

Research Article

THE COMPARISON OF SINGLE TEACHER AND MULTI TEACHER IMPACT ON LEARNING OF MATHEMATICS PROBLEM-SOLVING STRATEGIES AMONG SIXTH GRADE STUDENTS IN KHOY CITY IN ACADEMIC YEAR 2014-15

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ABSTRACT

This study aimed to compare the impact of single teacher and multi teachers impact on learning of mathematics problem-solving strategies among sixth grade students in Khoy city in academic year 2014-2015. The population consisted of all sixth grade students (N=3659) in Khoy city in academic year 2014-2015. Using cluster sampling method, 30 single teacher students and 30 multi teachers students were selected as sample. This was causal-comparative study. The data were collected using a researcher made test. The validity of this test was evaluated and confirmed by experts and sixth grade teachers. Also, the reliability was obtained through Cronbach's alpha coefficient (0.81). The descriptive statistics including mean, standard deviation, skew and kurtosis, and frequency charts was used to describe the data; also, the independent t-test was used to test the hypotheses. The collected data were analyzed using Spss software. According to the results of testing hypotheses, it was found that there was no significant difference between single teacher and multi teachers in terms of learning the shape drawing strategies and easier problem solving strategies in mathematics of sixth grade students in Khoy at 0.05 level. There was significant difference between single teacher and multi teachers in terms of learning the modeling strategies and guess and test strategies of sixth grade students in Khoy at 0.05 level. According to the results of testing main hypothesis, however, there was significant difference between single teacher and multi teachers in terms of learning the problem solving strategies in mathematics of sixth grade students in Khoy at 0.05 level in favor of multi teachers.

Keywords: *Single Teacher, Multi Teachers, Shape Drawing, Modeling, Easier Problem Solving, Guess and Test*

INTRODUCTION

In the present society, the well-being requires selection, reasoning, decision-making, and problem solving abilities. The Education System has a great mission in the creation of such abilities. From the perspective of planners, mathematics is one of the materials that its teaching and learning is essential in order to carry out such a mission. The development of thinking and creativity is the minimum expectation from mathematics education (Lowrie & Whitland, 2000). Cassidy and Lang (2002) define the problem-solving style as cognitive and behavioral processes which identify and propose effective strategies to deal with problematic success in routine life. These researchers proposed a multidimensional model of problem-solving styles which include helplessness, control, confidence, creative, avoidance, and approach dimensions (quoted by Momeni *et al.*, 2014).

The self-directed learning is a process in which the learners are responsible for planning, implementation, and evaluation of their learning and they are expected to work independently in order to achieve predetermined objectives (Nadi *et al.*, 2011).

The basic element of problem solving is the application of pre-learned knowledge and skills in new situations. In the classification of learning types, therefore, the problem solving is in application class. In Ganye theory (1985), the rule learning problem solving is named higher level. According to this theory, the learner mixes things and creates higher level rules which lead to problem solving (quoted by Momeni *et al.*, 2014).

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Fenma & Peterson (2002) believe that girls are not independent in learning style and need help to solve a math problem, while the boys have more control on their learning and are able to evaluate different solutions. The first source of problem solving difficulty may be the inability of students to actively monitor and continuously adjust the cognitive processes involved in problem solving. The people with these abilities pay attention to understand the dimensions of a problem. They carefully monitor the issue, simplify difficult and complex issues at different stages, and ask questions from themselves and answer them to control their thinking (quoted by Momeni *et al.*, 2014).

For example, Shownfled (1992) provided methods to monitor and assess the problem solving process. He believes that students need to stop in problem solving process and ask questions such as: what should I do on this issue.

The researchers and theorists have offered a variety of models to explain the relationship between motivational and cognitive factors and performance development. The theoretical framework for the conceptualization of motivation and recognition of students is based on Elliott and MacGargore goal setting model (2001) and Pintrich's self-regulatory strategies model (2000).

Craft (1982) considered the problem-solving as the ability to use mathematics in different situations and believes that the student cannot solve a problem, unless the problem to be converted to suitable statements.

George Puglia states that problem solving strategies include following steps: 1) understand the problem, 2) plan for solving the problem, 3) run the plan, and 4) return to test the answer (Robert (2001), quoted by Momeini *et al.*, 2014).

According to the Institute of Education Studies and the National Centre of TIMSS & PIRLS Studies, the ranking of Iran in teaching fourth grade elementary mathematics was 25 from 26 countries in 1995, 22 from 25 countries in 2003, and 28 from 36 countries in 2007; about 15 points progress has been made during 12 years. The ranking of Iran in teaching third grade middle school mathematics was 34 from 49 countries in 2007; in this regard, 15 points drop can be seen in Iran since 1995 to 2007 (Center of Education Studies, 2014).

Today, unfortunately, there are few books which consider active learning and problem-solving. However, the data transfer is outstanding in most books. According to Piaget, more knowledge does not make more developed the thinking of children; development is qualitatively different (Zeinalzadeh, 2014).

However, most students in all grades of primary school have difficulty in learning mathematics. This study actually aims to help teachers to have better understand of problem-solving techniques and be able to implement different models in math class. Therefore, this study sought to answer this question: what is the difference between single teacher and multi teachers sixth grade students in learning problem-solving strategies in mathematics in Khoy in 2014-2015?

MATERIALS AND METHODS

This was causal-comparative study. Two groups of single teacher and multi teachers students were compared in terms of problem-solving strategies. The population consisted of all sixth grade elementary students in Khoy in 2014-2015 (total= 3659, boys= 1965, and girls= 1694). In this study, the cluster sampling method was used for selecting the sample. However, 60 participants were selected from as sample; 30 participants from single teacher schools and 30 participants from multi teachers schools. In the present study, a researcher made test was used to compare the effect of single teacher and multi teachers in learning the problem-solving strategies in mathematics. This test was provided by researcher to investigate the effect of single teacher and multi teachers in learning the problem-solving strategies in mathematics and performance of students in sixth grade. This test consists of 28 questions and includes figure drawing, modeling, easier problem solving, and guesses and test sub-scales. The grading of questions was like the quantitative mathematics scoring system of Education System. In this test, the questions 1 to 7, 8 to 14, 15 to 21, and 22 to 28 are related to figure drawing, modeling, easier problem solving, and guess and test components of sixth elementary mathematics, respectively. The face and content validity of the test was confirmed by math professors and teachers. The reliability of test was

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obtained using Cronbach's alpha method (0.81). The descriptive statistics including frequency, percentage, and average was used to describe the data; also, the independent t-test was used to test the hypotheses.

RESULTS AND DISCUSSION

The following table shows the descriptive indicators of single teacher and multi teachers problem solving strategies according to the type of school.

Table 1: Descriptive indicators of problem solving strategies according to the type of school

School type	Mean	Standard deviation	Minimum	Maximum	Kurtosis	Elongation
Single teacher	12.73	4.68	7	22	-0.525	-0.323
Multi teacher	16.03	5.62	3	25	-0.515	-.0250

According to Table 1, the average in multi teachers and single teacher schools equals to 16.03 and 12.73, respectively.

Main hypothesis: there is difference between sixth grade single teacher and multi teacher students in terms of learning the mathematics problem solving strategies in Khoy in 2014-2015.

The independent t-test was used to test this hypothesis. With 58 degrees of freedom, the t-value was equal to -2.47. Therefore, there is significant difference between single teacher and multi teachers in terms of learning the problem solving strategies in mathematics in favor of multi teachers.

First hypothesis: there is difference between sixth grade single teacher and multi teacher students in terms of learning the figure drawing in mathematics in Khoy in 2014-2015.

The independent t-test was used to test this hypothesis. With 58 degrees of freedom, the t-value was equal to -1.156. The significance level is equal to 0.252. Therefore, there is no significant difference between single teacher and multi teachers in terms of learning the figure drawing strategies.

Second hypothesis: there is difference between sixth grade single teacher and multi teacher students in terms of learning the modeling in mathematics in Khoy in 2014-2015.

The independent t-test was used to test this hypothesis. With 58 degrees of freedom, the t-value was equal to -3.034. The significance level is equal to 0.004. Therefore, there is significant difference between single teacher and multi teachers in terms of modeling problem solving strategies in favor of multi teacher schools.

Third hypothesis: there is difference between sixth grade single teacher and multi teacher students in terms of easier problem solving learning in mathematics in Khoy in 2014-2015.

The independent t-test was used to test this hypothesis. With 58 degrees of freedom, the t-value was equal to -1.036. The significance level is equal to 0.304. Therefore, there is no significant difference between single teacher and multi teachers in terms of easier problem solving strategies.

Fourth hypothesis: there is difference between sixth grade single teacher and multi teacher students in terms of learning guess and test in mathematics in Khoy in 2014-2015.

The independent t-test was used to test this hypothesis. With 58 degrees of freedom, the t-value was equal to -2.200. The significance level is equal to 0.032. Therefore, there is significant difference between single teacher and multi teachers in terms of guess and test strategies in favor of multi teacher schools.

Conclusion

This study aimed to compare the mathematics problem solving strategies in single teacher and multi teacher schools.

The results of general theory showed that in general, there is significant difference between single teacher and multi teacher schools in terms of mathematics problem solving strategies; the average of multi teacher schools was significantly higher than single teacher schools.

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The importance of study, research, and teaching the problem solving, particularly in the area of mathematics (considering the experiences of teachers, students, and researchers), is clear and obvious. The lack of awareness of problem-solving strategies and lack of using them in solving mathematical problems leads to disinterest, considering inefficient the mathematics, and academic failure in this area. The learning of problem solving methods causes the learners use more opportunities and benefit from problem solving methods in their academic and research daily life. Instead of enticing students to memorize the concepts, methods, and rules, the Education System may put the learners in the position of problem solving (Aghazadeh, 1998).

To explain these results, it can be stated that this average difference may be related to the impact of teaching problem solving strategies through multi teachers on ability of students. Therefore, it can be argued that if problem solving strategies are used by teacher to teach the students in sixth grade mathematics, it will impact on the achievement of students to educational goals. Given that the multi teachers plan is recently proposed in Education System and was implemented in Fifth and sixth grades in some schools in academic year 2014-2015, there is apparently no research on this issue. Therefore, it was not possible to compare the results of this research with previous research.

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