

# Efficacy of Multi-Sensory Learning Strategies in Enhancing Mathematical Proficiency of Pre-School Students

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## Abstract

Learning of mathematics is for important for the livelihood of the people. It is one of the significant subjects which support learning of the abilities and skills. Learning mathematical skills at the preschool level help the cognitive and psychomotor skills of the children. This is an experimental study using single group pretest treatment posttest design. The major objectives of the study to diagnose the mathematical performance of preschool students who are identified to be improved, and to assess the efficacy of multi-sensory strategies in enhancing mathematical performance of preschool children. For this study, a sample of 15 preschool children studying at House of English who were identified poor in proficiency in mathematic ability was selected by using purposive sampling technique. Data were collected using Tools for Assessment in Early Mathematics (TEAM), Observation Sheet and Early Numerical Tasks: The findings of the study have revealed that efficacy of multi-sensory learning strategies was effective in enhancing mathematical achievement of preschool children.

**Keywords:** Psychomotor; Tools for Assessment in Early Mathematics (TEAM); Observation Sheet; multi-sensory learning strategies

## Introduction

Mathematics is one of the significant subjects which support learning of the abilities and skills. Learning mathematical skills at the preschool level help the cognitive and psychomotor skills of the children.

The methods of learning the proficiency of mathematics highly depends on the techniques of learning in the classroom. Multi-Sensory learning strategies are one of the innovative and new techniques in which teacher employ the advantages of integrating multi senses of students (seeing, hearing, touching, etc.) in learning teaching process in the class to optimize the learning outcomes. These strategies integrate visual, auditory and kinetic learning elements and help learners to discover their learning style and the techniques best for them. They can also be enabled by assistive technology and individual learning

## Need for the Study

Mathematic proficiency is important for the cognitive development of the preschool students and economic gate keeper that provides a key basis for achieving other academic and career skills. The strategies of activating different senses make the students learn easily. In preschools, several instructional methods and strategies are used for teaching preschool children, especially for improving mathematic proficiency. These methods were reported be relatively not that effective (Jazeel, 2017).

A review of related literature revealed that though there are some studies found in the line of teaching language using multi-sensory approaches, there is little researches found to focus mathematical teaching of preschool students in Sri Lankan context. Therefore, this study "Efficacy of Multi-Sensory Learning Strategies in Enhancing Mathematical Proficiency of Pre-School Students" was planned.

## Objectives of the Study

1. To diagnose the mathematical performance of preschool students who are identified to be improved.
2. Design and Implement efficacy of multi-sensory learning strategies among preschool children.

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3. Assess the effectiveness of the efficacy of multi-sensory learning strategies in enhancing mathematical performance of preschool children.

investigator while doing the numerical tasks using multi-sensory strategies. The sheet was validated with expert's opinion.

## Methodology

In this study, an experimental method was adopted with pretest treatment posttest design.

### Population of the Study

The population of the study constitutes all the preschool children studying in the preschools in Addalaichenai Education Division.

### Sample of the Study

A sample of 15 preschool children studying at House of English who were identified poor in proficiency in mathematic ability was selected by using purposive sampling technique. Though all the children were used for the study, the scores of the sample only were used for statistical analysis.

### Tools for the Study

1. Tools for Assessment in Early Mathematics (TEAM), The tool developed by Clements Sarama and Wllfe (2011) was moderated with experts opinion to suit the local context and measure mathematical ability of preschool students in terms of their age. For establishing the reliability of the tool, test - retest method was used. The co-relation coefficient was 0.86. The pilot run was done among 10 children studying at Batticaloa Nursary School and moderated considering the opinions of the experts. This tool had both content and face validity and that it was used in the study.

This tool was used to identify the students needed to be improved in their mathematical proficiency, and to find out the levels of their performance before and after the intervention.

2. Observation Sheet: Children under study were observed using this sheet by the

### Multi-Sensory Learning Strategies

Multi-Sensory Learning Strategies are the methods and approaches in which teacher employ the advantages of integrating multi senses of students (seeing, hearing, touching, etc) in learning teaching process in the class to optimize the learning outcomes. For implementing multi-sensory strategies, a Multi-Sensory Learning Package consisting of a series of activities of numerical tasks the children performed as intervention.

### Procedure

After obtaining the informed consents of the guardians of the children and the management of House of English, the sample was treated with multi-sensory strategies to perform the designed numerical tasks. The teacher of the class was trained by the investigator on how to teach numerical tasks using multi-sensory package Before and after the intervention, the mathematical proficiency level of the children were identified using Tools for Assessment in Early Mathematics and the scores obtained were tabled for statistical analysis. The observation sheet was used to observe the interest, activeness, etc of the children while doing the specified tasks on numeracy.

## Results and Discussions

### Research Hypothesis -1:

Multi-sensory strategies will significantly enhance the attainment of mathematical proficiency of the pre-school children

From the table 1 it may be inferred that, since the value obtained 3.49 is more than the table value 2.89 the difference in performance between the Pre -Test and Post - Test is significant at 0.01 level. Thus, the hypothesis of the study has been confirmed. Thus, multi-sensory strategies have enhanced the attainment of mathematics of the preschool students.

Table 1:

Sl. No.	Performance Test	N	Mean	Standard Deviation	't' value	Level of Significance
1	Pre-Test	15	14.2	4.17	3.49	Significant at 0.01 level
2	Post-Test	15	46.7	6.42		

### *Findings of the Study*

Multi-sensory strategies have enhanced the attainment of preschool students.

Multi-sensory strategies have improved the, confidence, activeness and interest among students to do activities. The techniques were user friendly.

### **Discussion**

It is revealed from the analyses of the findings that multi-sensory strategies. The findings of the present study strengthen the results of the previous researches. Bäckman (2012) found in the similar study conducted in Malaysia schools that the use of peer works improved the mathematical skills. This study also revealed that the students should be given appropriate activities to improve their mathematical problem solving skills. The mathematic activities should be student-centered and easier. However, the multi-sensory strategies are rarely used in preschools in Sri Lanka and that there needs more researches to test the ability of improving language, aesthetic, creative skills of the preschool children.

The results of the study carried out by Runesson, and Marton (2002) showed that the teaching using different sensors were more effective than conventional methods. Similarly, Shulman (1986) concluded that approaches of giving peer assignments were more effective than conventional methods in developing language and mathematics for slow learners. The present study has supported this result.

However, according to Murphy and Nancy (1997) emphasized in their studies that multisensory approaches are more useful for the students with learning difficulties and the over use of this techniques discourage the students learning themselves. This arguments need to be proved with more studies using the multi-sensory approaches. As far as the present study is concerned, what both Murphy and Nancy opined was contradictory to the results of the study.

By and large, the various previous studies have strengthened the findings of the present study and vice-versa. Hence, this is an important attempt in search of an appropriate method for teaching mathematics in preschools

### **Conclusion**

The following conclusions have been made from the analyses of the data collected.

It is concluded that the multi-sensory strategies are very effective methods in teaching mathematics among preschool students. The students are very active and interested and seem to be confident in this doing their mathematical activities.

By using strategies difficulties in mathematics can be minimized. The mathematics of all the students can be enhanced further irrespective of the bottom performers.

The strategy of using different methods with suitable technology instead of conventional teaching methods can activate the brains of the students and make the students learn the difficult concepts in mathematics easily.

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