

Origami Activity Impact on Graphic Creative Thinking: A Case Study of Eighth-graders in China

Shihao Feng, Tie Liu

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Abstract

"Mathematical Curriculum Standards for Full-time Compulsory Education" in China clearly points out: "the cultivation of innovative consciousness is the basic task of modern mathematical education. Mathematical activities should encourage the creative thinking." Chongde Lin, a professor of Beijing Normal University, believes that creative mathematical activities can help to enhance the students' creative thinking in mathematics learning. Graphic creative thinking is an important component of creative thinking. The eighth-graders, who have gained a basic understanding of graphic shapes but haven't studied the nature yet, are at the critical stage of formation the graphic creative thinking.

J. P. Guilford, a famous American psychologist, proposed the concept of divergent thinking: the ability to generate multiple solutions to a problem; creativity. He associated divergent thinking with creativity, appointed it has several characteristics: fluency, flexibility and originality. This study designed a series of origami activities based on its theory, that is, the folding steps are described in the language based on the axioms of origamics, and focus on the new graphic information created by the creases. We noticed the variation of graphic creative thinking through a long period of origami activities, and then try to explain how it works through this case study.

Combined with the results of Torrance Tests of Creative Thinking in from of figural(Figural TTCT) of 48 eighth-grade students in a junior high school in Chongqing China, three students with high, medium and low levels of graphic creative thinking respectively were selected as object of the case study. Then the author conducted a two-month origami training activities for these three students and recorded the whole process with camera. The behavior of those students in origami activities can directly reflect their changes in graphics creative thinking.

It can be observed obviously that graphic creative thinking of the object students have been greatly improved through the origami activities. Figural TTCT was taken by the whole class again after two months. The results of this study were obtained by comparing the variation of the graphic creative thinking of the three students with that of the whole class in pre-post-test. Variance analysis has been down, and the result shows significant difference between the students trained by origami activities and the others who didn't. It is found that origami activities have significant impacts on graphic creative thinking of eighth-grade students, in the form of

total score (Table 1) and each characteristics respectively, with the impact on that of low level students being the greatest and other level ones being obvious as well.

Table 1: The effect of origami activities on the total score in TTCT.

factor	level	parameter estimation	Standard error	t-statistic	p-value
intercept item		0.089	0.833	0.107	0.915
origami activity	not trained	0.000	NA	NA	NA
	trained	22.244	3.332	6.68	<0.0001

The result of variance analysis shows that the score of the students trained by origami activities increased significantly ($p < 0.0001$). Specifically, the average score of the students who trained by origami activities was 22.244 higher than the average score of those who did not.