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The Impact of Errors on Problem Solving Ability in Mathematics

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Abstract

Obstacle of common errors in solving mathematical problems is severe. In this paper the errors are analyzed and effective remedy is given so that maths teacher can make use of it. As mathematics is cumulative in nature, it is important to identify errors (breakdowns) as early as possible before children lose their confidence or develop a fear of mathematics. The common errors that students commit are categorized as careless errors, conceptual errors and procedural errors. The maths teacher can do dominant role in removing common errors as well as fear of mathematics of the students.

Introduction :

Knowledge is not transferred, but it is constructed through one's experiences. Students construct knowledge through various experiences, both inside and outside the classroom. Sometimes lack of proper understanding may lead to the development of some preconceived notions may cause to occur errors. Such type of misconceptions arise and cause when the content is not properly transacted.

Mathematics is a subject that a student either understands or doesn't and probably little in between. In reality mathematics contains a wide variety of skills and concepts. These skills and concepts are related and often build on one another. It is possible to master a few and struggle with others. The errors are mainly related with the basic mathematical concepts. These basic mathematical concepts are the foundations on which students build their knowledge base. The errors should be pointed out by a teacher so that students can build their knowledge base by proper understanding of concepts. It can be possible by explaining conceptual theory of concerned topic. It needs to give attention by mathematics teacher.

In this, role of maths teacher is very significant. Teacher can easily understands the mistakes made by the students. For that after teaching a particular topic, teacher should give two to

three examples to solve so that teacher can point out the errors made by the students in understanding of the topic. These errors can be clarified to the students. Individual attention of the teacher is a must while clarifying the errors to the students which will help the students to develop interest in mathematics.

Research Objectives :

1. To identify and categories the errors committed by the students in solving mathematics problems.
2. To make the appropriate suggestions for the teachers to help students in correcting errors.

Delimitations of the study :

1. The study is delimited to CBSE schools.
2. The study is delimited to grade IX only.
3. The study is delimited to the chapter polynomials only.

Scope of the study :

1. The suggestions of the study will be helpful for teachers to remove fear of mathematics amongst student and to develop interest in mathematics problem solving.
2. The suggestions from this research can be extended to all schools especially with the CBSE pattern.

Research Sample :

The research sample consisted of 62 students of grade IX of Shantiniketan CBSE School, Kolhapur.

Research Methodology :

Research methodology adopted for the research was as follows :

1. One school was selected from CBSE pattern, that is, Shantiniketan School, Kolhapur.
2. Grade IX was considered for study.
3. 62 students (31 + 31) in two divisions were examined by giving a test containing questions based on chapter polynomials.
4. Questions were evaluated by senior mathematics teachers.
5. 25% (15 students) sampling was taken for interviews.
6. Stratified random sampling was used for interviews.
7. Collected information was tabulated, analyzed and results were drawn.

Analysis :

It is observed by overall assessment of students answer scripts and interviews that students are committed errors as careless errors, conceptual errors and procedural (computational) errors. Basically it reveals from the test and interviews that the students have their own fear about mathematics. It is assumed by them that mathematics is difficult subject. Probably this may cause to make an errors in problem solving in mathematics, that is, careless, conceptual and procedural errors.

Careless Errors :

It is observed that many of the students assume that maths is difficult subject and not going to pass in it. It resulted into less attention of students towards learning. Because of this, further faults like copying the problem wrong to begin with, writing a wrong number or sign, sloppy handwriting, dropping a sign etc. are the errors committed by them.

Conceptual Errors :

Table 1 : Conceptual errors from the answer scripts

Sr. No.	Incorrect	Correct
1.	$\frac{2}{0}=0$	Division by 0 is not defined.
2.	$(x+y)^2=x^2+y^2$	$(x+y)^2=x^2+y^2+2xy$
3.	$\sqrt{x+y}=\sqrt{x}+\sqrt{y}$	$\sqrt{x+y}\neq\sqrt{x}+\sqrt{y}$
4.	$\sqrt{x^2+y^2}=\sqrt{x^2}+\sqrt{y^2}=x+y$	$\sqrt{x^2+y^2}\neq\sqrt{x^2}+\sqrt{y^2}$
5.	$\frac{1}{x+y}=\frac{1}{x}+\frac{1}{y}$	$\frac{1}{x+y}\neq\frac{1}{x}+\frac{1}{y}$
6.	$x+x=x^2$	$x+x=2x$

It reveals from Table 1 that the students are lacking in mathematical signs and their proper use. Any single mistake may harm to compute problem. Therefore, it is suggested that the teacher should give more stress on basic concepts.

Procedural Errors :

Table 2 : Procedural errors from answer scripts

Sr. No.	Incorrect	Correct
1.	Square of $5x=5x^2$	$(5x)^2=(5)^2(x)^2=25x^2$
2.	Square of $-3=-3^2=-9$	$(-3)^2=9$
3.	$2(3a^2-3)=6a^2-3$	$2(3a^2-3)=6a^2-6$
4.	$3(2x-3)^2=(6x-9)^2$ $=36x^2-108x+81$	$3(2x-3)^2=3(4x^2-12x+9)$ $=12x^2-36x+27$
5.	$\frac{\not{3}a+5}{\not{3}}=a+5$	$\frac{3a+5}{3}=\frac{3a}{3}+\frac{5}{3}=a+\frac{5}{3}$

It is seen that the procedural errors occur in the problem solving process. The students incorrectly making use of addition, subtraction, multiplication and division. Many times students do not follow parenthesis. They do not understand the importance of the parenthesis.

Conclusion and Suggestions :

By foregoing analysis it is concluded that basically there is fear of mathematics in students mind. It needs to encourage students to pay proper attention towards learning. For that short tests are required to assess errors in problem solving before and during the teaching which will help to reduce errors in problem solving. Therefore, it is suggested that short tests should be arranged in the class. It is also suggested that teacher should focus on conceptual understanding and basic mathematical operations.

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