

# Cost Effective Assessment Models for Assessing Learning Outcomes

**Pranjal Chugh**

Researching Reality Summer Internship 2014  
Working paper: 318

## CONTENTS

Title	Page
Abstract.....	3
Introduction.....	4
Why is Assessment Required .....	4
How is assessment of learning Outcome carried out.....	5
Cost Involved in Conducting Assessment of Learning Outcome.....	6
Key Decisions to be Taken for Conducting National Assessment.....	8
Existing Models in India.....	11
International Assessment Models.....	11
Assessment Systems in Different Parts of the World.....	13
School Based Assessment.....	14
International Assessment and its relevance to India.....	16
Multiple Matrix Model.....	17
How to Reduce the Cost of Assessment .....	21
Ideal Assessment Model.....	27
Conclusion.....	27
Appendix-I .....	28
Appendix-II.....	29
References.....	30

## LIST OF TABLES

Assessment Model Matrix 1.....	12
Assessment Model Matrix 2.....	14

## LIST OF FIGURES

Graph depicting contribution of different factors to cost of Assessment.....	8
Sample Question in ASER.....	10
State wise per student allocation.....	23
Decline in Learning Outcome.....	24

## ABSTRACT

Through this paper, an effort has been made to highlight the difference between the evaluation and assessment of learning outcomes and to determine the cost effective practices that can be adopted for assessment of learning outcomes. To conduct this research, a comparison between different models being practiced in different parts of world has been made. Taking note of the fact that assessment of learning outcomes is not simply done to judge students on the basis of grades but the purpose is to make learning process better and learning stronger, the paper aims to analyse various models and adopt the best practices keeping the assessment procedure cost effective yet proficient.

## INTRODUCTION

The roots of education are bitter, but the fruit is sweet (Aristotle). But the fruits will grow only when the roots are strong enough. This makes assessment and evaluation an integral part of our education system.

Assessment of learning outcomes and evaluation are often used interchangeably. But there lies a difference between the two. Evaluation of students is part of the school curriculum, necessary to promote students to the next standard. So the question arises what are learning outcomes? Learning outcomes defines the purpose that what a student is expected to DO after attending a learning activity. This definition can be understood in a better manner if we analyse different phrases which constitute the definition:

- DO: The word alludes to what skill, knowledge or behavior a student is able to demonstrate as a consequence of a learning activity. It may refer to defining a concept, discussing about it or applying it in a practical situation.
- LEARNING ACTIVITY: For students going to schools, apart from classroom teaching, learning activities may also include any counselling session, participation in any sort of educational activity.

## WHY IS ASSESSMENT REQUIRED?

Assessment of learning outcomes is designed to describe the achievement of students in a curriculum area aggregated to provide an estimate of the achievement level in the education system as a whole at a particular age or grade level (Greaney & Kellaghan, Assessing National Level Achievements). With increasing efforts to make education available to all (Sarva Shiksha Abhiyaan), the question that arises in our mind is about the quality of education as a result of which assessment of learning outcomes is gaining more and more importance as it helps us to:

- Improve the current education practices being followed.
- Reduce expenditures on assessment as well as educational practices without effecting the quality of education
- Gauge overall levels of achievement, to assess the relative performance of particular subgroups, and to monitor changes in performance over time.
- Determine the effectiveness of government policies designed to improve outcomes in these and other areas.

Assessment of learning outcomes is carried at national and international levels. National assessment is basically an educational audit to inform the policy makers about the current educational level of the people and what changes are needed to make the system better. These include assessing students reading abilities (mostly local language) and their mathematical skills. Apart from these, many countries also assess the second language and knowledge of sciences and social sciences. Many countries participate in International assessments too. The purpose of international assessment is to judge the educational abilities of children at international level and to keep the curriculum updated as per international trends. Recently, few Indian states participated in PISA.

The primary objective of conducting an assessment is to answer the various questions:

- What is the learning rate of students i.e. how well they are able to perform as compared to the general expectations?
- Is there any particular kind of people which is performing poorly?
- Are there differences in achievements of:
  - A) Boys and girls
  - B) Rural and Urban population
  - C) People belonging to different categories ( for example in India -Schedule tribe, Schedule Caste, Other Backward Classes)
- What changes can be brought in the existing system so as to improve the learning outcomes?

In order to obtain answers to the above questions, assessments need to be conducted in a very efficient manner. But does that mean spending unwisely. Can assessment of learning outcomes be done in a cost effective manner?

## **HOW IS ASSESSMENT OF LEARNING OUTCOMES CARRIED OUT?**

Generally, conducting assessment analysis is the responsibility of Ministry of Education. But many times, certain non-governmental organisations also conduct surveys for such purposes. For example: In India, apart from National Achievement Survey, conducted by National Council for Educational Research and Training under Sarva Shiksha Abhiyan(SSA) , NGOs like PRATHAM conducts annual assessment survey ASER(Annual Survey of Education Report) to highlight the trends in learning outcomes. The surveys are implemented in the method described as follows:

- A) The ministry of education (MOE) appoints either an implementing agency within the ministry or an independent external body (for example, a university department or a research organisation), and it provides funding.

- B) The MOE determines policy needs to be addressed in the assessment, sometimes in consultation with key education stakeholders (for example, teachers' representatives, curriculum specialists, business people, and parents).
- C) The MOE, or a steering committee nominated by it, identifies the population to be assessed (for example, fourth grade students).
- D) The MOE determines the area of achievement to be assessed (for example, literacy or numeracy).
- E) The implementing agency defines the area of achievement and describes it in terms of content and cognitive skills.
- F) The implementing agency prepares achievement tests and supporting questionnaires and administration manuals, and it takes steps to ensure their validity. The tests and supporting documents are pilot-tested by the implementing agency and subsequently are reviewed by the steering committee and other competent bodies to
  - (a) Determine curriculum appropriateness
  - (b) Ensure that items reflect gender, ethnic, and cultural sensitivities.
- G) The implementing agency selects the targeted sample (or population) of schools or students, arranges for printing of materials, and establishes communication with selected schools.
- H) The implementing agency trains test administrators (for example, class- room teachers, school inspectors, or graduate university students). The survey instruments (tests and questionnaires) are administered in schools on a specified date under the overall direction of the implementing agency.
- I) The implementing agency takes responsibility for collecting survey instruments, for scoring, and for cleaning and preparing data for analysis
- J) The implementing agency establishes the reliability of the assessment instruments and procedures. The implementing agency carries out the data analysis.
- K) The draft reports are prepared by the implementing agency and reviewed by the steering committee. The final reports are prepared by the implementing agency and are disseminated by the appropriate authority.
- L) The MOE and other relevant stakeholders review the results in light of the policy needs that they are meant to address and determine an appropriate course of action.

## **COST INVOLVED IN CONDUCTING AN ASSESSMENT OF LEARNING OUTCOMES**

A number of factors contribute to the cost involved in implementing a particular model of assessment. The cost of conducting a survey depends on a number of factors:

**A) Organisation Involved- Governmental or Non-Governmental :**

For conducting the survey, huge infrastructure is required. So what infrastructure the associated organisation already has and what more is required contribute the cost of survey. Infrastructural requirements may include space for conducting the survey, stationery involved, human resources. For example: ASER is a house hold based survey so it does not require any space for conducting the survey, hence reducing the cost.

**B) Number of children:**

This is one of the major factor that contributes to the cost of assessment analysis. Whether we are considering a sample of population, or we are considering the whole population decides majorly most of the cost of the analysis. Amount of funds, human resources required, all are directly proportional to the number of students involved in the survey. Since assessment of learning outcomes is performed in order to get the knowledge of the general trends prevailing in the nation, it is not necessary to take the whole of the population into consideration. Studies show that if sampling is done properly, then the trends represented by analysis is quite accurate and hence the assessment process turns out to be efficient.

**C) Designing the Assessment Questionnaire:**

Generally, the assessment paper consist of different kinds of question viz. Multiple Choice question, Open Ended questions and Practical applications. Each question involves a different cost. For example: Multiple choice questions are difficult to design and hence they are more expensive as compared to open ended questions which are easier to design and hence relatively cheaper.

**D) Collection of Data:**

Collecting the data is one of the most important tasks while conducting the survey. If the data is not accurate, then there will be disparities in the data and hence the very purpose of conducting the survey gets defeated.

**E) Analysing the Data:**

This may be the most cumbersome task after the conduction of survey. ....

**F) Reporting the Data/Printing/Distributing the data:**

After analysing the data, it needs to be reported and presented to the different stake holders.

The cost of survey can be divided amongst the above parameters and is depicted below:

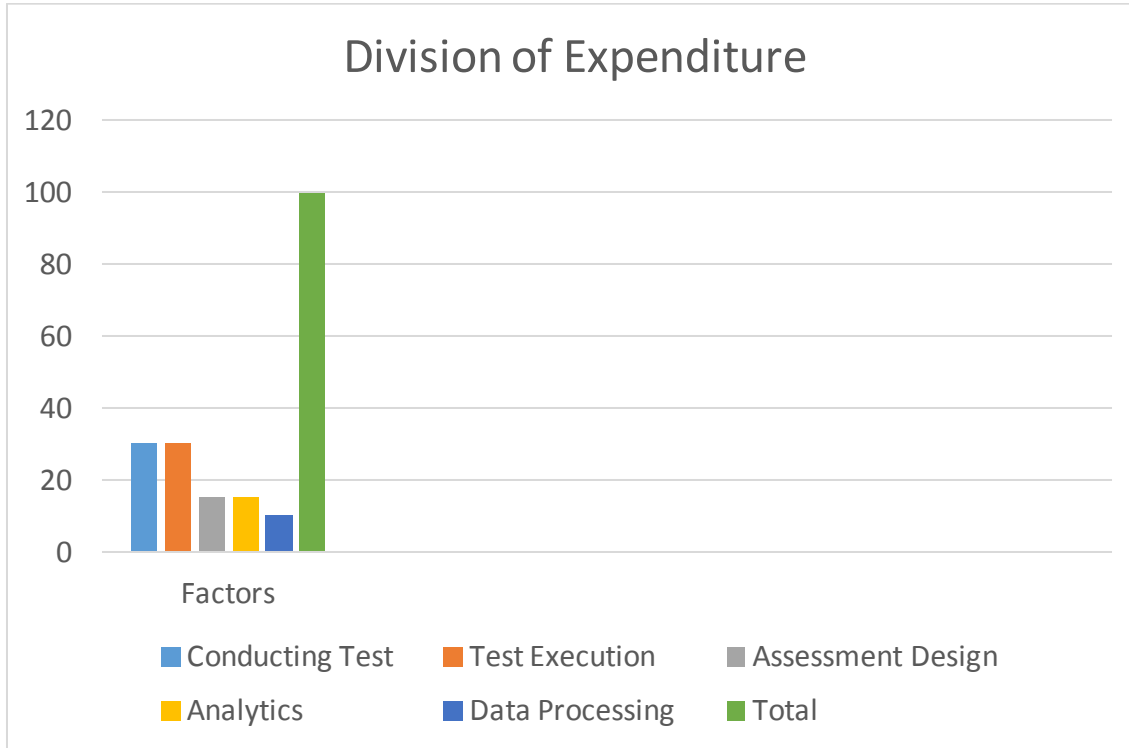
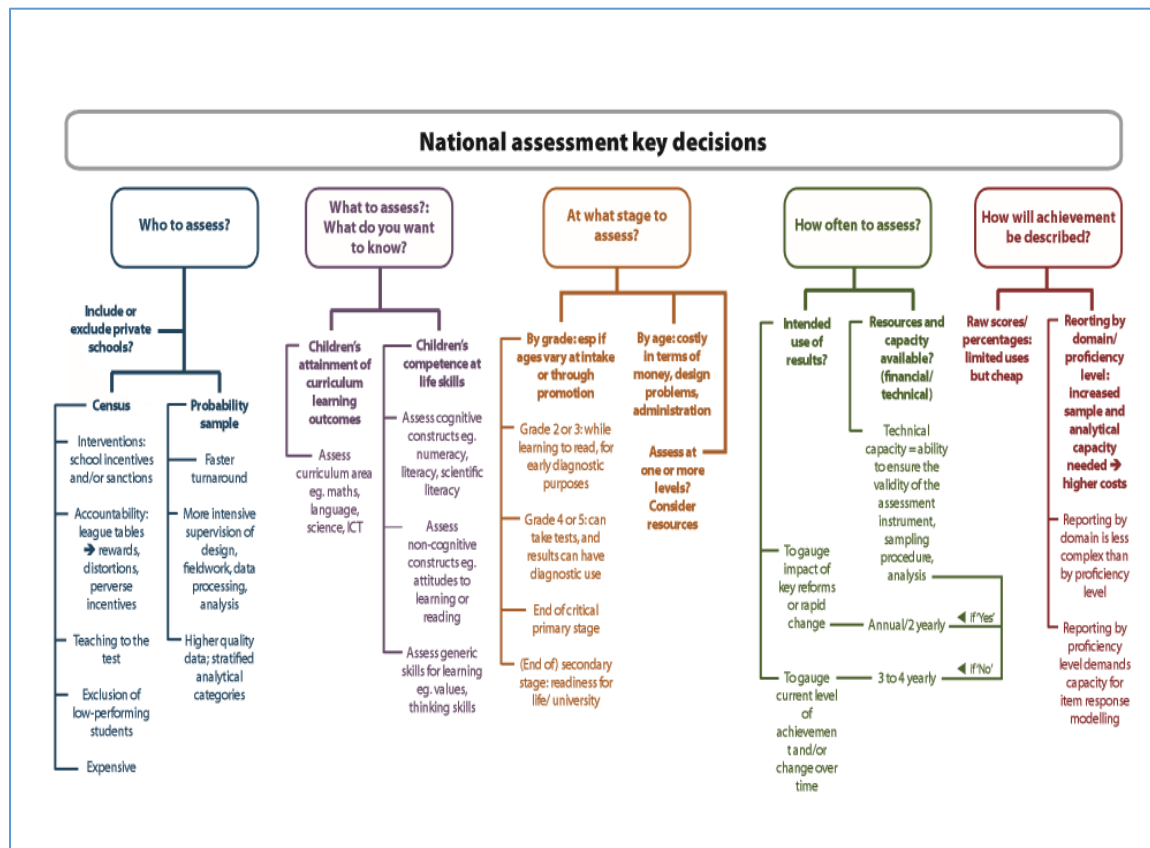


Figure 1: Graph depicting the contribution of different factors to Cost of Assessment  
X axis: Factors effecting the cost Y axis: Percentage of Total Cost





Source: Guidance Note, Department for International Development

## KEY DECISIONS FOR CONDUCTING NATIONAL ASSESSMENT

Conducting an assessment analysis is based on a lot of important factors:

### A) Census based or Sampled based Assessment:

The sample size is one of the biggest factors to be considered before conducting the survey. Although conducting a census based assessment helps in assessing whole of the population, but it incurs a lot of expenditure. So, one of the factors for determine the size of sample is the budget of the organisation conducting the survey. On the other hand, sample based helps us in saving on the cost factor along with following advantages:

- 1) Since lesser number of students are involved, costs for administration, scoring student responses, data entry and data processing are less.

- 2) In a large country, with large populations the difference in the sample size is huge if consider census based assessment over sample based population. Turn-around time is faster as less time is required for data preparation and analysis.
- 3) More intense supervision of fieldwork and of data preparation is possible, thereby ensuring higher quality of data.

Most of the assessment procedures are based on the sample based assessment but there are many systems which still chooses census based assessment over sample based.

For example: Chile has a census based assessment system whereas even many of the developed countries like the U.S.A. uses sample based assessment. Both of these has their own pros and cons. Many policy makers advocates that the sampled test was neither adequate for assuring basic academic ability of all students nor was it adequate for improving accountability of schools

B) Stage at which students need to be assessed:

Another big task while conducting the survey is about our target population. Policy makers debate over the issue whether to assess students in the same age group or in the same standard. While most of them are in favor of standard based assessment, still some of them find it necessary to assess on the basis of age. Since people can be easily grouped on the basis of the standard they are currently studying in, it would be easier to analyse the data and hence lesser cost involved. Another question that rises is: at what stage of their school life students should be assessed.

C) Criterion to be Assessed:

Most of the assessment models assess literacy and numeracy of the students. For assessing the literacy, the focus is mainly on the local language used in the area. For example: the under given pictures depicts the sample questions asked during ASER survey:

**पढ़ने की जाँच**

कहानी

बहुत दिनों से बारिश हो रही थी। गाँव में सभी जगह गंदा पानी भर गया था। सभी बारिश के रुकने की राह देख रहे थे। अचानक एक दिन बारिश रुक गयी। सूरज निकल आया। सब लोग खुश हो गये। आसमान में चिड़ियाँ उड़ने लगीं। लोग अपने कपड़े सुखाने लगे। बच्चे भी घरों से बाहर निकलकर खेलने लगे।

अनुकोव

राधा के पास एक तोता है। उसकी चोंच लाल है। वह बहुत बोलता है। सब को हँसाता है।

म र थ

ह श

ल ब न

क घ

गाना मोती खुश

घेर झोला

आलू धूप

आग किला मोर

Sample: Hindi basic reading test\*

Similar tests developed in all languages

Child can choose the language in which she wants to read.

**गणित की जाँच**

अंक पहचान 1-9		संख्या पहचान 10-99		घटाव	भाग
3	7	65	38	51 - 35	7) 918
1	4	92	23	84 - 49	6) 769
8	9	47	72	56 - 37	8) 987
5	2	56	87	45 - 18	4) 513
		29	11	67 - 48	
				73 - 36	
				31 - 13	
				43 - 24	

अंक के कोर्ड भी 5 अंक पहचानने को करें। काम से काम 4 राही होने चाहिए।  
 संख्या के कोर्ड भी 5 संख्या पहचानने को करें। काम से काम 4 राही होने चाहिए।  
 घटाव के कोर्ड भी 2 घटाव के सरासक करने को करें। दोनो ही राही होने चाहिए।  
 भाग के कोर्ड भी 1 भाग का सरासक करने को करें। सरासक होना चाहिए।

Sample: Arithmetic test

Similar tests developed in all languages

Figure2: Sample of questions in ASER Source: ASER Report, 2013

D) Frequency of Assessment:

How often to conduct the survey is another factor to be considered while planning assessment analysis. Recent studies indicate that the percentage of countries that conduct national assessment had increased from 11 per cent to 64 per cent in East Asia and the Pacific, and from 11 per cent to 44 per cent in South and West Asia from 1995 to 2006 (UNESCO, 2008). But many countries believe that assessment should be conducted after an interval of three to four years as otherwise no significant changes can be observed.

## EXISTING MODELS IN INDIA

### **National Assessment Survey:**

NAS is conducted by National Council of Educational Research and Training (N.C.E.R.T.) every three years to assess the learning outcomes amongst the rural as well as the urban population. The sample basically consists of the students studying in grade IIIrd, Vth and VIIIth. The students are assessed on the basis of their understanding of mathematics and a language. But the survey covers only public schools and doesn't consider the private schools.

### **Annual Status of Education Report:**

PRATHAM, an NGO conducts an assessment analysis every year to judge the learning outcomes of rural students. Again it works on the method of sampling. It is a household survey i.e. instead of taking samples from schools, samples are taken from households. This is done to ensure that children who are not going to schools are also covered under the survey. The model is so successful that another model has been created on the same lines by South African Agencies namely UWEZO.

### **Learning Guarantee Program:**

Azim Premji Foundation started LGP in 2002 in Eastern districts of Karnataka. The program was aimed at improving the quality of education. Competency based Assessment Tools were prepared for evaluation. For a school to become a Learning Guarantee School, at least 60% children should achieve 90% of the competencies. Even though no school has been able to achieve this criterion, there has been an improvement in the learning levels.

## INTERNATIONAL ASSESSMENT MODEL

### PISA (Program for International Student Assessment)

PISA is a triennial international survey which aims to evaluate education systems worldwide by testing the skills and knowledge of 15-year-old students. To date, students representing more than 70 economies have participated in the assessment.

### TIMSS (Trends in Mathematics and Science Studies)

TIMSS has measured trends in mathematics and science achievement at the fourth and eighth grades. It has been conducted on a regular 4-year cycle since 1995.

The basic purpose of participating in International Assessment activities is to:

- Monitor system-level achievement trends in a global context
- Establish achievement goals and standards for educational improvement
- Stimulate curriculum reform
- Improve teaching and learning through research and analysis of the data

Although International assessment has many advantages, but many the countries are not ready to participate in International Assessment due to various reasons.

Potential benefits of joining international assessment exercises	Potential risks of joining international assessment exercises
Adherence to high technical standards of assessment design, instrumentation, sampling, administration, analysis and reporting	Criticism of the cost of participation, particularly in view of the need to commit to successive rounds if the initial investment is to be worthwhile
Development of indigenous capacity to meet international standards of assessment practice	Disaffection with the international exercise if its assessment framework is of limited relevance and responsiveness to the country joining
High degree of transparency in dissemination of the results; political gains if performance is found to be relatively good compared with peers	Unfavourable comparison of results with neighbours and peers—with attendant political consequences
Positive effects of: driving up performance from diagnostic application of results; exposing education system to external scrutiny; and tracking impact of certain interventions/reforms over time	International assessment exercises should not be expected to deliver the accountability outcomes that national census assessment exercises provide
Opportunity to 'version' survey instruments of international standard, ie, to adapt them to the national language and context	Failure to fully adapt the survey instruments to the national context. 'Versioning' goes beyond translation, to ensuring that literacy texts (in particular) are suited to the children's educational experience and sociolinguistic background.

Source: Guide Note, Department for International Development

Table 1: APPENDIX MATRIX

Factors->	Organisation	Frequency	Student Involved
NAS	N.C.E.R.T(Govt Org)	3 Years	3 <sup>rd</sup> Grade
ASER	Pratham(NGO)	1 Year	Upto 12 years of age
LGP	Azim Premji Foundation(NGO)		
PISA	OECD	3 Years	Upto 15 years of age
TIMSS	IEA	4 years	4 <sup>th</sup> and 8 <sup>th</sup> Grade

## ASSESSMENT SYSTEMS IN DIFFERENT PARTS OF WORLD

### Brazilian Model of Assessment

Brazilian government has been using the SAEB (Sistema de Avaliação da Educação Básica) - the System of Assessment of Basic Education (Brazil, 2011a), which is a large scale, standardized assessment exam administered by the Ministry of Education, and supported by committees of educational specialists, which assesses a sample of pupils of the 5th and 9th grades of primary schools and the 3rd grade of secondary education, the sample including public and private schools both in urban and rural areas. Examination conducted under SAEB assess:

- A) Portuguese language, the emphasis being on abilities in reading (with 15 descriptors for the 5th grade and 21 for the 9th grade)
- B) Mathematics the emphasis being on abilities related to problem solving, ideas of space and shape, numbers and operations, and measurements and information interpretations (with 28 descriptors for the 5th grade and 37 for the 9th grade).

The IDEB index (Index of the Development of education Board) provides the school grade, ranging from 0 to 10. It is based on a mathematical equation that incorporates variables related to that quality as perceived by government rationale. The IDEB is expressed mathematically as-

$$IDEB = Q \times F$$

Q: Proficiency measure, students' average performance as per PROVA and SAEB

F: Measure related to school flow, average passing rate

That way, the IDEB of a school or of a system will show whether pupils have mastered abilities and competencies deemed necessary relative to national curricular guidelines and expressed in the SAEB and in the Prova Brasil results. Also, the IDEB will reflect whether pupils have or have not succeeded in passing the academic year, that is, the index will show whether they have not failed or repeated the year, as well as whether they have or have not dropped out of school before concluding basic education.

### **Australian Model**

Australia has Australian Curriculum Assessment and Reporting Authority (ACARA) to assess and improve the student learning through world-class teaching curriculum. A programme called as National Assessment Programme is being run by ACARA for the same purpose.

Selected groups of students in Years 6 and 10 (Year 6 only for Science Literacy) participate in NAP Sample assessments, which are held periodically after every three years. Sample assessments began in 2003 with Science Literacy, followed by Civics and Citizenship in 2004 and ICT Literacy in 2005, so these assessments occur in different years. Participating schools are chosen carefully to ensure that the samples are sufficiently large to provide an accurate picture of the performance of students in each state and territory.

## **SCHOOL BASED ASSESSMENT**

“Children spend the best part of their young lives with teachers and it is through the teacher assessments that we can better understand their capabilities” (G.N. Tshenko, 2010).

SBA<sup>1</sup> is an assessment of students by their own school teachers. Although this system had been prevalent in countries abroad since a long time, but it was recently introduced in India in the form of Continuous Comprehensive Evaluation (CCE). Once a student achieves an outcome the teacher records this achievement and the student moves on to another outcome. Classroom assessment by the teacher involves observing students and determining if they can demonstrate that an outcome has been achieved. This can be done in a variety of ways. The classroom activities are designed to give students many opportunities to achieve outcomes. Traditional quizzes or tests are just one way for a student to demonstrate their abilities. Presentations, oral discussions, project work and experimentation are some other ways for students to demonstrate their abilities. This method can be adopted by all the schools which

---

<sup>1</sup> For more information about role of SBA, refer to Appendix-I

will help in assessing the students in a better manner. Not only better assessment, but it will also reduce the burden on the government to conduct assessment surveys every year.

SBA should be adopted by all schools as teachers are the ones who can help students in improving if they are not able to perform well. Since it will be a part of the curriculum, it will not cost a lot of expenditure to the schools and the results may help in National Assessment.

### ASER and UWEZO

As per the information available, cost of assessing one village under ASER is around INR 3000/-. So cost of conducting the survey is  $3000 \times 20 \times 570 =$  INR Three Crore Forty Two Lac (3,42,00,000) which is quite low. Where

570= Number of rural districts in India

20= Number of Villages Sampled per district

ASER model's success and scalability proved to be an inspiration for many countries and it has led to the development of model named as UWEZO. It aims to improve competencies in literacy and numeracy among children aged 6-16 years old in Kenya, Tanzania and Uganda. It is a citizen-driven approach to social change that is accountable to the public.

The table given below describes the criteria used by different organisations for assessing students:

Table 2: Assessment Matrix

Assessment Criteria->	Mathematics	English	Environmental Science	Science	Civics	Local Language
NAS	Y					Y
ASER	Y					Y
Azim Premji Foundation	Y					Y
PISA	Y			Y		Y
TIMSS	Y			Y		
SAEB	Y					Y
NAEA	Y	Y	Y	Y	Y	Y



National Assessment Programme	Y	Y	Y
-------------------------------	---	---	---

## INTERNATIONAL ASSESSMENT AND ITS RELEVANCE TO INDIA

In 2009, India participated in PISA in which 73 countries participated. Himachal Pradesh and Tamil Nadu were the states representing the nation. But the performance was miserable. India ranked seventy second position which was very shameful. Mathematics which is considered as India's strong point, the states finished second and third last, beating only Kyrgyzstan; the English test threw up the same result. The performance of girls was better than boys and science results were the worst, where Himachal stood last. TN was slightly better and finished third from bottom. The average 15-year old Indian is over 200 points behind the global topper. The moot question is as to whether we are closing our eyes to the world reality or international assessment is not relevant in the Indian context.

The issue was debated and it was felt that rather than spending millions on international assessment, we should spend that money on providing better educational facilities to the children and ensuring effective learning. The policy makers realised that the need of the hour is that we should concentrate on improving the learning outcomes as a result of which the Indian government refused to participate in PISA 2012 and 2015. The HRD ministry has concluded that there was a socio-cultural disconnect between the questions and Indian students and it will work on the issue. While it is for the Government of India through HRD Ministry to take a final decision on the assessment of learning outcomes which we need to adopt for our country, as a researcher who has studied the national and international models in assessment of learning outcomes, an attempt has been made in the next part to suggest the model by way of feedback to the policy maker which includes in it the attributes of international model too.

## MULTIPLE MATRIX MODEL

Because of the ambitious scope of large-scale assessment programs, the assessment is designed in such a way that each student is administered only a fraction of all the available items in that assessment. Hence, each student is administered a particular combination of test items, thus ensuring sufficient content coverage across the population while reducing the assessment burden for any one student.

The term multiple matrix sampling (Shoemaker, 1973), or, in older literature, item-sampling (Lord, 1962), arises from the practice of sampling both examinees and items; that is, giving samples of items to samples of examinees.

For Example: Each subject is administered by a set of four of the six available items, and each item is administered to eight of the 12 examinees. Students 1 and 7 are each administered Items 1 through 4, Students 2 and 8 are each administered Items 2 through 5, and so on. Students 1 and 7 and Students 2 and 8, for example, may also be administered Items 2 through 4. Matrix sampling of items is thus used in large-scale assessments to accommodate a broad coverage of the content domain, thereby ensuring that items are administered to a sufficient number of students without necessitating excessive testing time for any one individual student. Matrix sampling of items also allows us to estimate proficiency distributions of the population, while reducing individual examinee burden and testing time at the school, and representing the assessment framework satisfactorily.

The cost of assessment was reduced by 43% by implementing the multiple matrix method. Multiple Matrix method was implemented in Rajasthan which can be described as:

- The competencies for all the subjects of each class were divided across three sets of question papers (Set A, B & C).
- The three sets were equally distributed to the children present on the day of evaluation.
- Thus in about 60-90 minutes, every child in a class was assessed in all the subjects in a manner that 1/3rd of the children present answered Question Paper set A, another 1/3rd answered Set B while the remaining 1/3rd answered Set C.
- This enabled the completion of evaluation in a short time with significantly less resources compared to the traditional model.

**The Rajasthan Learning Guarantee Program team reported that:**

- On an average, a school was evaluated by four evaluators in 1 day as against 3 days in the traditional model
- A child was able to complete his/her assessment in all the subjects in a time span of 60 to 90 minutes, whereas in the traditional model it was spread across three days of evaluation

- There was sufficient time during the rest of the day for the evaluator to conduct oral tests

The same model is being used for conducting TIMSS and PISA alluding to the fact the model is efficient as well as cost effective.

## 5. Savings on Resources using Multiple Matrix Model

Taking the same illustrative example that we described in earlier section, the resource utilisation has been compared for the two methods:

1. 10 Districts: 100 Educational Blocks: 1000 clusters
2. Approximately 18000 primary and upper primary government schools.
3. Estimated 15 lac children in classes 1 to 4 in these 18000 schools.
4. Evaluation to be done in 1 month (22 working days)

Sr No	Item	Existing LGP or Pre 2008 KSQAQ Method	Multiple Matrix Method
1	Question Papers: @ Rs. 3 per child for 15 lac children	Rs. 45 lacs	Rs. 15 lacs
2	ICR or OMR sheets to transcribe children's scores: @ Re. 1 per child	Rs. 15 lacs	Rs. 15 lacs
3	Scanning and data processing: @Rs 1.85 per child	Rs. 27.75 lacs	Rs. 27.75 lacs
4	School wise performance report feedback; @ Rs. 60 per school	Rs. 10.8 lacs	Rs. 10.8 lacs
5	Number of days to evaluate one school with 4 members in a team	3 days	1 days
6	Number of evaluators required to complete the evaluation in 1 month	10000	3300
5	Transportation of material: @ Rs. 100 per school	Rs. 18 lacs	Rs. 18 lacs
6	Honorarium or TA for evaluators: @ Rs. 70 per day for 22 days	Rs. 154 lacs	Rs. 51 lacs
7	Communication material: About the program, sample question bank etc. @ Rs. 40 per school	Rs. 7.2 lacs	Rs. 7.2 lacs
8	4 day training for evaluators @ Rs. 120 per evaluator	Rs. 56 lacs	Rs. 19 lacs
9	Orientation, follow up meetings, development of assessment tools in 10 districts: 6 workshops during the year	Rs. 2.5 lacs	Rs. 2.5 lacs
10	Honorarium to external experts for capacity building exercises	Rs. 1.5 lacs	Rs. 1.5 lacs
11	Reward and recognition program for schools, teachers; assumption @ Rs. 20000 per block	Rs. 20 lacs	Rs. 20 lacs
12	Meetings at district, block and cluster to discuss performance and develop improvement plan	Rs. 12 lacs	Rs. 12 lacs
	<b>TOTAL</b>	<b>Rs. 370 lacs</b>	<b>Rs. 198 lacs</b>
	<b>Cost per school</b>	<b>Rs. 2050</b>	<b>Rs. 1100</b>
	<b>Human Resources</b>	<b>10000 persons</b>	<b>3300 persons</b>

The above table shows that the Multiple Matrix Model can help save 43% of costs as compared to the traditional method. Similarly, the saving on human resources is huge as only 1/3<sup>rd</sup> the human resources are required.

## HOW TO REDUCE COST OF ASSESSMENT

One of the arguments in favor of holding national assessments is that they can lead to economic efficiencies in the education system (Greaney & Kellaghan, Monitoring the Learning Outcomes of Education). Cost is the most important parameter to be considered before planning an assessment analysis. The data obtained from assessment should be such that it is able to justify the expenditure. The cost of carrying out an assessment should be planned before so that necessary amendments/changes can be made in budget so as to meet the requirement.

In establishing the cost of an assessment program, Ewell and Jones (1986) proposed counting four categories of expenses:

- 1) Instrument costs
- 2) Administrative costs
- 3) Analysis costs
- 4) Coordination costs (salaries/benefits and overhead)

The following points can be considered for cutting down the cost of assessment yet keeping it efficient.

### A) Sampling:

As discussed above, due to smaller size of sample size, the cost of assessment reduces. But sampling should be done such that it covers all the kind of students and the process is efficient at the same time. The following types of sampling should be incorporated to make the sampling process efficient:

- 1) Rolling sampling is commonly used to back test a statistical model on historical data to evaluate stability and predictive accuracy. This kind of sampling is being used in the ASER model. Every year, while conducting the survey the team includes one new village, one village from the previous year's sample and one village from the sample of villages used two years back. This ensures that all kind of villages are included and it also helps to see if there is any development in the education level of the village.
- 2) Probability Proportional to Size Sampling  
The PPS approach can improve accuracy for a given sample size by concentrating sample on large elements that have the greatest impact on population estimates. This kind of sampling when implemented ensures that villages with greater population are covered so as to get accurate results.

#### B) Frequency of Assessment

The expenditure for conducting the assessment is directly proportional to the frequency of conducting the assessment. In deciding on the frequency with which data on student learning will be obtained, the main considerations are the intended use of results, and expense. Since the major objectives of a sample-based assessment are to obtain empirical information on current levels of achievement for the education system as a whole and for subpopulations, and to monitor possible changes over time, an assessment every three or four years is adequate, as achievement levels change very slowly. Although, this would definitely reduce the cost of assessment, but many policy maker still argue that it should be carried regularly. Apart from National Assessment, students can be assessed under School Based Assessment (SBA). This would be beneficial for students as well as for the organisation conducting the survey.

#### C) Computerised Assessment:

This can be very innovative step in the field of assessment. Although, in developing countries like India this cannot be implemented to the rural areas due to insufficient availability of electricity, but this can be very well applied to urban areas where almost all the schools have access to computers. Softwares like BlackBoard can be used to assess the students. These softwares can be used to store their responses. Since the data is being stored in computers, it can be compiled easily and hence analysing the data becomes easier.

This decision can be based on the cost of labour. If the cost of labour is lower than that of utilizing technology for assessment, then labour can be employed otherwise computerised assessment can prove to be very cost effective.

Students being assessed under SBA can be assessed by computerised assessment.

#### D) Volunteerism:

Assessment analysis should draw upon volunteers to administer the tests nationally. Other than nurturing the community/civic responsibility, it shifts the assessment of learning competencies away from the domain of education professionals to the public domain, hence helping to galvanize public response and action to the schooling process. It will take into account and cut down on hidden costs.

Since the major cost item in instruction is personnel, we know that reducing the time faculty and other instructional personnel spend and transferring some tasks to technology-assisted activities is the key to cost savings in instruction. If we can reduce the number of hours spent by faculty and others while keeping credit hours constant with no diminution of learning results, we can reduce costs while maintaining quality. Of course, it is possible to reduce contact hours and save money, but without the use of IT and the redesign of the instructional process, quality would most certainly decline. With

technology, one can serve the same number of students at a lower cost-and serve them more effectively

E) Printing and Reporting:

The purpose of assessment is to critically analyse the ability of the future of the country. So the results and inferences of the survey should be shared with all the stake holders. Again the use of technology can help us reduce the expenditure. As per the information available, it takes around Three Lac Rupees (INR) to get three thousand reports printed. Apart from reducing the monetary cost, it will also help in protecting the environment. By circulating the report online, a small amount of money can be saved. Although small amount of money will be saved from this step, but "Penny saved is a penny earned".

F) Staff Training:

Picus (1994), building on lessons learned from K-12<sup>2</sup> testing programs, specifies expenses associated with training and program evaluation as unique assessment cost categories. The main focus in both sets of categories is on identifying direct costs—with the acknowledgment that indirect costs are significant but difficult to estimate. Training of staff for conducting assessment can be done online. A lot of expenditure is done on training staff for carrying out assessment. A common portal can be created for training where teachers. For example: google+<sup>3</sup> can be used to provide training to teachers.

### **Difference between National Assessment and Public Examination and their relation with cost effectiveness**

National assessments differ from public examinations in three important ways in their implications for efficiency.

First, whereas public examinations are held annually, the frequency of national assessments varies from once every year (in Colombia, France, and the United Kingdom) to once every ten years (in Finland). Once every four or five years in a subject area would seem a reasonable compromise and should provide adequate monitoring information because overall achievement standards tend to change slowly.

---

<sup>2</sup> K-12 is a designation for the sum of primary and secondary education. It is used in the United States, Canada, Turkey, the Philippines, and Australia. The expression is a shortening of kindergarten (K) for 4- to 6-year-olds through twelfth grade (12) for 17- to 19-year-olds, the first and last grades of free education in these countries, respectively

<sup>3</sup> For more information , refer to appendix 2

Second, not every student has to take a test in a national assessment. All that is required is a sample of students that adequately represents the total student population and is large enough for proposed analyses to yield valid and reliable information for policymakers.

Third, it is not necessary for every student who participates in a national assessment to respond to all items. The use of matrix sampling, in which a total test is divided into several components, means that comprehensive content area coverage can be achieved without placing an undue burden on individual students. Only the last of these issues, it should be noted, would preclude the use of public examinations for national assessment on the grounds of efficiency. If other conditions were satisfactory, national assessment data could be extracted from public examination data for a sample of students at appropriate intervals (for example, every third or fifth year) in a cost-effective way.

### State-wise per-student SSA allocations.

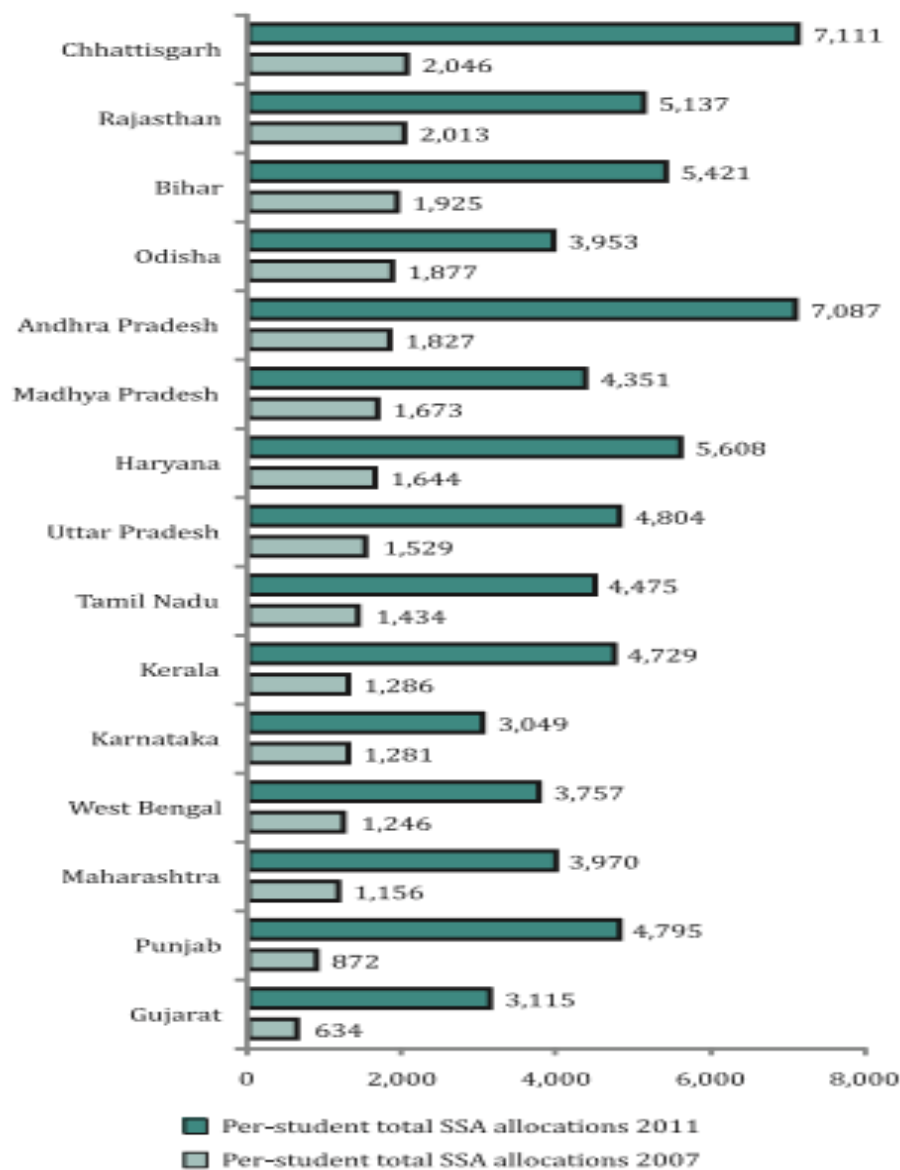




Figure3: State wise per student allocation SOURCE: Budget in Brief, 2013-14

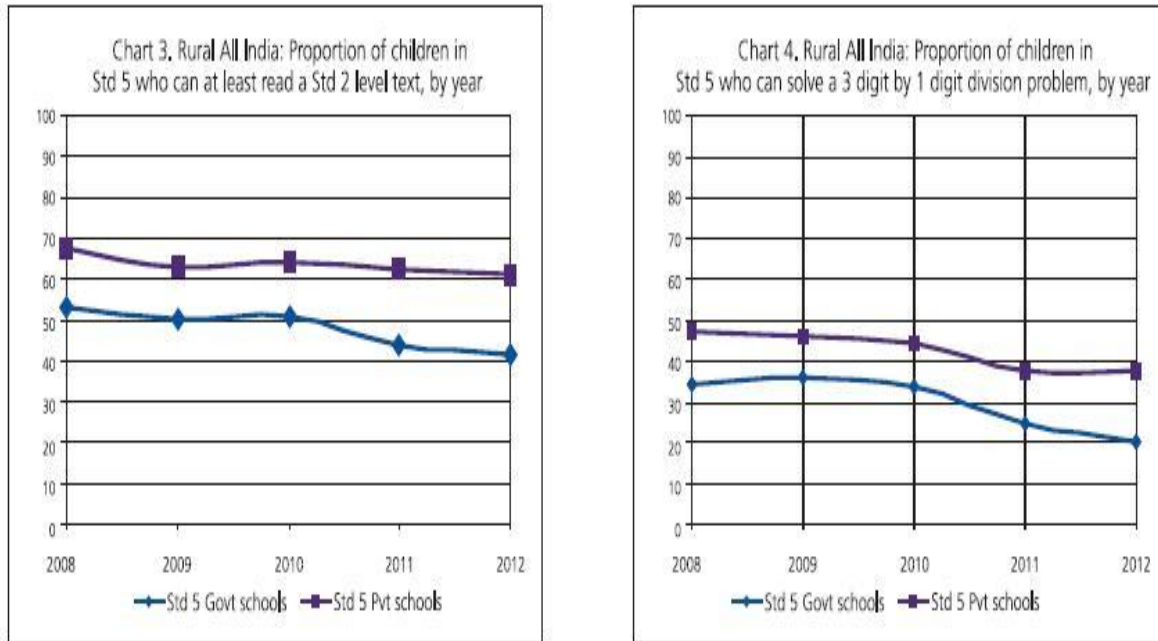


Figure 4: Decline in Learning Outcomes

The above graph compares the state wise per student allocation in the educational sector and the learning outcomes. As depicted in the above picture, the amount of funds has increased over the period of four years but still the learning outcomes has declined. The question arises that in spite of investing so much in the education sector, why there is no improvement in learning outcomes.

There can be several reasons behind it:

A) Lack of Required policy:

The very purpose of carrying out assessment analysis is to make necessary policy changes so as to improve the teaching process and hence improve learning outcomes. So, carrying out an assessment spending hundreds of crores without making required policy changes can lead to decline in learning outcomes. The Government of India launched The Right to Education Act with the aim of improving the quality of education available. But instead of focusing on improving the learning outcomes, focus is on meeting the infrastructural requirements of schools. The government should pass policy which can improve student learning rather than school infrastructure.

“Just spending time in school is not enough. There has to be a significant gain in skills that requires an improvement in the quality of education.” (Philippe Le Houverou World Bank Vice President for the South Asia Region)

B) Delays in analysing and publishing the result:

An example has been set by ASER in carrying out the process by assessing and analysing the results of whole of the rural India just in 100 days. But there are organisations which considerably delays the process - delays in the process lead to delay in policy making and makes the assessment process irrelevant.

### **IDEAL ASSESSMENT MODEL (RECOMMENDED)**

Identifying and protecting effective practices can be as important a function of assessment as identifying and improving areas of weakness (Valuing Assessment, Swing & Coogan). Keeping this thought in mind, we can design an ideal model consisting of following best practices derived from the present world- wide models:

- A) Since the purpose of assessment is to analyse the trend of educational and learning abilities prevalent among the students, it is not necessary to include all the students in the process of assessment. Sampling can be used, especially rolling sampling so that growth rate of students previously assessed students can be maintained.
- B) In order to determine the effectiveness of policy over period of time (and not just one year) assessment should be carried over a period of three or four years so that necessary changes in the policies can be made and their significant effect can be observed. Most of the assessment like PISA, TIMSS carry out survey after a period of three to four years
- C) Assessment should be done at primary level (let us say after third standard ) so that if students are incompetent to perform basic reading/writing/performing mathematical calculations, then remedial classes can be organised for them. Recognizing the deficiencies at early levels can help us in negotiating poor learning outcomes and reducing the student drop-out rate.
- D) The assessment paper should be designed in such a manner such that it consists of both open ended as well as multiple choice questions. Although multiple choice questions are costlier to design but cheaper in terms of checking. So balance of cost is maintained and students are assessed thoroughly.

- E) Multiple matrix method can be used as it aims at judging the items from all the domains within one paper and as shown above, it is cost effective too. Impulse Response Theory (IRT) can be used to link multiple test booklets and to analyse the data. IRT uses a mathematical model to link a student's chance of answering correctly particular item to two main factors:
- i) Student's ability
  - ii) Difficulty level of item
- This method allows us to compare the scores of students using different test cycles even over a period of time, which is the desired characteristic of assessment. This feature has been adopted by many models like PISA, TIMSS. Following the success of IRT, N.C.E.R.T. also switched to IRT over Classical Test Theory (CTT).
- F) Assessments should be computerised so that data collection and processing becomes easier. PISA is gradually transitioning to a computer-based assessment, so that the process of assessment becomes easier. Since all the data will be stored on the computers, requirement of human labour is reduced thereby reducing the cost of personnel. Also the data can be analysed easily.

## CONCLUSION

"While assigning a price to a "priceless" education may seem crass, doing so makes it possible to determine whether spending on assessment is producing the desired level of return on investment" (Swing and Coogan). A model will be successful if it is able to bring out some positive changes in the educational sector. There is no use of conducting an assessment analysis if its result cannot be used for the development of the educational sector. But there will always be a difference between an ideal model and what can be practiced. Efforts should be made to reduce the difference between the two and carry out the assessment effectively. Further, it would be only appropriate if we do not keep the model stagnant and make the same more dynamic by reviewing the functioning of the model from time to time.

Although every assessment model aims to be cost effective by incorporating the features like sampling based assessment, carrying out assessment after a certain period of time and many more as discussed above, but still efforts should be made to reduce the cost further so that the money saved can be used in improving the quality of education. Multiple Matrix Model proved to be very cost effective as shown in the above example. However, the model can be refined by incorporating such fine changes from other discussed models as are considered appropriate

so that the final objective of learning outcome can be made as effective as possible.  
*"Assessment is the engine which can drive the learning process and the feedback, an oil that can lubricate the process."*

## APPENDIX-I

# Role of Teacher in School Based Assessment

by Shruti Mehta, Research Fellow, Guru Jambheshwar University of Science and Technology, Hisar and Trainer, CAER

Assessing what students understand and can do is an important aspect of the teaching-learning process. The main purpose of assessment is to provide meaningful feedback to students about their progress. However, research has raised questions on the efficacy of the traditional method of paper-pen testing at the end of the term. In end-term assessments, focus is on scores of the child rather than on learning or his/her all-round performance through other areas of curriculum.

As teachers get accustomed to the same examination pattern year by year, they employ exam-centric methods to maximise students' score by resorting to memorising or using lower level cognitive skills. They become indifferent to the fact that students work under pressure and thus their real output decreases and learning goes in vain.

However, the paper-pen method of assessment assumes less credibility in those cases where we want to assess the 'holistic' development of the child. School Based Assessment (SBA) plays a vital role in such

situations. As children spend a major part of their time with teachers, regular School Based Assessments assist in understanding their actual capabilities.

School Based Assessment goes hand in hand with the teaching-learning process. Teachers assess students while they are teaching in classrooms and alter assessment techniques according to needs of the student and learning gaps. The task of the teacher becomes monumental while developing an image of a child and identifying and planning appropriate tasks to judge a child. It aids the progress of the student as he/she receives constructive feedback.

The versatile nature of School Based Assessment makes it more appealing as it assesses both the lower and higher levels of Bloom's taxonomy, i.e. not just remembering but understanding, applying, analysing, evaluating as well as creating through a series of assessments. This is particularly important when learning is more cognitive rather than just recording facts and figures. It also improves the relationship between students

and the teacher. It empowers the teacher as the score of a child is not bound to end term results, but year-round performance demonstrating his/her caliber in different situations.

Though the theories of School Based Assessment are quite old, their acquaintance with Indian schools is recent. The Continuous and Comprehensive Evaluation (CCE), a method of School Based Assessment, was introduced in several schools in 2009 for classes I to X. The system covers all aspects of student's development – scholastic and co-scholastic – with two fold objective of continuity in evaluation and assessment of broad based learning. The move has aided the strengthening of the teaching-learning process in these schools.

The role of teachers becomes indispensable as far as School Based Assessments are concerned. In order to assess the child's progress on the development continuum, the teacher ought to be able to justify the image of the student, based on records available for formative and summative assessments. Watching, observing, questioning and interviewing become important

when critical assessment is required to create the child's image. This type of critical assessment can only happen when the goal of teaching is not just to teach but help the students learn and improve.

The teacher must be clear in assessing the targeted curriculum and assessments should be designed in a way that it avoids bias. The teacher plays an important role because she has been involved in the collection of evidences regarding the learning and growth pattern of the student since the beginning. She can quantify his/her performance, using tools and techniques of assessment and can subsequently place a child on the developmental continuum.

Ultimately, assessments should serve the purpose of motivating the students to learn and critique, rather than just indulge in rote learning as in the past. The scores obtained through assessment and its rationale should be shared with them so that they know what they are being assessed for and get a chance to improve before being reassessed by any tertiary body.

Source: Centre for Assessment, Evaluation and Research Newsletter, April-June 2014

## APPENDIX-II

## Google Plus for Sharing Assessment Practices

by Sheena Joseph Cherian, CAER

Teachers, all over the world, are increasingly becoming technologically savvy in order to build their own capacities as well as to explore areas that can add value to their teaching, learning and assessment practices. One of these technological platforms is Google Plus, which has been offering several applications that have proved to be very useful for teachers, students and the education community at large. While social media is also becoming a popular platform for sharing of learning and assessment practices for students and teachers, educators are now also inclined towards using Google Plus as tool to make their teaching, learning and assessment practices more effective and engaging.

### What is Google Plus?

A Google Plus account is based upon a Google profile.

- Google Plus offers **streams** which are similar to news feeds in Facebook. Users from the education and assessment community can update their status, post useful assessment related links, videos and other media, which can be shared with others. Posts of the users' network will also be featured here
- **Circles** enable users to create groups of like minded people and share updates on similar interests. Several such circles can be created and information can be shared. Example: Circle for sharing of ideas by item writers or test developers; circles of assessment experts, etc.
- **Hangouts** on Google Plus offer live video interaction facility with up to 10 participants who can simultaneously login and conduct discussions.
- By using '+' symbol, users can send a notification to fellow users that they have been mentioned in their post and send messages on similar lines.

### Google Plus for Teachers

One of the easiest ways to utilise Google Plus is to use it as a mode of communication with students and the learner community from remote locations. Google Plus provides a mechanism where teachers can interact directly with the online community of learners as well as with other educators. **Teachers can address student queries, provide online review of assignments, delegate homework to students, review topics and provide an open platform where students can get answers to their questions.**

Listed below are some tips for teachers to use Google Plus for assessment practices

- **Hangouts as a tool to share assessment practices with students:** Teachers can use Google+ Hangouts to conduct online classes and share assignments, rubrics, project work, etc. Hangouts allow a total of 10 participants to join the session and is ideal for small groups. It is useful in promoting activities like group discussions. Teachers may also promote instructions to student by answering queries in Q/A sessions and promote student-to-student interaction and feedback.
- **Sparks:** This feature helps the user to automatically upload articles and videos, related to key words or interests, to the allotted stream. This is highly effective to carry out in-depth research on particular topics of interest for teachers and students. The teaching community with an interest in sharing assessment practices can specifically share articles related to

assessments, assessment ideas, examination items, rubrics, etc. Useful videos such as online lectures on assessment, and website links that contain teacher resources for assessments can be shared. An online assessment repository can be created which can be accessed by the teaching community.

- **Circles of interaction and collaboration:** On the basis of her assessment activities, the teacher can take part in learning circles in which she groups her students into different grades or subjects and addresses requirements of each group accordingly. Related learning resources and assessment activities can be mutually shared and discussed within the circle.
- **Involve parents too!** Teachers can involve parents in the activities of the students and share assessment forms, test results, report cards, receive and share feedback on student performance etc. A separate circle for parents will keep them updated and informed about activities in the school. Feedback to parents on the performance of students is an important aspect that can be shared through this forum.
- **Drag and drop files:** Files and folders can be dragged and dropped on Google Plus. It eliminates the cumbersome process of browsing and then uploading the document.
- **Integrate docs and calendar:** When Google plus is integrated with docs and the calendar, it acts as alerts for students and teachers for test schedules, submission of papers, sharing of information, deadlines for project work, etc.
- **The Instant Upload feature** of Google Plus helps share assignments, rubrics, videos, photos, etc with students and the learner community.

### Getting Started with Google Plus: Tutorial

1. Open your gmail account and click on the + icon on the top left corner of the email to be directed to Google+



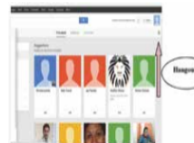
2. Click on 'Home' on the top left corner and then on 'Profile' to create your profile account on Google+



3. Users can update their status on Google Plus and also complete their profile by uploading photos and updating their personal information. Other features in this page include the *friends circle and hangouts*.



4. Click on 'Hangouts' on the top right corner of the page to enter into chat/live interactive sessions with colleagues (max of 10 people can participate in the hang out). Email IDs of people to be invited to the session can be entered into the text box. Click on 'Video Call' to start a live video session



5. The video session window would have all people who have been invited for the session (if they are available online and answer the video call).



7. Click on 'Home' and then on 'People' to invite contacts to join you on Google+. Click on 'add' to add friends to your list.

### Note:

Google+ specifies that all users must be 13 years or older. To tackle this, teachers can simply use a class account while in school or involve parents for home based assessment tasks with younger students.

### Tips of Assessment

The choice of tasks, whether in classroom or home, is an important aspect of School Based Assessment. Tasks have to be in tune with the learning objectives and should have opportunities for students to communicate their evolving understanding levels.

Source: Centre for Assessment, Evaluation and Research Newsletter April-June 2014

## REFERENCES

*Guidelines for Large Scale Learner Assessment*, FICCI School Educational Committee, March 2014  
Last Accessed on 16 July 2014

Swing & Coogan, *Valuing Assessment: Cost-Benefit Consideration*, May 2010  
Last Accessed on 10 July 2014 at  
[www.learningoutcomeassessment.org/documents/swingcoogan.pdf](http://www.learningoutcomeassessment.org/documents/swingcoogan.pdf)

*Guidance Note*, Department for International Development  
Accessed on 4 July 2014 at  
<http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=5&ved=0CEAQFjAE&url=http%3A%2F%2Fwww.heart-resources.org%2Fwp-content%2Fuploads%2F2012%2F04%2F04-Learning-Outcomes-How-To-Note.pdf%3Facad9b&ei=tZ3DU8n7CYyRuASro4LABQ&usg=AFQjCNF7OpTxdAo9Fle4igD-Eh-1D8Ousg&sig2=s2CTq8010TMXtxAKaXSXwQ&bvm=bv.70810081,d.c2E>

*ASER Report*, 2013 Last accessed on 20 June 2014

Greaney & Kellaghan, *Assessing National Achievement Level in Education*, 2008  
Last accessed on 7 July 2014 at  
[www.uis.unesco.org/.../assessing\\_national\\_achievement\\_level](http://www.uis.unesco.org/.../assessing_national_achievement_level)

Karopady & Giridhar, *School Quality Assessment: Multiple Matrix Model as an Alternative for Large Scale Assessment*, June 2009  
Accessed on 25 June 2014 at [www.azimpremjifoundation.org/pdf/School-Quality-Assessment.pdf](http://www.azimpremjifoundation.org/pdf/School-Quality-Assessment.pdf)

Trang Nguyen† Massachusetts Institute of Technology, *Information, Role Models and Perceived Returns to Education: Experimental Evidence from Madagascar*, January 23, 2008

Prus, Joseph and Johnson, Reid , *A Critical Review of Student Assessment Options*, 1994  
Last Accessed on 5 July at <http://assessment.uconn.edu/.../Pros and Cons of Assessment>

National Achievement Survey  
Last accessed on 12 July 2104 at  
[http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0CC8QFjAC&url=http%3A%2F%2Fwww.ncert.nic.in%2Fannouncements%2Ftendors%2Fpdf\\_files%2FNAS\\_C3.p](http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0CC8QFjAC&url=http%3A%2F%2Fwww.ncert.nic.in%2Fannouncements%2Ftendors%2Fpdf_files%2FNAS_C3.p)

[df&ei=DqXDU-7CHJGRuATa24DYDw&usg=AFQjCNHDi1avgBRWY14H-bJh4qELNrid2A&sig2=UV3i77-uALU0Y-IMa3OENA&bvm=bv.70810081,d.c2E](https://www.assessment.com/df&ei=DqXDU-7CHJGRuATa24DYDw&usg=AFQjCNHDi1avgBRWY14H-bJh4qELNrid2A&sig2=UV3i77-uALU0Y-IMa3OENA&bvm=bv.70810081,d.c2E)

[www.uwezo.net](http://www.uwezo.net)

[www.learningoutcomeassessment.org/](http://www.learningoutcomeassessment.org/)

<http://www.cambridgeassessment.org.uk/insights/school-based-assessment-asian-contexts/>

<http://www.adec.ac.ae/en/Students/PS/Assessments/SchoolBasedAssessment/Pages/default.aspx>

Centre for Assessment, Evaluation and Research Newsletter Last accessed on 17 July 2014 at <http://www.indiacaer.org/node/58>

<http://archive.indianexpress.com/news/poor-pisa-score-govt-blames--disconnect--with-india/996890/>