

Classroom Transaction to Deal with Fear and Phobia in Developing Basic Mathematical Concepts

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Abstract- Pedagogy means “The Art of teaching.” Pedagogy of Mathematics is the Art/skill of teaching Mathematics. This paper highlights the basic difference between Telling and Teaching of Mathematics. Telling means making oral statement regarding some mathematical concepts and facts and expected from the learner to remember these, whereas teaching includes organization of activities and demonstration with illustrations to make the learners understand the concepts and facts. Effective pedagogy will help learners in developing their confidence and to overcome from fear and phobia for learning mathematical concepts/facts. Mathematics Pedagogy involves certain important steps like to diagnose the hard spots of learning basic mathematical concepts and to devise remedial measures. Mathematics Pedagogy is similar to clinical Pedagogy. As the doctor first diagnoses the problem and then takes decision to adopt remedial measures for the treatment of the diseases. In Mathematics also at the first stage Diagnostic Evaluation is done to identify the hard spots of learning and then the remedial Effective pedagogy focuses on developing higher order thinking and makes the best use of the participation of the learner. Interactions, among teachers and students in a learning environment, help in developing sustainable learning among the learners. The use of various pedagogical skills helps in removing the fear and phobia among the learner in learning mathematical concepts. Telling v/s Teaching methodology for facilitating Mathematics learning has been tried by the author in upper primary and secondary level classes. For Example: A fraction is a part of a unit or of a group of similar things. This is one way of explaining the meaning of fraction. Demonstrating the concept of a fraction involving the learner using concrete material is the best pedagogical skill for this particular concept. The paper focuses on the use of best Mathematical Pedagogy to be used in the class room transaction with the involvement of learners. Use of Hands on Activities with the involvement of learner followed by the assessment for learning and re-learning.

Key Words: Telling V/s Teaching, Pedagogy of Mathematics, Fear and Phobia

Introduction

According to the latest National Achievement Survey conducted by NCERT, the performance of learners in Mathematics at Class X level is not very much encouraging. According to the experts at national level the school mathematics curriculum needs to be overhauled in view of the present National priorities. Pedagogy is one of the major component of the curriculum. There is a basic difference between Telling and Teaching of Mathematics. Telling means making oral statement regarding some mathematical concept/fact and expected from the learner to remember the fact/ concept, whereas teaching means telling with demonstration/ illustrations to make the learner understand the concept/fact and to apply it in solving daily problems. Effective pedagogy will help the learner in developing sustainable learning. Sustainable learning helps the learner to develop confidence and takes the learner away from fear and phobia for learning mathematical concepts/facts. Mathematics Pedagogy involves_There is a basic difference between Telling and Teaching of Mathematics. Telling means making oral statement regarding some mathematical concept/fact and expected from the learner to remember the fact/ concept, whereas teaching means telling with demonstration/ illustrations to make the learner understand the concept/fact and to apply it in solving daily problems. Effective pedagogy will help the learner in developing sustainable learning. Sustainable learning helps the learner to develop confidence and takes the learner away from fear and phobia for learning mathematical concepts/facts. Mathematics Pedagogy involves There is a basic difference between Telling and Teaching of Mathematics. Telling means making oral statement regarding some mathematical concept/fact and expected from the learner to remember the fact/ concept, whereas teaching means telling with demonstration/ illustrations to make the learner understand the concept/fact and to apply it in solving daily problems. Effective pedagogy will help the learner in developing sustainable learning. Sustainable learning helps the learner to develop confidence and takes the learner away from fear and phobia for learning mathematical concepts/facts. Mathematics Pedagogy involves certain There is a basic difference between Telling and Teaching of Mathematics. Telling means making oral statement regarding some mathematical concept/fact and expected from the learner to remember the fact/ concept, whereas teaching means telling with demonstration/ illustrations to make the learner understand the concept/fact and to apply it in solving daily problems. Effective pedagogy will help the learner in developing sustainable learning. Sustainable learning helps the learner to develop confidence and takes the learner away from fear and phobia for learning mathematical concepts/facts. Mathematics Pedagogy involves following important steps:

To diagnose the hard spots of learning basic mathematical concepts, to devise remedial measures. Mathematics Pedagogy is similar to clinical Pedagogy. As the doctor first diagnoses the problem and then takes decision important steps like to diagnose the hard spots of learning basic mathematical concepts, to devise remedial measures. Mathematics Pedagogy is similar to clinical Pedagogy. As the doctor first diagnoses the problem and then takes decision important steps like to diagnose the hard spots of learning basic mathematical concepts, to devise remedial measures. Mathematics Pedagogy is similar to clinical Pedagogy. As the doctor first diagnoses

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Mathematics is not so much a body of knowledge but as a special kind of language. The grammar of the mathematical language is determined by the use of rule of logic. Its vocabulary consists of symbols. In the 18th century, France. J.E Gallimond used the reverse symbol D as division. This has come from the fractional line \div . As we see in the fraction N/D so is the sign of division i.e to divide into parts. Mathematical concepts are derived from concrete experiences hen these are explicitly examined and identified and their relationships are explored. Different children think in different ways and this helps in developing Mathematical thinking among the children. Mathematics is precise and exact in Nature. This precision and exactness makes it different subject from other subjects.

The learning outcomes are derived from the curricular expectations which help the teacher as well as the learner to understand the goals to be achieved. The presenter has got the experience of teaching Mathematics at Elementary stage and also as a Teacher Educator. This was shared with the Teacher Trainees before going to the schools during their School experience programme. The trainees used this Pedagogy in the classroom for one of the concept i.e Introduction and the operations with integers in class 7th. This was found effective.

Pedagogy means “The Art of teaching.” Mathematics pedagogy defines the Art/skill of teaching Mathematics. There is a basic difference between Telling and Teaching of Mathematics. Telling means making oral statement regarding some mathematical concept and expected from the learner to remember these acts/concepts whereas teaching means telling with demonstration/ illustrations to make the learner understand the concept and to apply it in solving daily problems. Effective pedagogy will help the learner in developing sustainable learning. Sustainable learning helps the learner to develop confidence and takes the learner away from fear and phobia in learning mathematical concepts. Mathematics Pedagogy is similar to Clinical Pedagogy as the Doctor first diagnoses the problem and then decides the steps to be taken to solve the problem i.e the treatment of the disease.

Objectives

1. To diagnose the hard spots of learning basic mathematical concepts with the help of a **Diagnostic test.**
2. To develop the Teaching learning material in the **form of Hands on Activities pertaining to the hard spots identified.**
3. To make use of **the Hands on activities involving the learners for the hard spots identified.**
4. To assess the **effectiveness of the shift in the Pedagogical process on the learning outcomes of the learners**

Methodology and Procedure

Learning outcomes are directly related to the type and nature of content delivered in the class room to achieve the desired predetermined objectives of teaching. Curriculum transaction in the class room is not like the bank transaction i.e depositing and withdrawing money from the bank but instead this is the interactive approach between the teacher and the learner. Effective curriculum transaction depends upon the methodology adopted by the teacher. One of such a methodology is the use of various Mathematics Pedagogical skills to make the curriculum transaction live and interesting. Participatory approach was adopted with the involvement of learners using Hands on Activities.

A Diagnostic Test was developed for one specific concept of Mathematics, Integers and operations with integers, in class 7th. This concept has already been covered during the period April 2019 to Sept, 2019. This Test was administered among 150 students from three schools in different localities. On the basis of analysis of this Diagnostic test the specific hard spots were identified. The sample Diagnostic Test is Annexed as Annexure -1 at the end of this paper.

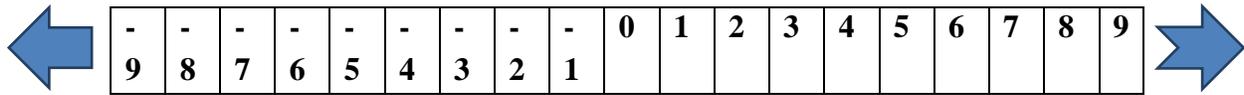
The analysis of the diagnostic test revealed the following types of hard spots. About 30% children were unable to compare the negative numbers correctly and about 70 % children were unable to do operations i.e addition, subtraction, multiplication and division on integers. $-33 \times a = 66$, more than 60% children wrote $a = -2$. This was discussed with the students and it was revealed that they wrote -2 , as on the left side there was a $-$ sign. This was clarified with the help of 3×4 multiplication grid where though a pattern the basic fact has been demonstrated involving the learners that in the multiplication 2 times $-$ sign gives $+$ result and when the $-$ sign is odd number of times this will give the result negative. After this intervention child wrote $33a = 66$ and $a = 2$ in place of -2 .

Why in addition two negative numbers give the result as negative instead of a $+$ sign. $-3 - 6$. Start from -6 and look at the sign of the other integer if it is $+$ then move to the right the number of steps on the number line and if it is $-$ then move to the left and look at then integer where we have reached that will give the result. Child

ren were given the number lines and were asked to move the required number of steps to reach the desired integer. -6 and move three steps to the left on the number line reaching -9 this is how $-$ and $-$ sign in addition gives the result again $-$. Below is given a number line. However in the class room cloth made number lines were used and the learners were provided the cloth number lines and were asked to locate integer on the number line as per the sign of the integer. After two three attempts learners were able to handle the number lines and could easily use the number line in the operations of addition and subtraction.

After a gap of two weeks another test was given to adjudge the effectiveness of the intervention. About 80 % children could develop the understanding of the operation with integers and got the clarity.

The first question was done correctly by 90% children, where the impact of oral statement is being observed. Normally teachers make a statement that in negative number the smaller integer is greater. This is not the end of teaching. Some practical aspect should also be discussed such that. Suppose you are standing at the tenth step of a stair case and you come down 3 steps i.e. -3 you are on the higher side in place when you step down 5 i.e. -5. Also when you lose rupees three instead of 5 rupees you are more rich than you lose rupees 5.



Activities for strengthening the concept of multiplication of negative multiplication and positive numbers or negative numbers with negative numbers were organized using the multiplication grid.

Data Analysis

Analysis of Diagnostic Test:

1. 17 test items were constructed on one particular concept i.e integers and operations with integers.
2. A sample of 143 children was taken from three schools.
3. Analysis has revealed that children are lacking bin conceptual clarity in the operations with integers.
4. Only 04 out of 17 items were correctly attempted by 60 % children.
5. The pin pointed problem was diagnosed in doing operations with integers, children are lacking clarity in understanding the integers, especially when there is a negative sign or negative/ positive signs are coming together.

Remedial teaching was organized with the same set of children. Although there were some new children were there and some were absent on the next date. Use of Hands on Activities in the class room and the learners were involved in performing activities in the class room. Number line strips were developed for understanding the clarity of comparison and other basic operations with integers. A pair of multiplication grid was developed for understanding the use of different signs in the operation.

After the intervention the effectiveness of the new Pedagogical process was assessed with the help of some items related to the concept and operations with integers. The items for assessment for learning were based on the identified Hard Spots.

Result and Discussion

The analysis of the test after the intervention revealed that about 80% children could attempt 12 out of 17 items correctly. Also in the presence of the regular teacher the children were doing questions using the Hands on Activities material. In view of post intervention performance of the children and their involvement in the teaching learning process using the Hands on Activities reflects that the suggested Pedagogical Process is helpful in reducing the fear and Phobia among

the learners in learning the basic fundamental mathematical concepts. Regular teacher of the class was also of the opinion that this Pedagogical process is helpful in making an impact in developing the basic concept of integers.

Conclusion and implications

Findings of the diagnostic test have revealed that mere telling the meaning of integer and doing certain operations is not enough to make the concepts clear. When basic concepts are not clear there is always a fear and Phobia in minds of the learner and that hampers in the sustainable learning and which is the essential component for attaining the learning outcomes up to the desired level. In view of the encouraging participation of the learners as well as the regular teachers teaching in the school this shift in the Pedagogical Process will have an implication in improving the teaching learning process in the class room and thereby will make an impact in the development of basic mathematical concepts among the learners and hence will contribute in reducing the fear and phobia among the learners towards mathematics as a discipline as well as an important component of school curricula.

Identification of Hard Spots in Learning Basic Mathematical Concepts

Topic: Integers

Need and importance of the knowledge of integers

In primary classes children have learnt about the fundamental operations with numbers or say Natural numbers. There are certain practical situations before the children where they encounter with the numbers other than the natural numbers. During the winter season there is news about the Maximum and minimum temperatures in the various parts of the country, where temperature is below zero degree and the same is written with the negative sign with the digit the number of degrees the temperature is below zero degrees centigrade. Also there could be situations where children have less amount of money than the amount they have to pay for the purchase of a certain material. A child has to buy a book whose cost is Rs. 31.00 and the child has only Rs. 30.00 with him/her. The shop keeper may ask the child that he/ she still owing Rs. 1.00 for him. A child is climbing down from the top of a ladder with 20 steps each step one meter apart. In the beginning the child is at a height of 20 meters. After climbing down 2 steps the child is at a height of 18 meters hence climbing down shows the negative movement. Mathematically we call them negative numbers.

Here in class 6th there is a starting of a very important topic i.e. Number System. When a child walks 10 steps towards his/her right side and then comes back 10 steps, now he/she is again at the starting point i.e 0 distances. If he/she still moves back two steps now the child is two steps down the starting point this is called -2 units.

Hard Spots

Hard spots are those where the child is likely to commit mistake or the step which hampers in the learning process. This is why these are called the HARD SPOTS.

Diagnostic Test

Subject: Maths Class:VII Topic:Integers

Note:

1. This Test is not to test your achievement.
2. The performance of this test will not be reflected in your assessment sheet.
3. This is only to know the Hard Spots of learning.
4. Your performance will not be shared with any one
5. Need not to write your name only write serial number.

Q No.1 When $5 > 3$ then $-3 - 5$

Q No.2 Difference between 10 and -10 is =

Q No.3 Difference between -10 and -10 is =

Q No.4 $-10 + (-3)$ =

Q No.5 Multiplication of -10 and 3 is =

Q No.6 $\underline{\quad} + \underline{\quad} = -3$

Q No.7 $\underline{\quad} - \underline{\quad} = -3$

Q No.8 $-3 - \underline{\quad} = 3$

Q No.9 $-33 \times \underline{\quad} = 33$

Q No.10 $-33 \times -a = 66$, then $a =$

Q No.11 $-11 \times -a = -88$, then $a =$

Q No.12 When a is a + integer and b is a - integer

Then the sign of $a \times b \times -a \times b \times -b \times a$ is =

Q No.13 When a and b are - integers

Then the sign of $a \div b$ is =

Q No.14 The value of $(-31) \div [(-30) + (-1)]$ =

Q No.15 If $-30 \div a = 5$, then $6a$ =

Q No.16 If $30 \times a = -360$, then $12 \div a$ =

Q No.17 If $-36 \div a = 6$, then a =

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4	X	3	=	12	4	X	-4	=	-16
4	X	2	=	08	3	X	-4	=	-12
4	X	1	=	04	2	X	-4	=	-08
4	X	0	=	00	1	X	-4	=	-04
4	X	-1	=	-04	0	X	-4	=	00
4	X	-2	=	-08	-1	X	-4	=	04
4	X	-3	=	-12	-2	X	-4	=	08
4	X	-4	=	-16	-3	X	-4	=	12