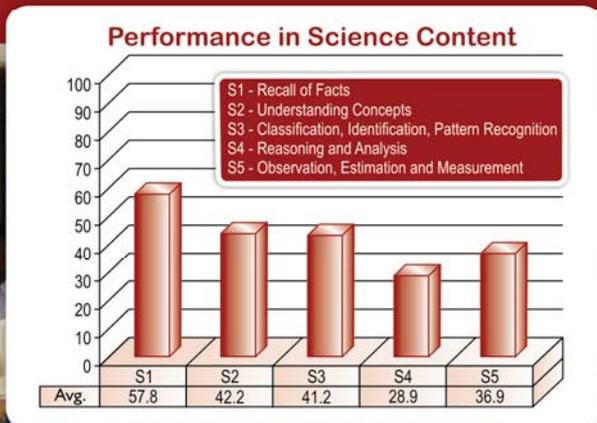


TEACHER NEEDS ASSESSMENT

El Working Paper Series - Issue 8



Specific feedback to teachers on their areas of strength and weakness - both in subject content and related aspects like how students learn - can help build teacher capacity and improve student learning.

Educational Initiatives (EI) believes that significantly improved student learning can happen only through systematic research into learning which includes assessment, as well as areas like misconception research. This working paper series will share learnings from various past and present EI projects as well as path-breaking work in these areas elsewhere in the world. Please write to us at assessment@ei-india.com for questions or comments.



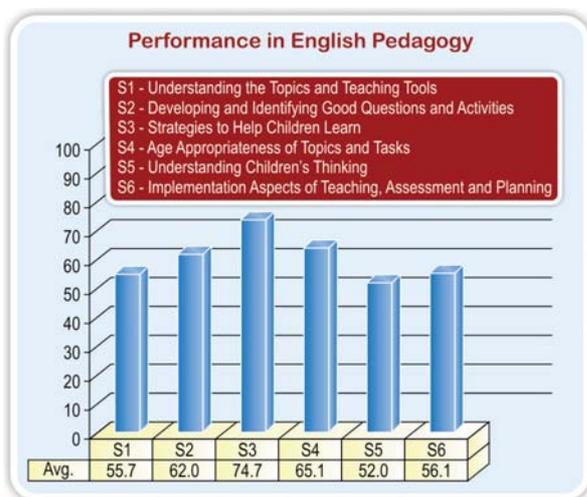
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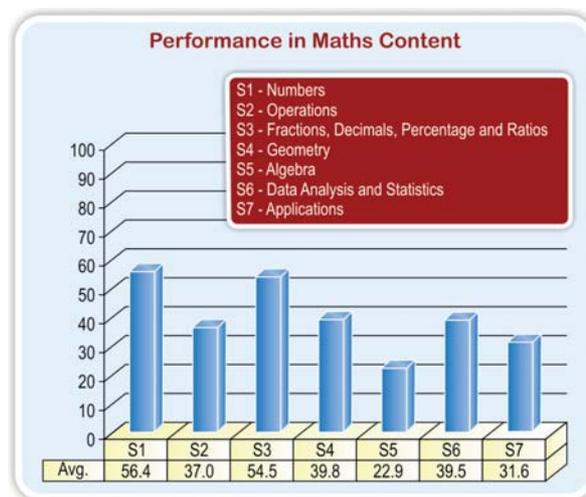
ENHANCING QUALITY OF LEARNING THROUGH TNA

Teacher Needs Assessments offer tremendous scope and direction to enhance teacher quality.

- The policy makers and school administrators are often at a loss to take specific data-driven decisions in the absence of authentic and scientifically collected data on the learning and teaching gaps existing among the teachers. Well designed and carried out assessments provide granular data.
- Teacher assessments provide evidence on the extent to which a teacher misconception could be prevalent among the teacher population and hence are a minefield for identification of training needs.



Understanding children's thinking is the weakest skill and a focus area for training.



Algebra is the weakest skill and a focus area for training

- Capacity of teachers could be built in a targeted manner through a series of subject specific workshops that provide deeper conceptual understanding and improved pedagogical practices.
- Pre-Service and In-Service Teacher Education curriculum could be revised based on specific recommendations that may be made available on the teacher strengths and weaknesses.
- Student Curriculum and Textbook reform by the State can specifically address and compensate for the misconceptions and gaps that may be prevalent among teachers.

CHARACTERISTICS OF AN EFFECTIVE TEACHER NEEDS ASSESSMENT

- **It must be data based:** As far as possible, it must rely on facts, data and evidence; it must allow stakeholders to draw their own conclusions, and help decide on action needed for improving effectiveness.
- **It must harness the intrinsic motivation of individual teachers:** Every individual wants to improve, wants to know 'what am I doing wrong?', and teacher assessments must provide a mirror that helps to improve.
- **It must provide suggestions for improvement:** The assessments must provide suggestion on things the teacher can start doing and practicing.
- **It must be implemented in a non-threatening manner:** Sustainable change is not possible in an atmosphere of fear, and by mandating things 'top-down'. Teachers must be encouraged to voluntarily improve their effectiveness and be provided the necessary support. It is important to explain the benefits of a teacher needs assessment by clarifying –
 - **What a TNA would do:** identify strengths and weaknesses, provide feedback to the teachers on areas to improve, identify professional development areas for each teacher and enable the system to align training with needs of teachers
 - **What a TNA would not do:** not grade teachers and categorise or label them, not rank schools or teachers.
- **It must promote excellence:** As the assessments reveal teachers with the best skills, this in turn can create a positive aspiration among all teachers and encourage the development of real leaders within the teaching community.

EI'S EXPERIENCE IN TEACHER NEEDS ASSESSMENT

Educational Initiatives has an ongoing project for carrying out Teacher Needs Assessment for all teachers of Bhutan PP-12 in partnership with the Royal Education Council and Ministry of Education, Bhutan. All teachers handling classes Pre-Primary to IV were assessed in the first phase in Bhutan in 2008-09. In India, government teachers in Ratlam district of Madhya Pradesh, with the help of local authorities and Suzlon Foundation, have voluntarily taken the teacher needs assessment carried out by EI.

FEATURES OF EI'S TEACHER NEEDS ASSESSMENT

Coverage: All teachers of classes K to 12 take the assessment. Each teacher takes 3 tests – one each in Subject Content Knowledge, in Pedagogical Skills and in General Skills. The assessments are grouped to target 3 sets of teachers – those handling i) Primary, ii) Upper Primary, iii) Secondary and Higher Secondary. Language, Maths and EVS are the areas assessed for teachers handling primary classes, while Social Studies is included for Upper Primary Teachers. For Secondary and Higher Secondary teachers, the areas covered are Language, Maths, Physics, Chemistry, Biology, Civics, History and Geography.

Scientifically Designed Testing Cycle: TNA follows a detailed scientific process of test development. This includes background research on teacher assessments, curriculum checking, development of test items, establishing face validity for items, pre-testing, statistical and quantitative analysis of pre-tests, establishing reliability for the paper, fine-tuning the final papers. As test security is a major concern, the pre-tests are usually conducted with teachers who will not appear for the main tests.

Test Design: These tests are designed to gather diagnostic information on 3 major ability areas:

- **General Ability:** This tests basic Math ability, Language ability, General Intelligence including logical, analytical and abstract reasoning, and General Knowledge.
- **Subject Knowledge:** This essentially tests the teacher's knowledge of the content. Here the content selected is a careful mix of level being taught as well as higher levels. These tests are designed to understand the conceptual strength the teachers have in their subject areas and their misconceptions.
- **Pedagogical Practices:** This assesses the methodology and the approach teachers use in classroom teaching, the age appropriateness of the content used in classroom, the sequential progression of complexity in a concept, the strategies that help children learn and understanding of student thinking. Questions in the paper are based on practical applications in a classroom.

Format of Tests: These are paper pencil tests. The questions follow a multiple choice format (MCQ) to increase the objectivity of the testing process and provide quick and detailed feedback. MCQ formats are also found effective in identifying misconceptions and common errors, and teachers are familiar with MCQ formats.

A Writing Task: Apart from the multiple choice test items all teachers are administered a writing task as a part of their general skills paper, for which they write 250 words on a topic out of the given two or three topics.

Standardised Test Administration: The tests are carried out by EI trained Test Administrators.

Perceived Needs Questionnaire: The perceived needs questionnaire collects basic information about education, training, experience, areas they need help and specific comments on the breadth and depth of concepts seen in textbooks

Analysis: Different types of analyses can be carried out on the collected data to extract patterns in performances and to understand differences in learning levels across subjects, understand common misconceptions, errors, practices followed. Performance of teachers based on state, district level, different school types, gender can also be analysed and shared.

Diagnostic Feedback: TNA aims to provide detailed diagnostic feedback and suggests remedial actions to individual teachers as well as the policy makers. The feedback at the system level is through a consolidated and comprehensive report that provides the policy makers insights into overall performance, and skill strengths and gaps, misconceptions and erroneous pedagogical practices, needs as perceived by teachers, association of teacher background with performance if any. Additionally each teacher gets an individual report with their overall performance, strength and weakness across all the papers. The teacher also gets an individualised letter that suggests areas and skills that they need to focus on for improvement.

Personalised Letter
TEACHER NEEDS ASSESSMENT [TNA]

Teacher Name: _____ Test Taken In: Feb 2009
Test Level: PP-IV SATS ID: _____
School Name: _____

Dear Teacher,

We encourage you to read your individual reports to identify your strengths and weak areas. The reports also give you relative position in terms of skill and subject knowledge level with respect to other teachers teaching PP-IV.

You are strong in the following skills:

S.No	Area	Skills To Be Focused On For Improvement
1	English Content	Understanding of grammar and teaching skills
2	English Pedagogy	Developing and identifying good questions and activities
3	Maths Content	Basal of facts and procedures, Classification, identification and pattern recognition
4	Maths Pedagogy	Understanding of topics and teaching skills, Pedagogical practices of teaching, assessment and planning

We recommend that you focus on the following skills for improvement:

S.No	Area	Skills To Be Focused On For Improvement
1	English Content	Comprehension (Inferencing), Comparison (Context)
2	English Pedagogy	Understanding of topics and teaching skills
3	Maths Content	Geometry, Algebra, Application
4	Maths Pedagogy	Strategies to help children learn
5	EVS Content	Understanding concepts
6	EVS Pedagogy	Developing and identifying good questions and activities, Knowing age appropriateness of topics and skills

We wish you all the best in your efforts in professional development.

Regards,
TNA Team.

Individual Analysis
TEACHER NEEDS ASSESSMENT [TNA]

Teacher Name: _____ Test Taken In: Feb 2009
Test Level: PP-IV SATS ID: _____
School Name: _____

Teacher Performance Profile Chart

Paper	Overall Performance %	Percentile Score	Certificate
General SATS	53.3	3.3	
English Subject	33.3		
Maths Subject	25.0		
EVS Subject	67.6		Outstanding
English Pedagogy	24.0		
Maths Pedagogy	74.0		Excellent
EVS Pedagogy	43.3		

*Percentile refers to percentage of teachers scoring better than you score. Certificate: Outstanding (top 1% scores), Excellent (70-80% scores)

Skill Profile Chart
TEACHER NEEDS ASSESSMENT [TNA]

Teacher Name: PP-IV Test Taken In: Feb 2009
Test Level: SATS ID: _____
School Name: _____

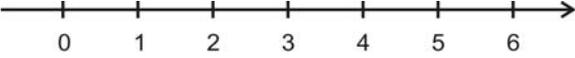
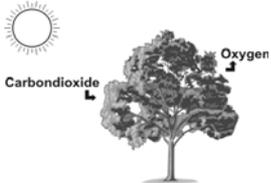
Teacher Strengths/Weaknesses Analysis

EVS Subject Content	Overall Range	Relative Range	Grade
1. Recall of facts and procedures	64.75-74.75	74	A
2. Understanding concepts	75	64.75-74.75	B
3. Developing and identifying good questions and activities	64.75-74.75	74	A
4. Developing and identifying good questions and activities	64.75-74.75	74	A
5. Developing and identifying good questions and activities	64.75-74.75	74	A
6. Developing and identifying good questions and activities	64.75-74.75	74	A

Teacher Skill Performance Relative To All Teachers

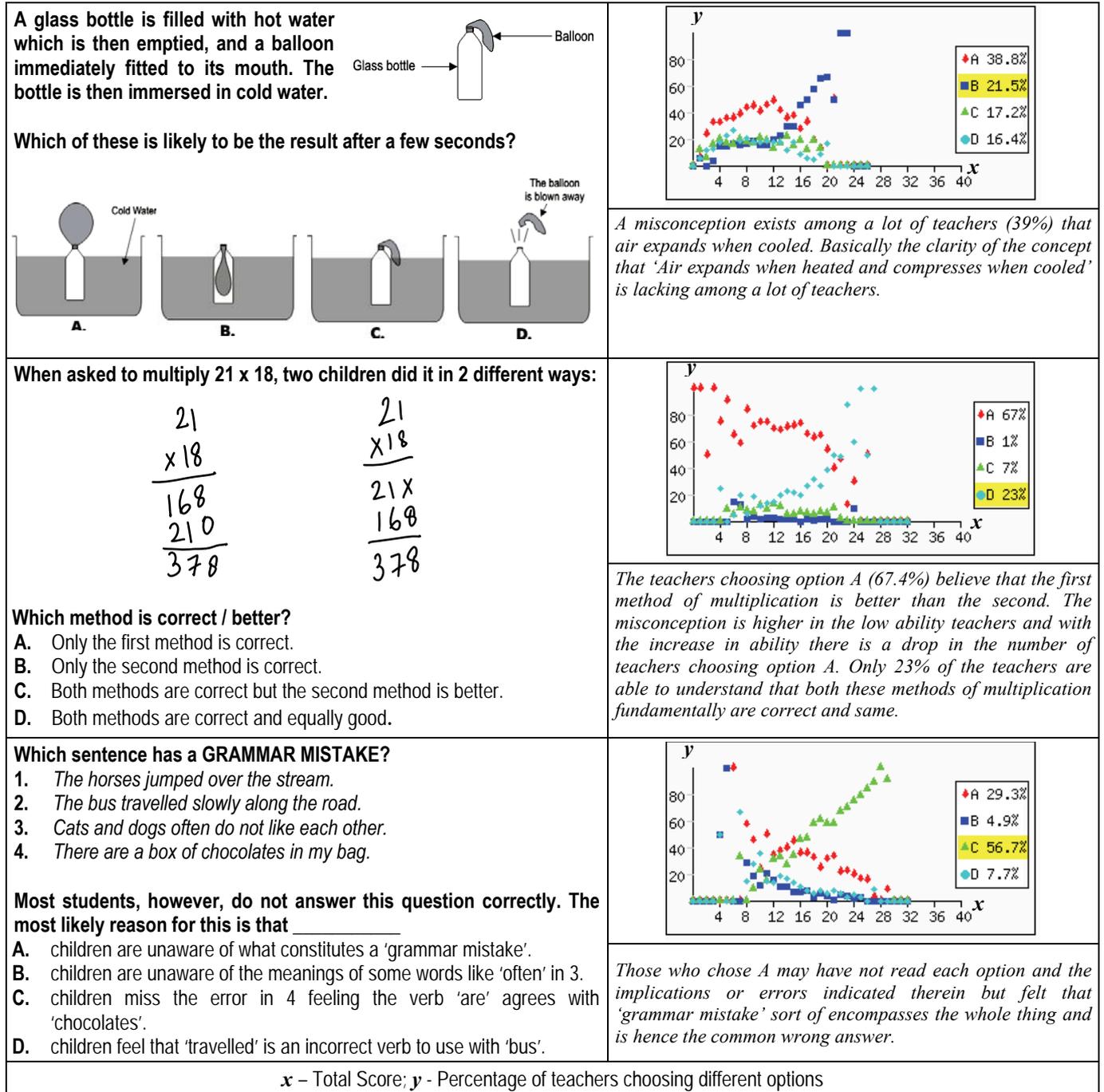
EVS Subject Content	Your Score	All Teachers Score
1. Recall of facts and procedures	74	64.75-74.75
2. Understanding concepts	75	64.75-74.75
3. Developing and identifying good questions and activities	74	64.75-74.75
4. Developing and identifying good questions and activities	74	64.75-74.75
5. Developing and identifying good questions and activities	74	64.75-74.75
6. Developing and identifying good questions and activities	74	64.75-74.75

TYPES OF QUESTIONS USED IN THE TESTS

<p>Subject Content: English</p> <p>The gentleman found it hard to understand the <u>obscure</u> sentence in his contract for the job of an engineer.</p> <p>A. vague B. obvious C. invisible D. unimportant</p>	<p>Pedagogical Skills: English</p> <p>Before primary school students are taught the concept of adjectives, it is important that they understand the concept of _____.</p> <p>A. verbs B. pronouns C. adverbs D. nouns</p>
<p><i>Sample Question 1: The item above tries to test the vocabulary and the understanding of the contextual usage of a word.</i></p>	<p><i>Sample Question 2: The question above tries to test whether the teacher has the clarity of sequence of the parts of speech to be taught to children. Further distracters explore if the teachers understand the relationship between the different parts of speech.</i></p>
<p>Subject Content: Maths</p> <p>Which of these equals y^5?</p> <p>A. $y^1 \times y^6$ B. $y^{10} \div y^6$ C. $y^6 + y^0$ D. $y^7 - y^2$</p>	<p>Pedagogical Skills: Maths</p> <p>Choose the BEST answer. The number line is a useful tool to help clarify the basic understanding of which of these concepts</p>  <p>A. fractions B. division C. geometry D. negative numbers</p>
<p><i>Sample Question 3: The item test the knowledge of exponents and their operations. The distracters are designed carefully such that they capture the common mistakes and misconceptions.</i></p>	<p><i>Sample Question 4: Teachers are expected to know the significance of the number line as a teaching tool to teach negative integers, operations involving negative integers. Students often struggle with the operations on negative integers. Number line helps them grasp this.</i></p>
<p>Subject Content: EVS</p> <p>What is the difference between evaporation and boiling?</p> <p>A. There is no difference - they are exactly the same. B. Evaporation, unlike boiling, occurs at all temperatures. C. In evaporation, unlike in boiling, there is no state change. D. In boiling, unlike in evaporation, the liquid volume reduces.</p>	<p>Pedagogical Skills: EVS</p> <p>When class 4 students are asked to identify the process shown below (in which carbon dioxide is absorbed and oxygen is given out by a tree) a large percentage of students say it is 'breathing'.</p>  <p>Which of these misconceptions could lead a student to give that answer?</p> <p>A. Any exchange of gases is known as breathing. B. Plants do not breathe in the day time when the sun is out. C. Plants unlike animals make their own food through photosynthesis. D. No gas exchange happens in a plant when it is resting.</p>
<p><i>Sample Question 5: The question tries to find if the teachers clearly understand the difference between evaporation and boiling. This question tests the conceptual understanding of the teacher.</i></p>	<p><i>Sample Question 6: Sometimes students have certain incorrect notions which give rise to certain misconceptions. Another such cause of misconception could be certain pedagogical practices followed by teachers. The item tries to test if teachers are able to identify the reason which could have given rise to a given misconception.</i></p>
<p>General Skills: General Intelligence</p> <p>Budhi has 7 crayons which are RED, BLUE or YELLOW. 2 are RED crayons, and 3 are not BLUE. How many are YELLOW?</p> <p>A. 1 B. 3 C. 3 D. 4</p>	<p>General Skills: General Knowledge</p> <p>Which famous politician was shot dead towards the end of the year 2007?</p> <p>A. Benazir Bhutto B. Nawaz Sharif C. Pervez Musharraf D. Murtaza Ali Bhutto</p>
<p><i>Sample Question 7: This question helps in checking the analytical ability of the teacher.</i></p>	<p><i>Sample Question 8: This question checks the current affairs knowledge and shows how much the teachers are abreast to new developments happening in the world.</i></p>

MISCONCEPTION ANALYSIS

Analysis of teacher responses looks for patterns of wrong answers and possible misconceptions teachers have:



WRITING TASK ANALYSIS

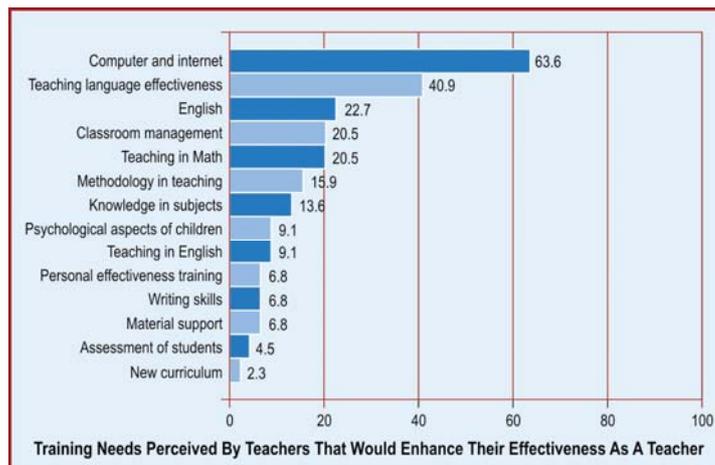
The aim of the writing task is to gauge the free expressive ability of the teachers and their comfort in using language effectively as a vehicle of their thoughts. Beyond the more basic or mechanical aspects of writing like handwriting, spelling and punctuation, the critical aspects of written expression include higher order skills such as usage of rich vocabulary, clarity in ideas expressed, coherence and style. The ability to write clearly and coherently is dependent on planning and organisational abilities. Sequencing or ordering thoughts, ideas and information within sentences, paragraphs and larger linguistic units is a fundamental requirement for effective writing.

The parameters that are usually considered for evaluation are Content, Grammar, Lexis, Cohesion and Coherence.

Evaluation of subjective, open ended essays often is prone to errors if they are rated differently by many people. The reliability of such scores is often debated in relation to the varying leniency or strictness of each rater. To address these, inter-rater reliability is established with each essay being evaluated by two raters and using a third rater whenever the difference between the two ratings was more than 3. The analysis apart from reporting scores also identifies common errors teachers make and insights for remediation.

■ ANALYSIS OF PERCEIVED NEEDS OF TEACHERS

The background questionnaire collects information that can be broadly grouped into variables related to teacher background such as their academic qualification, training and experience. Information on the needs perceived by the teachers for enhancing their effectiveness is collected through free response questions. The information collected on the teacher background is analysed using advanced statistical techniques to check for association of these with teacher performance. The data from the free response questions are grouped as per the needs expressed by teachers to identify the broad patterns in responses given by teachers.



■ NEXT STEPS AFTER TEACHER NEEDS ASSESSMENT IS DONE

The teacher needs assessment provides further steps for a policy maker, which could be in the form of:

- 1. Teacher Training:** The traditional solution to improve teacher quality is to do teacher training. Often, given the large number of in-service teachers who require strengthening of their skills and ability, these need to be specific and targeted workshops addressing specific and individual teachers based on their strengths and weaknesses as given in teachers' individual performance reports. Pre-service training and placement can raise the entry bar by checking for strengths in subject areas. While training is certainly a good idea, the following should be kept in mind:
 - a) **Teacher Accountability:** Some system by which the teacher accepts responsibility for the quality of student learning is important.
 - b) **Periodic Student and Teacher Assessment:** We believe that if this can be implemented – and it will not be easy – it may be the route by which the situation could be tackled without getting entangled in the messiness.
 - c) **Trainings should include motivational workshops, as well as content and pedagogy inputs:** The primary purpose of the workshops should be to move the system from one of 'rote learning' to 'learning with understanding'.
- 2. Teacher Observation Programmes:** An alternative to traditional teacher training (in which a teacher is asked to leave his or her class and attend a workshop), is **teacher observation support**. In its best form, groups of senior, experienced teachers and principals who have experience of teaching specific subjects, visit and observe the classes of each teacher, and provide concrete positive and negative feedback to the teacher. Wherever a negative feedback is given, specific ideas for improvement are also included. These experts may also give demonstration lessons which teachers can observe. The obvious challenge of teacher observation programmes is that they are very resource intensive. The longer term solution is to develop many people who can play the role of the experts, and eventually reach a point where experienced teachers within a school double as experts and help their peers – this is not very different from Japan's highly acclaimed Lesson Study system.
- 3. Technology Solutions:** Three technology solutions are discussed here:
 - a) **e-teacher:** The idea is to create a bank of videos of good teachers teaching at least basic and key topics and make them widely available so that they can be used by a large number of school teachers.
 - b) **'Mindspark?' for Teachers:** Developing a 'Mindspark for Teachers' may be a non-threatening, scalable solution that can work for a large number of teachers. The key strength of Mindspark is its adaptive nature so that different teachers will specifically get help in the areas that they need.
 - c) **Video Teacher Observation:** The teacher observation idea mentioned above becomes expensive and complex if experts have to travel from school to school. But if schools can be provided with low-cost video cameras and teachers are required to video-record their sessions – say one every fortnight - and send it to an expert, this may be an almost equally effective solution (except for the face to face observation and feedback).

² 'Mindspark' is an e-learning solution of EI that is web based and aids conceptual learning by guiding the learner through a series of finely graded questions in competencies. The product is available for all students globally at www.mindspark.in

■ ABOUT EI

It appears self-evident that if somebody is in a strong position to positively influence student learning, it is the teacher. However, investments in teacher training are not showing clear returns in increased student achievement levels. Could it be that the teacher development initiatives being adopted are not completely in line with the teachers' needs? A Teacher Needs Assessment (TNA) that identifies common strengths or weaknesses among teachers, provides feedback to individual teachers, and recommends specific system level interventions for teacher improvement assumes relevance in this scenario. This working paper shares EI's experience in designing and carrying out Teacher Needs Assessment in India and Bhutan.



We are an educational research organization that focuses on learning research through assessments. EI has been started by a group of IIM Ahmedabad alumni with first-hand experience of setting up and running educational institutions. It has been formed with a mission to work towards qualitative improvement in India's educational system and our vision is "A world where children everywhere are 'Learning with Understanding'".

PROJECTS OF EI:

Andhra Pradesh Randomised Evaluation Study (2004 onwards): Done in partnership with Harvard University, Azim Premji Foundation, World Bank and the Government of Andhra Pradesh, this is a longitudinal study across 8-9 years and covers currently 100,000 elementary school kids and measures the impact of various inputs (e.g., block grants, additional teachers) with outcome-based teacher incentives.

Assessment of Student Learning in Sarva Shiksha Abhiyan – RGSM, Chhattisgarh (2008 onwards): The test was developed in Hindi and administered to approximately 3 lakh students in about 1900 schools in 16 districts in Chhattisgarh states. The tests have already been conducted for students of class 3 to 8 for Language and Maths and the report submitted to RGSM.

Municipal School Benchmarking Study (2004-2007): Supported by ICICI Bank, this study assessed learning in 35,000 municipal school students from class 2, 4 and 6 across the 6 biggest towns in each of the states - Gujarat, Andhra Pradesh, Rajasthan, Chhattisgarh and Uttarakhand.

UNICEF Learning Assessment Study for Quality Education (2005-2006): assessed mathematics and language acquisition among primary school children in the UNICEF quality package schools in 13 states of India. The tests were standardised across 9 languages and involved very intricate development cycle involving language experts from all over India.

Teacher Needs Assessment (2008 onwards): is a census study that has been initiated by the Royal Education Council, Government of Bhutan. In this project all teachers of Bhutan are assessed for their general ability, competence in subject knowledge and pedagogical practices.

Student Learning Study (2008-2009): Supported by Google.org., this study is currently ongoing and assesses student learning in 21 states of India. Nearly 190000 students in classes 4, 6 and 8 are tested for learning in Language and Maths in rural and urban govt. schools.

EI'S PRODUCTS AND LEARNING SOLUTIONS:

ASSET: is an objective-type, multiple-choice test for students of Classes 3 to 10. It is a scientifically designed, skill based assessment developed in India for Indian schools. It assesses students' level of proficiency in the skills and concepts underlying the school syllabus and provides them feedback about their strengths and weaknesses. Know more about ASSET at www.ei-india.com

Mindspark: is a computer based self-learning programme that helps the child improve her skills. It allows each student to follow a learning path that is based on her need. Mindspark is currently available for Maths for classes 1-10 in English version. Mindspark can be accessed at www.mindspark.in.

Rural Mindspark: Hindi version is currently available on demand for some Maths modules. Contact EI to know more about other language versions and modules.

Some Partners / Clients

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Rajiv Gandhi Shiksha Mission, Chhattisgarh	Royal Government of Bhutan	Suzlon Foundation
WIPRO Applying Thought	World Bank	UNICEF, India

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