

ผลของโปรแกรม EF GUIDELINE ต่อทักษะการคิดเชิงบริหาร: การศึกษาติดตามผล  
เด็กปฐมวัยในห้องเรียนที่ใช้แผนการจัดประสบการณ์ตามแนวทาง EF GUIDELINE  
ในพื้นที่กรุงเทพมหานคร

THE IMPACTS OF THE EF GUIDELINE PROGRAM ON EXECUTIVE FUNCTION  
SKILLS: A FOLLOW-UP STUDY OF CHILDREN IN THE CLASSROOMS WHERE  
LESSON PLANS WERE BASED ON EF GUIDELINE IN BANGKOK

ผู้วิจัย

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### บทคัดย่อ

ในปี พ.ศ. 2560 สำนักงานกองทุนสนับสนุนการสร้างเสริมสุขภาพ ได้สนับสนุนให้สถาบันแห่งชาติเพื่อการพัฒนาเด็กและครอบครัว, มหาวิทยาลัยมหิดล และ สถาบันรักลูก ดำเนินการวิจัยและพัฒนา EF Guideline ซึ่งเป็นเครื่องมือสำหรับครูปฐมวัย ใช้เป็นแนวทางในการวางแผนการจัดประสบการณ์ และสภาพแวดล้อม เพื่อส่งเสริมทักษะการคิดเชิงบริหารของเด็กปฐมวัย ในโครงการวิจัยปฏิบัติการเชิงวิพากษ์ หลังจากที่ครูปฐมวัยนำ EF Guideline ไปใช้เป็นเวลาหนึ่งภาคเรียน (4 เดือน) ผลการวิจัยพบว่า ทักษะการสอนของครู จากการใช้แผนการจัดประสบการณ์ EF Guideline และ ทักษะการคิดเชิงบริหารในเด็กปฐมวัยมีการเปลี่ยนแปลงดีขึ้นอย่างมีนัยยะสำคัญทางสถิติ (ปนัดดา ธนเศรษฐกร และคณะ, 2560) งานวิจัยชิ้นนี้จึงมีวัตถุประสงค์ คือ (1) เพื่อติดตามความคงอยู่ของการเปลี่ยนแปลงความรู้ ทักษะและทัศนคติของการใช้แผนการจัดประสบการณ์ EF Guideline ในคุณครูปฐมวัยในภาคเรียนที่ 2 และ (2) เพื่อติดตามพัฒนาการทักษะการคิดเชิงบริหารของเด็กปฐมวัยในภาคเรียนที่ 2 ในห้องเรียนที่ใช้แผนการจัดประสบการณ์ตามแนวทาง EF Guideline ในเขตกรุงเทพมหานคร โดยใช้ระเบียบวิธีการวิจัยแบบผสมผสาน กลุ่มตัวอย่างคือ คุณครูและเด็กปฐมวัย ภาคเรียนที่ 1/2560 จำนวน 4 โรงเรียนในกรุงเทพมหานคร แบ่งเป็น (1) คุณครูที่ผ่านการอบรมการจัดประสบการณ์ EF Guideline จำนวน 7 คน และ (2) เด็กปฐมวัยในห้องเรียนที่ได้รับการจัดประสบการณ์ตามแนวทาง EF Guideline จำนวน 134 คน

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ผลการศึกษาพบว่า หลังจากจบโครงการ EF Guideline Training Program ในภาคเรียนที่ 1 คุณครูที่เข้าร่วมโครงการยังคงวางแผนการจัดประสบการณ์ และจัดกิจกรรมตามแนวทาง EF Guideline ในภาคเรียนที่ 2 และคาดว่าจะใช้ต่อเนื่องไป เนื่องจากคุณครูตระหนักเห็นคุณค่าของการเขียนแผนการจัดประสบการณ์ที่มีเป้าหมาย และมีวัตถุประสงค์ชัดเจน ซึ่งทำให้เกิดความประณีตและละเอียดถี่ถ้วนต่อการสร้างประสบการณ์ในเด็กปฐมวัย และยังมีส่วนช่วยให้คุณครูเขียนแผนการจัดประสบการณ์ได้ง่ายขึ้น นอกจากนี้เด็กปฐมวัยในห้องเรียนที่คุณครูใช้ EF Guideline ทั้งฉบับเป็นแนวทางในการจัดประสบการณ์การเรียนรู้อย่างต่อเนื่อง มีค่าเฉลี่ยคะแนนทักษะความคิดเชิงบริหารในภาคเรียนที่ 2 สูงกว่าภาคเรียนที่ 1 อย่างมีนัยสำคัญทางสถิติ ที่ระดับ  $p < .05$

**คำสำคัญ:** ทักษะการคิดเชิงบริหาร โปรแกรมส่งเสริมทักษะการคิดเชิงบริหาร เด็กปฐมวัย

## ABSTRACT

In 2017, EF Guideline, the teacher tool for planning learning experiences and environments for promoting kindergarten children's executive function (EF) skills, was developed and studied by the collaboration between National Institute for Child and Family Development, Mahidol University and RLG Institute and funded by Thai Health Promotion Foundation to investigate the impact of the EF Guideline program on teachers' teaching skills and children's EF skills. After implementing for one semester (4 months), the findings showed that both teaching skills and children's EF skills were significantly improved. In this research, the follow – up of children in the classrooms where lesson plans based on EF Guideline was focused. The objectives of the study were (1) to follow – up the persistence of the teachers' changes in their teaching practices; including knowledge, attitude, and skills in semester 2, and (2) to investigate the development of children's EF skills in semester 2. A mixed method research was designed to answer the research questions.

Four kindergarten schools in Bangkok containing 7 teachers who participated in the EF Guideline program and implementing learning experiences based on EF Guideline in semester I and their 134 children were purposively selected to be the sample. The instruments were the interview questions of EF Guideline Persistence and the Assessment of Executive Function in Early Childhood (MU.EF - 101).

For the data analysis, constant comparative analysis using themes and interpretive description was utilized to explain the persistence of the EF Guideline program in the classrooms. Moreover, paired t - test was utilized to evaluate the differences in the children's scores on the development of EF skills between the semester 1 and semester 2. The results from the constant comparative analysis yielded 3 themes, including EF Guideline Principles and Components (Knowledge), The Behavioral Changes in Mutual Interactions (Attitude), and Teaching Skills (Practice). The results also showed that the children in the classroom where their teachers had continuously used the full form of the EF Guideline had significantly higher scores on the development of EF skills in semester 2, comparing to their scores in the semester 1. The depth of knowledge, attitude, and the consistency of the mechanism of EF Guideline element were the significant results. Thus, EF Guideline training program was developed to increase the teacher's competence since it impacts the children's EF skills.

**Keyword:** Executive function skills, EF Skills, Program, Preschool, EF Guideline

## Introduction

As the world moves into the 21<sup>st</sup> century, the rapid change of technology has resulted in the pattern of human life. Many scholars proposed that in addition to professional skills, information literacy and the new education management, the required skills for being successful in the 21st century are 3 R and 4 C skills.(1) Likewise, the researchers of Harvard University in the child development field stated that children in the 21st century should have the abilities to manage complex situations in a variety of competition. Those skills were related to Executive Function (EF).(2) EF is a set of high – level brain process for regulating emotions, thoughts, and behaviors to achieve goal – directed behaviors. The core domains of EF include inhibitory control, working memory and shifting skills. (3) These 3 domains of the EF were the fundamentals for required skills in the 21st century. In 2013, Randy Kulmand, who using technologies to improves EF, stated that EF is the major component of the 21st century skills, which are defined by the capacity to think flexibly and innovatively (creativity); the aptitude to communicate with colleagues both face – to – face and digitally (collaboration); and capability in planning, self - management, organization, time management, and critical – thinking skills.(4) The notion of the relation between EF skills and achievement has been long mentioned before. In 2017, Blankson, A. N. and colleagues (2017) conducted research in the factors of meaningful success in achievement and school adjustment with 263 early childhood children and found that EF was the key to predict academic achievement and the effectiveness in the classroom. Likewise, in the

same year, Blankson and colleagues (2017) found in their research in delineate developmental processes that contribute to early school success that EF skills could improve language development and reading skill. (5)

In Thailand, the 21<sup>st</sup> century skills was also on educational agenda. The Office of the Education Council has launched the National Education Plan in 2017 – 2036, stating that in response to the national policy with the theme Thailand 4.0 on transforming technology into a digital society and serving labor market in the 21<sup>st</sup> century, education aims to form graduates who are equipped with 21<sup>st</sup> century skills and moral and ethical skills. (6) However, even though the 21<sup>st</sup> century skills were stated in the nation's educational plan, there was little movement in practice. Nualchan Chutabhakdikul and colleagues (2017) examined EF development in 2,965 two– to six–year–old children (51.6% boys and 48.4% girls) as measured by the assessment of development of EF in early childhood (MU.EF – 101 and MU.EF - 102), the results showed that there was gradual improvement in the sample's behaviors related to EF skill during 2 – 6 years old. The researchers stated that if the delay development in EF skills were not addressed on urgent agenda, the other developmental areas and behaviors of children in Thailand would also be at risk. (7) Finding from the previous research shows the significant roles of the EF skills. Thus, EF development should be addressed in education in Thailand in all levels; especially in the level of early childhood education.

According to the research from Harvard University, the golden period of EF development

was early years of life. It was the period when neurons and brain networks develop quickly, and the core domains of EF skills were fast emerged. (8) In addition to the capability of learners, other factors supporting the quality of education were considered. The researchers and educators in early childhood education and development also concerned about the quality of administrators and teachers because they played important roles in all aspects of school achievement. (9) Tassanee Warakhum (2012) conducted a research study on the contribution of environmental management to learning. The author suggested that learning environment was essential to the learning method. The physical environments such as buildings, classrooms, safety, and the psychological environment such as learning management, secure attachment, positive communication, and teacher – student relationships were important to children’s learning. Children could create positive interaction and interest in learning collaboration. (10)

In 2017, Panadda Thanasetakorn and colleagues in National Institute for Child and Family Development, Mahidol University conducted a study on EF Guideline training program to enhance teachers’ knowledge in EF development, attitude toward their own abilities to promote children’s EF skills, and the skills of planning and implementing learning experiences based on EF Guideline for promoting the preschooler’s EF skills. EF Guideline is a guidance tool for planning a lesson plan. The findings revealed that the teachers who had been trained in the EF Guideline program had significant improvement in their knowledge and self–efficiency in using EF Guideline. Moreover, the preschoolers

in the experimental group had significantly increased in their scores on EF skills, comparing to the control group. (11, 12)

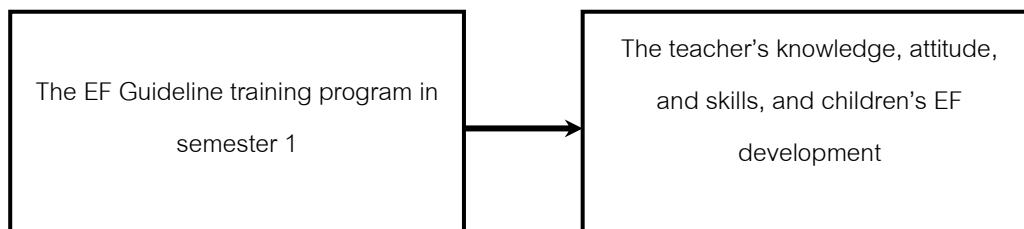
The previous research in EF Guideline training program showed great attempt to help early childhood teachers to raise their quality bar in teaching performance. EF Guideline was developed to guide teachers’ thinking process for planning effective lesson plans to promote children’s EF skills. The training program was carefully planned based on research – based best practices to help teachers transform their teaching skills. The results showed that the teachers finally become capable of create effective lesson plans based on EF Guideline, and the children’s EF skills were significantly developed. Although the findings showed quite impressive results in teachers’ performance and their children’s EF skills improvement, it was essential that the teachers consistently developed lesson plans based on EF Guideline to promote children’s development after participating the EF Guideline training program. Whether the EF Guideline’s elements and mechanism were transformed to the teachers’ teaching skills or not would be the focus of this research.

However, there was little follow - up research in the persistence of skill improvement and behavioral changes after the research project was done. Since the previous research in the impacts of the EF Guideline training program showed the positive impacts on the teachers’ behavioral changes and teaching skill improvement that served the goal of the nation’s educational plan and policy, this research attempted to bridge the

gap between the research field and practical context in classroom setting. Therefore, the current research aimed to investigate the impact of the EF Guideline training program on the persistent changes in the teachers' knowledge of EF skills, attitude toward their competence to promote children's EF skills, skills of planning and

implementing lesson plans based on EF Guideline, and children's EF skills. The expected benefits of this research would be significant evidences for supporting an effective tool and professional development program for promoting teachers' teaching skills required for the 21st century classrooms.

### Conceptual Framework



### The objectives of the research

1. To follow-up the persistence of the teachers' changes in their teaching practices; including knowledge, attitude and skill.
2. To investigate the development of children's EF skills in semester 2.

### Research Hypothesis

1. The EF Guideline training program affected the persistence of the teacher's knowledge, attitude, and skills.
2. The scores on EF skills of the children in the EF Guideline classrooms in semester 2 were significantly higher, comparing to their scores on the semester 1, as measured by MU.EF – 101.

### Methodology

#### 1. Population and Sample:

The teachers who participated in the EF Guideline training program in the semester 1 and the preschoolers who had been continuously studying in the classroom throughout the 2016 academic

year from 8 schools in Bangkok, suburbia and other provinces were the population of this research. The accessible population was 8 teachers and their 134 with 4 to 6 – year – old children in the schools located in Bangkok. Purposive sampling, a non-probability method was utilized based on the inclusion and exclusion criteria for the selection.

Inclusion criteria for selection were the teachers who planned their learning experiences based on EF Guideline to promote the children's EF skills throughout the semester 2 and agreed to participate in this research and children who had studied 80 % in the classrooms where the teachers used the EF Guideline to plan learning experience and whose parents agreed to have their children participate in this program and signed the consent form.

#### 1.1 The teacher sample's background

The teachers participated in this research were kindergarten teachers taught in 7 Kindergarten classrooms in 4 schools located in

Bangkok. Because one teacher in a school was excluded regarding the exclusion criteria, the total sample was 7. All teachers were female between the age ranges of 36 to 55 years old. Most of the sample graduated bachelor degree. The range of teaching experience was over 5 years to over 30 years. Based on previous research in the EF Guideline training program in the semester 1, the sample significantly had higher posttest scores on EF knowledge and understanding, attitude toward their competence of using EF Guideline to promote the children's EF skills, and the skills of planning and implementing lesson plans based on EF Guideline, comparing to their pretest scores.

## 1.2 The children sample's background

134 children whose teachers were the sample of this research were included. 54.5% of the children was boy and 45.5% was girl between the age ranges 51 months to 79 months. **Table 2 illustrates** the percentages of the sample's gender and the means of the sample's age in each school. Based on previous research in the EF Guideline training program in semester 1, the sample significantly had higher posttest scores on EF skills than their pretest scores. The gender and ages had no significant impact on the changes in pretest to posttest scores.

**Table 1** The results of descriptive statistical analysis of the children's gender and age (N= 134)

School	Total (%) N = 134	Gender		Age	
		Number (%)		$\bar{X}$	SD
		Boy	Girl		
Total sample	134 (100)	73 (54.5)	61 (45.5)	65.59	6.057
School 1	37 (27.6)	20 (54.1)	17 (45.9)	65.51	3.927
School 2	20 (14.9)	12 (60)	8 (40)	73.20	4.200
School 3	32 (23.9)	16 (50)	16 (50)	65.90	5.799
School 4	45 (33.6)	25 (55.6)	20 (44.4)	62.06	5.280

## 2. Research variable

2.1 **Independent Variable:** The EF Guideline training program in semester 1

2.2 **Dependent Variable:** The teacher's knowledge, attitude, and skills, and children's EF development in semester 2.

## 3. Instrument

3.1 **The Assessment of Executive Function in Early Childhood (MU.EF – 101)** was a behavioral rating scale, developed by Chutabhakdikul et al., (2017) for teachers to evaluate their 2 – to 6 – year – old children's EF skills in classrooms. It consists of a single rating form with 32 items for rating the children's EF skills in 5 domains, including Inhibitory Control, Emotional Control, Working Memory and Plan/Organize. (7)

3.2 **EF Guideline Scoring rubric** was developed based on the elements and mechanism of the EF Guideline. The rubric score describes how well teachers use the EF Guideline for planning their lesson plan to promote children's EF skills. It consists of 3 parts. The first part focuses on the learning goals. There are 3 criteria for scoring; including clear articulation, measurable goals, and the consistency between the learning goals and expected behaviors. The second part focuses on teaching process. The criteria for scoring are clear procedures and the consistency to the learning goals. The last part focuses on the after-class reflection. The criteria for scoring are the learning process evaluation, the outcome evaluation, and the teachers' learning reflection for self-improvement. The content validity was screened by 3 experts in psychology and education fields. The Item Objective Congruence (IOC) Index was 0.97. (11,12).

3.3 **The EF Guideline Interview Question Form** was developed by the researcher to investigate the persistence of the teachers' knowledge, attitude, and skills to promote the children's EF skills based on EF Guideline in semester 2 after completing the EF Guideline training program in the semester 1. The type of interview was standardized open – ended interview; the same open – ended questions for asking interviewees. The interview question form was divided into 2 parts, consisting of six questions. The first part included 2 questions, regarding the persistence of using EF Guideline in semester 2. The second part included 4 questions, regarding the teachers' knowledge of EF skills and the attitude toward their competence of using EF Guideline to promote the children's EF skills.

#### 4. Data collection

##### 4.1 Primary Data Collection

1. After the research ethics was approved, the informed letters were sent to the faculty of Graduate Studies to get a letter of permission to collected data.
2. The letter of permission for data collection were sent to school directors of the sample school of this research.
3. The researcher contacted the school, and explained objectives, expected benefits, data collection process of this research, and make an appointment to collect the data.
4. The consent form was sent to the teachers and their children to ask for the permission.
5. Preparing the document; The Assessment of Executive Function in Early Childhood (MU.EF – 101), The EF Guideline Interview Evaluation Form and EF Guideline scoring rubric.
6. The teacher evaluated the children's EF skills, using MU.EF – 101.
7. The teachers were interviewed, using EF Guideline Interview Question Form.
8. 10 lesson plans per teacher in each school were collected.

##### 4.2 Secondary Data Collection

1. After the research ethics was approved, the informed letters were sent to the head of the research project to explain the objectives, expected benefits, and the data collection process of this research.

2. The permission form for using the children's scores on the EF skills in the semester 1 was signed by the head of the research project.
3. Data analyses were performed to test the hypothesis and report the findings.

**Table 1** The summary of data collection in the research

Data	Instrument	Method
Primary Data Collection	1. The Assessment of Executive Function in Early Childhood (MU.EF - 101)	Evaluating the children's EF skills. Evaluated by the teachers.
	2. The EF Guideline Interview Evaluation Form	Interviewing the teachers. Interviewed by the researcher.
	3. EF Guideline scoring rubric	Evaluating the teachers' skills in planning and implementing learning activities based on EF Guideline. Evaluated by the researcher and an expert.
Secondary Data Collection	1. The Assessment of Executive Function in Early Childhood (MU.EF – 101 ) in semester 1	In order to use the secondary data, the informed letter was sent to the head of the research project and the permission form was signed by the head of the research project

#### 5. Data analysis

1. Descriptive statistics was used for describing the general information such as percentage, mean score and standard deviation.
2. Inferential statistics using paired t – test was used for comparing the children's EF skills in semester 1 and 2.
3. A summative content analysis; a qualitative research technique for counting and comparing content followed by the delineation of interpretation, was utilized to clarify the persistence of the teachers' knowledge and attitude.



## Results

The results of the study are presented in 2 sections. The first section explains the general information of the sample. The second section reports the results of the research question 1 and 2. Research

### 1. The impact of the EF Guideline training program on the persistence of the teachers' changes in their teaching practices based on knowledge, attitude, skills

According to the theoretical framework of the previous research in the EF Guideline training program, the significant key factors required for a behavior to be changed were new knowledge, new skills, and new attitude. This follow-up research aimed to examine the factors affecting the usage of EF Guideline for planning and implementing lesson plans. In other words, this research attempted to study if the teachers' practices became transformed. Thus, the persistence of the teachers' knowledge of EF skills, attitude toward their competence of using EF Guideline to promote the children's EF skills, and the skills of planning and implementing the lessons plans based on EF Guideline were inextricably studied. The results are reported in 3 themes as follows:

#### 1.1 The persistence of the teachers' knowledge of EF Skills: Not all, but more

The findings indicated that not all knowledge of the EF domains was persistent, but the teachers gained more and deeper understanding in some domains. Even though the teachers did not define all domains of the EF skills, it was obvious that the teachers had deeper understanding in the EF domains they mentioned than they did before. The teachers could define the terms of some EF domains and explained the

activities they created to promote such the EF skills. It was important to note that, in addition to give the examples of activities for promoting EF skills, the teachers could explain their children's behaviors related to the domains of EF skills. It could be concluded that after completing EF Guideline training program, the teachers' knowledge of EF skills was persistent. Yet, it also could be added that the teachers' knowledge of some EF skill domains became completely transformed.

#### 1.2 The persistence of the EF Guideline usage for planning and implementing the lesson plans to promote the children's EF skills: Part and whole

This theme describes why and how the teachers persistently used the EF Guideline for planning their lesson plans to promote the children's skills. The results in the "why" questions showed if the teachers persistently used the EF Guideline for planning and implementing the lesson plans and the reasons why the teachers still used the EF Guideline. The results in "how" questions showed the ways the teachers used the EF Guideline for their teaching practices. The results of both "how" and "why" questions revealed the main factors influencing on the persistence of the EF Guideline usage (i.e., the changes in the attitudes toward the significant role of preschool teachers, positive feedback, and effectiveness of the EF Guideline).

Interestingly, for "why" questions, the overall results showed that after completing the EF Guideline training program in the semester 1, all teachers consistently used the EF Guideline for planning and implementing lesson plans in the semester 2 because

they found the positive responses from their children's EF skills and the effectiveness of the EF Guideline mechanism. The teachers reported that when the children had positive responses to the activities and learning experiences based on the EF Guideline, the teachers were encouraged to create quality lesson plans. The teachers also reported that when the children engaged in the activities, their EF skills were improved. Moreover, the EF Guideline mechanism helped the teachers create welcoming and interesting classroom environments. The EF Guideline helped the teachers set clearer learning goals and make sure that the processes of the activity provided children opportunities to reach the expected goals. Moreover, the finding also revealed that when the teachers in one school positively interacted with the children by using the 101s positive discipline techniques to set an enrich environment, the children had better behaviors than they did in the past semester.

Next, for the "how" question, the results could be reported in 4 dimensions, including the frequency of the use in planning learning experiences, the duration of the use in planning, the benefits of the EF Guideline component for planning, and the benefits of the purposes for planning. First, for the frequency of the use in planning learning experiences, the results showed that after participating in the EF Guideline training program, all teachers used the EF Guideline to facilitate their thoughts for planning learning experiences and activities 5 days a week. The differences in the frequency of the usage were related to the competence and context of the teachers (e.g. time and the principals). Second, for

the duration of the use in planning learning experiences, the results showed that the teachers would like to continue using the EF Guideline for planning learning experiences and activities to develop the children's EF skills. Third, for the benefits of the EF Guideline's component for planning, there were some differences in how to use the EF Guideline's components for planning learning experiences and activities. While most teachers took advantages from only some parts of the EF Guideline components, some teachers took the whole part of the EF Guideline for planning and implementing their lesson plans to promote the children's EF skills. Some teachers used the EF Guideline to reflect their teaching performance and to guide them to improve their practices. The results yielded the theme "Part and whole", indicating that the changes in the teachers' teaching practices in term of the usage of the EF Guideline, but it was not necessarily that the usage of the whole part were persistently used. This dimension viewed that the EF Guideline components would be the supporting factor of the persistent changes in teaching practices. Fourth, for the benefits of the purpose for planning, the teachers might solely use the EF Guideline to evaluate their lesson plans to make sure the quality and effectiveness of their lesson plans to promote EF skills or used the whole purposes of EF Guideline to both create and evaluate their lesson plans. Overall, the results showed that the persistent changes in the teaching practices were the use of the EF Guideline and the attitude towards their competencies of using EF Guideline to promote the children skills.

### 1.3 The persistence of the teacher'

#### skills: Do more, get more

This theme describes the teachers' performance in planning their lesson plans based on the EF Guideline to promote the children's EF skills. In order to analyze the quality of the lesson plan measured by the EF Guideline scoring rubrics in the semester 2, 10 lesson plans based on the EF Guideline per teacher were evaluated. Overall, the results showed that while all the teachers' lesson plans in the semester 1 were scored in the excellent level which was 3.6 - 4, their scores on the lesson plans in the semester 2 were totally lower, comparing to the semester 1. Moreover, even though all teachers

consistently used the EF Guideline for planning and implementing lesson plans in the semester 2, the teachers' skills in designing activities and environment to promote the children's EF skills were different. For the first school, the results showed that the total mean scores on the teachers' lesson plans in the kindergarten 2 and 3 classrooms were 3.38 and 3.6; respectively, which was excellent (See Table 3.). The highest mean scores were on the EF Guideline's evaluation part (3.57 and 4.00; respectively). In the other schools had the lower mean scores which were strongly needed to be improved.

**Table 3** The mean scores of the EF Guideline component in each school

School	Level (10 Lesson plans)	Mean	Mean	Mean	Total
		Part 1: Objective	Part 2: Activity	Part 3: Evaluation	
School 1	Kindergarten 2	3.12	3.54	3.57	3.38
	Kindergarten 3	3.46	3.70	4.00	3.68
School 2	Kindergarten 2	3.24	2.64	0	0.25
School 3	Kindergarten 2	1.48	0.78	0.97	0.12
	Kindergarten 3	1.32	0.86	0.63	0.09
School 4	Kindergarten 2	1.22	0.54	2.07	0.10
	Kindergarten 3	1.14	0.52	1.23	0.12

The findings from the summative content analysis yielded the theme "Do more, get more", indicating that the consistency of planning and implementing were confirmed the performance of knowledge, attitude, and skills. Their scores on the skills for planning and implementing the lesson plans based on EF Guideline in the semester 2 were lower than they did in the semester 1. Only teachers in the school 1 could use full form of the EF Guideline to clarify their lesson plans and performed well in EF knowledge, attitude, and practical skills for planning and implementing the lesson plans.

## 1.2.1 The consistency of the teachers' knowledge, attitude, skills and the children's EF

## Development

To answer the research question after completing the EF Guideline training program in the semester 1, were the scores on EF skills of the children in the EF Guideline classrooms in semester 2 significantly higher than the scores on semester 1, as measured by MU.EF-101? Dependent paired t – test was utilized. Before performing, the assumption of the dependent paired t - test was tested. The result of the tested assumption showed the interval scale and normal curve; therefore, the dependent paired t - test was performed. According to **Table 4**, there were statistically significant differences, at the .05 significance level, in semester 1 to semester 2 scores for inhibitory control, shift/cognitive flexibility, emotional control, working memory and planning and organizing. The results showed that the scores on inhibitory control, shift/cognitive flexibility, emotional control, working memory and planning and organizing decreased in semester 2 ( $t = - 5.59, - 5.74, - 7.42, - 4.65$  and  $- 5.29, p < 0.05$ , respectively).

**Table 4** Paired t - test between the mean scores on Inhibitory Control, Shift/Cognitive Flexibility, Emotional Control, Working Memory and Planning and organizing in semester 1 and semester 2

EF Components	Semester 1	Semester 2	t	p-value
	(n = 134)	(n = 134)		
	$\bar{X} \pm SD$	$\bar{X} \pm SD$		
Inhibitory Control	63.01 ± 6.98	57.95 ± 8.74	-5.59*	.000
Shift/Cognitive Flexibility	61.51 ± 6.51	55.79 ± 9.17	-5.74*	.000
Emotional Control	61.41 ± 7.46	54.42 ± 10.40	-7.42*	.000
Working Memory	62.06 ± 8.24	57.86 ± 8.06	-4.65*	.000
Planning & Organizing	61.79 ± 6.38	57.05 ± 7.95	-5.29*	.000
Total	63.40 ± 8.54	58.02 ± 9.54	-5.22*	.000

To investigate the significant changes in the pretest to posttest scores on the EF skills in the semester 2 compared with semester 1 in each schools, the result is as follows: According to the **Table 5**, there were statistically significant differences, at the .05 significance level, in semester 1 to semester 2 scores for inhibitory control, emotional control, working memory and planning and organizing. The results showed that the scores on inhibitory control, emotional control, working memory and planning and organizing increased in semester 2 ( $t=4.64, 2.69, 5.99$  and  $5.55, p < 0.05$ , respectively).

**Table 5** The comparison between Inhibitory Control, Shift/Cognitive Flexibility, Emotional Control, Working Memory and Planning and organizing of semester 1 and semester 2 in school 1

EF Components	Semester 1	Semester 2	t	p-value
	(N = 37)	(N = 37)		
	$\bar{X} \pm SD$	$\bar{X} \pm SD$		
Inhibitory Control	58.35 ± 5.39	62.10 ± 4.45	4.64*	.000
Shift/Cognitive Flexibility	57.91 ± 5.29	59.89 ± 4.80	1.70	.097
Emotional Control	58.16 ± 5.04	60.94 ± 4.86	2.69*	.011
Working Memory	56.78 ± 4.91	61.51 ± 4.03	5.99*	.000
Planning & Organizing	55.97 ± 4.57	61.08 ± 3.31	5.55*	.000
Total	56.97 ± 8.13	62.54 ± 3.23	4.05*	.000

In School 2, 3 and 4, there were statistically significant differences, at the .05 significance level, in semester 1 to semester 2 scores for Inhibitory Control, Shift/cognitive Flexibility, Emotional Control, Working Memory and Planning and organizing. The whole results showed that the scores on these components were decreased in semester 2. These results showed the evidence of the skills in planning and implementing of the teachers that influenced their children EF development. It was indicated that when the teachers persistently used the full form of the EF Guideline for planning their lesson plans and activities, the children's EF skills were persistently improved as shown in the school 1. For the children whose teachers used only some parts, not full form, of the EF Guideline, the scores on inhibitory control, shift/cognitive flexibility, emotional control, working memory and planning and organizing decreased.

Overall, the results of this study could be concluded as follows;

1. For the teacher's knowledge of EF skills, attitude toward their competence and the skills of planning and implementing learning experiences based on EF Guideline to promote their children's EF skills, the findings showed that the teachers persistently had EF knowledge, attitude and the skills of planning and implementing the lesson plan based on EF Guideline. However, the depth of knowledge, attitude and skills in the teachers was different. The majority of the teachers could explain the meaning of EF at least 3 components and used only some parts of the EF Guideline whereas only 2 teachers used the full form of the EF Guideline. Thus, the teachers' skills of planning and implementing EF Guideline to promote children's EF skills in each school were totally different. Yet, the teachers' attitude toward their competence to promote their children EF skills were still positively persistent. All teachers realized that the EF Guideline was a significant tool for helping them to create the clearly objective and meaningful lesson in the classroom.

2. For the children's EF skills, the findings showed that the children in the classrooms where their teachers had higher scores on the skills of planning and implementing EF Guideline to promote children's EF skills significantly had higher scores on the development of EF skills in semester 2, comparing to the scores in the semester 1.

## Discussion

The impact of the EF Guideline training program on the persistence of the teachers' knowledge of EF skills, attitude toward their competence to promote their children's EF skills and the skills of planning and implementing learning experiences based on EF Guideline.

According to EF Guideline training program conducted by Thanasetakorn et. al. (2017), to develop the teachers' practices to promote the children EF's skills, the researchers developed the training program based on the KAP model. By containing 3 parts of training. First, the training part, the main purposed of this part was to boost the understanding of EF knowledge and EF Guideline. Second, coaching part, the main purpose of this part was twofold: to enhance the teachers' skills in planning and implementing learning lessons, and to increase their attitude toward their efficacy to use the EF Guideline for planning lessons and activities to promote the children's EF skills. The PAOR coaching approach was utilized. (Plan, Act, Observe, Reflect). Finally, the follow - up part, the teachers planed 7 more learning experiences and sent to the professional to prove the quality before implementing. The teachers who completely participated in the training program must be passed all 3 parts. Whereas, the KAP model was conducted by Schwartz (1975) Knowledge – Attitude – Practice theory (KAP) presents the concepts of the relationships among knowledge, perception or how they interpret the situation and their behaviors. (13)

The model of KAP relationships for behavioral change describes that knowledge (K) affects attitudes (A), and the attitudes are expressed through behaviors or practices. Then, the practices

reversely affect attitudes, and the attitudes affects the knowledge. The studies based on a Knowledge – Attitude – Practice (KAP) model are a common method for understanding and analyzing human responses to particular phenomena. (14)

Furthermore, the findings of the current research were consistent with the previous research conducted by Joyce and Showers (2002). The researchers proposed that there were 4 stages of learning process. For the first stage, knowledge was developed when an individual understood a theory and created series of information related to the individual's experiences. Second stage was when the individual transformed the acquired knowledge to performance. The third stage was about keeping practicing the skills and coaching others. Finally, the last process of learning was when the individual gained positive attitude toward the acquired knowledge, theories, and the practices. (15) Therefore, teachers would have effective learning when their acquired knowledge was persisted, and specific teaching methods were chosen on purpose. Gradually, the teachers constructed their own specific attitude and skills based on the understanding of their own persistent knowledge and understanding theories. In other research conducted by Guskey. (2000) suggested that to make a professional development effective, teacher development should have done by including courses and workshops in the mix of teacher learning experience because it would recognize the power of the informal types of learning such as the planning of the lesson, the relation of the topic and the study of the circumstance materials. (16) In addition, Moon (2013) studied the relationships between the reflection in learning and professional

development. The researcher suggested that reflection was needed to gain more understanding the past experiences and make effective decision. (17)

Interestingly, the EF Guideline is based on research-based best practices of relevant literature from the research literature and their factors that

influence EF skills. EF Guideline consists of 3 parts. Each part contained key elements guided teachers to carefully plan their learning experiences step by step based on EF principles to promote the children's EF skills as a mechanism to drive the learning experience.

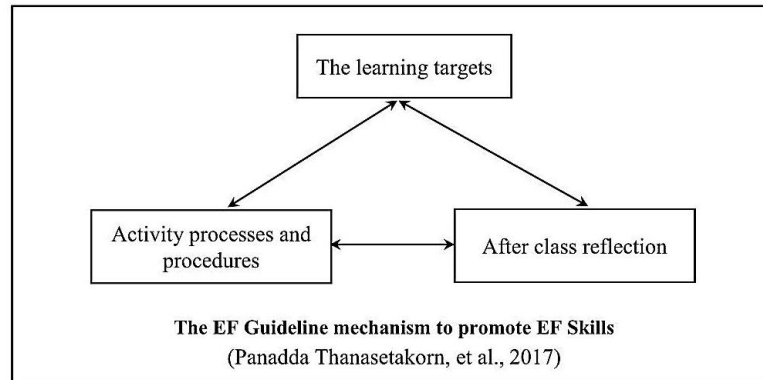


Figure 1 Relationship between the elements of EF Guideline experience plan

Nevertheless, most teachers had knowledges and positive attitudes toward the importance of the EF Guideline to increase the children's EF development. The teachers agreed that the EF Guideline helped them to design clearer lesson plans and create more effective learning experience activities. In this research, the actual lesson plans have been checked by the EF Guideline scoring rubric to evaluate the correctly data in each element and to assess the consistency in the EF Guideline mechanism. The results showed that there was only one school where the average score was very good. Correspondingly, the children's scores on the EF development increased from semester 1. The 2th, 3th and the 4th schools had the average score in 'need to improve' level. This result showed that the teachers' skills for planning leaning experiences based on the EF Guideline needed to be improved. In School 1, all teachers

realized that EF Guideline was the key to go through deeper in the activity and also was the specific the ways to promote the holistic development including EF skills. This finding was important to note that the teachers who used the full form of the EF Guideline for planning their learning experiences to promote the children's EF skills everyday showed their understanding of all the EF components in depth details. It could be possibly concluded that the more the teachers practiced, the deeper knowledge they acquired and the more positive attitude toward their own abilities to help their children develop the EF skills. The findings were consistent with Thorndike's law of exercise in 1905, mentioned that the repetition behaviors had an impact on one's performance. (18) Significantly, one teacher in the school 1 realized that she had been improved her competence to promote the children's EF skills. Because the EF Guideline provided the systematic of thinking

processes, the teacher was guided to think outside the box. She could create new activities, discovered new ways for teaching, did not stick with the old learning activities and old teaching patterns. When the situations changed, they would use their shift/cognitive flexibility skill. Beside the others mentioned that the EF Guideline helped them to create learning experience more clearly. Moreover, the findings from this research found that the teachers in the 1<sup>st</sup> school, who had the highest scores on planning and implementing skills and whose children had the highest scores on the EF skills, changed their own format of lesson plan to be the same format as the EF Guideline. The elements and mechanism of the EF Guideline help the teachers to think thought the processes.

**The impact of the teacher's knowledge, attitude toward their competence and skills of planning and implementing on the children's EF skills**

In the school where the teachers did not use the full form of the EF Guideline to plan their learning experiences, the understating and their attitude were different from others and their children's scores on the EF development were decrease from semester 1. In all the results it could be possibly concluded that the teachers in the school 1 had deeper EF knowledge and stronger attitude toward their competence in planning learning experiences based on the EF Guideline to promote the children's EF skills. According to Yordsalee., C and Boonsong., K. (2016) student factors and teacher factors (Behavior and their attitude of teaching ) affected the academic achievement. Specially, teaching behaviors had an

influence on the students' learning process and academic achievement. (19)

Thus, the EF Guideline is an important tool to help teachers plan their learning experiences to promote EF skills in early childhood classrooms. EF Guideline could be used as an analyzing tool for refining existing lesson plans or clarifying the original plan to be clear and organized. The EF Guideline could also be used as a guiding tool for creating new lesson plans for promoting children's EF skills. In order to promote children's EF skills, teacher is the key person. The teachers' knowledge, attitude and skills for teaching practice are related to behavioral change. In this research, when the teachers improve their knowledge, attitude toward their ability, and teaching skills, the children's EF skills were also improved. Thus, EF Guideline training program was developed to increase the teacher's competence, then, it impacts the children's EF skills.

**The limitation of the and suggestion**

1. The EF Guideline program should be continuously use in the semester 2; especially, the training processes including coaching, following-up process and PAOR until the knowledge, attitude and practice (KAP) have been changed.

2. To enhance teachers' skills to the fullest potential and build the thinking process systematically. The teachers should use full form of the EF Guideline for planning and implementing learning experiences.

3. The support from the school principal is the key success to motivate teachers to persistently use the EF Guideline for planning learning experiences for promoting their children's EF skills.



4. The EF Guideline could be used as the analyzing tool or/guiding tool for implementing the schools' curriculum.

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