

Verify the Development of the CRE-FATD Module to Enhance Young Children's Creative Thinking

Lan Zhang ^a, Muhammad Fazli Taib Bin Saearani *

Faculty of Music and Performing Arts, Sultan Idris Education University, Tanjong Malin, Malaysia

* **Corresponding author:** Muhammad Fazli Taib Bin Saearani (Email: fazli@fmsp.upsi.edu.my), ^a zhanglan19840706@gmail.com

Abstract: The purpose of this chapter is to verify the development of the CRE-FATD module to enhance young children's creative thinking. Statistical analysis methods include independent sample t-tests and paired sample t-tests for difference analysis, comparing the significance of the observed subjects' Torrance Creative Thinking Test scores before and after the test to understand whether the observed young children's creative thinking has improved. To make the experiment more rigorous, the post-measurement of creative thinking is conducted for two classes Transform data Conduct an independent sample t-test to observe whether there is a significant difference in the creative thinking of the two classes of children after the start of the course. Before each round of activities, a pre-test is conducted on a total of 20 observation subjects in the two classes, and a post-test is conducted after the activities. By comparing the pre- and post-test data of the two classes, the conclusion is drawn whether creative dance can promote the development of creativity in middle-aged children, and the process and results of the action research are reflected and evaluated.

Keywords: CRE-FATD Module; Creative Thinking; Independent Sample; Paired Sample.

1. Introduction

This study used the Torrance Creative Thinking Test - Drawing Test (Type A) to test young children in order to obtain quantitative data on the impact of creative dance activities on the development of creative thinking in middle-school children.

Before the start of the course, two middle classes from D Kindergarten in X City are selected, with two classes designated as Class A and Class B. Class A is used as the experimental class in the experiment, while Class B is used as the control class. A pre-test is conducted on 20 middle-school children from the two classes participating in the study, and the experimental data is analyzed using SPSS. The pre-test of creative thinking in the two classes is Transform data performed an independent sample t-test to observe whether there is a significant difference in the creative thinking of the two classes before the start of the course.

After the end of the activity, 20 middle-class children are selected from the two classes where the study is implemented for a post-test, and the experimental data are analyzed using SPSS for comparative analysis. Experimental class A pre-test Data paired sample t-test is conducted with the post-test data of the experimental class A to observe whether there is a significant improvement in the quantitative data of children's creative thinking before and after the activity. Control class B pre-test Data paired sample t-test is conducted on the post-test data of the control class B to observe whether there is a significant difference in the quantitative data of children's creative thinking before and after the activity [1-6].

2. Study Subjects

This study selected two middle classes in D Kindergarten in X City to carry out creative dance activities. The two classes are labeled as Class A and Class B. Five male and five female children are randomly selected from each class, for a total of 20 children observed in the two classes. The basic

information of the children is shown in Table 1.

Table 1. Basic information of children participating in creative dance activities.

Classroom	No. of	Name:	Gender:
Class A	S1	H Infant	Male.
Class A	S2	L Infant	Male.
Class A	S3	Z Infant	Male.
Class A	S4	W Infant	Male.
Class A	S5	L. Infant	Male.
Class A	S6	M Infant	Female.
Class A	S7	X child	Female.
Class A	S8	L Infant	Female.
Class A	S9	G. Infant	Female.
Class A	S10	Z Infant	Female.
Class B	S11	B Infant	Male.
Class B	S12	W Infant	Male.
Class B	S13	S Infant	Male.
Class B	S14	Z Infant	Male.
Class B	S15	X Infant	Male.
Class B	S16	R Infant	Female.
Class B	S17	C. Infants	Female.
Class B	S18	G Infant	Female.
Class B	S19	J. Infant	Female.
Class B	S20	L Infant	Female.

A teacher conducts each round of research as the implementer. The basic information of the implementing teacher is shown in Table 2.

Table 2. Basic information of teachers who implement creative dance activities.

No. of	Name:	Gender:	Professional	Academic qualifications	teaching years
T1	Teacher H	Female.	Preschool education	Graduate student	4 years
T2	Teacher Y	Female person	Preschool education	Undergraduate	7 years
T3	Teacher W	Female.	Preschool education	Undergraduate	1.5 years

3. Research Tools

Torrance Creative Thinking Test - Drawing Test (Type A)

The Torrance Test of Creative Thinking (TTCT) was developed by Torrance, a professor of psychology at the University of Minnesota in 1966. It has been widely used for 57 years. The TTCT has good reliability and validity and is suitable for people at different stages.

Wu Jingji taking male and female students in Taipei as a sample, the reliability, test-retest reliability, content validity, concurrent validity, predictive validity, and construct validity of the measurement scale are tested through multiple comparisons and tests based on the scores obtained from the test. The results showed that the measurement scale had good reliability and validity and is suitable for Chinese students.

In summary, TTCT is suitable for Chinese children, and this study believes that art has similarities, so the picture test is chosen. roll as the research tool for this study. The drawing test has three parts (see: Appendix One. The Torrance Creative Thinking Test - Drawing Test (Type A) has the following testing rules:

Part 1: Constructing a picture. The tester adds drawings on the basic shape of a "circle" based on imagination.

Part 2: Complete the drawing. There are 10 irregular lines in this question, and the test is required to draw them by associating them with the lines.

The third part is lines. The test draws associations on 10 pairs of short parallel lines.

The test requires 10 minutes for each part of the painting, for a total of 30 minutes It is required, but the quantity should be as large as possible [7-13].

4. Data Analysis on the Implementation Effect of Creative Dance Activities

4.1. Experimental Group and Control Group Creativity Test for Young Children Homogeneity Analysis

To prove that the development of the CRE-FATD module improves children's creative thinking, the author quantified the creative thinking of experimental class A and control class B before the activity began and conducted a homogeneity test between the two groups using SPSS statistical analysis software to compare the differences in creative thinking between the two classes.

For both classes pre-test of creative thinking Data is an independent sample t-test To observe whether there is a significant difference in the creative thinking of the two classes of children before the start of the course. The independent sample t-test for fluency, flexibility, originality, proficiency, and total score between the experimental group and the control group yielded P values greater than 0.05, indicating that there are no significant differences between the experimental group A and the control group B in terms of the four dimensions of creative thinking. The creative thinking of children in the experimental group and the control group is basically at a homogeneous level.

For both classes, pre-test of creative thinking the independent sample t-test is conducted on the fluency data, and no significant difference is observed between the two classes of children before the start of the course, as shown in Table 3.

Table 3. Homogeneity test of fluency between the experimental group and the control group (pre-test)

Variable	Experimental group (n=10)		Control group (n=10)		T.	P.
	M.	SD is	M.	SD,		
smooth and fluent	17.5	2.07	17.2	1.62	0.361	0.853

For both classes pre-test of creative thinking the data are subjected to independent sample t-tests, and no significant differences are observed in the adaptability of the two classes before the start of the course, as shown in Table 4.

Table 4. Homogeneity test of adaptability of children in the experimental group and control group (pre-test)

Variable.	Experimental group (n=10)		Control group (n=10)		T is	P.
	M.	SD,	M.	SD,		
make a change	13.7	3.68	14.3	3.47	-1.626	0.913

For both classes, pre-test of creative thinking the original data are tested using an independent samples t-test, and no significant differences are observed between the two classes of children before the start of the course, as shown in Table 5.

Table 5. Homogeneity test of originality of children in the experimental group and control group (pre-test)

Variable variables	Experimental group (n=10)		Control group (n=10)		T.	P.
	M.	SD.	M.	SD is		
original creation	19.1	4.95	20.3	4.55	-1.505	0.671

For both classes, pre-test of creative thinking the data are tested using an independent sample t-test, and there is no significant difference in the improvement of the two classes before the start of the course, as shown in Table 6.

Table 6. Homogeneity test of the experimental group and control group children's progress (pre-test)

Variable quantity	Experimental group (n=10)		Control group (n=10)		T.	P.
	M.	SD is	M.	SD is		
to work diligently	13.5	3.92	12.9	6.77	0.566	0.212

For both classes pre-test of creative thinking the total score data are tested using an independent sample t-test, and there is no significant difference in the creative thinking of the two classes before the start of the course, as shown in Table 7.

Table 7. Homogeneity test of creative thinking between experimental group and control group (pre-test)

Variable quantity	Experimental group (n=10)		Control group (n=10)		T.	P.
	M.	SD.	M.	SD.		
Total score	63.8	12.16	64.7	12.95	-1.228	0.972

4.2. Difference Analysis of Creative Thinking between the Experimental Group and the Control Group Before and After the Test

(1) Difference analysis of pre-and post-test creative thinking of children in the experimental group

This study conducted a paired sample t-test to detect the significance of the pre- and post-test scores of the Torrance Creative Thinking Test for the experimental group A, to understand whether the creative thinking of the observed children has been improved. Quantifying the creative thinking of experimental group A before and after the activity, the pre- and post-test data of the experimental group are obtained for differential analysis.

Pre-test data of experimental class and post-test data the paired sample t-test for fluency, adaptability, originality, progress, and total score of the experimental group A obtained a P value less than 0.05, indicating that the pre-test and Post-test on creative thinking. There are significant differences in all four dimensions. The mean value of the post-test data is significantly greater than that of the pre-test. The results of the difference analysis showed that after the activity, the creative thinking of the children has been significantly improved.

For the experimental class, fluency pre-tests and the paired sample T-test are conducted on the post-test data, Pre-test data of experimental class There is a significant difference in the fluency of young children between the pre-test and post-test data, with the post-test data significantly higher than the pre-test data, as shown in Table 8.

Table 8. pre-and post-test results of children in the experimental group smooth and fluent differential analysis

Variable quantity	Pre-test of the experimental group(n=10)		Post-test of experimental group (n=10)		T.	P.
	M.	SD.	M.	SD.		
smoothly	17.5	2.07	18.1	2.08	-1.327	0.01

For the experimental class. The pre-test and the paired sample T-test are conducted on the post-test data and pre-test data of the experimental class There is a significant difference in the flexibility of young children between the pre-test and post-test data, with the post-test data significantly higher than the pre-test data, as shown in Table 9.

Table 9. Difference analysis of flexibility of pre-and post-test for children in the experimental group

Variable variables	Pre-test of the experimental group(n=10)		Post-test of experimental group (n=10)		T is	P.
	M.	SD.	M.	SD.		
make a change	13.7	3.68	15.4	3.03	-2.684	0.002

For the experimental class pre-tests and the paired sample T-test is conducted on the post-test data, Pre-test data of the experimental class There is a significant difference between the originality of the children in the post-test data and the pre-test data, with the post-test data significantly higher than the pre-test data, as shown in Table 10.

Table 10. Difference analysis of originality of children in the experimental group before and after the test.

Variable quantity	Pre-test of the experimental group(n=10)		Post-test of experimental group (n=10)		T is	P.
	M.	SD.	M.	SD.		
original creation	19.1	4.95	21.8	3.68	-2.51	0.017

For the experimental class pre-tests and the paired sample T-test is conducted on the post-test data, The Pre-test data of the experimental class shows a significant difference in the improvement of young children between the pre-test and post-test data, with the post-test data significantly higher than the pre-test data, as shown in Table 11.

Table 11. Difference analysis of pre-and post-test improvement of children in the experimental group

Variable.	Pre-test of the experimental group(n=10)		Post-test of experimental group (n=10)		T is	P.
	M.	SD.	M.	SD is		
striving diligently	13.5	3.92	15.2	3.05	-2.978	0.004

For the experimental class, the pre-test and the paired sample T-test are conducted on the post-test data, Pre-test data of experimental class, there is a significant difference in children's creative thinking between pre-test and post-test data, with post-test data significantly higher than pre-test data, as shown in Table 12.

Table 12. Difference analysis of creative thinking between pre-and post-tests of children in the experimental group

Variable	Pre-test of the experimental group(n=10)		Post-test of experimental group (n=10)		T.	P.
	M.	SD is	M.	SD.		
Total score	63.8	12.16	70.5	7.81	-2.796	0.001

(2) Difference analysis of creative thinking between pre-and post-tests in the control group

This study uses paired sample t-tests to detect the significance of pre-and post-test scores in the control group B, which does not participate in creative dance activities. Quantifying the creative thinking of control group B after the same period, we obtained pre-and post-test data for the control group and conducted a difference analysis. The results of the difference analysis are shown in Table 13.

Compared to Pre-group test data, The paired sample t-test for the fluency, adaptability, originality, improvement, and total scores of the post-test data obtained a P value greater than 0.05, indicating that the control group B's pre-test and post-test on creative thinking, there are no significant differences in the four dimensions of creativity. The analysis of differences showed that without creative dance activities, children's creative thinking does not significantly improve.

The control class is fluent pre-tests, and the paired sample t-test is conducted on the post-test data, and there is no significant difference in the fluency of the children in the control class between the pre-test data and the post-test data.

Table 13. Difference analysis of the fluency of the control group children before and after the test

Variable	Contrast pre-group test(n=10)		Post-test of control group (n=10)		T is	P.
	M.	SD.	M.	SD.		
smooth and fluent	17.2	1.62	15.1	0.99	1.445	0.182

Adaptation of control class pre-tests and paired sample t-tests is conducted on the post-test data, and there is no

significant difference in the flexibility of the children between the pre-test data and the post-test data in the control class, as shown in Table 14.

Table 14. Difference analysis of flexibility between pre-and post-tests for children in the control group

Variable variables	compared to pre-group test(n=10)		Post-test of control group (n=10)		T.	P.
	M.	SD (standard deviation)	M.	SD is		
make adaptations	14.3	3.47	13.9	3.38	0.233	0.821

Original creation in the control class pre-tests and the paired sample t-test is conducted on the post-test data, and there is no significant difference in the children's originality between the pre-test data and the post-test data in the control class, as shown in Table 15.

Table 15. Difference analysis of originality of children in the control group before and after the test.

Variable quantity	control, contrast group pre-test(n=10)		Post-test of control group (n=10)		T is	P.
	M.	SD,	M.	SD is		
original creation	20.3	4.55	20.5	3.44	-0.651	0.531

Improve the control class pre-tests and the paired sample t-test is conducted on the post-test data, and there is no significant difference in the children's progress between the pre-test data and the post-test data in the control class, as shown in Table 16.

Table 16. Difference analysis of pre-and post-test progress of children in the control group

Variable quantity	control, contrast group pre-test(n=10)		Post-test of control group (n=10)		T.	P.
	M.	SD is	M.	SD,		
make constant efforts	12.9	6.77	11.5	3.44	0.772	0.110

Creative thinking in the control class pre-tests and the paired sample t-test is conducted on the post-test data, and there is no significant difference in the creative thinking of children between the pre-test data and the post-test data in the control class, as shown in Table 17.

Table 17. Difference analysis of creative thinking between pre-test and post-test in the control group

Variable	Compared to group pre-test(n=10)		Post-test of control group (n=10)		T.	P.
	M.	SD,	M.	SD is		
Total score	64.7	12.95	63.0	9.51	-0.126	0.902

4.3. Difference Analysis of Creative Thinking between the Experimental Group and the Control Group After the Post-Test

To further demonstrate the development of CRE-FATD modules to improve children's creative thinking, quantitative

analysis is conducted on the creative thinking of experimental class A and control class B after the activity begins. A difference analysis is conducted between the two groups using SPSS statistical analysis software, and a difference comparison is made between the two classes' creative thinking post-test data.

Post-test of creative thinking in two classes Transform data The results of the independent sample t-test after the start of the course are shown in Table 18. The independent sample t-test for fluency, flexibility, originality, proficiency, and total score between the experimental group and the control group obtained P values less than 0.05, indicating that there are significant differences in the four dimensions of creative thinking between the experimental group A and the control group B in the post-test data.

There is no significant difference in creative thinking between the two groups of children before the observation session began. Still, after the activity began, the children in the experimental group who participated in the creative dance activity showed significantly higher creative thinking than the control group. This hypothesis is further validated, suggesting that the development of the CRE-FATD module can improve children's creative thinking [14-20].

An independent sample t-test is conducted on the fluency post-test data of the two classes, and the results showed that there is a significant difference in the fluency post-test data of creative thinking between the experimental group A and the control group B.

Table 18. Difference analysis of fluency between the experimental group and the control group (post-test)

Variable	Experimental group (n=10)		Control group (n=10)		T is	P.
	M.	SD is	M.	SD.		
smooth and fluent	18.1	2.08	15.1	0.99	2.451	0.023

An independent sample t-test is conducted on the post-test data of the two classes, and the results showed that there is a significant difference between the experimental group A and the control group B in terms of their post-test data on creative thinking, as shown in Table 19.

Table 19. Difference analysis of adaptability between the experimental group and control group children (post-test)

Variable quantity	Experimental group (n=10)		Control group (n=10)		T.	P.
	M.	SD.	M.	SD is		
make adaptations	15.4	3.03	13.9	3.38	1.698	0.013

An independent sample t-test was conducted on the original post-test data of the two classes, and the results showed that there are significant differences in the original post-test data of creative thinking between the experimental group A and the control group B, as shown in Table 20.

Table 20. Difference analysis 1 of originality between the experimental group and control group (post-test)

Variable.	Experimental group (n=10)		Control group (n=10)		T.	P.
	M.	SD,	M.	SD is		
original creation	21.8	3.68	20.5	3.44	1.678	0.041

An independent sample t-test is conducted on the post-test data of the two classes, and the results showed that there is a significant difference between the experimental group A and the control group B in terms of creative thinking post-test data, as shown in Table 21.

Table 21. Difference analysis of the progress of children in the experimental group and the control group (post-test)

Variable.	Experimental group (n=10)		Control group (n=10)		T.	P.
	M.	SD.	M.	SD is		
To work diligently	15.2	3.05	11.5	3.44	2.566	0.022

An independent sample t-test is conducted on the post-test data of the two classes' creative thinking scores, and the results showed that there is a significant difference between the experimental group A and the control group B in the post-test data of creative thinking, as shown in Table 22.

Table 22. Difference analysis of the total scores of children in the experimental group and the control group (post-test)

Variable	Experimental group (n=10)		Control group (n=10)		T is	P.
	M.	SD is	M.	SD,		
Total score	70.5	7.81	63.0	9.51	2.628	0.027

5. Conclusion

The development of the CRE-FATD module is verified to improve children's creative thinking. The statistical analysis method used independent sample t-test and paired sample t-test to analyse the difference and compare the significance of the test scores before and after the Torrance creative thinking test.

From the comparison between the two groups, after the activity, the pre-test and post-test data of the experimental group were significantly different, and children's creative thinking was significantly improved. The control group did not carry out creative dance activities, there was no significant difference in the pre-test and post-test data, and children's creative thinking did not significantly improve. This verifies the hypothesis that the development of the CRE-FATD module can improve children's creative thinking.

From the perspective of comparison between the two groups, there was no significant difference in children's creative thinking between the two classes before the start of the observation course. Still, after the start of the activity, the children's creative thinking in the experimental group who carried out creative dance activities was significantly higher than that in the control group. This hypothesis is further verified that the development of the CRE-FATD module can improve children's creative thinking.

References

- [1] Jiao Sicheng. (2013). Action Research on Ecological Dance Teaching Activities in Kindergarten. Master's thesis, Hunan Normal University. https://kns.cnki.net/kcms2/article/abstract?v=auxnrJTP8flxwkPI5ErWIXQ6OB_tvkaTp_Q6CHxN8qrcKpbPc8Um4W6MPUOAZB60kOq2zEdceY8rlfz-UUtwEl9yOZ4_mpin7_WhChbyw_OumZ_K8sd_Piej_UfK_zM7xXhAJQbG0ZyJ07XP1Q9DoJvgzxWJA==&uniplatform=NZKPT&language=CHS.
- [2] Bi Xiang. (2015). The Application of Creative Dance in Large-Scale Stage Sound and Poetry Shows. *Popular Literature and Art*, (19), 169-170.
- [3] Bi Yujun. (2009). Investigation and Research on the Current Situation of Preschool Dance Education. Master's thesis, Shandong Normal University. https://kns.cnki.net/kcms2/article/abstract?v=auxnrJTP8flxJoi227wv5Rb4kWK_3wBRYjAKJaPt15gZQGEduhfVNIw6gbAVx2SR18D6TxhjctSXg_XlsL7puL7sqEGyTxEF3jdnHOCbr8boz_tKbNrZ-GznGujO_MvMFzqenKjSyMAG0nRF1lxdabazg==uniplatform=NZKPT&language=CHS.
- [4] Bu Caili. (2014). Research on the Application Model of the ADDIE Model in Micro-Course Design. *Teaching and Management*, (24), 90-93.
- [5] Cao Xing. (2020). Exploring Contemporary Creative Dance Teaching Concepts: Taking Huang Chengquan's Creative Dance as an Example. *Grand View (Forum)*, (09), 101-103.
- [6] Chen Chunyu. (2019). On the Cultivation of Creative Thinking in Dance Education. Master's thesis, Beijing Dance Academy. <https://kns.cnki.net/kcms2/article/abstract?v=auxnrJTP8flwxmC0J7r4ZE8mWcj4tTN0YL67X3tTH9uJngp9K8KbCOIF7vtyS53Ua1Tj3up502lMRr1NA1piFIHe5lpEHcXtEXxm9ksltTyNvVipKRBBBuGo6vXokQCHbGXLiUk4FvkAabVZ5iDaV4A==&uniplatform=NZKPT&language=CHS>.
- [7] Chen Jiannan & Zhu Tingting. (2020). Thoughts on Dance Teaching in Kindergarten. *Modern Communication*, (08), 207+206.
- [8] Chen Qian. (2011). Aesthetic Experience: The Proper Meaning of Children's Art Education. *Early Childhood Education*, (13), 1.
- [9] Chen Zhen & Cui Jiandong. (2018). Analysis on How to Improve the Quality of Kindergarten Dance Teaching. *Weekly Journal*, (29), 172-173. doi: 10.16657/j.cnki.issn1673-9132.2018.29.110.
- [10] Chen Xiaojun. (2018). Research on the Integration of Story Drama Teaching Mode into Creative Dance: Taking the Cross-National Language Course of the Sixth Grade in a Primary School in Tainan as an Example. Master's thesis, National Taiwan University of Arts. Taiwan Dissertation Knowledge Value-Added System. <https://hdl.handle.net/11296/n44puz>.
- [11] Mo Chunyan. (2018). Practice and Attempts to Introduce Traditional Ethnic Dance Elements into Early Childhood Dance Education. *Journal of Jiamusi Vocational College*, (04), 381+383.
- [12] Dang Xia. (2019). Research on the Integration of Ethnic Dance into Kindergarten Dance Teaching. *Chinese Extracurricular Education*, (28), 11.
- [13] Du Lingyan. (2016). Exploration and Application of Contemporary Early Childhood Dance Education Methods. Master's thesis, Chinese National Academy of Arts. https://kns.cnki.net/kcms2/article/abstract?v=8dkf_uZKvX3Q9g8PbBMN_8QEtZ-NpO4jlwi8_ylh4Wo_G0cYC_SBh_W9_LZ6g_mKMwxOx4e0dColiZds1HrNz52dRQCM5KqRCaQGr2_cg3cO_pYWA_3zi4S_u6RerS71c6x-b5qhuqy_Yufw_AusiI_Wpk8aA1Q==&uniplatform=NZKPT&language=CHS.
- [14] Guan Fengxiang. (2017). The Enlightenment of Experiential Teaching in Kindergarten to Traditional Dance Teaching for Children: Taking the Dance "Soldier Doll" as an Example. *Talent*, (06), 93-94.
- [15] Guo Yu & Tian Yingqian. (2020). Review of Early Childhood Dance Teaching Research in China from 2009 to 2018. *Education Observation*, (08), 14-16+21. doi:10.16070/j.cnki.15388/g4s.2020.08.004.
- [16] Guo Pinzhong. (2018). Research on the Integration of Marine Education into Elementary School Performing Arts Teaching:

- Taking Creative Dance Courses as an Example. Master's thesis, National Taiwan University of Arts. Taiwan Dissertation Knowledge Value-Added System. <https://hdl.handle.net/11296/g22sa4>.
- [17] Jia Shu. (2016). Problems and Countermeasures in Kindergarten Dance Education. Radio and TV Engineering, (04), 94-95. doi: 10.19469/j.cnki.1003-3319.2016.04.0094.
- [18] Hou Boyu. (2019). Analysis of the Practice of Creative Dance Curriculum in Kindergarten: Taking the Kindergarten Affiliated to Beijing Normal University as an Example. Art Education, (01), 112-113.
- [19] Hu Xiaoyu. (2019). How to Integrate Ethnic Dance into Kindergarten Dance Teaching. Guangdong Sericulture, (08), 111+113.
- [20] Hua Cuo. (2016). Let the Flower of Ethnic Dance Bloom More Brilliantly in Kindergarten. Qinghai Education, (Z1), 60-61.