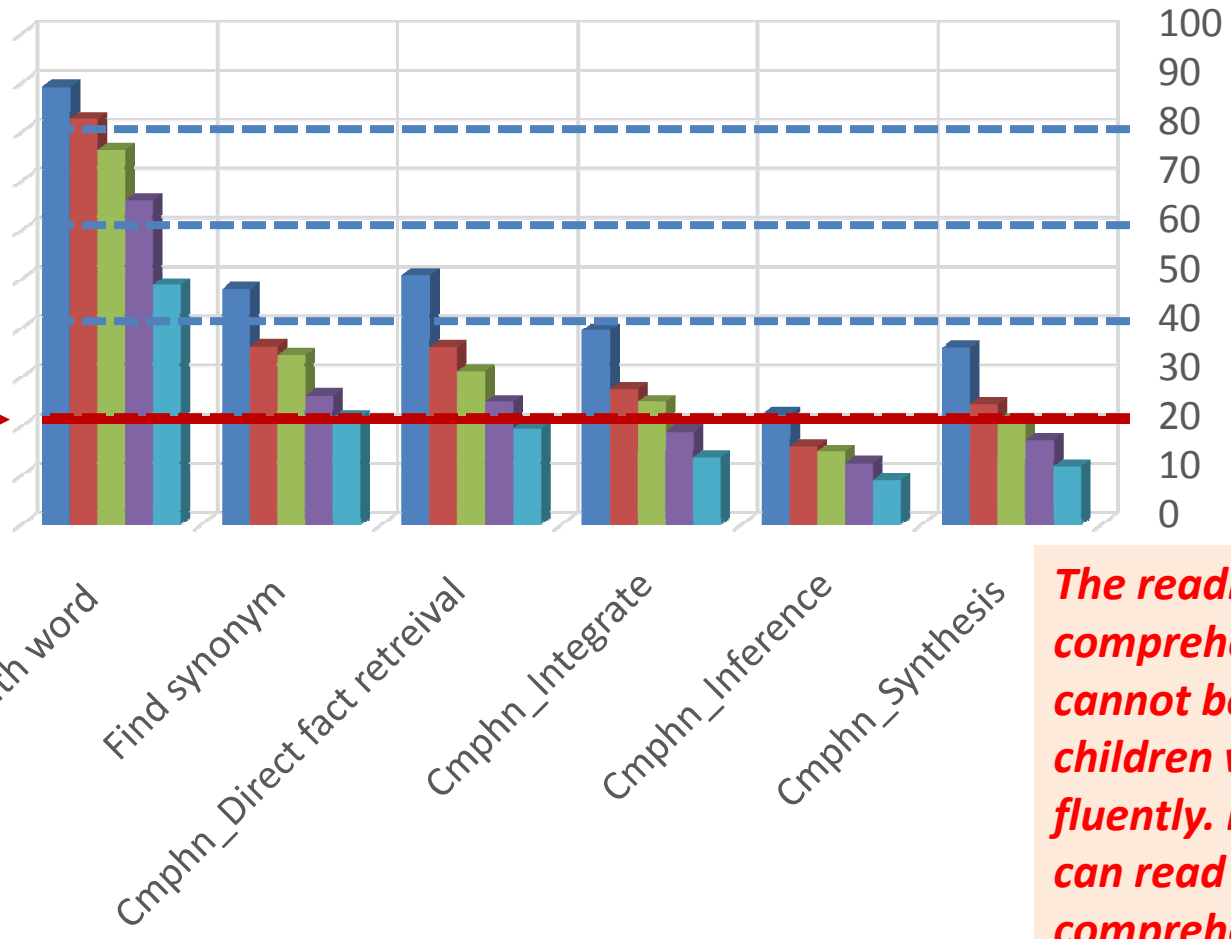
For every question, children who can read fluently are doing much better than children who cannot read.

% Children answering specific questions correctly
Std 4 written test in language by reading level

Note: If children randomly mark options in MCQ format they will get 20% correct.



The reading-comprehension tasks cannot be done by children who cannot read fluently. But not all who can read can answer the comprehension questions

What was the structure/content of the pen-paper language test for Std 6?

The pen-paper assessment in language had:

- Word usage: Chose the right word to complete a sentence..
- Vocabulary items : Choosing the right word from a list of given words (synonym, antonym etc) Also items on meaning of proverbs/"muhavara"
- Reading-comprehension: Questions based on a given passage (short & long)
  - Retrieve fact directly from text
  - Integrate information
  - Make inference
  - Synthesize/summarize

There were two passages – one short 100 words (seen passage) and one long 200 words (unseen passage).

Questions were a combination of multiple choice format (5 options) and open ended questions.

There were 2 samples for the written test. Children sitting next to each other were given different samples.

At the beginning of the language pen-paper test, how to do multiple choice questions was explained on the black board.

Grading of MCQ was done in every district by the evaluators under supervision. Open ended questions were graded by master trainers.

Example 1: Std 6 : Vocabulary tasks

Q1. वाक्य पूरा करने के लिए सही शब्द चुनो।

अपना काम पूरा किए बिना रमा ____ नहीं करती।

a) गुस्सा ☐
b) ज़िद ☐
c) खुश ☐
d) विश्राम ☐
e) उत्तर पता नहीं ☐

A total of 17648 children in Std 6 took the pen-paper language test.

About half of all children tested are able to do the questions on word usage and vocabulary correctly.

% Children answering correctly	Items	All children tested
Word usage : Choose correct word from word list to complete a given sentence	Item 1	51.2
	Item 2	57.4
	Item 3	57.9
	Item 4	43.2
Find synonym word	Item 5	50.9
Find antonym word	Item 6	32.3
	Item 7	47.9
Find correct meaning of proverb (muhavara)	Item 8	52.5

Q5. इनमें से कौन-सा शब्द 'इनाम' का समानार्थी/समान अर्थ वाला शब्द है?

a) पकवान ☐
b) निमंत्रण ☐
c) पुरस्कार ☐
d) संस्कार ☐
e) उत्तर पता नहीं ☐

Example 2: Std 6: Reading-comprehension tasks

Q9. असलम की माँ ने उसे किसकी दुकान से कपड़े लेने भेजा?

a) मोहन की दुकान ☐
b) रहीम चाचा की दुकान ☐
c) अब्दुल चाचा की दुकान ☐
d) असलम के मामा की दुकान ☐
e) उत्तर पता नहीं ☐

Direct fact retrieval question – The answer to this question can be found in one sentence in the text.

61% got this question correct

This is a short passage. ~ 30 sentences & 330 words.

Q10. मोहन स्कूल में क्यों रो रहा था?

a) क्योंकि वह बहुत गरीब था। ☐
b) क्योंकि उसकी माँ का देहांत हो गया था। ☐
c) क्योंकि उसके पिताजी बहुत बीमार थे। ☐
d) क्योंकि उसके कोई भाई–बहन नहीं थे। ☐
e) उत्तर पता नहीं ☐

Indirect fact retrieval question – The answer to this question requires the student to read an entire paragraph and find the correct answer.

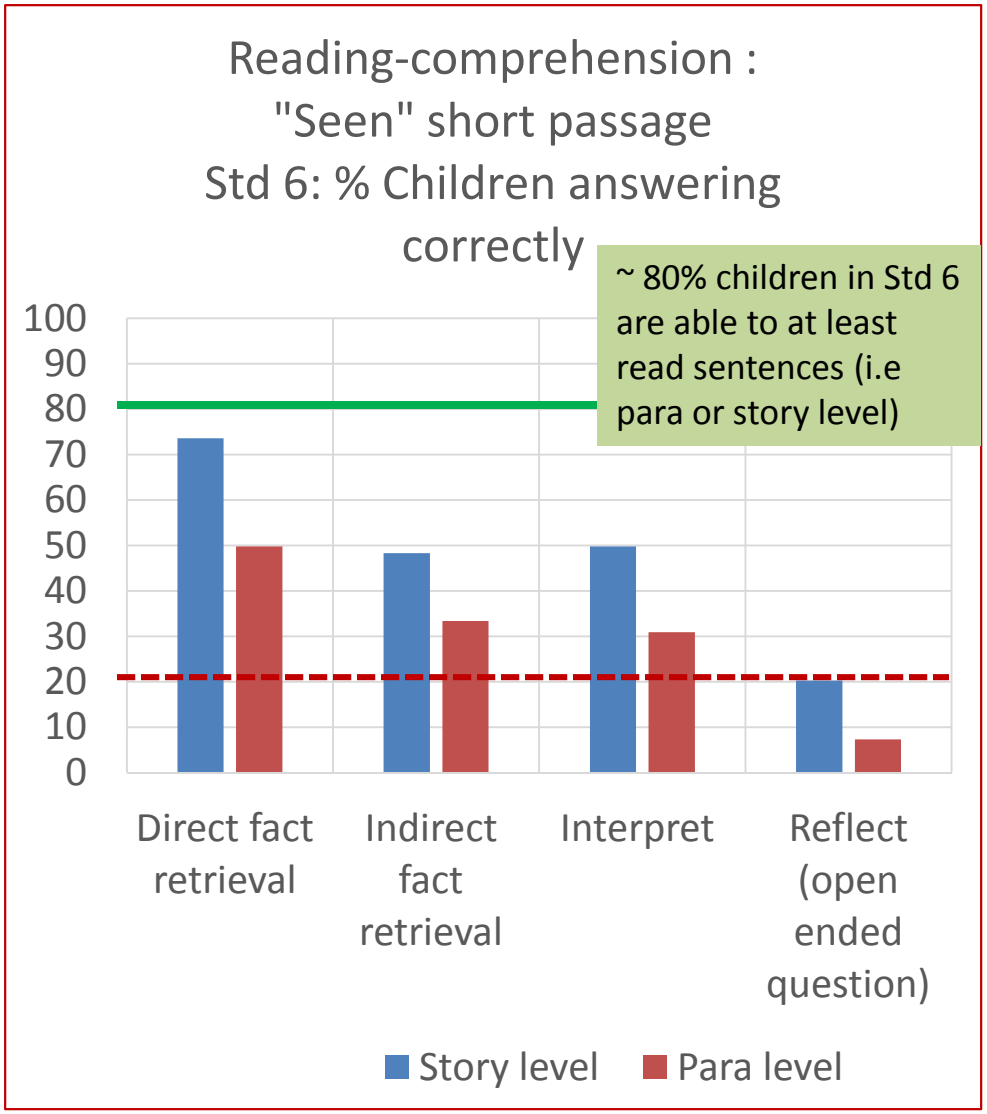
About 40% got each of these questions correct

Q11. असलम को सपने में अल्लाह ने कहा - "सच्ची ईद तुम्हीं ने मनाई।" अल्लाह ने ऐसा क्यों कहा?

a) क्योंकि उसने अपनी माँ के निर्देश का पालन किया। ☐
b) क्योंकि उसने सारे रुपये माँ की दवाई खरीदने में खर्च कर दिए। ☐
c) क्योंकि उसने एक ज़रूरतमंद व्यक्ति की मदद की। ☐
d) क्योंकि उसने गरीब बच्चों के लिए नए कपड़े खरीदे। ☐
e) उत्तर पता नहीं ☐

Interpretation question – The answer to this question requires an understanding of the entire text & synthesis for overall meaning.

Std 6: Links between reading & comprehension



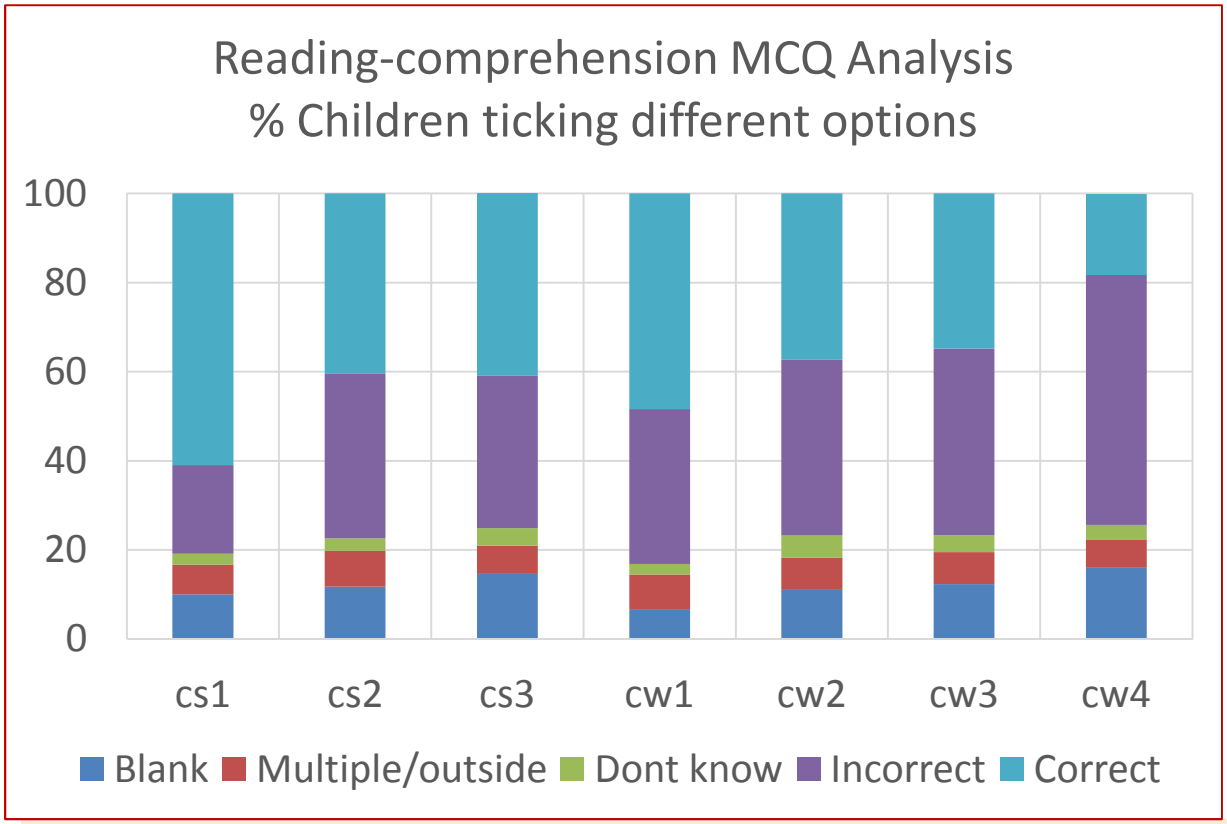
Among comprehension items, children find it easier to do the fact retrieval tasks than the questions which need interpretation, application or reflection.

Fluent readers do much better than others in comprehension tasks.

In our classroom teaching, much more focus needs to be put on deeper discussion of texts and on higher order critical thinking skills so that children learn how to interpret, infer, summarize and reflect. These abilities will strengthen if there is more in depth discussions in the classroom based on texts. .

In Std 6, 61.6% are reading at Std 2 level or higher. 18% can read at para level (Std 1 level).

Std 6 : Analysis of "mistakes"
Reading comprehension MCQ items



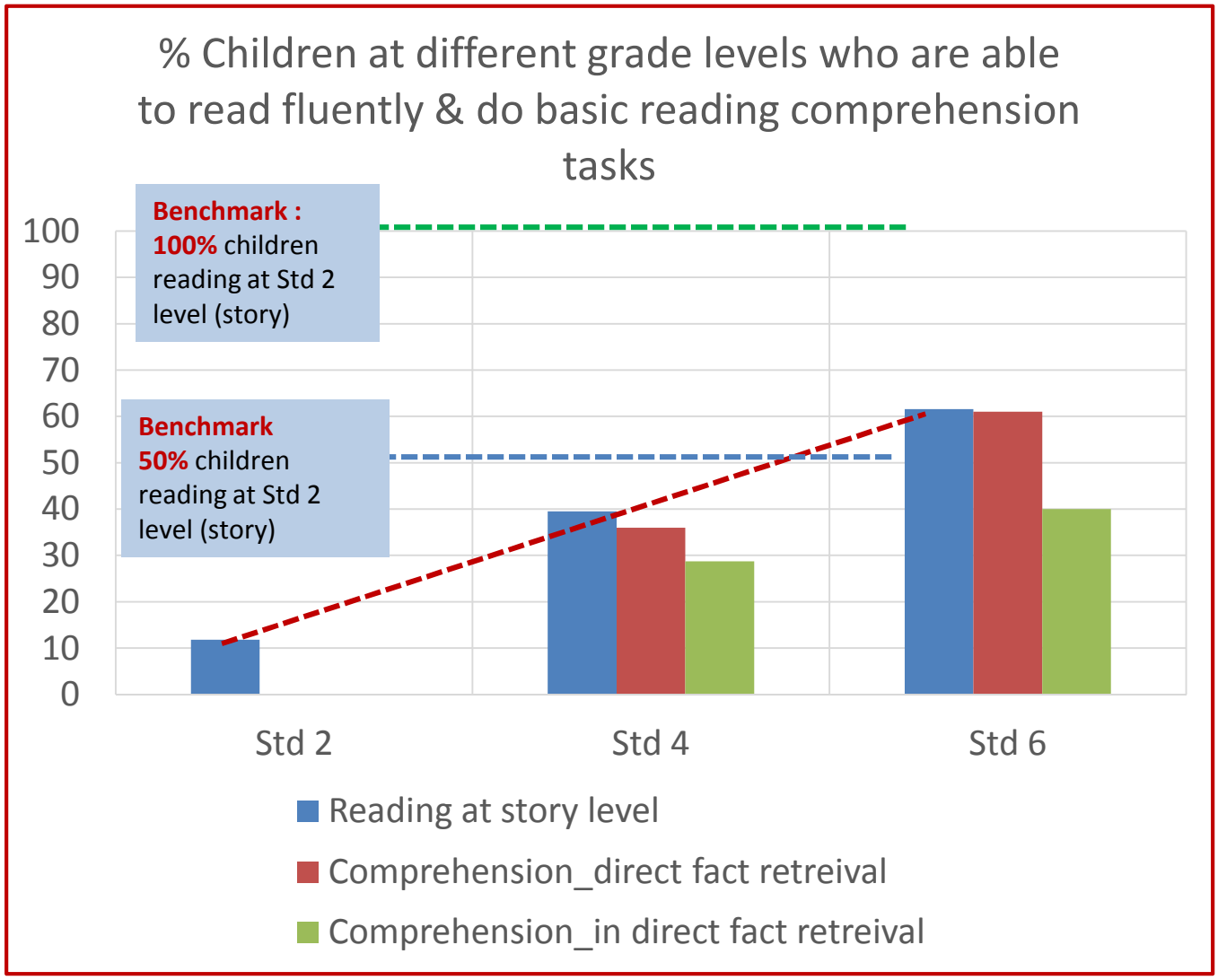
Different kinds of reading-comprehension tasks (MCQ)	
Short passage	
cs1	Direct fact retrieval
cs2	Indirect fact retrieval
cs3	Interpret
Longer passage	
cw1	Direct fact retreival
cw2	Indirect fact retreival
cw3	Integrate
cw4	Interpret

The "correct" and "incorrect" responses vary by the level of difficulty of the question but

- 20-25% do not attempt the question (blank)
- 6-8% do multiple ticks or do not tick in the box
- 2-5% tick the "do not know" option

One fourth to one third of all children

Ability to read and comprehend – Comparison across grade levels: Data from written language assessment



Ability to read is higher in higher classes. But even in Std 6 we do not have all children reading at Std 2 level.

The ability to read and comprehend at least at the basic level (fact retrieval) is highly correlated with the ability to read fluently.

Std 2 was only given the reading assessment. No written test.

Summary: Language written assessment

- The data clearly indicates the importance of building strong ability to read. Without being able to read fluently, children cannot progress successfully in school.
- Going beyond reading to comprehension, we see that of children who can read, a majority can do basic tasks like direct fact retrieval.
- But most are unable to go beyond just facts to tasks that involve integrating information, inferring meaning or synthesizing or summarizing what they have read.
- In daily classroom activity, much more discussion is needed so that children learn to engage meaningfully with texts. Such activities will also help to improve critical thinking skills among children.

For children particularly younger children such as those in Std 4, the data using MCQ format has to be interpreted with caution.

Recall that the multiple choice questions had 5 options. This means that the probability that a child would get the correct response, by randomly ticking an option, is 20%. Therefore, estimates around 20% have to be interpreted with caution -- they may just be indicative of children choosing random responses rather than knowing the correct response.

Section 4 : Math assessment – One-on-one assessment & pen and paper tests

Sample: One-on-one math assessment.

This was done with every child in Std 2 & Std 4 in the selected schools.

गणित की जाँच SAMPLE (1)

अंक पहचान 1–9	संख्या पहचान 10–99	जोड़	घटाव
3 7	64 88	27 + 42 = ___ ; 55 + 23 = ___	51 − 35 = ___ ; 84 − 19 = ___
1 4	92 56	47 + 21 = ___ ; 65 + 33 = ___	67 − 49 = ___ ; 73 − 36 = ___
8 9	37 72	51 + 36 = ___ ; 34 + 12 = ___	56 − 38 = ___ ; 62 − 13 = ___
5 2	85 11	46 + 32 = ___ ; 71 + 22 = ___	45 − 18 = ___ ; 43 − 24 = ___
	29 87		

बच्चे को कोई भी 5 अंक पहचानने को कहें। कम से कम 4 सही होने चाहिए।

बच्चे को कोई भी 5 संख्या पहचानने को कहें। कम से कम 4 सही होनी चाहिए।

बच्चे से कोई भी 2 जोड़ के सवाल करने को कहें। दोनों ही सही होने चाहिए।

बच्चे से कोई भी 2 घटाव के सवाल करने को कहें। दोनों ही सही होने चाहिए।

This set of arithmetic tasks are progressive. Children were marked at the highest level they could do correctly.

What about math in one-on-one testing?

MAY 2014 : BASIC MATH TEST : ONE-ON-ONE		
% Children ability to do basic maths at different levels by grade	Children's std refers to their grade in in 2013-14 school year:	
	Std 2	Std 4
Can do 2 digit subtraction with borrowing	14.8	46.6
Can do 2 digit addition without carry over but not 2 digit subtraction with borrowing	21.5	24.9
Recognizes 2 digit numbers but cannot do 2 digit addition	10.0	8.0
Recognizes 1 digit numbers but not 2 digit numbers	42.5	17.3
Not yet able to recognize numbers till 9	10.4	2.5
Total %	100	100
Number of children tested	22424	22467

53% in Std 2 not comfortable with numbers till 100

27% in Std 4 need to learn basic addition subtractn

For Std 2 & 4 basic foundational skills in number knowledge & operations is needed.

How does children's math ability in May 2014 compare to the data from ASER 2013? Data from Std 4

% Children in Std 4 who can do different arithmetic tasks	Sept-Oct 2013 ASER	
Division 3 digit by 1	18.5	38.2%
Subtraction with borrowing	19.7	
Number recognition 11-99	27.5	
Number recognition 1-9	25.2	34.4%
Beginner level	9.2	
Total %	100	

% Children in Std 4 who can do different arithmetic task	May 2014	
Subtraction with borrowing	46.6%	
Addition without carry	24.9	
Number recognition 11-99	8	
Number recognition 1-9	17.3	25.8%
Beginner level	8.5	
Total %	100	

Results for the same cohort are higher in May 2014 than for Sep-Oct 2013 (ASER). However, methods of collecting data in each case is different. Also time period is different and tools are slightly different.

What was the content of the pen-paper maths written assessment?

For Std 4 and 6, the written test had the following components:

- Tasks that assessed child's number knowledge (e.g. comparison between numbers, writing numbers in words and numerals etc)
- Basic operations : addition, subtraction, multiplication, division – both in numerical and word problem formats
- Applied questions (tasks with calendar, menu, telling time etc)

Std 6 had additional items for geometry, fractions, integers, pictographs, data handling etc

The maths question papers had multiple choice questions as well as questions that children had to solve.

At the beginning of the testing session, how to do multiple choice questions was explained to children using examples.

Two samples of question papers were used for both grades. Children sitting next to each other were given different samples of the question paper.

On a daily basis, grading was done by surveyors under the guidance of the master trainers.

Std 4 : How well can Std 4 children do the math written test paper? Basic tasks

Number knowledge & simple operations			% Children who get correct answers	
Q1a	2 digit	Comparison of numbers	67	Multiple choice questions
Q1b	3 digit	Comparison of numbers	62.8	
Q1c	3 digit	Comparison of numbers	50.6	
Q3a	3 digit	Write number in numerals	46.4	Requires reading
Q3b	3 digit	Write number in numerals	46.9	
Q4a	2 digit	Numerical addition sum with carryover	69.8	Does not require reading
Q4b	2 by 1	Numerical multiplication	60.2	
Q4c	2 by 1	Numerical division	47.5	

By end of Std 4:

- Between half and two-thirds of all children are able to do basic number knowledge tasks and basic operations with 2 digit numbers.
- About two thirds of the children in Std 4 seem comfortable with 2 digit numbers and operations. By this stage in school, all children should have number knowledge of all numbers up to 100 and beyond. About half the children can deal with 3-digit numbers.

Std 4: How well can Std 4 children do the math written test paper? Word problems

% Children getting correct answers			All children	Of children who are reading at story & para level what % can do these problems? → Story	Para
Q7	2 digit	Word problem subtraction (borrow)	49.1	68.8	50.8
Q8	2 by 2	Word problem multiplication	30.1	46.2	28.6
Q9	2 by 1	Word problem division	31.1	47.7	30.4

Q7. एक दुकानदार के पास 70 किलो आलू थे। उसने 35 किलो आलू बेच दिए। बताओ कि दुकानदार के पास कितने किलो आलू बचे?

Q8. एक कलम की कीमत 15 रुपये है। रमेश ने दुकानदार से 12 कलम खरीदे। बताओ कि रमेश ने दुकानदार को कुल कितने रुपये दिए?

Q9. सीमा दीदी 75 बिस्कुट को 5 बच्चों में बराबर-बराबर बाँटती है। अब बताओ कि हर बच्चे को कितने बिस्कुट मिलेंगे?

- To do these type of word problems correctly, a child should know how to read, understand what operation is to be done and then be able do the operation correctly.
- Even among children who can read, we can see that a large proportion do not know what is to be done to solve the word problems.
- Comparison between questions reveals that for the same operation, more children can correctly do the numerical problem rather than the word problem.

How well can Std 4 children do the math written test paper? Applied questions

Example of one applied question

Q10. नीचे दिए गए जून 2014 के कैलेन्डर को देखो और दिए गए प्रश्नों के उत्तर दो।

जून 2014

रविवार	सोमवार	मंगलवार	बुधवार	वृहस्पतिवार	शुक्रवार	शनिवार
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

a) इस महीने का तीसरा मंगलवार 17 तारीख को है। बताओ कि इस महीने का दूसरा बुधवार कौन-सी तारीख को था?

उत्तर यहाँ लिखो

b) ये कैलेन्डर जून 2014 का है। बताओ 2 जुलाई 2014 को कौन-सा दिन होगा?

उत्तर यहाँ लिखो

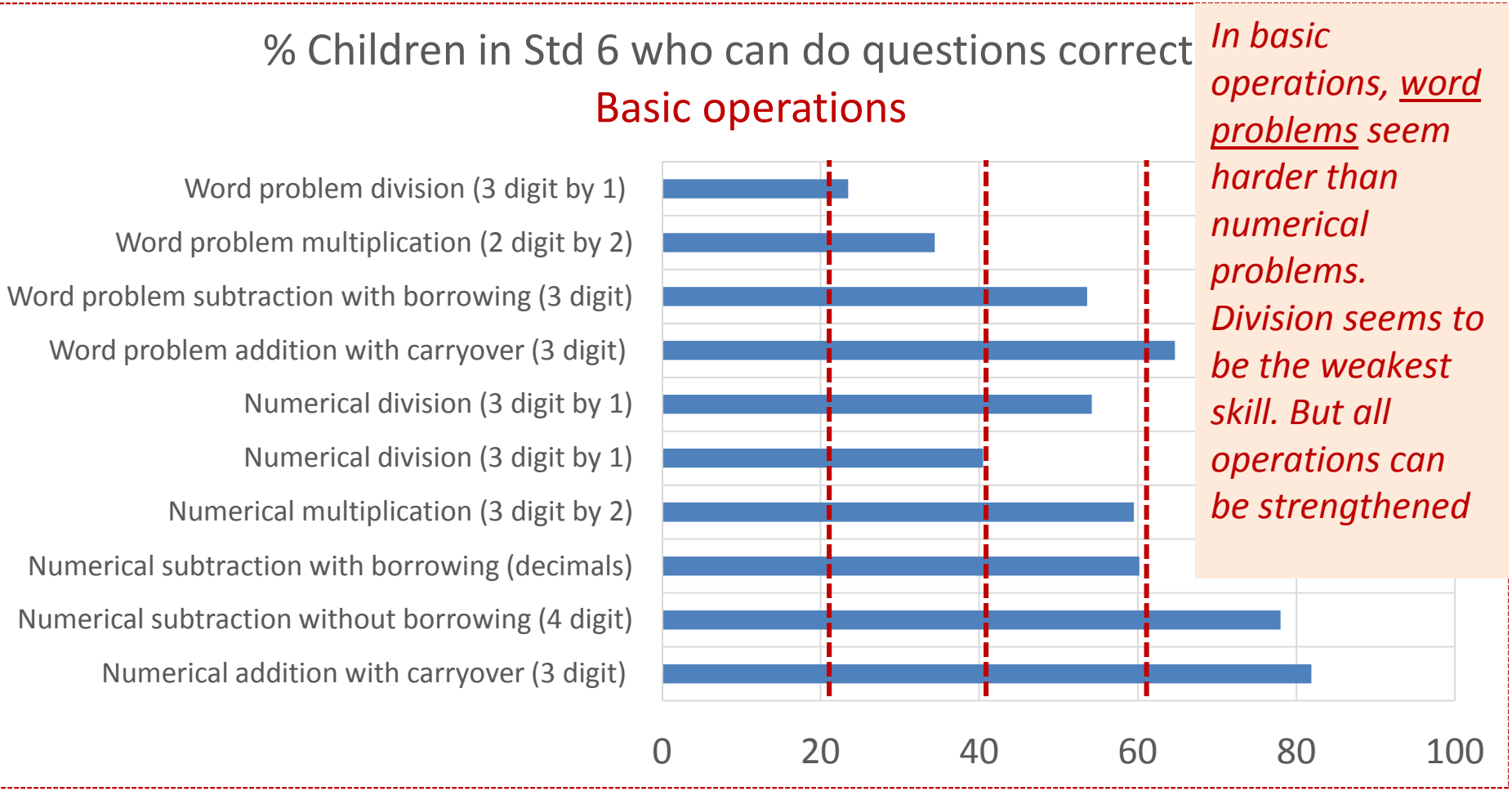
		% Children who got correct answer	All children
Q5a	Clock	Telling time	17.1
Q5b	Clock	Telling time	29
Q10a	Calendar	Calendar word problem 1	24.6
Q10b	Calendar	Calendar word problem 2	16.7
Q11b	Menu	Menu card problem 2	24.5

The applied questions aim to see if the children can apply what they know to "real life settings".
The computations, if any, are straightforward but the format/context of the questions may be unfamiliar to children. In addition, the question requires that children can read and comprehend.

Overall, performance in these questions is quite low. Even among children who can read fluently, 1 out of 3 can do the first calendar problem and 1 out of 4 can do the second.

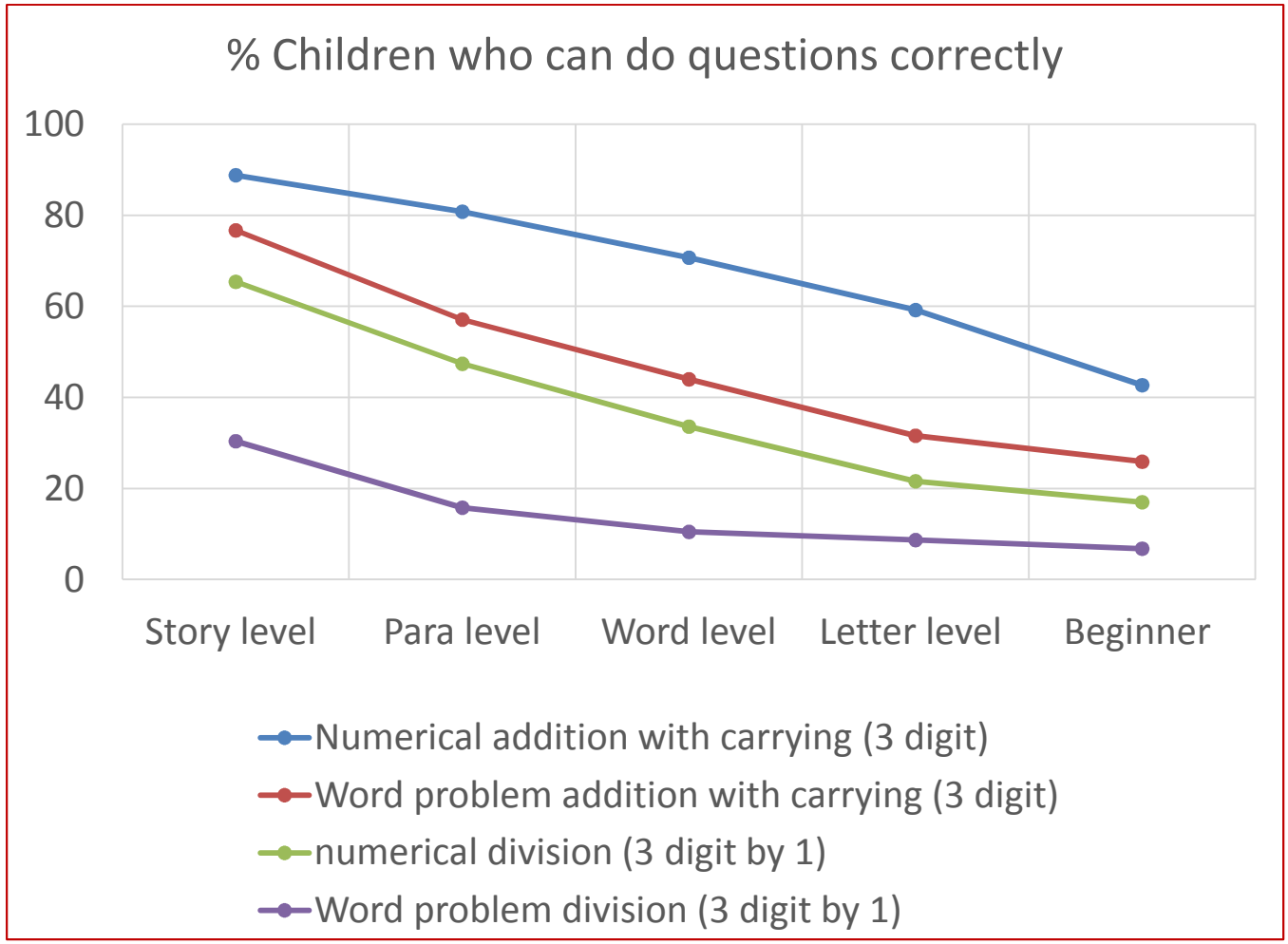
How well can Std 6 children do the math written test paper? Basic operations

- 17640 Std 6 children took the math written test.
- 70-80% children could do the number knowledge questions correctly.



In basic operations, word problems seem harder than numerical problems. Division seems to be the weakest skill. But all operations can be strengthened

How well can Std 6 children do the math written test paper? Link to reading ability?



Two types of operations have been chosen here as examples:

- Addition with carryover
- Division

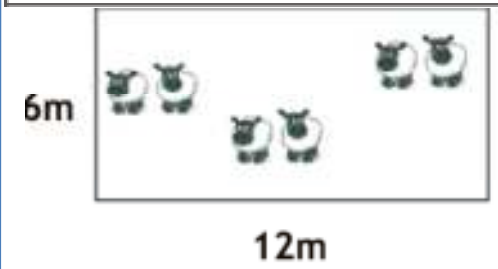
For each type of operation, the ability to do numerical problems much higher than that for doing word problems

Again we can see that the ability to solve arithmetic questions (whether numerical or word problems) is strongly correlated with the reading level of the child.

How well can Std 6 children do the math written test paper? Applied questions

Example of an applied question

Q18. राजू के पास एक खेत है, जहाँ उसकी भेड़ चरती है। नीचे दिया गया चित्र राजू के खेत की लंबाई और चौड़ाई को दर्शाता है।



a) इस खेत का क्षेत्रफल (Area) निकालो।

b) इस खेत का परिमाप/परिमिति निकालो।

c) एक मीटर तार की कीमत 20 रुपये है। राजू को अपने खेत के चारों ओ
तार लगाने में कितने रुपये खर्च करने होंगे?

% Children getting correct answer	Of all story level readers % who can do this problem correctly	Of all para level readers % who can do this problem correctly
Area question	36.8	23.7
Perimeter question	27.2	15.3
Calculation question	16.8	9.8

This is another example of how reading level influences the ability to do maths.

Children's basic concepts as well as the ability operations need to be strengthened. Other applied questions also indicate similar performance.

Summary points : Maths

Of all the competencies in maths, children at different grade levels are relatively better in number knowledge.

Even with basic operations, strengthening of children's computational ability is needed.

For each operation, children find the numerical problems easier than the word problems even if the calculation that needs to be done is similar. The ability to do word problems is based on the ability to read, to understand what needs to be done and then the computational ability to do the operation correctly. All of these three abilities need focus for majority of children in Std 4 and Std 6

Children's performance levels in applied questions suggests that perhaps they are not exposed to a variety of applications or of how to link questions/problems or contexts that need mathematical applications in real life (See NCF and BCF recommendations on this issue). Classroom teaching activities need to focus on discussions of problems in maths as well as on developing critical thinking skills. (Note: a recent study on teachers and teaching also indicated that teachers have difficulties in teaching such competencies.) This is clearly an input that needs to go into teacher training.

Section 5 : Cluster report cards

One of the reasons to do this exercise at the cluster level was to provide information to CRCCs and others of how to monitor/guide and support the schools in their care. (Such report cards will be made available shortly for all clusters that were sampled in each district.)

In this section, there is a sample of a cluster report card. Looking at the data school by school, it is clear that there is a great deal of variation in performance across schools in the cluster.

- There are schools that are performing well. These schools/teachers can be a valuable resource or a "model" of good practice in the cluster.
- There are schools which need focussed attention and may need additional training and monitoring.

Based on data generated by this exercise, plans can be made for academic tracking of children's progress over time, think about how teacher training needs more inputs and how CRCCs and others can support and monitor schools in an ongoing basis.

Example : Cluster report card: Reading Std 2 West Champaran – Baishakhwa

School Name	Total children tested	Beg.	Letter	Word	Para	Story	Reading test not given	Total %
GOVT. M.S. BAISAKHWA	78	35.9	17.9	17.9	14.1	14.1	0.0	100
GOVT. M.S. DHANKUTWA	50	66.0	28.0	2.0	2.0	0.0	2.0	100
GOVT. U.M.S. JHAKHRA	84	13.1	38.1	16.7	20.2	11.9	0.0	100
GOVT. U.M.S. NARKATIA	61	44.3	34.4	4.9	8.2	8.2	0.0	100
GOVT. U.M.S. BEHRA DAKSHIN TOLA	43	23.3	41.9	23.3	9.3	0.0	2.3	100
GOVT. P.S. GANESHPUR	43	34.9	44.2	4.7	9.3	7.0	0.0	100
GOVT. P.S. GOPALPUR.	37	8.1	32.4	18.9	18.9	21.6	0.0	100
GOVT. P.S. DHANKUTWA UTTAR TOLA	32	34.4	40.6	3.1	6.3	15.6	0.0	100
GOVT. P.S. JAGORIA TOLA	37	75.7	18.9	5.4	0.0	0.0	0.0	100
GOVT. P.S. DUMARA	33	30.3	45.5	3.0	12.1	6.1	3.0	100
GOVT. P.S. AUSANPUR	32	12.5	28.1	6.3	18.8	34.4	0.0	100
GOVT. P.S. PATUKAHIA	16	50.0	31.3	0.0	6.3	0.0	12.5	100
P.S.CHHARDAWALI	45	37.8	31.1	17.8	6.7	4.4	2.2	100
P.S.PATHARUA TOLA	25	36.0	44.0	4.0	4.0	12.0	0.0	100
P.S.TOLARAM GHATA	19	0.0	15.8	31.6	36.8	10.5	5.3	100
P.S.PANDEYA TOLA	4	0.0	0.0	25.0	25.0	50.0	0.0	100
Average for Cluster	**639**	**33.5**	**32.4**	**11.4**	**11.6**	**10.0**	**1.1**	**100**

Example : Cluster report card: Language written test Std 4 – West Champaran – Baishakhwa

Std 4. Language Written test		% Children getting correct answer							
		Vocabulary items			Short passage	Reading-comprehension Longer passage			
School Name	Total Child Tested	Picture word match	Find synonym word	Find antonym word	Direct fact retrieval	Direct fact retrieval	Integrate	Inference	Synthesis
GOVT. M.S. BAISAKHWA	59	78.0	50.8	49.2	52.5	50.8	47.5	13.6	37.3
GOVT. M.S. DHANKUTWA	45	57.8	15.6	15.6	17.8	13.3	2.2	0.0	0.0
GOVT. U.M.S. JHAKHRA	50	86.0	58.0	60.0	50.0	56.0	56.0	24.0	44.0
GOVT. U.M.S. NARKATIA	27	44.4	11.1	14.8	25.9	22.2	29.6	14.8	25.9
GOVT. U.M.S. BEHRA DAKSHIN TOLA	49	73.5	65.3	49.0	63.3	67.3	34.7	36.7	40.8
GOVT. P.S. GANESHPUR	30	60.0	33.3	16.7	26.7	26.7	13.3	16.7	36.7
GOVT. P.S. GOPALPUR.	28	60.7	42.9	32.1	17.9	25.0	14.3	17.9	17.9
GOVT. P.S. DHANKUTWA UTTAR TOLA	24	83.3	45.8	37.5	33.3	25.0	16.7	20.8	16.7
GOVT. P.S. JAGORIA TOLA	23	73.9	30.4	21.7	26.1	39.1	21.7	17.4	21.7
GOVT. P.S. DUMARA	19	68.4	73.7	10.5	36.8	68.4	63.2	5.3	57.9
GOVT. P.S. AUSANPUR	40	90.0	62.5	55.0	37.5	82.5	22.5	17.5	57.5
GOVT. P.S. PATUKAHIA	34	38.2	8.8	8.8	11.8	8.8	5.9	2.9	2.9
P.S.CHHARDAWALI	15	93.3	80.0	86.7	60.0	66.7	60.0	60.0	46.7
P.S.PATHARUA TOLA	6	100.0	83.3	83.3	100.0	83.3	50.0	33.3	50.0
P.S.TOLARAM GHATA	8	75.0	12.5	12.5	87.5	50.0	25.0	50.0	37.5
P.S.PANDEYA TOLA	5	60.0	0.0	0.0	40.0	80.0	0.0	40.0	40.0
Average for Cluster	**462**	**70.6**	**43.5**	**36.4**	**38.7**	**44.4**	**29.4**	**18.8**	**31.6**

Section 6 : Learnings from the exercise

- Reading and one-on-one math assessment provides a good way to know and understand children especially in the case where children's reading ability is still not strong. These assessments are easy to do, to record and to use. At the school level doing such basic assessments at the beginning of the year will help teachers know where their children stand. Similar basic assessments in mid year and end of the year will provide information about progress of children on basic skills. Clearly reading and basic math skills need continued and sustained attention across all grade levels.

- Written tests especially multiple choice questions should keep in mind that at the lower end it is difficult to say how children are performing. Also for each item in the written tests about 10-12% (and maybe more) children do not mark the options in the boxes provided for MCQs. Children who cannot read often do not even attempt the question.

- Inputs from this assessment can do directly into thinking about how to design training programs for teachers, how to make monitoring more effective at cluster level and which schools to focus on for improvement and for support.

Our grateful thanks to Bihar Government Education department, SCERT and UNICEF for making this exercise possible.

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