

Full Length Research paper

Study of the effect of efficiency and teachers' opinions about cooperative learning on perception of mathematical conceptions for blind students

Maryam Najafi*, Mohsen Rostamy-Malkhalifeh, Poorya Pezeshki and Parvaneh Amiripour

Department of Mathematics, Science and Research Branch, Islamic Azad University, Tehran, Iran.

Accepted 18 October, 2011

The necessity of special education has been studied in regard to various views in present decade. Study of these views has led to implementation of modern method instruction in present research in mathematics class of blind students. The aim of this research is to study the effect of cooperative learning on perception of mathematical conceptions in elementary blind students and opinions of their teachers in Tehran. Research method is quasi-experimental. Cooperative learning method is performed on 40 blind students in third grade through cluster sampling. Twenty (20) opinions of teachers related to blind students were taken and it is shown that implementing cooperative learning is proper for elementary blind students in perception of mathematical conceptions field through math exam, questionnaire and statistical analysis; independent samples and one sample sign tests with meaningful level of 0.05.

Keywords: Mathematics education, cooperative learning, mathematical conception, teachers, blind students.

INTRODUCTION

Special children are people that depend on special education and services until they can use their whole human capacity. They need special education because their defects differ in one or several categories such as; those who do not have brain, learning disabilities, emotion disorders, physical disabilities, verbal disabilities, auditory agnosia and visual agnosia (Halahan et al, 1999). A blind person who has weak vision cannot use visual methods and his or her vision rate is less than 20/200; and/ his or her vision angle is less than zero degree (Shafiee et al., 2006).

Experience of education is visual in normal classes, but same instructional principles can be used for blind students through changes in methods (Maher, 1999). Often, specialists believe that they can use same general method for both the blind and perspicacious students; although some changes are needed, but they need instructional principles which they rely on to achieving more information themselves (Javadian, 1998). If instruction emphasizes learning dynamic sense and auditory, for visual amnesia students, it is very beneficial

(Mehrmohammady, 1995). Blind people need special instruction for efficiency in relating to society and to be independent (Shafiee et al., 2006). Piheyz (1941) believes that blindness does not lead to less intelligence automatically. Based on neurotic structure, and because the blind have disability in one of their senses, their other intelligent hemisphere which relates to logical and mathematical analysis is more active than that of other people. Most blind people have higher quantity of intelligence, and if combined, this intelligence leads to self-belief, allowing the achievement of great success.

Mathematical learning is not impossible to the blind unless one has difficulty in learning mechanically. This is because some blind people have intelligence and penchant to mathematics learning like common people; blinds differ in capacity and level learning like common people. In general, if mechanism of instruction is correct and proper to their learning capacities, there will not be problem in passing instruction to the blind (Behbahany, 2005).

Learning has different procedures and methods; and traditional learning which has enveloped our education for several years does not respond to the needs of students and teachers (Parsa, 1997). Direct instructional methods were unilateral and obligation of teacher is to

*Corresponding Author E-mail: maryam0866@gmail.com.

transfer knowledge and previous determinate information to students; and obligation of student is oneness and nonentity participation in making decision of programs and instructional activity. In such instructional space, students have no opportunity to practice and have group skills. Its consequence is lack of propensity to cooperative and coordinates with others (Rastegar et al, 1997). Cooperative learning is one of the creating development factors in mathematics learning that causes achievement of mathematics (Rezaee, 1997). Cooperative learning (learning together) means a method through which learners work together in small groups to reinforce their achievements. Important feature of this method is that group of members work together to attain to common goal, that all of them gain from it (Saif, 2007). This learning provides opportunity for students that practice context together and use grouping structures which are reflection of class.

In cooperative learning field, the main principle is that 'we are in this group and work together until we achieve success. In lessons where common goals are attained together among students, there is positive incorporation; and they note that if all group members work to attain common goals, then they will attain better yields.

In past, using of cooperative strategies in class was less. With the appearance of researches on learning salubrious with brain and intelligence emotion, it is necessary that they consider the importance of applying cooperative learning. Cooperative learning is applied in many fields and in all academic levels; and it is proper to any task (Artut, 2009).

Slavin (1994) stated that cooperative learning is useable in all people, from kindergarten to university and all schools throughout the globe. Also, Eskin and William (1998) have emphasized that positive effects of activities of cooperative learning do not depend on age, skills or kind of school which presents it (such as locations of school, private or state school). In cooperative learning, class is divided into groups or small teams which contain 3 to 6 students with heterogeneous capacities in problem solving or dominance on task (Artut, 2009). Importance of cooperative learning operation confirms coeval groups via Cohen (1997). Many Piagetian psychologists do examine increasing group activity in schools and they conclude that partnerships of students lead to self-achievement in learning (Damen, 1984; Maray, 1982). Cooperative learning leads to the use of cooperative skills widely. This learning method creates opportunities for discussion, presence of students en masse, and avenues to listen to the viewpoints of others. The most important goal of cooperative learning is that it creates the opportunity for respecting the achievement of other students (Sollivan, 1984; Slavin, 1995).

LITERATURE REVIEW

Among the widespread mass of researches done on the effect of cooperative learning on better perception of mathematical conceptions, the efforts of four groups are more considered: I) Johnson et al. (2000), who did research on cooperative learning scope in Minnesota University; they concluded that if this procedure is combined with problem solving method, then it will have positive effect on academic achievement of students in mathematics; II) research done by Slavin et al. (1991) on the effect of cooperative learning on academic achievement in mathematics using three testing groups (instruction through cooperative- individual and control groups) in Johns-Hopkins University. The results showed that the marks of the cooperative groups were the highest. III) research directed by Mosharan (1990). Results were demonstrators of approbation rate of students. He designed and examined different methods. He stated that stupendous application of cooperative learning is when several patterns of cooperative learning are used and combined together; and IV) Keramati (2003), who studied the effect of cooperative learning on social skills of growth and academic achievement in elementary fifth grade in Mashhad. In his thesis, he used quasi-experimental method for implementing his research. His results show that cooperative learning method was effective on social skills of the growth and academic achievement among male and female students. Although several researches lay emphasis on efficiency of cooperative learning in widespread of variables such as academic achievement, problem solving and social skills, efficiency of this method has not been studied on blind students, and also opinions of teachers on blind students using this method have not been studied.

Hypothesis

- I) Cooperative learning instruction is effective on increasing blind students' perception of mathematical conceptions.
- II) In regard to opinions of teachers, implementing cooperative learning can have effect on the perception of blind students in elementary school on mathematical conceptions.

METHODOLOGY

Method used in this work is quasi-experimental. Researchers selected one of the two sample groups as

Table 1. Marks of pretests and posttests in control and experiment groups.

	N	Mean	Std
Pretest of control group	20	13.25	0.25
Posttest of control group	20	12.1	3.5
Pretest of experiment group	20	12.82	2.37
Posttest of experiment group	20	14.05	2.23

experiment group and the other as control group randomly. Independent variable is implementing cooperative learning for elementary blind students of special education in Tehran Province who studied in 2010-2011. Statistical society of students is all elementary blind students in 2010-2011 and statistical society of teachers is all teachers who teach in special academic units of the blind (100 people). Sampling method was cluster sampling. Here, one special academic unit of the blind was selected randomly. Then two classes were selected randomly from this academic unit. Finally, one of the classes was selected as experiment group and the other as control group. Capacity of every class is 20 students that are selected from 40 students generally. Also, 20 teachers are selected from same special academic unit of the blind as samples.

Instruments

Math Exam

Instrument used is math exam, whose context of questions are designed based on instructional context of mathematical book in third grade (multiplication subject). This exam was written through Braille. Exam questions are provided based on the opinions of the mathematics teachers. This exam has acceptable contextual reliability. Validity coefficient of the exam was estimated through Split-half test and its Cronbach's alpha was equal to 75 percent.

Questionnaire

Research-constructed questionnaire was used for opinions of teachers of blind students. This questionnaire was designed and published based on opinions and ideas of specialists of blind students and also that of specialists of mathematics education. The questionnaire included 10 questions, using three Likert scales; "always", "sometimes" and "never". Reliability of questionnaire was studied by specialists of statistics, mathematics education and also teachers of special education. It has acceptable reliability. Validity of questionnaire was studied with Cronbach's alpha, which was 79 percent. This value is demonstrator of acceptable

validity. Also, questions of questionnaire were converted to Braille for some teacher of the blind.

Collecting Data

After samples were selected and divided as control and experiment groups, math exam was performed in two groups as pretest. Then, experiment group was under conditions of cooperative learning method in 2 months and 4 hours in each week. Finally, math exam was performed in two groups as posttest, and questionnaire related to opinions of teachers was distributed among teachers of blind students. Then data were analyzed.

Data Analysis

For description of studied cases, descriptive statistic such as mean and Std. deviation was used, and for hypothesis testing, One-Sample Kolmogorov-Smirnov test, Leven's test, Independent samples T-test and one sample sign test were used.

RESULTS AND DISCUSSION

Results of hypothesis I

Mean and Std.Deviation of marks of pretests and posttests of control and experiment groups are presented in Table 1. As shown in this table, marks of posttest experiment group ($M=14.05$) are higher than control group ($M=12.1$).

In Figures 1 and 2, numbers of bar posttest of experiment group are more and higher than posttest of control group. For testing hypothesis, we consider normality of marks in two groups through One-Sample Kolmogorov-Smirnov test. Results of this test show that marks of pretests and posttest of control and experiment groups are normal ($P>0.05$) in meaningful level of 0.05 (Table 2).

For testing pretest, equality of variances is tested through Leven's test. Results show that variances are equal ($F= 2.55, P>0.05$). Then, in Table 3, marks of pretest of control and experiment groups are tested through Independent samples T-test in meaningful level of 0.05. Results show that there are no meaningful differ-

Control Group

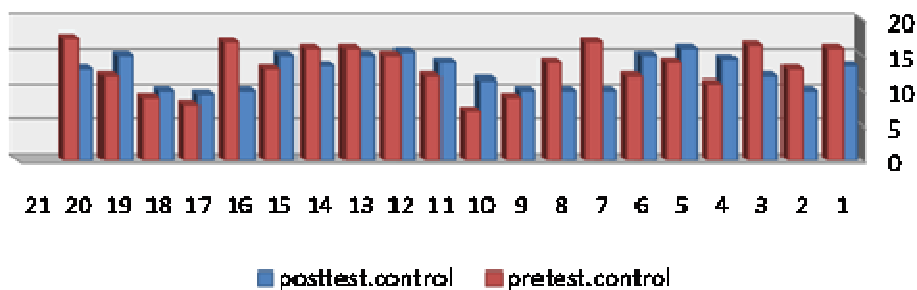


Figure 1. Marks of control group in pretest and posttest.

Experiment Group

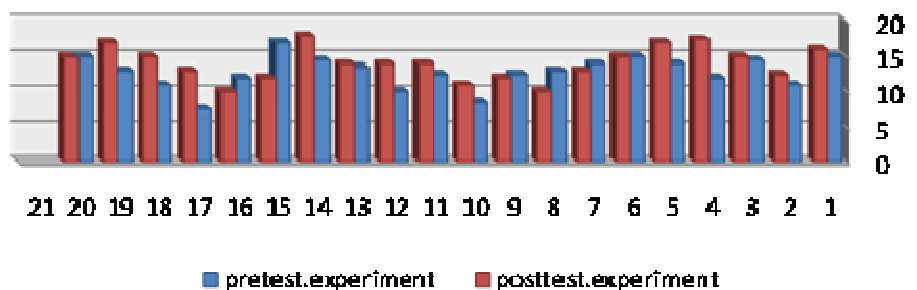


Figure 2. Marks of experiment group in pretest and posttest

Table 2. Normality of marks of pretest and posttest in control and experiment groups.

	Pretest control	Posttest control	Pretest Experiment	Posttest Experiment
N	20	20	20	20
Z	0.66	0.97	0.53	0.74
Sig	0.73	0.3	0.93	0.98

Table 3. Results of Independent samples T-test in pretests.

	Leven's Test for equality of Variances					T-test for Equality of Means	
	F	Sig	t	df	sig	Mean Difference	Std.Error Difference
Equal Variances Assumed	2.55	0.11	0.49	38	0.63	0.42	0.88
Equal Variances Not Assumed			0.48	34.9	0.63	0.42	0.88

rence between control and experiment groups ($T= 0.49$, $P>0.05$).

For testing hypothesis (posttests), equality of variances is tested through Leven's test. Results show that variances are equal ($F= 1.19$, $P>0.05$). Then, in Table 4, marks of posttest of control and experiment groups are

tested through Independent samples T-test in meaningful level of 0.05. Results show that there are meaningful difference between control and experiment groups ($T= -2.3$, $P<0.05$); it is shown that marks of posttest of experiment group are higher than marks of posttest of control group.

Table 4. Results of Independent samples T-test in posttests.

	Leven's Test for Equality of Variances		T-test for Equality of Means				
	F	Sig	t	df	sig	Mean Difference	Std.Error Difference
Equal Variances Assumed	1.19	0.28	-2.3	38	0.02	1.6	0.7
Equal Variances Not Assumed			-2.27	37.7	0.02	1.6	0.7

Table 5. Normality of opinions of teachers.

	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q 10
N	20	20	20	20	20	20	20	20	20	20
Z	1.49	1.49	1.84	1.84	2.27	1.73	2.17	1.96	1.7	2.1
Sig	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 6. Results of opinions of teachers

Median Sign test = 2 versus > 2						
	N	Below	Equal	Upper	P	Median
Q 1	20	0	10	10	0.9	1
Q 2	20	10	10	0	1	1.5
Q 3	20	7	13	0	1	2
Q 4	20	13	7	0	1	1
Q 5	20	17	3	0	1	1
Q 6	20	12	8	0	1	2
Q 7	20	4	16	0	1	1
Q 8	20	14	6	0	1	1
Q 9	20	13	6	1	0.99	1
Q 10	20	16	4	0	1	1

Results of hypothesis II

As shown in Table 5, results of One-Sample Kolmogorov-Smirnov test show that data of the questionnaire are not normal ($P < 0.05$) in meaningful level of 0.05.

Results of Table 6 show that all teachers' response to the questions of questionnaire is positive, because all P-values were more than 0.05 through One sample sign test ($P > 0.05$) in meaningful level of 0.05.

CONCLUSION

In comparing traditional instruction versus cooperative learning, students achieve the following more with the latter method: have the highest academic achievement, insolubility in academics skill of critical thinking, high reasoning level, deepest teaching material and the least moral behaviors in class and the most focusing on task, the least stress level, the most internal motivation in learning and improvement, the most capacity in viewing

situations through the views of others, the most positive and supporting communication with peers and have high self-esteem.

Generally, cooperative learning helps an individual to do most conceptual tasks, problem solving, make-decision and to be involved in most creativity responses. Data analysis shows that cooperative learning instruction increases perception of mathematical concept in elementary blind students in third grade. Yet, many students are receivers of it than they are in creating knowledge. Unfortunately, in traditional instruction, students often have less opportunity to get result by benefits from combing together. Cooperation is not just that children sit around the table and speak together with each of them doing their individual tasks; it is superior when children are adjacent together, physically. Although, each of these elements are important parts of cooperative learning, cooperative learners argue about learning materials together and these instruction materials help to integrate children together.

Based on the results of the questionnaire on the opi-

nions of teachers relating to the effect of cooperative learning on perception of mathematical conceptions in elementary blind students, it can be concluded that implementing cooperative learning based on the suggestive method will help blind students have more perception of mathematical concepts. Limitations of implementing research include: 1) lack of access, research and study in all blind's centers and schools, 2) lack of implementation of this method in the society at large and 3) limitation of time and lack of possible implementation of long-term cooperative cycle in blind schools for studying more effective factors.

Based on the result of this research, it can be suggested to teachers that they should create cooperative groups among students in class, and provide counseling and experiences to better implement cooperative learning for blind students in schools. Teachers can launch to form cooperative learning groups for blind students via managers of schools and parents in class and reinforce academic achievement of skills in blind students with this method. Administrators of education can inform managers, teachers and instructional leaders of blind students of cooperative learning through seminars, scientific congress and instructional course in widespread level. This method can be implemented widely in the society and timely. It should also be extended to other areas of lessons for blind students such as empirical sciences, geometry, trigonometry and so on. They should allocate more time to teachers for implementing cooperative learning in mathematics in blind schools.

REFERENCES

- Artut PD (2009). Experimental evaluation of the effects of cooperative learning on Kindergarten children's mathematics ability. *Int. J. Educ. Res.* 48: 370- 380
- Behbahany N (2005). Visualization of the blind approach, including reviews of their books, dissertations mathematics education master's degree.
- Gillies R, Boyle MM (2010). Teacher's reflections on cooperative learning: Issues of Implementation. *Teaching and Teacher Education*, 26: 933- 940.
- Guneyusu S, Tekmen B (2010). Implementing an alternative cooperative learning method. *Procedia Social and Behavioral Sciences*, 2: 5670-5676
- Gardner J, Jerome J (2000). *Your college experience: strategies for success.* Wadsworth Publishing Company.U.S.A.
- Herried CF (2000). "Why isn't cooperative learning used to teach science?" *Am.Inst. of Sci.*
- Johnson DW, Johnson RT, Holubec (1991). *Cooperation in the Classroom,5thEdition.*Edina, MN:Interaction Book Company.
- Javadian M (1998). *Introduction to Education of Exceptional Children.* Emissions growth.
- Kocak R (2008). The effects of cooperative learning on psychological and social traits among undergraduates students. *Social Behavior and Personality*, 36(6): 771-782.
- Kale P, Chan L (1993). *Methods and strategies in the education of exceptional children..* (Translated by F. Maher). Emissions growth.
- Maher F (1999). *Exceptional Children.* Emissions growth.
- Melody D (2007). *Ninth International Conference on Mathematical Education of Iran.*
- Mehrmohammady M (1995). *New patterns of teaching and creativity.* Res. on educ. issues. 4.
- Namny MR (1984). *Satiety transient visual disability in the education and welfare.*
- Parsa M (1997). *Foundation theories on learning psychology.* Tehran: Center for Acad. Pub.
- Halahan P, Daniel K, James I (1999). *Exceptional Children* (Translator: F. Maher) emissions growth.
- Sadeghi AR (2006). *How to be a professional teacher.* Number of technol. Dev. (6, 7 and 8).
- Saif AA (1989). *Cultured Psychology (psychology of learning and teaching).* Fourth Edition Publisher: Cognizant.
- Shafiee R, Sharifi DP (2006). *Perception of blindness and the environment.* Publisher: Sepahan.
- Sadeghi M (2009). *Mathematics education master's degree thesis.* Validate the design and evaluation of collaborative learning model for middle school students in mathematics education.
- Rezaee A (1997). *Examining ways to engage students in the school guidance teacher VshagrdbapyshrtVartbat the West.* M.Sc. Thesis. TbatlavyAllameh University School Psychol. Sci. Educ.
- Rastegar T, Malekan M (1997). *Introduction Cooperative learning.* Publisher: straw.