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Enhancing achievement of science through effective multisensory integration approach

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Abstract
Sensory integration takes place in the central nervous system where complex interactions such as co-ordination, attention, arousal levels, autonomic functioning, emotions, memory and higher level cognitive functions are carried out. Sensory integration gets information through the senses, puts it together with prior knowledge, information and memories already stored in the brain to make a meaningful response. Multi-sensory learning, as the name implies, is the process of learning a new subject matter through the use of two or more senses. This may include combining visual, auditory, tactile or kinaesthetic, olfactory and gustatory sensation. By activating brain regions associated with touch, flavour, audition and vision, they indicate a direct relationship between perceptual knowledge and sensory brain mechanisms. The present research study to find out effectiveness of Multisensory Integration Approach to Enhancing Achievement on Science among IX Standard Students reveals that activating appropriate processes through on Multisensory Integration Approach plays a vital role in improving achievement in science. Further it is observed that the Multisensory Integration Approach expands the learning schema, since the learners is able to activate appropriate sensory integration. This contributes to meaningful and joyful learning. This facilitates the teacher's task of enabling the students to apply Multisensory Integration Model on enhancing learning.

Keywords: Multisensory Integration, Approach, Achievement, Science

Introduction

Multi-sensory learning, as the name implies, is the process of learning a new subject matter through the use of two or more senses. This may include combining visual, auditory, tactile or kinaesthetic, olfactory and gustatory sensation (Scott, 1993). By activating brain regions associated with touch, flavour, audition and vision, they indicate a direct relationship between perceptual knowledge and sensory brain mechanisms. In Multisensory Integration approach, a child gets the opportunity to seen, auditory, touch, feel, taste, handle, and smell. Such sensory experiences are caused by external environmental stimulations. These result in perception; it develops form impressions or an awareness of sensations caused by an environmental stimulus which requires little interpretation. Perceptions are primary factors in thinking which often initiate train of thought.

When perceptions are recalled at some later time without the use of external stimuli, the memories and images are already formed. The perception in the form of images and memories develop into greater abstractions called concepts. The concept is usually organised as a result of many related sensation, percept and images with verbal symbols incorporated.

Objectives of the study

The following are the objectives for this study

1. To design and develop Multisensory Integration Approach.
2. To implement the Multisensory Integration Approach on enhancing achievement in science.
3. To find out the effect of the Multisensory Integration Approach on enhancing achievement in science among students.

Hypotheses of the study

The following are the Hypotheses for this study:

1. There is no significant mean difference between control and experimental group students in their achievement in pretest.
2. There is no significant mean difference between control and experimental group students in their achievement in progressive test I.
3. There is no significant mean difference between control and experimental group students in their achievement in progressive test II.
4. There is no significant mean difference between control and experimental group students in their achievement in progressive test III.
5. There is no significant mean difference between control and experimental group students in their achievement in posttest.
6. There is no significant mean difference between pretest and post test Scores of achievement in control group.
7. There is no significant mean difference between pretest and post test scores of achievement in experimental group.

Method of the study

The present research has followed the two group pre-test post-test designs. In this design subjects are assigned to the experimental group and the control group at random and are given a pre-test. The experimental group taught through Multisensory Integration Approach and the control group taught through traditional method. After which the two groups are measured on dependent variable.

Variables of the study

The present investigation is an attempt to determine the effectiveness of Multisensory Integration Approach on

Enhancing Memory and Achievement in Science and to estimate the extent of relationship between selected variables in the most effective Multisensory Integration Approach.

1. The Multisensory Integration Approach is the independent variable in this study.
2. The Achievement score in science is the dependent variable.

Experimentation in Phases

Phase: I

1. Understanding of the Multisensory Integration Approach.
2. Developing a systematic model for the application of multisensory integration approach instruction promoting memory and achievement in science.
3. Identifying chapters related to the application of Multisensory Integration Approach in chemistry lessons in the science book of IX standard.

Phase: II

4. Trying out the Effectiveness of Multisensory Integration Approach with a small group of students as pilot study.
5. Formation of two groups for conducting experiment, one is control group and another one is experimental group.

Phase: III

6. Conducting pre – test to assess the entry behaviour of the students in the classroom.
7. Comparing the control and experimental group students based on pre – test achievement scores so as to enable them to establishing the equality of the two groups by mean and standard deviation.

Phase: IV

8. The students of experimental group to be taught through Multisensory Integration Approach and control group to be taught through the traditional method of teaching.
9. Duration of the treatment would be of three months.

Phase: V

10. Administering the test after the completion of equal amount of portions allotted to the experiment so as to enable the investigator to administer three progressive tests.
11. Administering the posttest after the completion of instructional units
12. Entering, categorizing and analyzing the pre – test, progressive tests and post – test scores

Sample for the study

The Simple Random Sampling Technique has followed in the Study. In the school selected for the study, the IX standard students were taken for investigation, 60 were selected out of 90 students (other than 30 those selected for pilot study) in the IX standard formed the sample of the study.

Out of 3 groups in IX standar. A group assigned as control group, B group assigned as experimental group and C group already taken for pilot study. Students were randomly assigned to form the two groups- control and experimental group. The pretest was conducted to the control and experimental groups fortunately their mean score are almost equal.

Tools for the study

1. Achievement Pre - test for science.
2. Achievement Progressive test I, II and III in Science.
3. Achievement post- test in Science.

Data Collection

The IX standard students were randomly assigned to form two groups, control and experimental group. Experimental group students were taught through Multisensory Integration Approach. Control group students were taught through traditional method. Initially they were administered the following tools to find out the level of their achievement.

1. Multisensory Integration Approach
2. Achievement Test.

During the course of instruction at regular intervals progressive tests were conducted. The marks scored in the three progressive tests were computed for analysis. Finally a post – test was conducted after the completion of all portions. The reliability of the progressive tests and the posttest were established. They were found to be significant.

Scheme of data analysis

In the present study the relevant data obtained from test scores of 60 students in the pretest, progressive tests and the posttest have been analyzed as follows.

1. Descriptive analysis

This generates information about the nature of a particular group of individuals. Mean and standard deviation were calculated to determine the central tendencies and dispersion of variables.

2. Differential analysis

This tool involves determination of statistical significance of difference between the groups with reference to selected variables. It involves ‘t’ test to determine the difference

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Table 1: Differential Analysis of Achievement in Pre-test, Progressive test I, Progressive test II, Progressive test III and Post-test.

S. No.	Test	N	Group	Mean	SD	“t” value	Remarks
1	Pretest	30	Control	21.53	6.76	0.11	NS*
		30	Experimental	21.36	5.56		
2	Progressive test-I	30	Control	23.76	3.53	6.41	S*
		30	Experimental	31.36	5.56		
3	Progressive test-II	30	Control	24.40	2.60	17.49	S*
		30	Experimental	42.20	5.93		
4	Progressive test- III	30	Control	27.53	3.35	17.57	S*
		30	Experimental	53.20	6.77		
5	Post-test	30	Control	28.30	1.82	31.64	S*
		30	Experimental	61.10	5.23		

N=30 NS*=Not significant S*=Significant 0.05 level

- The above table shows that the 't' value of Achievement in pretest, Progressive test I, Progressive test II, Progressive test III and posttest in control and experimental groups.
- There is no significant difference between the mean scores of the two samples at the beginning of the study.
- This shows both the control and the experimental groups are comparable and the entry level before the treatment was begun.
- The calculated 't' value is 6.41 which is greater than the table value. Hence there is significant Mean difference between the control and experimental group in progressive test- I.
- The calculated 't' value is 17.49 which is greater than the table value. Hence there is significant Mean difference between the control and experimental groups in the progressive test-II.
- The calculated 't' value is 17.57 which is greater than the table value at 0.05 level. Hence there is significant Mean difference between the control and experimental groups in the progressive test-III.
- The calculated 't' value is 31.64 which is greater than the table value at 0.05 level. There is significant Mean difference between the control and experimental groups in the posttest. Hence the Multisensory integration approach is more effective than the Traditional method in science learning.

Findings

The following are the findings of the study:

1. It is found that the achievement mean scores of control and experimental group are similar in pretest. Hence the two groups are equivalent before the treatment.
2. It is found that the achievement mean scores of experimental group is greater than the control group in progressive test I.
3. It is found that the achievement mean scores of experimental group is greater than the control group in progressive test II.
4. It is found that the achievement mean score of experimental group is greater than the control group in progressive test III.
5. It is found that the achievement mean scores of experimental group is greater than the control group in posttest. Therefore the Multisensory Integration Approach is more effective than the traditional method.
6. It is found that the achievement mean score of posttest of control group is marginally increased than the pretest.
7. It is found that the achievement mean scores of posttest of experimental group is greater than the pretest.

Conclusion

The present research study "Effectiveness of Multisensory Integration Approach on Enhancing Memory and Achievement in Science among IX Standard Students" reveals that activating appropriate processes through on Multisensory Integration Approach plays a vital role in improving achievement in science. Further it is observed that the Multisensory Integration Approach expands the learning schema, since the learners is able to activate appropriate sensory integration. This contributes to meaningful and joyful learning. This facilitates the teacher's task of enabling the students to apply Multisensory Integration Model in enhancing Achievement.

It is found out that Memory in Science is improved by learning through the Multisensory Integration Approach Model. Hence educational planners, administrators and curriculum designers should play a vital role in restructuring teacher education courses at all levels with the incorporation of Multisensory Integration Approach components. This will certainly develop the Memory of the students in Science. This research study highlights the need for optimum utilization of the Multisensory Integration Approach to gain maximum educational benefits to the society.

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