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EFFECT OF COOPERATIVE LEARNING AND DIFFERENTIATED INSTRUCTION ON RETENTION OF LEARNING AMONG STUDENTS WITH LEARNING DISABILITY

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ABSTRACT:

This study aimed at studying the effects of Cooperative learning, Differentiated Instruction and Traditional Instruction on the retention of learning of students with learning disability. The students with learning disabilities studying in 5th standard formed the sample for the study. The retention of learning was measured as a difference between the post-test and the delayed post-test scores on achievement test in Science subject. The delayed post-test was administered 40 days after the completion of the experiment. The data collected was analysed using SPSS. t-test for paired samples and one-way ANOVA were the statistical techniques used. The results after analysis revealed that there was a significant retention from post-test to delayed post-test in the group taught with Cooperative Learning based instruction, while in the Differentiated Instruction group and the Traditional Instruction group the retention was not significant. The results of one-way ANOVA suggested that there exists a significant difference in the mean gain scores on retention of learning among students with learning disability taught in three different groups. Further the post-hoc test revealed that Cooperative Learning group and Traditional Instruction group differ significantly in their retention, while there is no significant difference in the Differentiated instruction and Traditional Instruction groups. However, the two experimental groups i.e. Cooperative learning and Differentiated instruction showed insignificant difference in the retention of learning. Overall we can say that Cooperative learning based instruction proved about to be the best among the three in order to enhance retention of learning among the students with learning disability.

Key Words: *Learning Disability, Retention of learning, Cooperative Learning, Differentiated Instruction.*

INTRODUCTION

The children with learning disabilities have varied academic requirements which are generally not met in a regular classroom. Teachers must design the academic and social environment of the classrooms so that students develop the skills and attitudes required to interact across perceived differences and disabilities. The favourable academic performance of students does not merely counts for the good achievement scores but also the proper retention of the knowledge or outcomes gains and their utilization or application in further new situations. Retention is the capacity to remember the modelled behaviour. Learning is a permanent change in the behaviour that involves a three step sequential process of initial acquisition,

retention and application. Retention can only occur if the knowledge/information has been acquired initially, and the transfer of this knowledge into new situations is only possible if the outcomes have been retained well (Klausmeier & Goodwin, 1966). Instructional strategies that actively involves the children in the class lessons, contribute effectively towards long term retention (Slavin, 1997). The search for instructional strategies to help improving the academic performance of the students with learning disabilities has led the investigator towards two recommended strategies. These are- Cooperative Learning based instruction and Differentiated Instruction. The cooperative learning strategy has gained immense attention in the recent years as being successful in educating the children with learning disabilities in an inclusive environment. It has been defined as a small group of learners working together as a team to solve a problem, complete a task or accomplish a common goal (Artz & Newman, 1990). Kagan 1994 defined cooperative learning as peer interactions where positive relationships, collaboration, learning and shared participation are used to teach any subject matter. In the cooperative learning setup students are divided into heterogeneous mixed ability groups of 4-5 students per group. Students are often assigned some roles that they have to play for completing the set task. Kagan cooperative structures have been used in this particular study. There are five basic elements of Cooperative learning that makes it different from other forms of group learning. These elements are- Positive Interdependence, Individual and Group Accountability, Interpersonal and Small Group Skills, Face to Face Promotive Interaction and Group processing. Many researchers have studied the effectiveness of cooperative learning in improving the academic performance of children. According to Slavin, Madden and Leavey (1984) cooperative learning has been used extensively to promote achievement in mathematics of students both with and without learning disabilities. Stevens and Slavin (1995) in their study found that cooperative learning promotes higher achievement and greater retention than the individualistic learning for all the students. Torchia (2012) suggested that cooperative learning does influence students' achievement, students' self-efficacy and intrinsic motivation positively.

Children do have many things in common because they all are human beings and because they all are children but they also have some important differences. They may be alike in terms of their abilities, interests, hobbies, learning styles, learning preferences etc. The push from homogeneous grouping has made it vital to call for differentiated instruction. Differentiated Instruction is simply providing instruction in a variety of ways to meet the needs of variety of learners (Nunley, 2006). According to Tomlinson (1999), it is an organised yet flexible way of proactively adjusting teaching and learning to meet kids where they are and help them to achieve maximum growth as learners. In differentiated classrooms, the learning choices tap into students' developmental levels, interests and learning styles (Tomlinson, 1995). The teacher can differentiate the instruction by modifying the regular instruction in four of its elements i.e. the content, the process, the product and the learning environment. Thus, it is a cyclic process of knowing about the learner and in turn responding by differentiating any or all of these elements. It is based on same curriculum expectations from all the students to achieve same high standards of performance. Brimijoin (2001) & Teiso (2002) in their two dissertation studies reported achievement gains for students in effectively differentiated classrooms. Ferrier (2007) in his study found that the students in the differentiated instructional classes were found to score significantly greater than their traditionally instructed peers. Brigham, Scruggs & Mastropieri (2011) had studied many strategies along with differentiated instruction and the strategies reviewed yield tangible and positive effects that suggest that their application to the target domain will substantially improve outcomes for students with learning disability in science education. Flaherty and Hackler (2010) in their research have found that Differentiated Instruction and Cooperative Learning activities were effective in raising the intrinsic motivation levels of students that interfered with their overall academic performance.

OBJECTIVES:

1.To study the differences in the post-test and delayed post-test mean scores on achievement test in Science for Retention of learning among students with Learning Disability exposed to Cooperative Learning based instruction.

2.To study the differences in the post-test and delayed post-test mean scores on achievement test in Science for Retention of learning among students with Learning Disability exposed to Differentiated Instruction.

3.To study the differences in the post-test and delayed post-test mean scores on achievement test in Science for Retention of learning among students with Learning Disability exposed to Traditional Instruction.
4.To compare mean differences on Retention of learning among students with Learning Disability exposed to Cooperative Learning, Differentiated Instruction and Traditional Instruction.

METHOD AND PROCEDURE:

The design, sample and method of the study are as follows.

Design:

This study was based on a post-test and delayed post-test experimental design. The two experimental groups were taught by Cooperative Learning and Differentiated Instruction and the third control group was taught using Traditional Instruction. All three groups were taught for a period of about 45 days.

Sample:

The sample of the study consisted of 60 students with learning disability studying in 5th standard in a regular classroom, with 20 students each in all the three instructional groups.

Tools Used:

Following tools were used for the present study:

1. For identification of students with learning disability three instruments were used. These are:
a) Standard Progressive Matrices Test (SPM) by Raven, Raven and Court (2000).
b) Diagnostic Test for Learning Disability (DTLD) by Swarup and Mehta (1993).
c) Teacher Referral Form constructed by the investigator.
2. Achievement test in Science constructed by the investigator.

Statistical Techniques Used:

Descriptive statistical techniques such as mean, standard deviation, skewness and kurtosis were used to study the nature of the distribution of the sample.

t-test was used to study the significance of differences between the paired samples.

One way ANOVA was used to study the significance differences between the three groups and the multiple comparisons.

Procedure:

For the identification of the students with learning disability, first of all the Standard Progressive Matrices test (2000) was administered on the students. The students with average and above average intelligence were further examined for learning disability by using DTLD. The students with score below or equal to 30.5 are identified as the students with learning disability. Teacher referral form developed by the investigator was also taken into consideration while identification.

At the beginning of the experiment, the level of all the students in the sample was considered same as none of them have studied before the topics chosen to be the part of the experiment. Then the three groups were taught the chosen science topics using Cooperative Learning (CL), Differentiated Instruction (DI) and Traditional Instruction (TI) for a period of around 45 days. At the completion of the experiment, Achievement test in Science was administered on the students which acted as the post test. To measure the retention of learning among the students, the same achievement test was again administered on the students after 40 days. This test acted as the delayed post-test. The difference in the post-test and delayed post-test acted as the measure of retention of learning. The data obtained was then analysed using SPSS and the results were discussed in the light of the set objectives.

RESULTS AND DISCUSSIONS:

The details of the descriptive statistics in order to check the normality of the sample is discussed below.

Table 1: Mean, Standard Deviation, Skewness, and Kurtosis of Retention of Learning of Students with Learning Disability taught with various methods of instruction

	Post-Test				Delayed Post-Test			
Group	Mean	SD	Sk.	Ku.	Mean	SD	Sk.	Ku.
CL	31.70	5.992	0.242	-0.282	33.95	5.145	0.560	-0.182
DI	30.50	8.210	0.174	-1.055	31.75	8.130	0.061	-1.200
TI	23.10	4.115	0.067	-0.367	22.05	4.084	0.511	-1.044

Table 1 shows the post-test mean scores for achievement in science measured immediately after the intervention is over. It can be seen that these values are almost comparable in the cooperative learning based instruction and differentiated instruction groups, while in the traditional instruction group the mean scores are much lower. The values of skewness lies well within +/-1 range and are slightly platykurtic in few groups. Overall, the data do not deviate much from the normal distribution.

The paired samples in each instruction groups were then tested for the significant differences from post-test to delayed post-test using the t-test for paired samples

Table 2: t-test for paired samples from post-test to delayed post-test of achievement in science to measure Retention in learning for students with Learning Disability

Group	Level	N	Mean	Std. Dev.	Diff. in Means	df	t	Sig. (2-tailed)
CL	Post-test	20	31.70	5.992	2.250	19	4.008	**0.001***
	Delayed Post-test	20	33.95	5.145				
DI	Post-test	20	30.50	8.211	1.250	19	1.101	**0.285**
	Delayed Post-test	20	31.75	8.130				
TI	Post-test	20	23.10	4.115	-1.050	19	-1.390	**0.181**
	Delayed Post-test	20	22.05	4.084				

(*indicates significant values)

As presented in Table 2, all the subjects in one of the experimental group i.e. CL retained significantly from post-test to delayed post-test. The increase in mean of 2.250 has been observed in the CL group from post-test to delayed post-test. This means difference was found to be significant ($t=4.008$ and $p<0.01$). Thus implying that there exists significant difference in the post-test and delayed post-test means scores on retention of learning of students with learning disability taught with Cooperative Learning based instruction.

The mean gain from post-test to delayed post-test in the DI group is 1.250 which was found to be insignificant ($t=1.101$ and $p>0.05$). Thus it can be stated that there exists no significant difference in the post-test and delayed post-test mean scores on retention of learning of students with learning disability taught with Differentiated Instruction.

However, in the control group i.e. the Traditional Instruction (TI) group the mean gain from pre-test to post-test was observed at -1.050 which is very low and was found to be insignificant at 0.05 level of confidence ($t=1.390$ and $p>0.05$). Thus it can be stated that there exists no significant difference in the post-test and delayed post-test means scores on retention of learning of students with learning disability taught with traditional instruction.

Overall, this indicates that both the interventions i.e. Cooperative Learning based instruction and Differentiated Instruction have better effect on the retention of learning of students with learning disability, as compared to Traditional Instruction.

For the differences in the mean gain scores on retention of learning among students with learning disability in all the three groups, one-way ANOVA had been used. Results found are presented in the tables below.

Table 3: Total Mean gain scores on Retention of learning obtained by students with Learning Disability in 3 groups

Level	Group	N	Mean
Gain scores (delayed post-test – post-test)	CL	20	2.250
	DI	20	1.250
	TI	20	-1.050

Table 4: Summary of one-way ANOVA for gain scores of Retention of learning among students with Learning Disability

		Sum of squares	df	Mean square	F	Sig.
Gain scores (delayed post test –post test)	Between groups	114.533	2	57.267	3.950	**0.025***
	Within groups	826.450	57	14.499		
	Total	940.983	59			

(* indicates significant values)

It is quite clear from the Table 3 that the mean gain scores in both the experimental groups i.e. CL and DI are higher than the mean gain scores of the control group i.e. TI group (Gain scores = delayed post test – post test)

Moreover, as presented in Table 4, it can be seen that the F-value of the groups i.e. CL, DI and TI on the mean gain score of retention of learning is 3.950 which was found to be significant ($p<0.05$). This indicates that there exists significant mean gain difference on retention of learning of students with learning disability taught with Cooperative Learning based instruction, Differentiated Instruction and Traditional Instruction.

Now, as the difference between the three groups on the mean gain scores on retention of learning came out to be significant ($F=3.950$, $p<0.05$), this calls for the conduction of the post-hoc tests to study the multiple comparisons so as to check where this difference actually lies as we have three groups in consideration. Scheffe's test for multiple comparisons has been used in this study whose description is given in the table below.

Table 5: Post Hoc test on the mean gain scores of students with learning disability on the achievement test to measure the Retention of learning for multiple comparisons among the 3 groups

Dependent Variable	Group (I)	Group (J)	Mean Difference (I-J)	Std. Error	Sig.
Mean Gain scores	CL	DI	-1.000	1.204	**0.710**
	CL	TI	-3.3000	1.204	**0.029***
	DI	TI	-2.3000	1.204	**0.171**

(* indicates significant values)

As shown in Table 5, the mean gain scores on retention of learning among students with learning disability in all the 3 groups are compared to find whether the differences between the groups are significant or not. The comparison between the two experimental groups i.e. CL and DI on the mean gain scores yielded no significant difference ($p= 0.710> 0.05$). Thus, it can be stated that there exists no significant mean gain difference on retention of learning among students with learning disability taught with Cooperative Learning based instruction and Differentiated instruction. However, the comparison of the experimental group CL with the control group TI on the mean gain scores yielded a significant difference ($p= 0.029< 0.05$). It can be thus inferred that there exists significant mean gain difference on retention of learning among students with learning disability taught with Cooperative Learning based instruction and Traditional Instruction. Similarly, when the experimental group DI and the control group TI are compared for the mean gain scores, the difference was again found to be insignificant ($p= 0.171<0.05$). It implies that there exists no significant mean gain difference on retention of learning among students with learning disability taught with Differentiated Instruction and Traditional Instruction.

From the above stated results, it can be concluded that among the three interventions, Cooperative Learning based instruction is better than the Differentiated Instruction and Traditional Instruction for improving

the retention of learning of students with learning disability. However, among the two interventions DI and TI, the Differentiated Instruction has the better mean gain score on the retention of learning among students with learning disability as compared to the Traditional Instruction (as seen from Table 3).

CONCLUSION:

This paper aimed at measuring and comparing the retention of learning of students with learning disability taught with Cooperative learning based instruction, Differentiated Instruction and Traditional Instruction. It can be concluded from the results discussed above that among the three types of instructions, the Cooperative learning based instruction stands out to be the best among the three in order to improve the retention of learning. The experimental group DI (Differentiated instruction) had better effect on retention of learning as compared to the control group TI (Traditional Instruction) however this difference in the effect was not significant. So, it is recommended that for better retention in learning among the students with learning disability, instructional methods other than the regular traditional instruction must be opted for, among which Cooperative Learning based instruction and Differentiated Instruction are the ones to be considered.

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