TEACHER NEEDS ASSESSMENT

El Working Paper Series - Issue 8



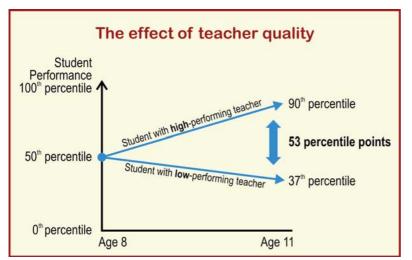
Educational Initiatives (EI) believes that significantly improved student learning can happen only through systematic research into learning which includes assessment, as well as areas like misconception research. This working paper series will share learnings from various past and present EI projects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



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WHY THIS IDEA HAS LARGER RELEVANCE

That teacher quality and student achievement are tightly correlated is a well accepted view in the present day society. Most people who have been to schools also intuitively know how their development has been moulded by their own teachers. Several studies - both local and international, are unanimous in their view that teacher quality and teaching are critical to student learning.



According to a research by Sanders and River in 1996, on an average, two students with average performance (50th percentile) will diverge by more than *50 percentile points* over a three year period depending on the teacher they were assigned. The experiences of the top school systems suggest that three things matter most: 1) Getting the right people to become teachers; 2) Developing them into effective instructors; and 3) Ensuring that the system is able to deliver the best possible instruction for every child and targeted support to ensure that every child is able to benefit from excellent instruction¹. Education Commission of India, 1970-84 states that the quality, competence and character of teachers are the most significant factors influencing the quality of education.

This fact seems to be widely believed in private and public schools. Teacher training is an important activity across schools including at the government levels. System-wise programmes like the District Primary Education Programme (DPEP) and the *Sarva Shiksha Abhiyan* (SSA) lay a lot of emphasis on and allot significant budgets to teacher training. Yet, there is also a sense of disillusionment that investments in teacher training are not showing clear returns. Student achievement levels are not increasing correspondingly. 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.

WHY DO WE NEED TEACHER NEEDS ASSESSMENT (TNA)

Teachers in many cases are in need of specific feedback - which will provide them insights on where, what and how to improve their own abilities in order to function with effectiveness. These are needed because –

• Teachers have a number of misconceptions that they pass on to students - According to Howard Gardner, it is common for adults to have a large number of misconceptions in subjects apart from their own specialisation. Teachers, like other adults, would be unaware of their own misconceptions.

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A. 1111 C. 100100100100	B. 1001001001 D. 11111111111	B. 41% ✓ C. 10% D. 0%	correctly while a larger percentage of them answered A, which is also the common student mistake.

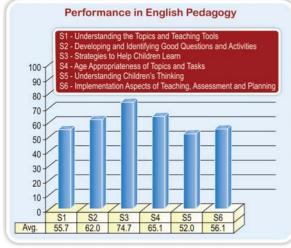
- Contrary to popular belief, teachers often do not know how their children are learning Teachers often have a higher belief on what their students have learnt in the class and are often surprised when it is shown empirically that students are performing lower than what they thought the students were capable of doing. This is because current teaching approaches are based on the teacher 'teaching' with very little focus on finding out what students are learning.
- Inappropriate teaching methods lead to more misconceptions Halim and Meerah (2002) suggest that being aware of misconceptions alone does not guarantee that teachers will consider or use that awareness in their teaching.
- Certain learnable pedagogical practices also add to the problem When a child gives the wrong answer to a question asked in class, teachers often express unhappiness or anger at the wrong answer, sometimes non-verbally, or ask the child harshly to 'sit down'. They then proceed to someone else who can give the right answer, and ask such a student to explain the answer. However, focussing on the wrong answer and helping students to realise why it is wrong, may be a far more effective strategy which can be learnt.
- Certain teacher attitudes also influence teacher effectiveness. For example, a teacher may believe that different students have different abilities to learn, based on gender or other socio-economic or cultural divides. This in turn affects the time they invest in students to mentor and guide them to better learning.

¹ How the World's Best Performing School Systems Come Out on Top, McKinsey & Company, September 2007

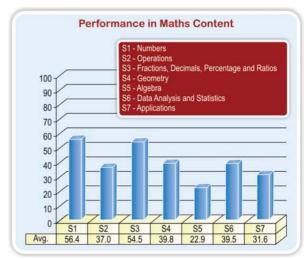
ENHANCING QUALITY OF LEARNING THROUGH TNA

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 El.

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.

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Subject Content: English	Pedagogical Skills: English
The gentleman found it hard to understand the obscuresentence in his contract for the job of an engineer.A. vagueB. obvious	Before primary school students are taught the concept of adjectives, it is important that they understand the concept of
C. invisibleD. unimportant	 A. verbs B. pronouns C. adverbs D. nouns
Sample Question 1: The item above tries to test the vocabulary and the understanding of the contextual usage of a word.	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.
Subject Content: Maths	Pedagogical Skills: Maths
Which of these equals y^5 ? A. $y^1 \ge y^5$	Choose the BEST answer. The number line is a useful tool to help clarify the basic understanding of which of these concepts
B. $y^{10} \div y^5$ C. $y^5 + y^0$ D. $y^7 - y^2$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
D. $y' - y^2$	 A. fractions B. division C. geometry D. negative numbers
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.	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.
Subject Content: EVS	Pedagogical Skills: EVS
 What is the difference between evaporation and boiling? 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. 	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'. Which of these misconceptions could lead a student to give that answer?
	 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.
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.	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.
General Skills: General Intelligence	General Skills: General Knowledge
Budhi has 7 crayons which are RED, BLUE or YELLOW. 2 are RED crayons, and 3 are not BLUE. How many are YELLOW? A. 1 B. 3 C. 3 D. 4	 Which famous politician was shot dead towards the end of the year 2007? A. Benazir Bhutto B. Nawaz Sharif C. Pervez Musharraf D. Murtaza Ali Bhutto
Sample Question 7: This question helps in checking the analytical ability of the teacher.	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.

MISCONCEPTION ANALYSIS

Which method is correct / better?maxA. Only the first method is correct.thB. Only the second method is correct.teC. Both methods are correct but the second method is better.ab	The teachers choosing option A (67.4%) believe that the first method of multiplication is better than the second. The misconception is higher in the low ability teachers and with the increase in ability there is a drop in the number of teachers choosing option A. Only 23% of the teachers are able to understand that both these methods of multiplication fundamentally are correct and same.
 Which sentence has a GRAMMAR MISTAKE? 1. The horses jumped over the stream. 2. The bus travelled slowly along the road. 3. Cats and dogs often do not like each other. 4. There are a box of chocolates in my bag. Most students, however, do not answer this question correctly. The most likely reason for this is that	Those who chose A may have not read each option and the implications or errors indicated therein but felt that 'grammar mistake' sort of encompasses the whole thing and is hence the common wrong answer.

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

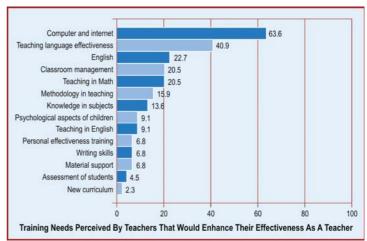
WRITING TASK ANALYSIS

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.

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.



I 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) 'Mindspark²' 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).

ASSET is a registered trademark and Mindspark is a trademark of EI

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 <u>www.mindspark.in</u>



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 El'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.

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E-mail us at: assessment@ei-india.com Website: www.ei-india.com May 2010								