in the classroom

Teacher's Diary on Classroom Assessment – II

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In the last entry in my teacher's diary on classroom assessment, I had reiterated the importance of and the need for assessment- both formative and summative. I had decided to start the year with the topic of mensuration and had included the sample diagnostic test for the students I would be meeting that year in std. VIII.

After administering this test, I was able to gain good insights about my students' understanding of this topic. The performance of the class encouraged me to divide the group into five groups in such a way that students who had solved particular questions could be part of particular groups. Each group was assigned specific questions from the test and were required to present their solutions to the rest of the class. This engaged the students in collaborative learning within groups. Each group then made a small presentation to the rest of the class and I also tried to ensure that students, who had not solved some of the questions during the test, did so later. Finally, each student worked individually on, and submitted their corrections.

Keywords: *formative assessment, CCE, mathematical skills, abstraction, mensuration, area, trapezium, GeoGebra*

In token form at least, there is now a paradigm shift in the role of a child in the classroom from that of a passive listener to that of an active participant. The position paper *Teaching of Mathematics* (NCF 2005) says *"The higher aim (of teaching mathematics) is to develop the child's resources to think and reason mathematically, to pursue assumptions to their logical conclusion and to handle abstraction. It includes a way of doing things, and the ability and the attitude to formulate and solve problems"*. To this end, my role as a teacher is to facilitate learning in the classroom using various pedagogical techniques. Consequently, assessment takes on an even more important role. Observing students' work, keeping anecdotal records and timely feedback are key components of this process. Hands on activities such as paper folding, writing graphing stories, working with dynamic geometry software, etc., home assignments and classroom dialogues can be a source of evidence for both teacher and student alike. Assessment needs to provide answers for two questions:

- How is the student evolving as a learner?
- What can I do to facilitate that learning?

As I planned my work for the year, based on the CCE Manuals for Teachers brought out by CBSE in 2009, I realised that continuous and comprehensive evaluation would be daunting in terms of work load.

In the scholastic areas, subject teachers (Hindi, third language, English, Social Science, Science, Science and Mathematics) are required to award marks for various tests conducted as part of Formative and Summative Assessment for each student studying in classes VI- X. In each year, the formative tests have 40% weightage and summative tests carry 60% weightage. In my school, there were four formative assessments each year and within each formative assessment, written tests (called pen and paper tests) get 50% weightage and other activities get 50% weightage.

Under CCE, for all the subjects taken together, a student is required to work on 70 projects and appear for 40 examinations within a period of 8 to 9 working months (this includes 4 quiz /oral tests in mathematics). Each teacher is required to complete the following proforma (see Figure 1) subject wise for each formative assessment containing the details of marks scored by each student. Besides conducting four formative assessment tests, the teachers are required to conduct two summative tests as well.

I realised that unless I modified the assessment criteria, I would not be able to spend sufficient time on reading students' note books and looking carefully at the projects and on assessing their projects and activities. The sheer variety of modes of assessment would leave no time for remedial teaching based on my formative assessment.

Class :									
Subject : Maths									
S.No.	*Name of Student*	*Pen-Paper Test*	*Lab Activities*	*Project Work*	*Assignments*	*Home Work & Class Work*	*MCQ/ Quiz/ Oral*	*Total*	100 Marks are to be reduced to 10%
		50	*10*	*10*	*10*	*10*	*10*	*100*	

Figure 1 : Formative test proforma for Mathematics

With the encouragement of a supportive principal, I re-worked the model for formative assessment and proposed the following format

FA1: Pen - pencil 40% + Lab Activity 50% + Homework 10%

FA2: Pen - pencil 40% + MCQ/Quiz/Oral 50% + Homework 10%

FA3: Pen - pencil 40% + Individual Project Work 50% + Homework 10%

FA4: Pen - pencil 40% + Group Work & Presentation 50% + Homework 10%

I tried to plan my assessment in such a way that my over arching goal of students moving from the concrete to the abstract would be assessed in each session. I also kept in mind the following sub-skills while proceeding with the assessment.

i. Use and understand mathematical language including symbols
ii. Generalize from specific results
iii. Apply logical thinking
iv. Appreciate the notion of proof

Since remedial teaching was core to the success of formative assessment, I had to allocate time for this after each test. For FA 3 & 4, I decided to assign projects to the class in groups of 10. These would be designed such that the individual project work in FA3 would be consolidated and put together in FA4. Through this, co-scholastic areas such as collaborative work as well as artistic and presentation skills could be assessed. Students would also have an opportunity to improve on their individual projects based on the teacher's feedback which is the true meaning of formative assessment.

Along with the annual plan I also structured my classroom assessment carefully. I used questioning as a method to keep track of students' knowledge and understanding of the concepts.

The next section of the article describes a lab activity which was conducted by me to enable the students to 'discover' the formula of the area of a trapezium. Students already knew the definition of a trapezium. They were also familiar with the use of GeoGebra, an open source dynamic geometry software for exploring geometrical shapes.

LAB ACTIVITY TO 'DISCOVER' THE FORMULA FOR THE AREA OF A TRAPEZIUM

Task 1: Draw a trapezium ABCD with parallel sides AD and BC.

Task 2: Find the perpendicular distance between the parallel sides.

Task 3: Divide the trapezium into 2 right angled triangles and a rectangle. (See Figs. 2 and 3 for the GeoGebra sketches)

Task 4: Find the area of each of these polygons and hence find the area of the trapezium. Show your calculations. *(This is important as GeoGebra can give the area of each polygon if required)*

Task 5: Repeat the above calculation for a trapezium for which the parallel sides are of lengths *a* & *b* with *h* being the perpendicular distance between them.

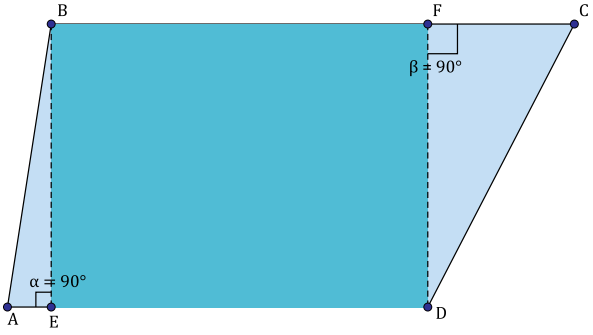

Figure 2

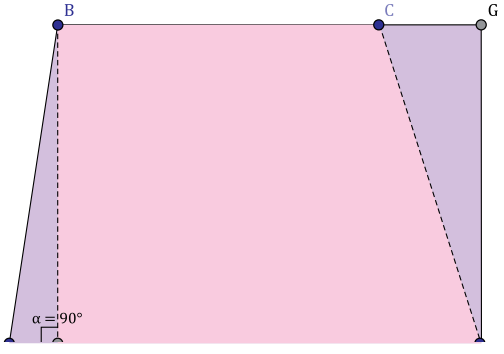

Figure 3

After this we had a group discussion on the formula for the area of the trapezium and arrived at the result *Area* = ½ $h(a + b)$

This exercise was followed by a home assignment in which students were required to solve problems based on the area of a trapezium. The object was to reinforce their understanding of the formula. Some of the problems in the assignment were as follows:

1-3. Find the area of the following trapezia.

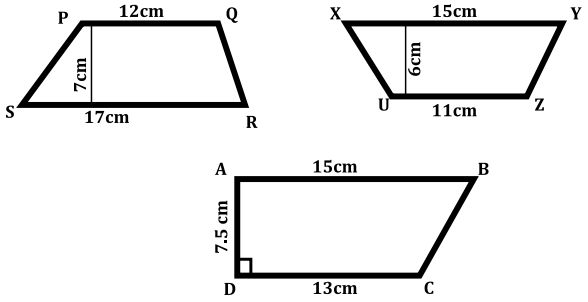

Figure 4

4. Find the side EF of the trapezium EFGH.

Area of EFGH = 152 square cm.

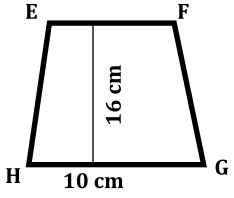

Figure 5

5. Mohan wants to buy a trapezium shaped field. Its side along the river is parallel to and twice the side along the road. If the area of this field is 10500 m^2 and the perpendicular distance between the two parallel sides is 100 m, find the length of the side along the river.

The next day, I made notes on students responses based on the lab activity worksheets with Geogebra and the homework. Finally I displayed a copy of the answer key using the overhead projector and we discussed each answer in detail. My strategy was driven by Wiggins (1993) *"an authentic education makes self-assessment central"*. Students need to reflect on their understanding and modify or adjust, based on their performance and feedback is an important tool for self-assessment. The class ended with the students completing the corrections for homework.

The same concept may be assessed in different ways and through different activities. Students may be given the following paper cutting activity either to reinforce understanding, evaluate progress or as remedial teaching after assessment. I have found that re-teaching a concept does not mean a re-explanation. A different route often helps students grasp better.

1. Cut the trapezium EFGH on the dotted lines. If EH = x and FG = y and the distance between the parallel sides is z, prove by summing the areas of the polygons formed that *Area* = ½ z $(x + y)$.

   Can the same formula be obtained by cutting the trapezium into a parallelogram and a triangle?

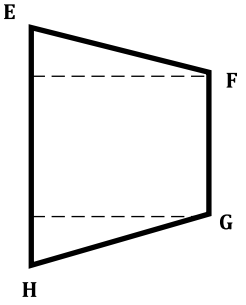

Figure 6

2. Where should point O be located along CB so that if ABCD is cut into two parts along the dashed line, the parts may be joined to form a triangle? If AB = l and CD = b and the height of this trapezium is h prove using the triangle so formed that the area of both the triangle and the trapezium is
   ½ h ($l + b$)

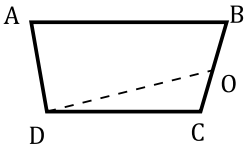

Figure 7

3. Fold the rectangle PQRS along the dotted lines PA and SB so as to make a trapezium. If PQ = *l*, PS = *b*, QA = BR = *x*, find a formula for the area of trapezium PABS in terms of l, b and x. What happens if BR = y where y is not equal to x?

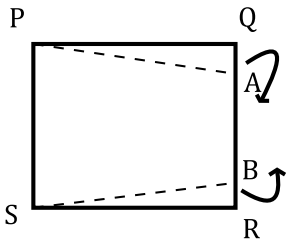

Figure. 8

I see this as a good opportunity for peer assessment for which the parameters will be given to the students as:

- Identification of polygons after folding or cutting.
- Use of mensuration formulae learnt earlier.
- Deriving the proposed formula and giving justification for the steps taken

Peer assessment enables students to openly discuss different problem solving strategies as well as justify specific strategies used. Once children assess their peers they tend to assess themselves on the same parameters. For the formative assessment, I now had the lab activity as well as the homework. In both these, I had ensured that the skills that I had identified were being developed in the students. The paper-pencil test that followed assessed the students' understanding of the formulae for the area of all quadrilaterals. After this, I did a final round of remedial teaching and corrections and was able to start the next unit.

Prior to this exercise, I had only assessed students' understanding through anecdotal evidence. However the use of a combination of assessment methods such as lab activities and paper folding activities I obtained a deeper insight into the students' understanding of concepts.

We tend to use or interpret words such as assessment, evaluation and examination interchangeably everywhere, especially in the context of education and particularly towards the year end or term end or end of the unit. But assessment is not the end of anything - rather, it is the beginning of better learning for the student as well as the teacher. And evaluation need not always be based on quantitative assessment rather, qualitative assessment can direct richer learning for both student and teacher.

The CCE column is the product of the Azim Premji University Resource Centre. The team members who are working on it are SINDHU SREEDEVI, JOYITA BANERJEE and SNEHA TITUS.

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