

Effect of Sequential Storytelling Program on Executive Functions of Preschoolers

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Abstract

The brain capacity in life management or Executive Functions is an important feature necessary for every step of living in a modern society. According to the Thai children survey, it is found that most of children in Thailand have a deficiency of this ability. Consequently, this research aims to study the effect of Sequential Storytelling Program on Executive Functions of preschooler. The samples are 24 boys and girls studying in 3rd year Kindergarten of Thawsi School, Bangkok including 12 children as an experimental group, and 12 children as a controlled group. The methods used in this study are Sequential Storytelling Program and the Executive Function of preschooler assessment. The result reveals that the Sequential Storytelling Program can develop 4 domains of the Executive Functions in preschooler which are Inhibitory Control, Cognitive Flexibility, Emotional Control, and Planning & Organizing. However, it is found that there is no development of Working Memory domain.

Keywords: Executive functions, Storytelling, Preschoolers

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Introduction

Executive Functions is a vital skill to control emotions, thoughts and actions to express appropriately, including the control of accomplish things set as goals. The advantages of Executive Functions affect to the achievement in every stage of life, both study, work and family. (Diamond, 2012)

However, the development of Executive Functions need to be improved since children are in the kindergarten. According to the research from Harvard University (Harvard University, 2014), it is shown that this ability should be developed since childhood, especially during the age of 3-6 years old due to the fact that children brains are built and developed most in this stage. Moreover, the development can be more effective by focusing on children's learning by doing it themselves. There are 5 domains of the Executive Functions in early childhood which are Working Memory, Inhibitory Control, Shift/Cognitive Flexibility, Emotional Control, Planning & Organizing (Nuanchan Chutabhakdikul, 2014)

Although the Executive Functions are important skill for early childhood, the curriculum and teaching in Thailand focuses on reading and writing development in 0 to 6 years old preschooler more than other skills. (Weraphan Suphanchaimat, 2016) Besides, the study of Executive Functions in 2014 reveals that there were 18.5% of 243 preschoolers aged between 3-6 years old encountering the problem of Inhibitory Control, Working Memory, and Emotional Control. Also, a survey in the year 2015-2016 by Mahidol University and the Health Systems Research Institute, sampling 2,965 children aged between 2-6 years old, found that there were 30% of them had defective behaviors of Inhibitory Control, Working Memory, and Emotional Control. (Mahidol University, the Health Systems Research Institute, and National Research Council Thailand, 2016)

According to the problems mentioned above, it is the reason for researcher to study about activities that can help children to develop their Executive Function. Afterwards, it is found that, there are many activities such as the Using of Computer Program (Lisa &Thorell, 2009 ; Nutley, Söderqvist, Bryde, Thorell, Humphreys, & Klingberg, 2011), the Using of Curriculum (Barnett, Thomas, & Munro, 2007 ; Diamond, 2012), Reading Activity (Supawadee Hanmethee, 2016 ; Day, Connor & McClelland, 2015), Storytelling (Bates, 2012 ; Cavanaugh, Clemence, Teale, Rule& Montgomery, 2016), Imaginary Play, Music for Movement, Quiet Game, Aerobic, Taekwondo, Yoga, and Autogenic Training. (Suphawadee Hanmethee, 2015 ; Harvard university, 2014) However, the researcher did not found the study about the effect of using these activities to develop the 5 domains of Executive Functions. In this study, the researcher focuses on the creating of development program that can develop the 5 domains of the Executive Functions in preschooler.

Storytelling is the one of activities that can develop the Executive Functions in preschooler. The study of Harvard University (Harvard University, 2014) reveals that 3 to 6 years old preschoolers like telling story. The complexity of storytelling will improve many kinds of skills in young children which accord with Piaget's theory of intelligence development. Piaget explained that 2to6-year-old children's development is at the preoperational stage. Children use language as a tool of thoughts and often pick up words to compose new sentence for telling their own story, (Aree

Sanhachawee,2007) by using language and brain to motivate through the design of activities consistent with the principles of learning management which is match with the brain function. The theory of Brain Compatible Learning (Aree Sanhachawee, 2007; Wittayakorn Shiangkool, 2005), and the study of some research and document about activities enhancing executive function mentioned that storytelling and executive function happened together and relate to each other. (Bates, 2012) As a result, the researcher is interested in applying activity of telling story with the Executive Functions development in preschoolers, and furthering the activity by additional conditions and techniques into a sequential storytelling, to create sustainable learning process of children, which is an activity that encourage children to use their experiences, knowledge and imagination for taking turns in telling story sequentially and accordingly. The condition or situation determined to reach the goal of connected narration into one story which is different from the typical storytelling, and able to develop the Executive Functions more inclusively. Due to the fact that the sequential storytelling need more various Executive Functions along the activity.

Research Method

This research was a quasi-experimental research conducted by using experimental plan with controlled group and assess participants by using pretest and posttest (the pretest posttest control group design). The experiment occurred in second semester 2017 at Thawsi School, lasting for 5 weeks. Preschoolers participated in 10 activities according to the experimental plan. In case of participants did not complete all 10 activities, the researcher would analyze data of only participants who complete at least 8 activities.

Participants

There were 24 male and female preschoolers studying in 3rd year Kindergarten of Thawsi School, Bangkok participating in the study. The participants were divided into group of twelves. One was an experimental group and another was a controlled group. All participants selected by simple random sampling. The researcher used pretest and matching for grouping and do another simple random sampling again for grouping participants into controlled group and experimental group. All participants were permitted, by their parents, to participate this study.

Instruments

The instruments used in this study were:

1. Sequential Storytelling Plan

The Sequential Storytelling Plan was an activity plan that aim to develop the 5 domains of the Executive Functions in preschoolers. There were 10 activities including in the plan and they all were sequential storytelling activities with different conditions, for example, pick up the character in the Three Little Pigs for a new different storytelling, or clay-storytelling: underwater world which young children can make clay into anything and tell their story connecting into one story under the condition that non-happy ending. Each activity lasted 45-50 minutes each along 5 weeks.

All activities will be developed the Executive Functions in all domains as shown in Table 1.

Table 1: Summary of Executive Functions development that children acquired from Sequential Storytelling Program

Domains	Executive Functions Development
Working Memory	<ul style="list-style-type: none"> • Be able to remember the story told by friend to retell to others. • Be able to create new story by using their own experiences.
Inhibitory Control	<ul style="list-style-type: none"> • Be able to inhibit themselves not to say special words. (in the activity that specify the forbidden word) • Be able to control themselves to tell story harmonized with friends.
Cognitive Flexibility	<ul style="list-style-type: none"> • Be able to adjust their own story to their friend story telling before.
Emotional Control	<ul style="list-style-type: none"> • Be able to control their own emotion in group activities. • Be able to tell their own emotion after activities.
Planning & Organizing	<ul style="list-style-type: none"> • Be able to follow the steps set by teacher. • Be able to tell problems and solutions of the activities.

2. The Executive Functions of Preschooler Assessment

The assessment used in this study will evaluates 5 domains of the Executive Functions in preschoolers which are Working Memory, Inhibitory Control, Shift/Cognitive Flexibility, Emotional Control, and Planning & Organizing. There are 25 questions, for activities assessment with 4 criteria containing different indicators. This assessment will be used along with storybook. Teacher will tell story and then ask questions and do activities from the story

Table 2: Example Questions used for Executive Functions Development Assessment

Domains	Example Questions
Working Memory	<ul style="list-style-type: none"> • Describe outstanding characteristic of 4 characters. • Describe event in the storybook 5 events.
Inhibitory Control	<ul style="list-style-type: none"> • Restrain themselves not to speak with other when teacher is telling story. • Do things opposite with what happen in the story, for example, show “Wrong Mark” if the character is in the story or show “Correct Mark” if the character different is not in the tory.
Cognitive Flexibility	<ul style="list-style-type: none"> • Making new story from what happen in the storybook. • Discuss with others when doing group project.
Emotional Control	<ul style="list-style-type: none"> • Tell emotion and the reason of character in the story. • Control their own emotion when confront something regretful or disappointing
Planning & Organizing	<ul style="list-style-type: none"> • Plan to solve problems and follow the steps. • Be able to evaluate their own operation

Results

This research aims to study the effect of Sequential Storytelling Program on Executive Functions of preschoolers and there are 2 hypotheses which are;

Hypothesis 1: The experimental group participating the Sequential Storytelling Program will have Executive Functions more than before participating the program.

The researcher examined the hypothesis 1 and found that the experimental group participating the Sequential Storytelling Program have Executive Functions more than before participating the program at the level of .001 ($t=6.10, p^{***}<.001, 1\text{-tailed}$). It was found that the participants of experimental group had higher Posttest scores than before attending the program in every domain. To explain the each domains of Executive Functions, First domain is the Working Memory, the experimental group participants had higher Posttest scores than before attending the program at the level of .000 ($t=5.74, p^{***}<.001, 1\text{-tailed}$). Secondly, the Inhibitory Control, the participants significantly had higher scores than before participating the Sequential Storytelling Program at a level of .001 ($t=4.13, p^{***}<.001, 1\text{-tailed}$). Third, the Cognitive Flexibility, the participants of experimental group had higher scores than before participating the Sequential Storytelling Program significantly at a level of .000 ($t=4.60, p^{***}<.001, 1\text{-tailed}$). Next, the Emotional Control, it was shown that the participants had higher scores than before participating the program significantly at a level of .000 ($t=5.93, p^{***}<.001, 1\text{-tailed}$). Lastly, the Planning & Organizing, the scores of experimental group were higher than before participating the Sequential Storytelling Program significantly at a level of .001 ($t=3.99, p^{***}<.001, 1\text{-tailed}$) as shown in Table 3

Table 3 : The comparison of pretest and posttest scores of the experimental group before and after participating the program

Domains	Experimental Group (n=12)				t	p
	Pretest		Posttest			
	M	SD	M	SD		
Executive Functions	2.10	.27	2.33	.32	6.10***	.000
Working Memory	1.52	.52	2.37	.27	5.74***	.000
Inhibitory Control	2.14	.60	2.93	.16	4.13***	.001
Cognitive Flexibility	1.91	.70	2.88	.16	4.60***	.000
Emotional Control	2.20	.38	2.81	.15	5.93***	.000
Planning&Organizing	2.32	.54	2.87	.10	3.99***	.001

Note : *** $p<.001$, ** $p<.01$, * $p<.05$

Hypothesis 2 : The experimental group participating the Sequential Storytelling Program will have Executive Functions more than the controlled group who did not participate the program.

The researcher examine the hypothesis 2 and found that the participants of experimental group who attending the Sequential Storytelling Program had more rising Executive Functions scores than the controlled group who not attending the program significantly at a level of .004 ($t=1.04, **p<.01, 1\text{-tailed}$). To explain each domains of the Executive Functions, there were 4 domains that the experimental group significantly got more rising scores than the controlled group, who did not

attend the program, which were the Inhibitory Control, at a level of .024 ($t=2.34$, $*p<.05$,1-tailed), the Cognitive Flexibility which the experimental group got more rising scores than the controlled group significantly at a level of .014 ($t=2.69$, $*p<.05$,1-tailed), the Emotional Control which more rising scores significantly at a level of .007 ($t=2.42$, $**p<.01$, 1-tailed), and the Planning & Organizing which the experimental group had more rising scores than the controlled group significantly at a level of .014 ($t=2.92$, $*p<.05$,1-tailed). However, it wasn't shown that the Working Memory of experimental group was higher than the controlled group significantly at a level of .155 ($t=2.09$, $p>.05$,1-tailed) as shown in table 4

Table 4 : The comparison of pretest and posttest scores between experimental group and controlled group before and after participating the program

Domains	Experimental Group (n=12)					Control Group (n=12)					t	p
	Pretest		Posttest		\bar{D}	Pretest		Posttest		\bar{D}		
	M	SD	M	SD		M	S D	M	SD			
Executive Function	2.10	.27	2.33	.32	.23	2.12	.358	2.18	.37	.06	1.04**	.004
Working Memory	1.52	.52	2.37	.27	.85	1.52	.82	2.10	.44	.58	2.09	.155
Inhibitory Control	2.14	.60	2.93	.16	.79	2.19	.63	2.47	.36	.27	2.34*	.024
Cognitive Flexibility	1.91	.70	2.88	.16	.97	2.09	.69	2.42	.36	.32	2.69*	.014
Emotional Control	2.20	.38	2.81	.15	.61	2.10	.50	2.19	.47	.09	2.42**	.007
Planning & Organizing	2.32	.54	2.87	.10	.56	2.20	.55	2.37	.42	.17	2.92*	.014

Note : *** $p<.001$, ** $p<.01$, * $p<.05$

Conclusion

Executive Functions is an important life skill which can be improved most in preschoolers. Therefore, this research study the effect of Sequential Storytelling Program on Executive Functions of preschoolers by using Executive Function of Preschooler Assessment created by researcher to study the effects of program designed from Cognitive Development Theory of Piaget and the Compatible Learning Theory. The methods used for assessment designed to use with the program created concordantly. The result shows that, before participating the program, the participants of experimental group and controlled group had equivalent in Executive Functions confirmed by pretest result. After the experimental group participating the Sequential Storytelling Program, it is found that the experimental group participants had more rising scores in every domain, and more than the controlled group in 4 domains which

were Inhibitory Control, Cognitive Flexibility, Emotional Control, and Planning & Organizing. The Working Memory was the only domain not showing that the experimental group had more rising scores than the controlled group. In summary, The Sequential Storytelling Program is able to develop the Executive Functions in 4 domains of Inhibitory Control, Cognitive Flexibility, Emotional Control, and Planning & Organizing.

The result shows that this program is effective to be used for Executive Functions development in preschoolers. Even the program is not able to develop all domains of the Executive Functions, it is able to develop 4 important domains. Moreover, according to the preschooler comments, they found that it was fun and interesting to participating the program frequently and they want to do this activity more even the study was finished. This results shows that the Sequential Storytelling Program is not only able to develop the Executive Functions, but also suitable and interesting for the preschoolers

Research Implications

The Sequential Storytelling Program is the activity suitable for preschooler age of 5 years old and above because they can use language to express their idea and they are able to do activity with others. The activities are suitable for small group about 5-12 people depending on the age of children. The Sequential Storytelling Program can develop the Executive Functions in preschoolers in many domains. Therefore, it is good to apply this as an extra activity in kindergarten classroom. Teacher may lead preschoolers to do activity together or have the children play with themselves and let them tell their imaginary story without any control from teacher or any framework, just only simple task such as telling story from clay, puppet or painting.

Moreover, the parents can use this activity to their children after bedtime or daily storytelling. Parents may ask question from the story, change a plot to have children solve the problem and imagine from changing situation, let children pick up their favorite character to retell again noticeably, or let children do sequential storytelling activity in free time. The sequential storytelling can be regularly used both at school and home for more Executive Functions development in preschoolers.

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