



EFFECTIVENESS OF COOPERATIVE LEARNING IN IMPROVING MATHEMATICAL CONCEPTS AMONG STUDENTS WITH MILD INTELLECTUAL DISABILITY

Dr., Ibrahim Rajab Abbas Ibrahim¹

Department of Special Education, Najran University,
Kingdom of Saudi Arabia

Abstract:

The purpose of this study was to identify the effectiveness of cooperative learning in improving mathematical concepts among students with mild intellectual disability (SMID). The sample of the study consisted of 8 SMID at Najran in the Kingdom of Saudi Arabia. The sample of the study was divided randomly into two equal groups control and experimental. The students in the experimental group have studied the mathematical concepts by using cooperative learning; however the students in the control group were received their teaching by the conventional method. The photo mathematical concepts test was applied for two groups as pre-test and post-test. Results showed the effectiveness of cooperative learning in improving mathematical concepts for SMID in favour of the students in the experimental group.

Keywords: cooperative learning; mathematical concepts; students with mild intellectual disability; inclusion

1. Introduction

Disability reduces the ability of students with intellectual disabilities in learning, which requires providing them with special educational programs, adaptation of curricula, and teaching strategies. The educators paid attention to the activities that make the student the core of the teaching and learning process by using of cooperative learning strategy (Alhila, 2009). Cooperative learning is one of the teaching strategies that have contributed to improve the academic and social skills of students with intellectual

¹ Correspondence: email hima_abbas2009@yahoo.com

disabilities (Al-Qahtani, 2009). Modern trends in teaching mathematics for students focus on the use cooperative learning, which is a form of learning that depends primarily on the cooperation and positive participation of the students in the classroom (Mahdi, 2013). In addition, cooperative learning helps students to use imagination and perception skills during the learning and teaching process (Williamson & Null, (2008). Akinbobola (2009) indicated that cooperative learning effective strategy in the teaching and learning process, this strategy include a small group of students who are not homogenous in academic abilities and they using a variety of activities in order to understand a certain subject.

Cooperative learning has been recommended as a strategy for inclusion settings by many who support inclusion as the appropriate educational environment for students with special needs, and some another suggest that cooperative learning provides teachers with a strategy for designing instruction for the classroom where the abilities, background experiences, and cultures vary widely. Inclusion, by definition, increases the heterogeneity of the classroom environment. From this perspective, cooperative learning seems a natural approach to the effective inclusion for students with special education in the regular classroom (Jenkins, Antil, Wayne & Vadasy, 2003).

Mercer, Mercer and Pullen (2011) emphasized that the cooperative learning received more attention from the special and general education teachers. Al-Khateeb and Hadidi (2011) recommended the application of cooperative learning in special education programs. Thus, the cooperative learning contributes to improve motivation, self-confidence, self-esteem, engagement and social acceptance of students with disabilities by their normal peers (Langworthy, 2015). According to Acar and Tarhan (2008) cooperative learning contributes to improve academic achievement and social skills of students. Consequently, cooperative learning can contribute to the success of inclusion students with special needs with their normal peers in the regular classroom.

Mohammed (2013) showed the effectiveness of teaching package in improving mathematical concepts for SMID. Ibrahim (2013) confirmed the effectiveness of cooperative learning in improving adaptive behavior skills among SMID. Issa (2012) demonstrated the effects of a training program on developing of some mathematical concepts for SMID. Ebrahimi (2012) revealed the effect of cooperative learning in the acquisition of mathematical concepts among students in intermediate stage. Al-Ghamdi (2012) confirmed the effectiveness of a computerized program to improve the mathematical concepts and adaptive behavior among SMID. Schlitz and Schlitz (2001) indicated to the effectiveness of cooperative learning in improving social skills of students with moderate and severe cognitive delays. Jacques, Wilton and Townsend

(1998) emphasized the benefits of cooperative learning strategy in improving social acceptance of students with mild intellectual disabilities in the inclusion programs.

2. Problem of Study

Children with mild intellectual disability when acquiring the concepts, they pass the same acquisition stages, which normal children pass with the same order and with the same characteristics, but slowly with great difficulty. On the other hand, the normal students are facing problems in learning math skills. However, these problems are more severe among SMIDs. The teaching math skills for students with mild intellectual disability need to apply instruction strategies. Thus, this study seeks to identify the effectiveness of cooperative learning strategy in improving mathematical concepts among SMID.

3. Method

3.1 Research Design

This study was based on the quasi-experimental method to test the effectiveness of cooperative learning (independent variable) in improving mathematical concepts (dependent variable) among SMID in inclusion schools.

3.2 Participants

The sample of the study consisted of 8 SMID enrolled at the primary schools which apply inclusion of SMIDs with their normal peers in Najran, Saudi Arabia. The sample were divided randomly into two equal groups control (n=4) and experimental(n=4).

3.3 Instruments

This study included the following instruments:

1. **Photo Mathematical Concepts Test:** In order to develop the test, the researcher reviewed the previous studies(Mohammed, 2013; Issa.2012; Al-Ghamdi, 2010). The first draft of the test contained of (24) true and false questions which divided into three domains related to engineering concepts, spatial concepts, and arrangement concepts. However, the test was reviewed by (7) experts in the field of special education, curriculum and instruction, and psychology from Najran University. However, the final draft of the test consisted of (18) item divided equally on domains of engineering concepts, spatial concepts, and arrangement concepts. Thus, each correct answer takes (1) mark, and(0) mark to the wrong answer. In order to identify the reliability of the test; the researcher was applied

the test on a pilot study that consisted of (12) SMIDs. The reliability coefficient of the test was (0.86) by using Kuder–Richardson Formula (KR-20).

- 2. Teacher's Guide of Cooperative learning:** In order to identify the major steps in the development guide of cooperative learning, the researcher depended on cooperative learning model that was prepared by Johnson and Johnson (1999). The guide in this study consisted of 26 sessions related to engineering, spatial, and arrangement concepts. In order to ensure the validity of the guide, the researcher presented the guide to the same reviewers who reviewed the photo mathematical concepts test. The final draft of the guide consisted of 24 sessions, duration of each session (45) minutes every day, and (4) sessions in per week.

3.4 Procedures

This study follows these procedures:

1. The sample of study consisted of 8 SMID from the primary schools which apply inclusion of SMIDs with their normal peers.
2. The sample were divided randomly into two equal groups, control (n=4) and experimental (n=4).
3. The students in the experimental group have studied the mathematical concepts with their normal peers by using cooperative learning; however the students in the control group have studied the mathematical concepts with their normal peers by the conventional method.
4. Photo mathematical concepts test was developed and applied for two groups as pretest and posttest.
5. The test was designed to be applied individually. It is in the form of pictures of mathematical concepts that are pointed out and each item includes two pictures. One of them resents the correct answer and the other represents the wrong answer.
6. Teacher's guide of cooperative learning was developed which consisted of 24 sessions related to engineering, spatial, and arrangement concepts.
7. The researcher trained mathematics teacher on the application procedures of cooperative learning on the experimental group members. The duration of training (3) days and (2) hours every day.
8. During the training process, mathematics teacher provided with information about the concept of cooperative learning, its significance, the role of teacher and students, and the difference between cooperative learning and traditional way of teaching. Also, mathematics teacher has been trained on how to prepare lessons by using cooperative learning.

4. Results

Results related to the first hypothesis: *“There are no statistically significant differences between the mean rank of experimental and control groups on the pre-photo mathematical concepts test”*? For this question Mann-Whitney test was used as shown in Table 1.

Table 1: Mann-Whitney results according to pre-photo mathematical concepts test

Dimension	Group	N	Mean Rank	Sum of Ranks	Z	Sig.
Engineering Concepts	Control	4	3.62	14.50	-1.029	.304
	Experimental	4	5.83	21.50		
Spatial Concepts	Control	4	5.00	20.00	-.683	.495
	Experimental	4	4.00	16.00		
Arrangement Concepts	Control	4	4.12	16.50	-.458	.647
	Experimental	4	4.88	19.50		

Table 1 demonstrates that there are no statistically significant differences ($P \leq .05$) between the mean rank of experimental and control groups on the pre-photo mathematical concepts test. These results showed that the two groups are equivalence on the pretest.

Results related to the second hypothesis: *“There are no statistically significant differences between the mean rank of experimental and control groups on the post-photo mathematical concepts test”*? For this question Mann-Whitney test was used as shown in Table 2.

Table 2: Mann-Whitney results according to post-photo mathematical concepts test

Dimension	Group	N	Mean Rank	Sum of Ranks	Z	Sig.
Engineering Concepts	Control	4	2.50	10.00	-2.323	.020
	Experimental	4	6.50	26.00		
Spatial Concepts	Control	4	2.50	10.00	-2.381	.017
	Experimental	4	6.50	26.00		
Arrangement Concepts	Control	4	2.62	10.50	-2.247	.025
	Experimental	4	6.38	25.50		

Table 2 shows that there are statistically significant differences on the all domains of post-photo mathematical concepts test due to the variable of group, in favor of SMID in the experimental group.

6. Discussion

This study aimed to measure the effectiveness of cooperative learning in improving mathematical concepts among SMID. Results showed the effectiveness of cooperative learning strategy in improving mathematical concepts among SMID in the experimental group. We found that SMID in the experimental group had achieved an improvement in learning mathematical concepts as a result for used of cooperative learning. Moreover, cooperative learning provided SMID in the experimental group an opportunity in the effective learning and plays a positive role in the performance of math activities with their normal peers. On the other hand, the work of SMID with their normal peers through small groups during the process learning has led to increase the spirit of cooperation and interaction between members of the experimental group. In this regard, Jenkins et al. (2003) emphasized the existence of positive attitudes among special education teachers who use cooperative learning; it is more effective than individual instruction because it increases academic achievement and self-concept among students with special needs. Abdul Aziz (2012) indicated that cooperative learning increases the spirit of cooperation, exchange of information, experience and roles between the group members. Cooperative learning allowed members of the experimental group opportunities to express their opinions without fear. The results of this study agree with previous studies, which confirmed the effectiveness of use of cooperative learning with SMID (Mohammed, 2013; Issa, 2012; Ebrahimi, 2012; Al-Ghamdi, 2012; Townsend, 1998; Schlitz & Schlitz, 2001; Langworthy, 2015).

7. Conclusion

In light of the study results, the researcher recommended to organize training workshops for special and general education teachers on the application of cooperative education, organize counseling programs for normal students in order to instill values of cooperation with SMID, and reconsidering of the facilities and equipment of classes in inclusion schools at Najran to suit the application of cooperative learning. The researcher also recommends conducting studies related to effects of cooperative learning in improving word recognition skills or social skills among SMID.

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