



Diagnosics for Remediation

an assessment of learning losses due to COVID-19 in Pakistan



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EXECUTIVE SUMMARY

The onset of COVID-19 and the continued, prolonged school closures have significantly impacted student learning across the globe. In Pakistan, student learning prior to the pandemic was already substantially low and COVID-19 has worsened the existing learning levels.

In Pakistan, only 17% of Grade 3 students could solve two-digit division, and this number plummeted to a mere 10% in 2021 (Idara-e-Taleem-o-Agahi, 2021). In 2019, Pakistan participated for the first time in the Trends in International Mathematics and Science Study (TIMSS) for Grade 4 math and science. Amongst 600,000 students from 58 countries and six regions, Pakistan ranked second from the bottom (57th out of 58): Only 27% of our fourth graders met the low international benchmark in mathematics, 8 percent met the intermediate international benchmark, and just one percent (1%) met the high international benchmark (TIMSS, 2020).

School systems across the globe are now attempting to recover their students' learning and Pakistan's education system should follow a similar path. Pakistani classrooms cannot operate on a business-as-usual trajectory and it is imperative that education departments invest and prioritize the reorganizing of curriculum and instruction; the first part of this task is to design and conduct a diagnostic assessment. The purpose of the proposed diagnostic assessment will be to a) identify students' existing learning levels in prioritized SLOs for specific grades, and b) guide provinces to identify topics and SLOs where students have attained little/no mastery, which schools can then choose to remediate.

This document presents a few options for conducting diagnostics to gauge student learning levels and offers a framework for how these diagnostics can be effectively executed to inform any strategy for recovering students' learning.

DIAGNOSTIC ASSESSMENT

This section lays out the need for diagnostic assessment as an instrument to identify foundational and prioritized SLOs where remediation is required

The purpose of the proposed diagnostic assessment is to help teachers recognize competencies, topics, and student learning outcomes (SLOs) where student achievement has fallen due to school closures as well as to identify areas in which students have retained their mastery. The proposed structure of the diagnostic is to assess students in foundational and prioritized SLOs for learning continuity at grade 3, 4, 6, and 7 levels. These SLOs will be for languages (English and Urdu), mathematics, and science, with the assessment based on SLOs that were planned to have been covered in the previous grades (2nd, 3rd, 5th, and 6th).

The rationale for selecting these grades is:

01

Early primary grades [Grade 3 & 4] offer a greater chance to bridge learning gaps.

- The structure and organization of the curriculum is such that mastery of skills during foundational grades [grades 1-3] is critical for achievement in the higher grades. Research indicates that a strong foundation in mathematics and reading (in both Urdu and English) during early grades is key to future success in mathematics and language acquisition/development [for data on current learning levels in English and Math in Pakistan, please refer to the Diagnostic Assessment Framework].
- Learning of younger students has been more affected by COVID-19 than that of older students [McKinsey, 2021; Pratham, 2021; Brookings, 2020]. During pandemic-related school closures in Pakistan, younger students were less likely to use smartphones to continue their learning virtually [ASER, 2021] and less likely to watch TeleSchool [CGD, 2021]. The lack of access to phones, television and learning resources could be a potentiating factor; in Punjab (Pakistan), 90% of the poorest children live in households without a single child-oriented book (Brossard et. al, 2020); also, the economic disruption caused by COVID-19 hit hardest on the households with the least resources, thereby, lessening their access to learning materials (Conto et. al, 2021). Another reason for the relatively lower engagement of younger students could be the low likelihood of younger students to regulate or self-monitor their learning [Tomasik et. al, 2021]

02

Grades that are transition points [grades 6 and 7] and without the pressure of board exams present greater flexibility of reorganizing instruction based on students' learning levels

DIAGNOSTIC ASSESSMENT

For the proposed diagnostic for each of the grades (3, 4, 6 & 7), specific competencies, topics and SLOs have been identified. The process of shortlisting and selecting these competencies, topics and SLOs was based on:

Reviewing competencies, topics and SLOs identified by well-known institutions that have worked on/assessed foundational literacy and numeracy skills (ASER, Pakistan; Pratham, India; Early Grade Reading Assessment (EGRA); Early Grade Mathematics Assessment (EGMA); TIMSS 2019 Assessment Framework).

Competencies, topics and SLOs from previous grade(s) critical for current grade-level mastery, identified through official curriculum documents as well as the progression frameworks developed by the Pak Alliance for Math and Science [for more detail on the progression framework, please refer to the Diagnostic Assessment Framework].

Prioritizing competencies, topics & SLOs where student performance can be gauged through oral assessment and those that had the least assessor variability

Results of the March 2020 Grade 5 and Grade 8 science and maths standardised exams conducted by FDE in all government schools in Islamabad, the Sindh Achievement Test 2016-17, and the Punjab Examination Commission's Exam Analysis Report 2019.

Pakistan's National Curriculum (2006) and Single National Curriculum I-V (2020)

Prioritized SLOs include both foundational and non-foundational SLOs. Students in grades 3 and 4 will be assessed only on foundational SLOs while students in grades 6 and 7 will be assessed on foundational SLOs as well as non-foundational SLOs critical for their grade-level mastery. The Diagnostic Assessment Framework can be referred to for more detail on the selection of topics and SLOs.

DIAGNOSTIC ASSESSMENT

Here are the prioritized competencies and topics for proposed subjects & grades:

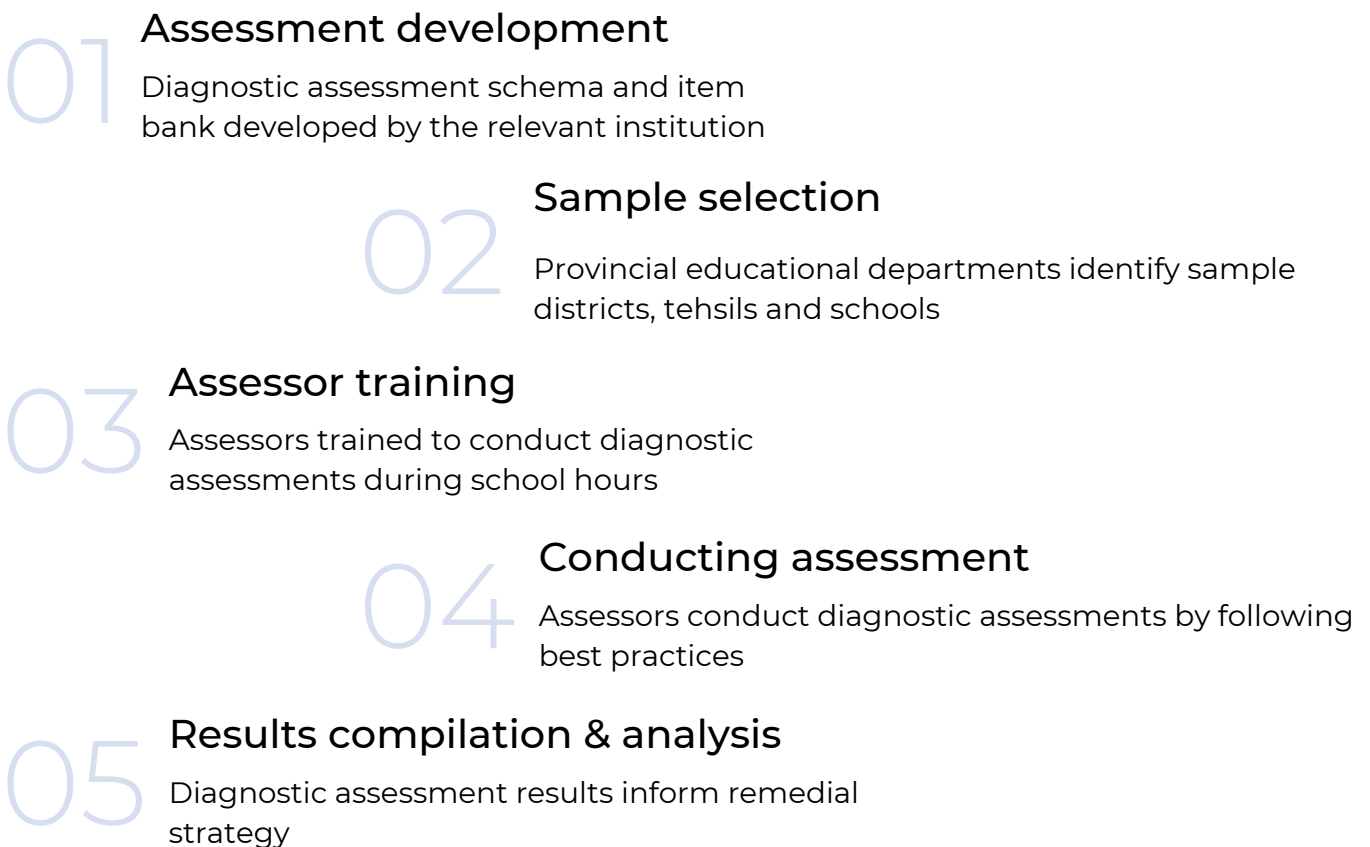
Subject / Grade	English Grades 3, 4, 6 & 7	Urdu Grades 3, 4, 6 & 7	Mathematics Grades 3, 4, 6 & 7	Science Grades 6 & 7
Competency 1	Oral communication skills	سننا	Number operations	Life sciences
Topics	<ul style="list-style-type: none"> Letter recognition Introducing ourselves Pronunciation 	<ul style="list-style-type: none"> حروف تہجی الفاظ اور جملے 	<ul style="list-style-type: none"> Number recognition Addition & Subtraction Multiplication & division Factors & multiples 	<ul style="list-style-type: none"> Classification & characteristics of living things Understanding ourselves Environmental pollution Photosynthesis & respiration in plants Cellular organization of plants & animals
Competency 2	Reading & thinking skills	بولنا	Data and probability	Physical science
Topics	<ul style="list-style-type: none"> Phonics Reading fluency & comprehension Elements of a story 	<ul style="list-style-type: none"> الفاظ اور جملے 	<ul style="list-style-type: none"> Time Measures of central tendency Fractions, decimals & percentage Information handling 	<ul style="list-style-type: none"> Forces & machines Light Electricity and magnetism States of matter Elements and compounds
Competency 3	Formal & lexical aspects	پڑھنا	Geometry	Earth & space science
Topics	<ul style="list-style-type: none"> Parts of speech Punctuation Capitalization Tenses Types of sentences Transitional devices 	<ul style="list-style-type: none"> حروف، الفاظ اور جملوں کی پہچان حروف، الفاظ، اور جملوں کا ادراک عبارت کو روانی اور صحیح تلفظ سے پڑھنا 	<ul style="list-style-type: none"> Identification of basic shapes Lengths Perimeter, area, and volume 	<ul style="list-style-type: none"> Movement of the Earth Solar System
Competency 4	-	تقریر	Algebra	-
Topics		<ul style="list-style-type: none"> اپنا اور اپنے ماحول کا تعارف 	<ul style="list-style-type: none"> Factorization Algebraic expressions Linear equations 	
Competency 5	-	زبان شناسی	-	-
Topics		<ul style="list-style-type: none"> حروف صحیح اور حروف علت واحد جمع ماضی، حال اور مستقبل جملوں کی ساخت اور بناوٹ 		

DIAGNOSTICS: STUDENTS' ASSESSMENT

The first option for conducting diagnostics is to assess students' learning in foundational SLOs in key subjects (Urdu, English, Math & Science) in critical grades (3, 4, 6 & 7). This diagnostic assessment can be conducted for sample students (sampling details present in next section) at any point in the academic year.

An important pre-requisite for this diagnostic assessment is the availability of baseline data for selecting student groups, which in most cases schools have in the form of monthly and/or annual examination results. The advantage of this diagnostic type is that it can provide personalized understanding of student needs and can facilitate provinces, districts, and schools to focus on students at risk. However, a limitation of this option is that students having experienced disruptive schooling over the last two years and providing another assessment may induce stress unless of course it is pre-empted and effectively navigated. Secondly, even though this diagnostic type will provide a clear window into students' academic mastery (or lack thereof) in prioritized outcomes, it will not provide information on students' socio-emotional needs, which directly influence student well-being and indirectly influence student learning.

The flow chart below summarizes the steps for conducting the diagnostic via student assessment:



DIAGNOSTICS: STUDENTS' ASSESSMENT

Step 1: Creating assessment items for the diagnostic assessments

Education managers at the federal and provincial levels should develop a guidance note that defines the purpose and methodology of the assessment. To facilitate provincial educational departments in designing the diagnostic assessments, a diagnostic scheme has been proposed for each of the identified subjects & grades (details present in the Diagnostic Framework document). This scheme contains:

1. Total prioritized student learning outcomes (SLOs) for each identified competency and topic
2. Percentage of foundational SLOs in each subject and grade:
 - For Grades 3 & 4, all identified SLOs will be foundational as these SLOs will be drawn from the previous classes (Grades 1, 2 & 3). Similarly, for Grades 6 & 7, students will be tested on foundational SLOs as well as non-foundational SLOs important for grade-level mastery. Foundational SLOs are critical because:
 - Helping children master foundational skills like literacy and numeracy enables them to effectively engage with advanced and complex topics in later grades (Hwa et. al, 2020; Beeharry 2021)
 - Evidence from school closures in low-income countries indicates a reduction in foundational skills (Contol et.al, 2021) and, therefore prioritizing foundational learning is critical to recovering student learning.
3. Approximate number of questions/assessment items:
 - Each prioritized SLO should be tested in a way that provides students multiple opportunities to display their SLO mastery. For some SLOs, this may mean asking a single question while for other SLOs (depending upon the SLO verb and its scope), this may mean asking multiple questions.
4. Verbal vs. written questions:
 - As per international and regional best practices, the verbal component of the diagnostic assessment is always predominant, which is evident in the Early Grade Reading Assessment (EGRA), Early Grade Mathematics Assessment (EGMA) and Pratham's Teaching At the Right Level assessment. Keeping this in mind, those SLOs were prioritized which can be assessed orally.
 - In the diagnostic scheme for each subject & grade, the respective competencies & topics have been identified that will be tested verbally as well as those that will be tested in writing have been identified.

Leveraging existing assessments

Provincial education departments can leverage existing international, regional and local assessments; the assessment structure and item banks available in EGRA, EGMA, Pratham's Teaching At the Right Level and ASER can be leveraged and tailored to the school context. Secondly, each of the provincial education departments has an assessment & examination body that conducts regular assessments for multiple grades. With an existing item bank of SLOs, provincial education departments can tailor those existing SLOs to use them for the diagnostic assessment.

DIAGNOSTICS: STUDENTS' ASSESSMENT

Step 2: Sampling of student population

The proposed sample is presented in Annexure A. Here are a few key features of the sampling process:

Selecting sample districts

To ensure representativeness, the two factors of geographical spread and learning profile can be used. Districts can be identified from each of the provincial regions. The choice of choosing a particular district from each region can be based on the Annual Status of Education (ASER) 2019 Report that provides a learning profile for each district. Within each district, schools from two tehsils or talukas should be chosen to ensure a varied geographical spread across the province.

Sample size

The sample size numbers above are based on a 95% confidence level and a 3% confidence interval in the results which should be provincially representative, with the analysis at three tiers for primary grades, and two for students enrolled in Grades 6 and 7. A total of 21,600 students would be required to be assessed across the four grades, with the breakdown in Annexure A.

An example of the type of analysis that would be available for students enrolled in Grade 3 is illustrated in the figure below:

X% of students enrolled in Grade 3 in Province Y have achieved proficiency in the 'addition up to 3-digits' SLO

X% of girls enrolled in Grade 3 in Province Y have achieved proficiency in the 'addition up to 3-digits' SLO

X% of boys enrolled in Grade 3 in Province Y have achieved proficiency in the 'addition up to 3-digits' SLO

X% of girls enrolled in Grade 3 in stand-alone govt primary schools have achieved proficiency in the 'addition up to 3-digits' SLO

X% of boys enrolled in Grade 3 in stand-alone govt primary schools have achieved proficiency in the 'addition up to 3-digits' SLO

X% of girls enrolled in Grade 3 in the primary section of govt middle schools have achieved proficiency in the 'addition up to 3-digits' SLO

X% of boys enrolled in Grade 3 in the primary section of govt middle schools have achieved proficiency in the 'addition up to 3-digits' SLO

X% of girls enrolled in Grade 3 in the primary section of govt high / higher secondary schools have achieved proficiency in the 'addition up to 3-digits' SLO

X% of boys enrolled in Grade 3 in the primary section of govt high / higher secondary schools have achieved proficiency in the 'addition up to 3-digits' SLO

DIAGNOSTICS: STUDENTS' ASSESSMENT

Step 3: Train assessors to conduct and grade the diagnostic assessment

To conduct and mark the Diagnostic Assessment, external administrators can be used. These administrators can be trained on:

- Understanding the assessment's purpose
 - Familiarizing themselves with and using the assessment booklet that contains assessment items for each of the selected grades [3, 4, 6 & 7] and subjects [English, Math, Science, and Urdu] as well as the answer key
 - Identifying guidelines for conducting Diagnostic Assessments using best practices [please refer to Diagnostic Assessment Framework]
 - Using the marking sheet to mark student responses [for a sample marking sheet, please refer to the Diagnostic Assessment Framework]
-

Step 4: Assessors conduct diagnostic assessments using best practices

- A comfortable testing environment should be ensured
- Students should have opportunities for self-correction: A child may self-correct their answers. If a child gives a response to an item and then notices that he/she is not happy with that answer and then changes his/her answer, the last answer given by the child will be treated as the child's answer (even if the first answer was correct and the second answer incorrect).
- Assessments must be short to avoid student fatigue
 - a. Proposed time for Grades 3 and 4 assessment: 30 minutes
 - b. Proposed time for Grades 6 and 7 assessment: 45 minutes
- Assessors (teachers) must be careful when responding to students' answers – Assessors must never say “correct” or “incorrect”. In fact, it is better that assessors say nothing as their responses will delay the progress of the child and increase the time taken to complete the tasks and assessment in general
- In the case of Mathematics and Science, the child may respond in any language that he/she chooses (provided of course that the assessor understands the response)

DIAGNOSTICS: STUDENTS' ASSESSMENT

Step 5: Assessment results inform remedial strategies

One of the main tasks of the education departments will be to engage and mobilize relevant education stakeholders across tiers on the purpose of the Diagnostic Assessment and the subsequent action steps that will emerge based on the assessment results.

One key responsibility will involve planning, organizing, and providing professional development support to district education officers and teachers to: a) communicate purpose and methodology of the assessment, ii) the potential benefit in identifying their student's learning needs and iii) specific, structured support on how teachers can remediate for these needs and what support district educators can provide.

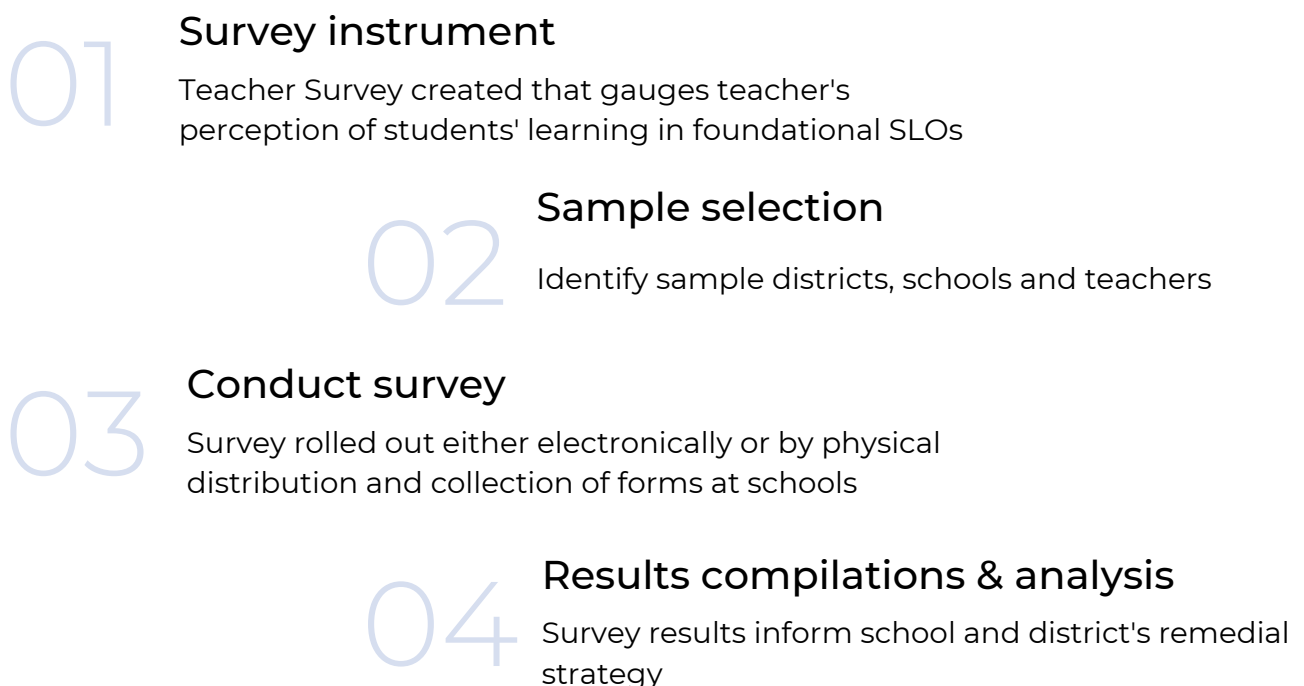
DIAGNOSTICS: TEACHERS' SURVEYS

A second option for conducting the diagnostics is to conduct a Teacher Survey to gauge teacher's perception of students' learning in foundational and prioritized SLOs. The surveyed subjects (English, Urdu, Math & Science) and grades (3, 4, 6 & 7) will remain the same as Option 1.

Surveying teachers' understanding of their students' needs can help indirectly assess students learning. The advantage of this approach is that the survey can also integrate teacher's assessment of their students' socio-emotional needs. This option is less expensive than conducting students' assessment, may be easier to collect and collate data, and may help creating a buy-in among teachers for the roll-out of remediation strategies.

However, as this diagnostic type relies heavily on teacher's capabilities of assessing students' needs and does not qualify the teachers' own content knowledge and pedagogical skills, there is likely to be a strong variation in survey responses. One prime reason is that teachers in non-board classes (Grade 3, 4, 6 & 7) often design quizzes and examinations themselves and the quality and rigor of these assessments is likely to be inconsistent; therefore, the data from the survey may be an inaccurate representation of students' actual needs if analysed at the school level.

To conduct the survey, it can be rolled out at any time of the school year. The survey can be conducted electronically (availability of technology permitting) or through physical distribution and collection of the forms at the schools designated in the sample. The flow chart below summarizes the steps for conducting the diagnostic via teacher survey.



DIAGNOSTICS: TEACHERS' SURVEYS

Sampling of teacher population

A total of 4240 teachers (2120 primary teachers in Grades 3 & 4 and 2120 middle teachers in Grades 6 and 7) will be required to be surveyed in each province. These teachers will be 50% male and 50% female.

This sample size is based on:

- 95% confidence level, and 3% confidence interval (similar to how the students' sample in Option 1 has been drawn)
- 162,000 primary school teachers and 81,000 middle school teachers in Punjab (2018 school census) – the province has the highest number of teachers among other federating units so the sample size has been drawn based on these and can be easily replicated by all provinces
- Primary school teachers (on an average) will be teaching two (of the four subjects) to the two grades (3rd and 4th)
- Middle school teachers (on an average) will be teaching two (of the four subjects) to the two grades (6th and 7th)

CONCLUSION

Local, regional and international educational assessments like PEC, ASER and TIMSS 2019 provide ample evidence on the grim state of Pakistan's education.

The pandemic, however, offers an opportunity for educational systems to reorient the relentless and exclusive focus on grade progression to a concerted focus on student learning.

This policy brief proposes the conduction of a provincial-level diagnostic assessment to identify students' existing learning levels in prioritized SLOs for specific grades, and to guide provinces in identifying SLOs where students have attained little/no mastery in order to customise and deploy a remediation strategy.

The brief provides two options for provinces to diagnose their students' learning levels; based on each province's feasibility and context, they can choose to implement either or both of the two options to assess the needs for a focused academic recovery strategy.

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ANNEXURE A

Survey Calculations - Students

The sampling of student population for diagnosing learning levels needs to be cognizant of the existing structures (school tiers, gender) and gaps within the system. The proposed sampling frame considers two essential tiers during the design-phase:

- Gender disparity in learning outcomes
- Classifications of schools: standalone primary school, middle/elementary schools, high and higher secondary schools

Sample size for diagnostic assessment for English, Urdu, Maths (Grade 3)

Grade / school-tiers	Gender	Total sample size (6 districts)	Sample size per district
Grade 3 (stand-alone primary school)	Girls	1080	180
Grade 3 (primary section of middle school)	Girls	1080	180
Grade 3 (primary section of high/HS school)	Girls	1080	180
Sub-total (a)		3240	
Grade 3 (stand-alone primary school)	Boys	1080	180
Grade 3 (primary section of middle school)	Boys	1080	180
Grade 3 (primary section of high/HS school)	Boys	1080	180
Sub-total (b)		3240	
TOTAL		6480	

Sample size for diagnostic assessment for English, Urdu, Maths (Grade 4)

Grade / school-tiers	Gender	Total sample size (6 districts)	Sample size per district
Grade 3 (stand-alone primary school)	Girls	1080	180
Grade 3 (primary section of middle school)	Girls	1080	180
Grade 3 (primary section of high/HS school)	Girls	1080	180
Sub-total (a)		3240	
Grade 3 (stand-alone primary school)	Boys	1080	180
Grade 3 (primary section of middle school)	Boys	1080	180
Grade 3 (primary section of high/HS school)	Boys	1080	180
Sub-total (b)		3240	
TOTAL		6480	

ANNEXURE A

Survey Calculations - Students

Sample size for diagnostic assessment for English, Urdu, Maths, Science (**Grade 6**)

Grade / school-tiers	Gender	Total sample size (6 districts)	Sample size per district
Grade 6 (middle section of middle school)	Girls	1080	180
Grade 6 (middle section of high/HS school)	Girls	1080	180
Sub-total (a)		2160	
Grade 6 (middle section of middle school)	Boys	1080	180
Grade 6 (middle section of high/HS school)	Boys	1080	180
Sub-total (b)		2160	
TOTAL		4320	

Sample size for diagnostic assessment for English, Urdu, Maths, Science (**Grade 7**)

Grade / school-tiers	Gender	Total sample size (6 districts)	Sample size per district
Grade 6 (middle section of middle school)	Girls	1080	180
Grade 6 (middle section of high/HS school)	Girls	1080	180
Sub-total (a)		2160	
Grade 6 (middle section of middle school)	Boys	1080	180
Grade 6 (middle section of high/HS school)	Boys	1080	180
Sub-total (b)		2160	
TOTAL		4320	

ANNEXURE B

Survey Calculations - Teachers

Sample size for diagnostic survey of teachers (**Grades 3, 4, 6 & 7**)

Grade / school-tiers	Gender	Total sample size (10 districts)	Sample size per district
Grades 3 & 4 - English, Urdu, Maths	Female	1060	106
Grades 3 & 4 - English, Urdu, Maths	Male	1060	106
Sub-total (a)		2120	
Grade 6 & 7 - English, Urdu, Maths, Science	Female	1060	106
Grade 6 & 7 - English, Urdu, Maths, Science	Male	1060	106
Sub-total (b)		2120	
TOTAL		4240	

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