

## IMPACT OF A REMEDIAL STRATEGY ON TRIGONOMETRICAL ERROR PATTERNS- A CASE STUDY

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### ABSTRACT

*Mathematics in daily life, to a large extent is problem solving. Problem solving approach which is core of teaching and learning of Mathematics, depends upon trial and error theory. The errors committed by students cannot be eliminated but reduced to certain extent by studying their causes. Teaching is a process in which a teacher follows various steps out of which two major steps are to discover the errors of students and to provide the remedy for the errors. An attempt was made in the present investigation to study the case of a subject which showed maximum reduction of errors. It found that, the perceptual errors in case of the subject were totally eliminated.*

**Key-words:** Case study, Entry behavior errors, Perceptual errors, Conceptual errors, Computational errors, Remedial Teaching, Strategy.

The present study is the case of Amandeep Kaur which is a part of the broader study "Impact of A Remedial Strategy on Trigonometrical Error Patterns in relation to Cognitive Styles and Cerebral Dominance". The study was experimental in nature. Percentage of reduction in errors committed by the students was studied with the help of statistics. For qualitative analysis, some case studies were done. The present study is also one of those case studies. The subject was in the experiment group of the investigator. Maximum percentage of reduction in errors reported in case of the subject.

Generally attempts have been made at identifying errors committed by students however a few studies have been found aimed at remedying the

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trigonometrical errors. Mathematics in daily life, to a large extent is problem solving. It is not a rote learning subject. Problem solving approach which is core of teaching and learning of Mathematics, depends upon trial and error theory. Recognizing the significance of PSA, CBSE has introduced Problem Solving assessment for class IX and XI w.e.f. 2012-13 vide circular no. 087/2012 dt 6.11.2012. Trigonometry is a major topic in the curriculum of Mathematics. Students commit so many errors in Trigonometry.

Errors may occur at any stage in the progress of problem towards solution. There are many reasons behind an error.

Newman (1977), Casey (1978), Clements (1980), Raman (1989) classified errors in different types. In the present study, the classification given by Raman (1989) was taken. Overall as well as type wise percentage of errors of the subject was studied.

The subject was in tenth class of Govt. Sen. Sec. School, Khosa Randhir of Moga district. The school is affiliated to PSEB, Mohali. The health of the subject was normal and she was not affected from any serious disease. The vision, hearing and speech of the subject was also normal as observed by the investigator. Father of the subject is a farmer and mother is house wife. She has one sister studying in seventh grade. There was a congenial environment at home. Parents and siblings enjoy healthy relationship.

Subject usually watches television in her free time and also spends time with her peers. She took part in various co-curricular activities like Gidha, Athletics etc. organized by school. She also voluntarily helped in the organization of school functions. The conduct of the subject was good and she behaved very well with her peers and elders. She was not confident in classroom interaction whereas she was confident in her peer group.

#### **Previous Achievement in Mathematics:**

She got 44 out of 100 in Mathematics in IX grade annual exams 2009.

#### **Diagnosis:**

A self prepared diagnostic test of Trigonometry was administered to diagnose the errors committed by the subject in four categories i.e. Entry Behaviour errors, Perceptual errors, Conceptual errors and Computational errors.

On the diagnostic test comprising of 60 items, the subject committed total 39 errors in pre test out of which 10 were Entry Behavior, 7 Perceptual, 10 Conceptual and 12 Computational errors.

**Treatment:**

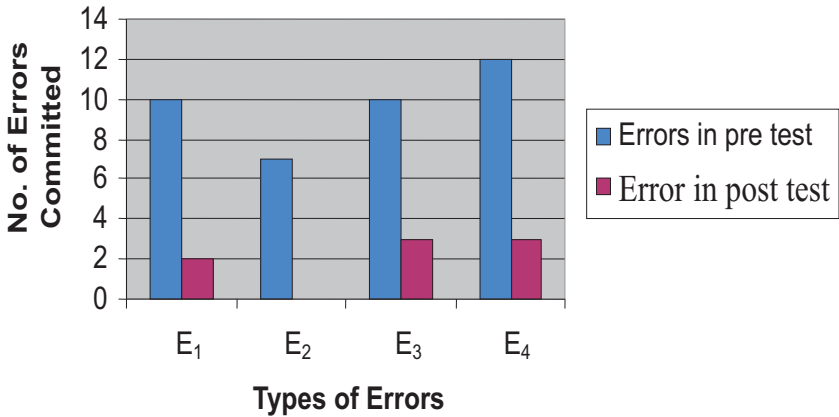
Amandeep was subjected to the remedial teaching of forty sessions of thirty five minutes duration each. After the treatment a post-test had been administered to the subject.

**Results:**

In the post test comprising of 60 items, the subject committed total 8 errors out of which 2 were Entry behavior, 3 Conceptual and 3 Computational errors. No perceptual error was committed by the subject. It found that there was significant reduction in Entry Behavior, Perceptual, Conceptual and Computational errors committed by the subject in Trigonometry which is evident from the comparison of pre and post test scores and percentage reduction of errors given in Table 1.1 and Figure 1.1. The subject benefited most from the strategy in remedying the perceptual errors.

**Table 1.1 : Comparison of Type wise and overall errors committed by Amandeep in pre and post tests**

Types of Errors	Test	Errors Committed	Percentage Reduction
E <sub>1</sub>	Pre Test	10	80%
	Post Test	2	
E <sub>2</sub>	Pre Test	7	100%
	Post Test	0	
E <sub>3</sub>	Pre Test	10	70%
	Post Test	3	
E <sub>4</sub>	Pre Test	12	75%
	Post Test	3	
E	Pre Test	39	79.49%
	Post Test	8	



**Fig. 1.1: Bar Graph showing comparison of different types of errors committed by Amandeep in Pre and Post tests**

**Follow Up:**

Mathematics teacher of the subject was guided about drill work technique in Mathematics so that he can continue to offer support in the school. Two months after the treatment researcher visited the school again to witness the progress made by the subject. Her mathematics teacher told that her performance in classroom interaction was better than before the experiment and the performance in class tests has also been improved. The scores in class tests after the experiment were given in the table 1.2.

**Table 1.2: Comparison of performance of the subject in Mathematics before and after the Experiment**

Before Experiment	May, 2010	July, 2010	August, 2010	September, 2010	October, 2010
	12/20	13/20	11/20	10/20	12/20
After Experiment	Jan, 2011	Feb, 2011	March, 2011		
	16/20	15/20	15/20		

### Opinion of siblings

The subject's sister reported that before the experiment she spent her ideal time in watching T.V. programs and talking about her classmates. She told that during the experiment Amandeep did home work regularly and talked about the classroom activities instead of classmates only. She made serious efforts towards doing drill work of mathematics daily during not only the experiment but she made it her habit.

### Opinion of parents

The parents of the subject reported that the subject reduced the time in watching Television and straying. Before experiment she helped in house chores sometimes but during the experiment she preferred her home work to house chores. Everyday she studied about two hours at night after dinner.

### Opinion of Mathematics teacher

The subject's mathematics teacher reported that her performance in class interaction as well as in class tests was average. She was punctual and interacted rarely in classroom discussions. Her homework were found occasionally full of mistakes. But after the experiment she not only interacted in the class but gave strong logics to the questions. e.g The teacher solved the problem  $\sin^2 A + \cos^2 A = 1$  by deductive derivation from Pythagoras theorem as below;

In a Right angled Triangle ABC,

By using Pythagoras Theorem,  $AB^2 + BC^2 = AC^2$

Divide both sides by  $AC^2$ , We have,

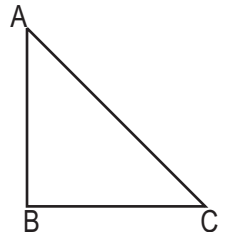
$$\frac{AB^2}{AC^2} + \frac{BC^2}{AC^2} = \frac{AC^2}{AC^2} \quad \text{or} \quad \left(\frac{AB}{AC}\right)^2 + \left(\frac{BC}{AC}\right)^2 = 1$$

$$(\sin)^2 + (\cos)^2 = 1 \quad \text{or} \quad \sin^2 + \cos^2 = 1$$

Take L.H.S.  $\sin^2 + \cos^2 = \frac{AB^2 + BC^2}{AC^2}$

By using Pythagoras Theorem,

$$\text{L.H.S.} = \frac{AC^2}{AC^2} = 1 = \text{R.H.S.}, \text{ Hence proved.}$$



She studied every topic deeply and asked about application part of some topics.

e.g. In daily life, where we use heights and distances, profit and loss, mensuration, algebra, geometry etc. How would she benefited in routine life by using mathematics fundamental rules.

There were so many if, how, why, what etc. about the topics in her interaction. There was a lot of reduction in the mistakes in her homework.

### **Opinion of peer group**

The peer group of the subject reported that she did her studies in free periods during the experiment. Now students consulted their problems in mathematics with her and most of the times she satisfied them by giving logics and making them understand about the fundamental rules in mathematics.

### **Conclusions :**

After studying the case thoroughly, the investigator reached at the following conclusions:

### **Errors**

- It was noted that total number of errors committed by the subject has been reduced significantly. The total percentage of reduction in errors was 79.49%.
- The perceptual errors have been totally eliminated.
- The least percentage of reduction in Conceptual errors have been 70% which is also highly significant.
- In the follow up after two months subject reported significant increase in marks in the monthly class tests.

### **General Behaviour**

Following changes have been observed in the general behavior of the subject

- The subject started exhibiting interest in class activities.
- Subject exhibited her deep knowledge of Mathematics by offering help in solving problems of peers.

### **Study Habits**

Following changes were reported in the study habits of the subject

- The subject started spending her ideal time in doing homework after the experiment.
- The subject started more judicious use of time for studies.
- After the experiment, the subject exhibited the habit of planned, neat & clean and stepwise home work.
- The subject started taking interest in discussions on topics of mathematics with peers.
- The subject started taking active part in classroom interactions.

### **Introspection Report by the Subject**

I feel that the experiment proved very beneficial for me. I had interest in Mathematics but not performed well in solving problems. During the experiment, I came to know where I was weak in Mathematics. I took drill work very seriously. I have interest in solving problems in which we have to convert word problems in figures and diagrams than in calculation work. Now I prefer the school work than helping in house chores. I became confident not only in classroom discussions but also I help my peers in solving their problems in Mathematics. During the experiment, the investigator taught the group with a lot of drill work and no punishment was given to us which is not in our routine school life.

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