Original Article

The Effects of Origami Training on Creativity and Visual-motor Integration in Preschool Children

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Objective: This research aimed to examine the effects of Origami Training on the level of creativity and visual-motor integration of pre-school children.

Materials and Methods: The subjects were pre-school children at the age of 5 years. Sixteen participants met the inclusion criteria were divided into experimental group and control group. Each group consisted of 8 participants. The experimental group participated in Origami Training program, whereas the control group received daily regular activities. Origami training program was conducted in 25 sessions. Each session was operated in 30 minutes, 5 days a week and 5 weeks consecutively. This research compared creativity and visual-motor integration scores before and after participating in Origami training of the experimental group and compared those scores between the experimental and control group. Subjects' creativity and visual-motor integration were assessed by Test for Creative Thinking-Drawing Production [TCT-DP] and The Developmental Test of Visual-motor integration, 6th edition [VMI 6th] respectively.

Results: The results of the present study revealed statistically significant differences between the experimental group (mean $\pm$ SD = 29.9$\pm$5.9) and the control group's (mean $\pm$ SD = 17.9$\pm$2.3) posttest creativity scores, and between the experimental group (mean $\pm$ SD = 118.9$\pm$8.2) and the control group's (mean $\pm$ SD = 104.6$\pm$4.7) posttest visual-motor integration scores (p<0.01).

Conclusion: These findings suggested that the Origami Training program may help improve creativity and visual-motor integration in pre-school children.

Keywords: Origami, Creativity, Visual-motor integration, Pre-school children

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To maximize the potential as a human being, fostering interventions at an appropriate period is imminent[1]. Children are undeniably important especially in their early childhood development period; the period in a child life from 2 through 6 years of age. In early childhood, there is a variety of tasks for children to complete that attribute to various aspects of their development. At each stage, the primary aim of attempt is to reach more complicated tasks by integrated, organized and combined various developmental skills together[2]. It is a critical time for them to develop the physical, socio-emotional, language, and cognitive skills while the development in each of these areas also affect and interact with the other types[3]. Creativity and visual-motor integration can evidently be examples that represent the interaction of these developments.

One of the most desirable human abilities is creativity: the ability to think about something in novel and unusual ways and come up with unique solutions to problems[3]. It represents a noticeable connection between cognitive development, language development and the ability to create new idea in order to change oneself and the world excellently. Visual-motor integration is another essential skill for children in the stage of early childhood. This skill requires effective visual perception that translates

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into motor functioning, accurate hand movement and hand-eye coordination. It is closely related to their cognitive development, learning ability, academic performances and everyday life skill. Perception, selection, organization, and interpretation of the information from sensory organs are important because they are needed for learning initiation and understanding of the environment. Moreover, the degree of development of fine motor movements especially their hands- is correlated with the speech development[4,5]. The children's physical development allows them to perform more complicated tasks which bring them into greater social contact with others.

Creativity and visual motor integration in young children should be stimulated by providing an encouraging environment as it is claimed that surroundings influence more than genetic predispositions. Furthermore, it is believed that these two sets of skills can be most encouraged during the early childhood period, which is the most sensitive period of development. Traditionally, art was used as a tool to encourage children's physical and mental development. Children's creativity and visual motor integration by art activities which can be classified by National Primary Education into 5 categories: drawing and painting received popular attention among Thai children followed by print making, sculpture, paper folding and cutting, and crafts. However, Origami, the traditional Japanese folk art of paper folding, has advantages over other types of activity because it required both hands participated equally. In addition, it is a non-threatening and attractive activity for children as they can create a 3-dimensional model without using any other instruments and easy to clean up. The process of creating Origami requires cognitive and motor skills such as visual-spatial motor skills, fine motor skill, concentration, and especially hand-eye coordination; Origami makers have to perceive visually and accurately, and copied models by using both dominant and non-dominant hands effectively. Origami is not only a visual-motor activity but also a bimanual activity which allows makers to function their inter-hemispheric interaction by using both hands[6]. Folding process activates the left hemisphere, or the logic hemisphere; while activates the right hemisphere, or the creative hemisphere, by utilizing three-dimensional perception and art ability. Also, it is claimed that this process stimulates the whole brain functioning. In accordance with the research of Shumakova (2011)[6], Origami training based on asymmetrical bimanual activity leads to brain hemispheres interaction and stimulates motor, intellectual, and creativity development in children. With those qualifications, the researcher can determine that children should be encouraged especially at a state of maximum readiness with a useful intervention in order to promote their vital developmental progress.

Objective

To examine the effect of Origami training on creativity and visual-motor integration among children by 1) the comparison of the pre- and post-test creativity and visual-motor integration score within the experimental group and control group. 2) the comparison of creativity scores and visual-motor integration scores between the two groups.

Materials and Methods

Participants

Subjects came from one private pre-school and were comprised of children aged 5 years old. Sixteen participants met the inclusion criteria were randomized into experimental group and control group. Each group consisted of 8 participants.

The present study was conducted with the approval of the Siriraj Institutional Review Board [SIRB], Faculty of Medicine Siriraj Hospital, Mahidol University. Informed consent was obtained from all of the participants.

Procedure and measurement

In the process of the training, the researcher proceeded with the following procedure:

1) Contact one private pre-school and ask for permission and cooperation.

2) Conduct the pre-test of creativity and visual-motor integration.

3) Subjects participated in Origami training for 25 sessions, 30 minutes each.

4) After the training, the researcher conducted the posttest of creativity and visual-motor integration.

Instruments

Three instruments were used to collect the data, which were: 1) Personal records which consisted of name, age, gender, education level, hobby, and Origami experience, 2) The Creative Thinking-Drawing Production [TCT-DP], and 3) The developmental test of visual-motor integration, 6th edition [VMI 6th].

Analysis

The data were analyzed using PASW 18.0

Table 1. Comparison of creativity score and visual-motor integration score between groups

	Mean ± SD		*p*-value
	Experimental (n = 8)	Control (n = 8)	
Creativity score			
Pre	19.1±9.4	17.1±3.4	
Post	29.9±5.9	17.9±9.0	
Post-pre	10.8±3.5	0.8±6.4	<0.01
p-value	<0.01	0.941	
Visual-motor integration score			
Pre	105.6±8.6	103.0±3.6	
Post	118.9±8.2	104.6±4.7	<0.01
Post-pre	13.3±0.4	1.6±1.1	
p-value	<0.01	0.902	

(SPSS Inc., Chicago, Illinois, US). Demographic data were presented by descriptive statistics. Mann-Whitney U test was employed to test the difference in score between two groups. Wilcoxon's signed-rank test was used to compare pre- and post-test score in the same group.

Results

The demographic data of the sample are presented in Table 1. Each of the sample groups consisted of 8 pre-school children. All subjects were in their third year of kindergarten. There were 5 female in the experimental group and 4 female in the control group, 3 male in the experimental group, and 4 male in the control group. All of the subjects' ages were 5: 0 to 5: 11 with the average age of 5: 6 in the experimental group, and 5: 4 in the control group. 3, 3, 2 subjects in the experimental group and 4, 2, 1 in the control group had drawing, painting and clay works as their favorite hobby respectively. 5 subjects of the experimental group and 4 subjects of the control group had some Origami experiences.

Effects of origami training on creativity

The comparison of the pretest and posttest scores within the experiment through revealed that posttest scores (Mean ± SD = 29.9±5.9) were higher than the creativity pretest score (Mean = 19.1, SD = 9.4) at a statistically significant level of <0.01.

The comparison of the post test scores between the experimental group and the control group revealed that the creativity posttest scores of the experimental group (mean ± SD = 29.9±5.9) were higher than the creativity posttest scores of the control (mean ± SD = 17.9±2.2) at a statistically significant level of <0.01.

Effects of origami training on visual-motor integration

The comparison of the visual-motor integration scores between pretest and posttest in the experimental group demonstrated that the mean score of the experimental group had a tendency to increase after the experiment. When compared the mean scores of the experimental group prior to receiving Origami training and after their training, it was found that the visual-motor integration posttest scores (mean ± SD = 118.9±8.2) were higher than the visual-motor integration pretest scores (mean ± SD = 105.6±8.6) at a statistically significant level of <0.01.

The comparison of the visual-motor integration posttest score between the experimental group and the control group revealed that the scores of the experimental group (mean ± SD = 118.9±8.2) were higher than the visual-motor integration posttest scores of the control (mean ± SD = 104.6±4.7) at a statistically significant level of <0.01.

Ethical consideration

This research was conducted with the approval of the Siriraj Institutional Review Board [SIRB], Faculty of Medicine Siriraj Hospital, Mahidol University; Si. 311/2012.

Discussion

Effects of origami training on creativity

The level of creativity of after participating in Origami training was higher than before their participation at a statistically significant level of <0.01. The Origami training program had effects on creativity in pre-school children. The children participating in the Origami training program had learned the skills which enhanced their creativity. The activity which covered the abilities of fluency, elaboration, flexibility, originality, composition and risk taking, enabled the children to understand how to generate creativity. This result is consistent with a study of 25-session Origami Training, conducted by Shumakov (2011)[6] which found that the training of origami based on asymmetrical bimanual activity caused intensive interaction of brain hemispheres and allowed creative abilities of children 7 to 11 years old to develop.

The creativity scores of the experimental group before their participation in the Origami training program were no different from that of the control group at a statistically significant level of <0.01. After participating in the intervention, the experimental group participants achieved better scores of creativity at a statistically significant level of <0.01. The comparative analysis of personal data and pre-test scores of creativity between samples in the experimental group and the control group found no difference with regard to gender, age, hobbies and Origami experience at a statistically significant level of <0.01. Thus, the differences in creativity of the two groups were certainly related to the participation in Origami training program, not because of the differences in the subjects' characteristics. This could explain the fact that the children in the control group did not participate in Origami training and only participated in daily regular activities. In contrast, the children in the experimental group continually participated in the Origami training program. They accomplished activities concerning the abilities of fluency, elaboration, flexibility, originality, composition and risk taking that could be applied to practical use.

Consequently, this study indicated that the Origami training program had effects on creativity in pre-school children. The program improved creativity among pre-school children when compared with the control group and the experimental group after the intervention.

Effects of origami training on visual-motor integration

The level of visual-motor integration of the experimental group after Origami training was higher than prior to the intervention at a statistically significant level of <0.01. It indicated that the Origami training program had effects on visual-motor integration in pre-school children. Origami training program provided activities that enhance children's fine motor skills. The type of "learning by doing activity" played an essential role in motor control and eye-hand co-ordination. Children needed to synchronize their hands and eyes continuously. The result of the present study showed accordance with the study conducted by Shumakov (2011)[6], which found that motor activity of both hands was developed in dynamics of the origami training, and, its greatest development was marked in the middle of the training.

Regarding the research results, the score of visual-motor integration between the experimental and control groups after participating in the study showed statistically significant differences (p<0.01). The results indicated that the experimental group had significantly higher scores of visual-motor integration than the control group. The differences in visual-motor integration of the two groups were related to the participation in Origami training program as the scores between pre-training and control group were not different at a statistically significant level of <0.01. This could be explained as both groups of children in the program did not participate in the Origami training at first. In contrast, the children in the experimental group continually participated in the Origami training program which motivated a coordination of eyes-hands extensively and contributed to different post-training.

Conclusion

The Origami training program, a combination of art, creativity and visual-motor integration components, may help improve creativity and visual-motor integration in pre-school children.

What is already known on this topic?

The findings of this study showed that the Origami training program had effects on creativity and visual-motor integration in pre-school children.

What this study adds?

The program could be applied as an activity to enhance creativity and visual-motor integration skills in children. However, there should be a study that covers other populations and a comparative study of Origami training program and other types of art activities and their effects on creativity and visual-motor integration.

Potential conflicts of interest

None.

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