

Designing a teaching model and developing creative thinking and its effect on the mathematical learning of elementary school students in Bandar Abbas city

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Abstract

Purpose: The purpose of this research is to design and evaluate a teaching model that fosters creative thinking and investigates its impact on the mathematics achievement of fourth-grade elementary students in Bandar Abbas.

Method: A quasi-experimental pre-test/post-test design with a control group was employed. The population comprised all fourth-grade female students in Bandar Abbas city during the 1399-1400 academic year. A sample of 60 students was selected using multi-stage cluster sampling and randomly assigned to experimental ($n=30$) and control ($n=30$) groups. The experimental group received eight 45-minute sessions of creative thinking skills training, based on the REACT strategy (Crawford, 2001), focusing on fractions (addition, subtraction, multiplication, and division) and decimal division, over six weeks. The control group received standard instruction. Pre- and post-tests used a standardized fourth-grade mathematics test approved by the Bandar Abbas Education Department.

Findings: Multivariate analysis of covariance (MANCOVA) revealed no significant difference between the experimental and control groups on post-test measures of mathematical achievement and creative thinking components ($p > 0.05$).

Conclusion: The results did not support the hypothesis that the REACT-based creative thinking teaching model would significantly improve students' mathematics achievement. Further research is needed to explore the potential benefits of this approach. However, integrating real-world applications, experiential learning, collaborative problem-solving, and knowledge transfer remains valuable in mathematics education.

Keywords: Teaching creative thinking, learning, Relating ,Experiencing ,Applying, Cooperating, Transferring

Introduction

Teaching thinking skills that have positive effects on the "self" and helping them develop by helping to solve problems related to youth, especially problems related to identity, can lead to improved health. (Marsh, Edington, Conway and Loveday, 2019). The United States offers a five-factor instructional strategy for educators, summarized by the REACT strategy. Each teacher's method is unique and different methods are used in the classroom, but there are at least five teaching strategies used by all these

teachers, which are called contextual teaching strategies: 1- Relating, 2- Experiencing, 3- Applying, 4- Cooperating and 5- transferring. Using this strategy in learning allows students to actively and deeply understand the concepts learned and to test and apply them in real situations. Learning with the REACT strategy is a bridge in the process of learning mathematics, which aims to increase the ability to think creatively. The result of this research is to provide an approach to institutionalize the development and cultivation of creative thinking and its effect on the learning of elementary school students. Since the purpose of education is to prepare a person to live in society and to enable a person to deal with personal and social problems, and the usefulness of using creative problem teaching in students' learning and cultivating their thinking has been mentioned in numerous researches. And considering the necessity of fostering creative thinking in students in order to prepare them with the challenges of real life in the future, the current situation and what prompted the researcher to act on the current research, the importance of designing a model for teaching creative thinking; Therefore, this research aims to answer the question, does the design of the teaching model and the development of creative thinking have an effect on the mathematics learning of the elementary school students of Bandar Abbas city?

Materials and Methods

The present research method is based on the practical purpose, based on the method of data collection, and because it was not possible to fully control the research variables, a semi-experimental method was used in the form of pre-test-post-test with a control group. The statistical population of this research includes all fourth grade female students of Bandar Abbas city. Thus, at a significance level of 0.05 with an effect size of 0.5 and a test power of 0.97, a sample size of 30 to 35 people is determined for each of the groups; That is, a total of 60 to 70 subjects are selected from the fourth grade female students of Bandar Abbas elementary school to examine the variables. After making the necessary arrangements with Bandar Abbas education and training to receive the letter of introduction and select the desired school, the researcher first selected one school (primary school) from among the girls' primary schools in Bandar Abbas city and randomly selected two classes and conducted a pre-test from each class and then He identified one group as the control group and the other class as the experimental group. Training sessions with creative thinking model were held for eight sessions during 8 weeks, one session per week and each session lasted 45 minutes for the experimental group. During each session, certain techniques from the steps of the creative thinking model were tested and practiced. Data is analyzed using SPSS software.

Results and Discussion

Research question: The implementation of the model of teaching and development of creative thinking is effective on the mathematical learning of fourth grade female students of Bandar Abbas city.

Table 1. Separate results of multivariate covariance analysis of total math test score with creative thinking components

Variable source	dependent variables	Test statistics	statistical power	eta squared	P-value
Group	Relating	18269/04	1	0/93	0/000
	Experiencing	14633/51	1	0/95	0/000
	Applying	12398/45	1	0/95	0/000
	Cooperating	17859/03	1	0/98	0/000
	Transferring	15632/61	1	0/92	0/000

According to the results of Table 1, the results of multivariate covariance analysis, considering the pre-test scores as auxiliary variables, creative thinking training has led to a significant difference between the control and tested groups ($P < 0.05$). Therefore, teaching creative thinking on the implementation of the communication model ($P < 0.05$ and $F = 18269.04$) with the test power of 0.06, experience ($P < 0.05$ and $F = 51.14633$) with the test power of 0.0676, using ($P < 0.05$ and $F = 45.12398$) with the power of the test 0.53, participating ($P < 0.05$ and $F = 17859.03$) with the test power of 0.65 and transferring ($P < 0.05$ and $F = 61.15632$) with the test power of 0.08 has an effect on students; Therefore, the null hypothesis is rejected and the research hypothesis is accepted, and we conclude with 0.95 confidence that there is a significant difference between the mean of the math test for communicating, experiencing, using, cooperating and transferring students in the control and experimental groups.

Conclusions

The results of covariance analysis indicate that there is a significant difference in group membership between the experimental and control groups in the implementation of the model of teaching and development of creative thinking on the mathematical learning of fourth grade female students in the post-test stage ($p > 0.05$); And according to the table of averages, it was found that the implementation of the model of teaching and development of creative thinking has increased the mathematical learning of fourth grade female students. The results of this research are consistent with the research findings of Qadri, Ikhsan and Yusrizal (2019), Supto, Suyitno and Susilo (2015), Ritonga (2017), KarSli and Yigit (2016) and Dewi, Aminah and Sukarnin (2015). who concluded that the increase in mathematical creative thinking skills of students who acquired the REACT strategy was greater than that of students who received traditional instruction. had earned. Due to the fact

that the results of this research and other researches showed that teaching creative thinking skill model is one of the influencing factors on students' learning. It is suggested to implement creative thinking training in some of the students' curricula. The constructive effects of the results of the current research can be implemented as feedback in other educational levels or other areas of education. The present research has been conducted at the level of education and it is recommended to conduct this research to other organizations such as higher education and Farhangian University. Using these findings, it is suggested to form educational workshops for teachers to increase their creative thinking skills. Using these findings, it is suggested to form workshops and training classes for parents and students to improve creative thinking skills.

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