

# Effects of Using Thinking Tools

## ~Using of X-chart on Essay~

Kiho Taniguchi  
Kansai University  
kiho.0707.t@gmail.com

Haruo Kurokami  
Kansai University  
kurokami@mbc.ocn.ne.jp

**Abstract:** The purpose of this research to clarify how children acquire higher-order cognitive skills by using thinking tools. The author compared and analyzed children's composition without X-chart and one with X-chart. Forty-six children in two classrooms at a public school in Sendai, Japan participated in this study.

After a class was completed, children wrote an essay about their sports festival and a musical that they saw. The author evaluated the essay from three perspectives, such as observing, listening, and verbalizing. By using a quantitative analysis tool, the author examined the t-test of average points. As a result, the author identified three significant different, that indicated that children can develop "viewing from multiple perspectives." However, the results showed that children cannot acquire cognitive skill completely in the long term. Further research will be conducted to explore how to cultivate children's cognitive skills.

**Keywords:** Thinking Tool, Cognitive Skills, elementary school

### INTRODUCTION

The Ministry of Education, Culture, Sports, Science and Technology (MEXT) Central Council for Education (2016) published a report about the revision of course of study "the improvement in the courses of study of a kindergarten, an elementary school, a junior high school, a high school and the special support school and a necessary policy." The report mentioned the importance of using thinking skills. The purpose of this research to clarify how children acquire higher-order cognitive skills by using thinking tools.

MEXT published new revision (2017), it is reference about Thinking Tool. Thinking Tools are expected to support children's ability to think. According to Kurokami, Kojima, and Taizan (2012), thinking tools help to visualizing ideas to develop thoughts and create new information. They defined "Thinking skills" as "Procedures to reveal one's thoughts."

### METHODS

This research had 46 children in two classes at a public school in Sendai, Japan. Children in both classes were asked to write essays using X-chart. Two trials were made to gather essays. The essay in first trial was about school excursion to a musical. Children in Class 1 wrote the first essay and put ideas about the musical on X-chart, then wrote the second

essays. Children in Class 2 used X-chart at first and wrote essays. In the second trial, theme of the essay was sports festival. The procedure of writing essays were changed in the trial.

The X-chart had four areas and each area was given to unique viewpoints, observing, listening, verbalizing, and feeling. Children wrote Post-its about themes. They put the Post-its on their X-chart in one of the areas of observing, listening, verbalizing, and feeling.

The authors compared the children's essay in five ways as below. The authors evaluated the essay how many points of view were reflected in them. The author examined the t-test of average points. In the evaluation, the fourth point of view, feeling, was not evaluated, because the point of view was different from others. Feeling is almost the contents of essays itself. Thus, the full marks of each essay was three points. T-test was conducted in the comparison.

The first comparison was made between 1a and 1b.

The second comparison was made between 1a,2a and 1b,2b. The data of 1a and 2a were combined and those of 1b and 2b were combined too to conduct the third comparison. The third comparison was made between the former date and the letter. The fourth comparison was made between 1a and 2c. The fifth comparison was made between 2a and 1c.

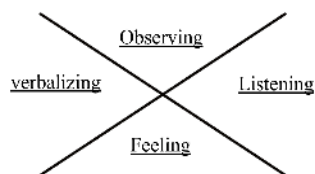


Figure1. X-Chart use in this study

The following value represents the composition for the t-test.

- 1a: Class 1 Musical (1st essay without X-chart)
  - 1b: Class 1 Musical (2nd essay with X-chart)
  - 1c: Class 1 Sports festival (essay with X-chart)
  - 2a: Class 2 Sports festival (1st essay without X-chart)
  - 2b: Class 2 Sports festival (2nd essay with X-chart)
  - 2c: Class 2 Musical (essay with X-chart)
- This study examined the t-test of average points in five patterns.

Table 1. Comparing the five ways.

①	1a and 1b
②	2a and 2b
③	1a,2a and 1b,2b
④	1a and 2c
⑤	2a and 1c

## RESULTS

As a result, significant differences were found in Patterns①, ②, and ③(1a>1b, N= 27, p<0.05, 2a>2b, N=18, p<0.05 1a,2a>1b,2b N=45, p<0.05). However significant differences were not found in Patterns ④ and ⑤(1a>2c, N=27,18, ns, 2a>1c, N=28,18, ns). According to the results, X-chart could support children to revise essays from multiple points of view. Only X-chart could not let children review their activities multiple from points of view.

Children used an X chart on essay, that indicates that children were able to utilize the skill of "viewing from multiple perspectives " corresponding to the X-chart.

Table2. Comparing 1a and 1b

	Mean	N	Std. Deviation	Std. Error Mean
1a	1.33	27	.679	.131
1b	2.07	27	.781	.150

Table3. Comparing 1a and 1b T test

	Paired difference					t	df	Sig.(bilateral)
	Mean	standard deviation	standard error	95%confidence interval of difference				
				lower limit	Upper limit			
Patern1	-.741	.984	.189	-1.130	-.351	-3.911	26	.001

Table4. Comparing 2a and 2b

	Mean	N	Std. Deviation	Std. Error Mean
2a	1.22	18	.732	.173
2b	2.22	18	.647	.152

Table5. Comparing 2a and 2b T test

	Paired difference					t	df	Sig.(bilateral)
	Mean	standard deviation	standard error	95%confidence interval of difference				
				lower limit	Upper limit			
Patern2	-1.000	.970	.229	-1.482	-.518	-4.373	17	.000

Table6. Comparing 1a,2a and 1b,2b

	Mean	N	Std. Deviation	Std. Error Mean
1a,2a	1.29	45	.695	.104
1b,2b	2.13	45	.762	.108

Table7. Comparing 1a,2a and 1b,2b T test

	Paired difference					t	df	Sig.(bilateral)
	Mean	standard deviation	standard error	95%confidence interval of difference				
				lower limit	Upper limit			
Patern3	-.884	.976	.145	-1.138	-.551	-5.804	44	.000

Table8. Comparing 1a and 2c

class	Mean	N	Std. Deviation	Std. Error Mean
V3 Class1	1.33	27	.679	.131
Class2	1.67	18	.970	.229

Table9. Comparing 1a and 2c T test

	Levene's Test for Equality of Variance		t-test for equality of Means						
	F	Sig.	t	df	Sig.(2-tailed)	Mean Difference	Std. Error Difference	95%confidence interval of difference lower	upper
V3	3.492	.068	-1.358	43	.182	-.333	.246	-.829	-.162
			-1.265	27.977	.216	-.333	.263	-.873	-.206

Table10. Comparing 2a and 1c

class	Mean	N	Std. Deviation	Std. Error Mean
V3 Class1	1.68	28	.863	.163
Class2	1.22	18	.732	.173

Table11. Comparing 2a and 1c T test

	Levene's Test for Equality of Variance		t-test for equality of Means						
	F	Sig.	t	df	Sig.(2-tailed)	Mean Difference	Std. Error Difference	95%confidence interval of difference lower	upper
V3	1.720	.196	1.854	44	.070	.456	.246	-.040	.953
			1.922	40.559	.062	.456	.237	-.023	.936

## CONCLUSION

This study proved the effect that children can develop "viewing from multiple perspectives" by using Thinking Tools in the context of revising their essays. Our expectation was the similar effect in using X-chart before first writing essays. The reason of powerlessness of X-chart in the context is not clear. More research is needed to clarify it. In addition further research will be conducted to explore how to cultivate children's cognitive skills.

## REFERENCE

Kurokami, H., Kojima, A. & Taizan, Y. (2012). シンキングツール~考えることを教えたい~. Osaka, Japan: NPO FiLC—Forum for i-Leaning Creation.

Ministry of Education, Culture, Sports, Science and Technology, entral Council for Education. (2016). About the improvement such as the courses of study of a kindergarten, an elementary school, a junior high school, a high school and the special support school and a necessary policy (197th report). Retrieved from [http://www.mext.go.jp/b\\_menu/shingi/chukyo/chukyo0/toushin/1380731.htm](http://www.mext.go.jp/b_menu/shingi/chukyo/chukyo0/toushin/1380731.htm)