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Influence of Teachers' Metacognitive Skills on Development of Early-Childhood Students

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Abstract: The objectives were to study and develop metacognitive skills of 1,616 early childhood in-service teachers in Child Development Center, Thailand. The quasi-experimental design were implied. Research Tools were Metacognitive Self-Assessment Questionnaire and scoring rubrics for early childhood students' assessment. Data were analyzed through fundamental statistics and inferential statistics. The research results were as follows: The teachers who joined with the program had got higher metacognitive skills score for both knowledge of cognition and knowledge of regulation than the other one. The teachers who had different supportive factors, different attitude towards pedagogy and different self-efficacy, would have got statistically significant difference in metacognitive skills in each dimension at the 0.01 level. Metacognitive skill score after participation in were higher than before in each dimension at the 0.01 level. Posttest score of early childhood students' metacognitive skills were statistically significant higher than pretest score in each dimension at the 0.01 level.

Introduction

Most teachers' learning process management nowadays focuses on learning by reciting. This makes Thai children are lack of thinking, practice, problem-solving skills. The way to enhance the students thinking skills, the teachers must have thinking skills first and then enhance the students to have got more thinking skills.

Thinking skill development in most teachers in general, it is just development in thinking skills only one level, for example creative thinking, inductive-deductive thinking, analytic thinking, or study the components of thinking what it consists of. These thinkings are general thinking and lack of investigation whether it is efficient and appropriate or not. Problem-solving from these thinkings is appropriate for the situation of the problem or not. Can it achieve or not? There are no obvious answers. These can be checked whether it can solve the problem or not. Thinking over thinking is called "Metacognition". Metacognitive skill development is a supervision and controlling individuals' thinking so that it can achieve his/her goal efficiently. Flavell (1970), Larkin (2010) studied that metacognition was comprehensive supervision and awareness of individual's intellectual process and can control this process; on the other hand, metacognitive process is developing of process for learners to be intellectual and proper decision making and help them be more comprehensive and learn better. Brown (1987) stated that Metacognition is thinking over think. Metacognition consists of metacognitive knowledge (Flavell 1987; Schneider & Lockl 2002; Pintrick 2002; Annerirta & Vauras 2001; Whitebread et al. 2009) metacognitive monitoring, controlling

(Brown, Nelson & Narens 1994; Son & Schwartz 2002; Pape & Wang 2003; Whitebread et al. 2009) and monitoring and controlling of emotion and motivational states) (Bockkerts 1999; Zimmerman 2000; Corno 2001; Efklids 2006; Whitebread et al. 2009). Khaemanee et al. (2006) studied the advanced metacognitive empowerment model for educational-curriculum undergraduate pedagogical students. The research objective was to present enhancing advanced metacognitive skills for undergraduate students to pedagogical curriculum instructors/lecturers in 2 higher education institutes in Department of Higher Education and Ministry of Education. The research results showed that there was 31 advanced thinking skills which can be categorized into 18 complicated thinking skills: a thinking-developing skill and 4 cognitive-process thinking skills; 21 basic cognitive skills which can be categorized into 3 communicative-cognitive skills and 18 core-cognitive skills.

Early Childhood Curriculum BC 2003 had set objectives and standards about the desirable characteristics of early childhood children age between 3-5 years old in the item no.10 "Children have got ability in cognitive and problem-solving according to their ages" and development in cognitive process in each age: 3-year-old children can easily create their tasks upon their own cognition, 4-year-old children can problem-solving by themselves after having received prompting, 5-year-old children can solve their problem by themselves. Early childhood teachers and to whom it may concern must consider in providing experience to enhance cognitive teaching according to each age by using learning material as mediator in activity providing for children by integrating, not emphasizing on contents, reciting, but emphasizing on essential and necessary skill practicing for children, for example psycho-motor skills, cognitive skills, language-usage skills, mathematics and science and so on. (Chuenchitarprirom 2007)

Therefore metacognitive skills are crucial skills and advanced –cognitive skills that teachers should develop both themselves and early childhood learners so that they can develop early-childhood learners' cognition to solve problem efficiently in the future and they are crucial skills for 21st century.

Research Objectives

1) To study metacognitive skills of early childhood in-service teachers in Child Development Center.
2) To develop metacognitive skills of early childhood in-service teachers in Child Development Center.

Research Hypothesis

1) Situational Variables: The difference of environmental factors (including of policy on educational support, administrators' support, relationship between teachers and administrators, relationship between teachers and colleagues) and metacognitive skills development make the difference of metacognition skills of early childhood in-service teachers.
2) Psychological Trait Variables: a) background factors: The difference of state of project participation, age, early childhood experience, attitudes toward pedagogy make difference of metacognition skills.
3) Psychological State Variables: Self-efficacy: The difference of self-efficacy make difference of metacognition skills of early childhood in-service teachers.

Concepts, Theories and Related Literature

Meanings of Metacognition and Metacognitive Learning

Flavell (1979) and Larkin (2010) stated that metacognition is monitoring one's own comprehension and awareness of his own cognitive processes and competence in controlling the process, but in the other hand, metacognitive learning process is the process for developing learners to be smarter and making them make decision properly, and also help them to be more comprehensive and enhance their learning. It also means thinking about thinking, consists of 2 components: one's knowledge and belief in his thinking process and also be one's sequence of thinking process. It can be divided metacognition-thinking process into 2 components:

1. Metacognitive Knowledge is individuals' knowledge which they store in their long-term memory that it makes them know what they know and how they achieve their goals. The factors which affect metacognitive knowledge are: a) personal factors: perceived self-metacognitive competence. b) task factors: perceived characteristics of task. c) strategy factors: perceived proper strategy.
2. Metacognitive experiences are the metacognitive experiences that can be controlled by individual and these essential experiences can control the 3 following components: a) planning is person's perception how to do the task by setting his goal, and perform to achieve his goal. b) monitoring is the revising the cognition about planning to check how possible it will be, the appropriateness of the sequence and the method that we choose to deal with. c) evaluating is thinking about planning to evaluate, the method for checking and the summative evaluating.

Whitebread et al. (2009) constructed metacognitive components in small children who were between 3-5 years old as the followings: 1) Metacognitive Knowledge is knowledge in one's own metacognitive processes which are related to factors, for example, person, task, and strategies which affect his own metacognitive processes. 2) Metacognitive Regulation is metacognitive processes which takes place continuously while one's carrying out, consists of planning, monitoring, controlling and evaluating. 3) Emotional and motivational regulation means continuously monitoring and controlling emotional situation and motivation while learning about task in activity process.

Ormrod (2006) and Whitebread et al. (2009) stated that metacognition is the ability of awareness of self-learning process by considering what is the most appropriate for himself for learning various matters; moreover, in strategic choosing and planning, monitoring, and self-learning evaluating. The dimensions for measuring metacognitive learning are: 1) Metacognitive knowledge: metacognitive process for checking what we know, or what we don't know; it can be divided into 3 categories: strategic knowledge, task knowledge and self-awareness. 2) Metacognition is planning process, one's own capability of knowledge-management planning which consists: (a) Evaluating to check the basic knowledge (b) Planning (c) Self-regulation (d) Result-evaluating

Brown (1978) stated that metacognition is person shows that his awareness and sequence of thinking processes to control situations, learning to plan, problem-solving, which looks like affective construct that exposes awareness of his own cognitive processes and knowing how to control their thinking. Baker & Brown (1984) divided metacognition up into 2 components as the followings: 1) *Awareness* is one's awareness of skills, strategy and essential source of information for working efficiently and knowing how to do it. Individuals know about the matter he thinks and the congruence of learning situation, the productivity of knowledge by describing to others, summarizing what he learnt, or the method he memorized, note taking and the ability of reflection on his own thinking while reading story or solving problems, which are the skills that persons must plan beforehand, and make them

know what task must be completed so that they can work it efficiently and also make the situation be carried out more efficiently. 2) *Self-regulation* is the ability to control metacognition while solving problems, considering to recheck whether they understand or not. It evaluates the working effort, planning the working process, it means the method of decision making, time consuming and using his potentiality and using other methods to solve problems.

Dickinson (1987) divided metacognition up into 4 dimensions: 1) Metacognitive Knowledge is knowing about what we have learnt and knowing about ourselves, for example "I know learning grammar is difficult for me." 2) Metacognitive Experiences are using thought consciously, for example, affection and understanding that we understand/don't understand something. 3) Goals or Task means setting objectives or assignments. 4) Action and Strategy means that person applies for achieving his goals, for example auditing the progress of task or we evaluate whether we can try to guess the meaning of the vocabulary and if we can't guess the meaning then we look up them in the dictionary.

Woolfolk (1990) summarized that metacognition consists of 2 components: 1) *Awareness* means individual is aware of himself what skills, strategies, and necessary sources he requires to accomplish his task efficiently and what he will do, this make him must know what he think and this should go according to the learning situation, then he expresses what he learnt and he can reflect on his own thought in the story he had read. All these skills make him work by planning and make him know what he must integrate so that he can work it out efficiently. 2) *Self-regulation* means one's ability to know how and when to do the task so that he can accomplish it perfectly, for example to control the metacognition while solving problems. The person must consider whether he understand it or not, he must think over about his effort for that task, planning and the working process, trying to use other strategies so that he can solve the problem.

Providing Experiences for Developing Metacognition

One of the important learning in educational system is teaching students to know the instructional method or we learn how to learn, how to learn whether we learn and we know what we learn, and how to learn continuously in the future. These questions are the questions about metacognition. Metacognition means thinking about one's own thinking which consists of 2 components: 1) *Reflection* that we know what we learn. 2) *Self-regulation* means how we learn. Metacognitive Knowledge is reflection on what we learn about metacognition. Flavell (1999) proposed body of knowledge about metacognition in 3 components as the followings: (a) Awareness of Knowledge is understanding what we know and what we don't know, and what we would like to know, for example we know that plants use sunlight for their photosynthesis but we don't know the reasons. (b) Awareness of thinking is the understanding task we know the method to accomplish that task, for example we know that reading newspaper is easier than reading academic textbooks (c) Awareness of strategy is the understanding the method to learn, for example reading this article is difficult so I should summarize and read gradually until it finishes.

These are the questions for enhancing students to develop their metacognition:1) What do we know? 2) What do we not know? 3) What should we know additionally?

Teacher can support students to reflect on what they know and what they don't know, and what they should know for additional matters. Teachers should enhance them to evaluate the situation for themselves, and the methods to construct their understanding, choosing/selecting learning sources, independent study, let them to asking questions about tasks or problems for learning. The questions that can be asked the students may vary upon

their level of competence. In case of early childhood, it may be used questions for self-study, for example while reading story, the teacher may motivate the students by asking them questions, for example who is the main character in this story? Any characters else? What is the question being solved; and could they tell the sequence of the events in the story?

Method for developing metacognitive skills is about asking and answering what is the most appropriate strategy for the students to use for problem-solving for themselves. The students will aware of their competence, strength and weakness of their learning. These sample of questions can help students to create their metacognition is the method that can make them learn most. Self-learning reflection on different situations, for example the students are aware of learning may state "I have read but I don't understand; however I will know if I can construct mind-mapping or any charts in my working process this will make me easily understand." This shows their awareness of metacognitive skills.

Metacognition Measures

Evolution in understanding in metacognition have been developing simultaneously with the evolution of metacognition to find out an appropriate method and describe the characteristics of metacognition. The methods of study, for example questionnaire, interview, thinking-aloud analysis, observation, computer-on-lined registration and off-lined registration. Each method has got its strength and weakness, for example questionnaire is practical for large groups while thinking-aloud assessment form was suitable for individual metacognition; however, it may be privacy invasion. Sometimes we accept to collect by using questionnaires to investigate metacognition. As a matter of fact, mean score from questionnaires may not reflect on the respondents' actual metacognition (Veenman et al. 2006)

Thinking process and metacognitive skills is very important for teachers to develop students. The way we discriminate thinking from metacognition is essential to learning efficiency. Metacognitive strategy will make the students plan, control and evaluate their learning.

Metacognition is how to manage their tasks. It is thinking about their thought and it is a process for us to consider what we learn and what we don't learn. Tasks for learners are how to manage their thinking by the following sequence (Dirkes 1985: 1) Linking information to background knowledge 2) Choosing strategies 3) Planning, mentoring, and evaluating in thinking process. Since metacognitive awareness is one component of metacognition, the way to measure metacognitive awareness is the same way to measure metacognition. Some educators constructed tools to measure metacognitive awareness.

Paris & Jacob (1984) had constructed measure of metacognition for reading known in The Index of Reading Awareness (IRA) consist of statements to measure metacognition for reading in 4 dimensions; for example, evaluating, planning, controlling, and knowledge in factor. IRA consists of 20 statements which each item had got three choices and scoring each item on a scale of 0, 1, 2 respectively that show metacognition in solving problems, for example we measure conditional knowledge.

Situation: If you are required to read about Science or Social Science, what do you do so that you can memorize all the information?

a) Answer yourselves about the important notions. (2)
b) Look up the unknown/incomprehension. (0)
c) Try to concentrate and try to memorize it. (1)

Schraw & Dennison (1994) studied about evaluating metacognitive awareness by self-report in 52 items, is called The Metacognitive Awareness Inventory (MAI), which measure

metacognitive awareness in 8 factors, for example 1) comprehension 2) Knowledge of process 3) conditional knowledge 4) planning 5) Information management strategies 6) revising 7) defective solution strategy, and 8) learning evaluation.

MAI was a bi-polar scale, on the right-sided words were false and the left-sided words were true; for example; 1) I ask myself whether I met/achieve my goal. 2) I answer the problems 3) I try to use strategy while I am working. 4) I draw picture or diagram so that it can help me to understand while I am learning. 5) I'll change strategy when I misunderstand.

Mokhtari & Richard (2002) constructed Metacognitive Awareness of Reading Strategy, which consisted of 2 parts; the first part was questionnaire about respondents' biodata and background which required short answer: asking about age, gender, ethnicity, self-report on reading ability and reading interest, ; the latter part was metacognitive awareness of reading strategy consisted of 60 items, 5-point rating scale, reading strategies consisted of 3 sub-strategies: 1) global/comprehensive reading strategy 2) problem-solving strategy and 3) support-reading strategy.

Gassner (2009) assessed metacognitive awareness by a structured qualitative interview with students' experience. All the students were asked by one question; there is no time limitation so that it could relieve stress. It took 15-40 minutes for an interview. While interviewing, it was recorded in the same time/simultaneously. After interviewing about metacognitive awareness, the students would be assessed by MAI again, which consisted of planning, revising, error correction, and evaluating.

Metacognitive awareness can be assessed in various methods, for example interview, thinking aloud, oral report, essay report, choosing choices, rating scale, questionnaire, self-report. In this research, used 5-point rating scale, questionnaire, self-report, early childhood interview.

Definitions of Terms

Metacognitive Skills are defined as competencies of metacognitive knowledge and metacognitive regulation as: 1) *Metacognitive Knowledge* is competence of indicating one's own metacognition, for example, competence, tasks, and strategies for dealing with tasks. Data needed for the study were collected by using teachers' Metacognition Assessment Scale, Early Childhood Learners' Metacognition Assessment Scale, Both scales were five-point Likert Scales and Early Childhood Learners' Metacognition Interview. 2) *Metacognitive Regulation* is defined as sequential process that one uses to control cognitive activities and to ensure that a cognitive goal has been met, contains of planning, monitoring and evaluating. Data needed for the study were collected by using teachers' Metacognition Assessment Scale, Early Childhood Learners' Metacognition Assessment Scale, Both scales were five-point Likert Scales and Early Childhood Learners' Metacognition Interview. 3) *Emotional and Motivation Control* is defined as emotional control while one's working or doing activities according to new situation continuously. Data needed for the study were collected by using teachers' Metacognition Assessment Scale, Early Childhood Learners' Metacognition Assessment Scale, both scales were five-point Likert Scales, Teachers and Early Childhood Learners' Metacognition Interview. (Flavell 1987; Schneider & Lockl 2002; Pintrick 2002; Annerirta & Vauras 2001; Whitebread et al. 2009)

Metacognitive Development Project (MDP) is defined as learning activities and a set of instruction manual and plans for providing experiences to develop metacognition for early childhood learners in Child Development Center, consists of 30 plans that takes 5 weeks' teaching experiences. The significance of teaching-experience plans focus on developing cognitive process, for example: 1) metacognitive knowledge which contains 3 sub-

components: a) self-analysis, b) task in each activity and c) strategy used. 2) regulation contains 3 sub-components: a) planning, b) monitoring and c) evaluating.

Research Procedure

This research was researching and developing (R&D) metacognitive skills of early childhood in-service teacher in Child Development Center in Thailand. The population were 1,616 early childhood in-service teachers who were divided into 2 groups for studying. First, The 310 sample size was randomized by the systematic random sampling for studying needs and state of metacognition skills of early childhood in-service teachers in Child Development Center. Second, 60 early childhood in-service teachers were randomized selection for conducting quasi-experimental research for developing metacognitive skills, and to be randomly divided into 2 groups by randomized assignment 1) The first group were 30 early childhood teachers who received the module of instructional sets for developing metacognitive skills for 4 months. 2) The comparative group were 30 early childhood in-service teachers who didn't receive the module of instructional sets. Data were analyzed by fundamental statistics such as frequency, mean, standard deviation and inferential statistics such as T-Test, Multi-analysis of variance (MANOVA)

Conclusion

Early childhood in-service teachers who participated in project would have got more metacognition skills than the teacher did not in all dimensions of metacognition. Early childhood teaching experience had not got statistically significant difference in metacognitive skills. Teachers who had different early childhood teaching experience would have got statistically significant difference in metacognition skills, especially for their own knowledge, knowledge of thinking process. The teachers who had different attitude towards pedagogical profession and self-efficacy would have got statistically significant difference in all dimensions of metacognitive skills significant different at the 0.01 level.

The early childhood teacher who received different support factors would have got statistically significant difference in metacognitive skills in each dimension at the 0.01 level. The post-MDP score of early childhood teacher and early childhood student's metacognitive skills were statistically higher than pre-MDP score.

When comparing metacognitive skills in 6 dimensions, for example, knowledge about themselves, knowledge about process, planning, monitoring, evaluation, emotional control in early childhood in-service teachers who had got different in early childhood teaching experience, background knowledge, organizational support, teaching experiences in early childhood, attitude towards pedagogical profession, self-efficacy, they had also got different metacognitive skills in 6 dimensions. The research findings were: early childhood in service teachers who had got a wide range of service years, would have metacognitive skills in knowledge about themselves and knowledge of thinking process differently. Early childhood in-service teachers who had statistically significant difference in background knowledge would have got metacognitive skills in knowledge of themselves, knowledge of process, and planning at the 0.01 level.

Early childhood in-service teachers who received different organizational support, would have got statistically significant difference in metacognitive skills in knowledge of themselves, knowledge of process, planning, monitoring, and emotional controlling at the 0.01. Early childhood in-service teachers who had different teaching experience, would have

got no difference in metacognitive skills. Early childhood in-service teachers who had different attitude towards learning, would have got different metacognitive skills in each sub-scales/dimensions. Early childhood teachers who had different self-efficacy, would have got statistically significant difference in metacognitive skills in each dimension at the 0.01 level.

When comparing early childhood in-service teachers' score of metacognitive skills between pre- and post-MDP score, found that post-MDP score was statistically significant higher than pre-MDP score in each dimension at level .01.

When comparing early childhood in-service teachers' score of metacognitive skill between pre- MDP score and post-MDP score, found that post-MDP score was statistically significant higher than pre- MDP score when compared in each dimension at the 0.01 level. When comparing early childhood in-service students' score between pre-MDP score and post-MDP score, found that there was a statistically significant difference in metacognitive skills between pre- MDP score and post- MDP score. Post- MDP score was higher than pre-training score when compared in each dimension: knowledge of themselves, monitoring, evaluating, emotional controlling, holistic thinking skills, and score of task assignment.

Discussion

1. Research findings of this study was obvious that factors, such as education, superior support, pedagogical attitude and self-efficacy affected on metacognitive skill of early childhood teacher. The early childhood in-service teachers' metacognitive skill who participated in MDP would have got more metacognitive skill than the other one. And after the MDP conducting, the early childhood students in Child Center Development would have more metacognitive skill than before. It was congruent with the environmental context of child development center. In this study, found that the factors affected to the metacognition of early childhood in-service teachers related to all-level factors, for example superior support, organizational support, relationship with executives, relationship with colleges. It's compatible with Isma-el (2013) who studied about administrative factors that related to teaching behavior of childhood teachers in private kindergarten school found that administrative factor had statistically significance in intermediate level of positive relationship with early childhood teachers at the 0.01 level. Meenacharus (2008) stated that administrative supervision was a morale and cheering up for the teachers. It's consistent with Steers & Porter (1978) who found that dictate-styled administration affected to the staff/personnel to their job satisfaction so that they accomplished. Organizational atmosphere that emphasized on people-oriented, for example open-communication, supporting each other, and decentralization/empowerment for them to make decision affected staff's performance, reduced turn-over rate, reduced productive cost, and reduced training time. Sweeney (1986) found that administrator's leadership factors: internal supervision and organizational atmosphere vitally drove teaching/pedagogical management to the teachers' accomplishment; administrator could be the teachers' leaders by helping/supporting and mentoring teachers, facilitated consulting, and empathized to develop teachers, made them be comprehensive, modified their behaviors in pedagogical process, and provided instructional material support.

2. When considering psychological traits, for example background and situational psychological state of early childhood teachers affected to various metacognitions. This means the early childhood teachers who had a position of seniority, background knowledge, attitude towards pedagogical profession, and different self-efficacy would have got different metacognition, too. This was correspondent to the study of Ghonsooly et al. (2014) who studied factors by using path-analysis to predict self-efficacy and metacognitive skill which

affected to teachers' academic competence and there was no statistically significant difference in metacognition between male teachers and female teachers. According to Arsal (2009) who studied diary recording about reflection on learning strategy by using teachers' self-regulative strategy and found that there was statistically significant difference in intrinsic motivation, perceived value of task, metacognitive skills, time management between experiment group and control group. Kilgahon et al. (2008) studied the early childhood teachers' retention. He studied the factors affected to early childhood teachers' retention found that attitude towards professions, beliefs, self-awareness, good health and well-being would have effect on early childhood teachers. It's also concordant with Muangphan (2012) who studied process of self-development and metacognition, development of learning style by using metacognitive activities in English reading for vocational students found that self-learning style by metacognitive activity which the researcher had developed could enhance statistically significant difference in English reading proficiency between posttest score and pretest score at the 0.01 level.

3. When comparing early childhood teachers' pretest and posttest score of metacognitive skill found that there was statistically significant difference. Posttest score of metacognitive skill was higher than pretest score at the 0.01 level. According to Henter & Indreica (2014) studied effect of training of metacognitive skills for elementary and early childhood teachers found that there was higher metacognitive awareness and teaching knowledge in metacognitive skills scores.

Recommendations

1. We should train in metacognitive skills, for early childhood in-service teachers and provide MDP for both knowledge and instructional method and for students to enhance their metacognitive skills while administrators should aware of supporting facilities and incentive rewards, promotion; these would positively affect to their professional attitude, and self-efficacy.

2. Local Government should facilitate essential welfare and support resources for early childhood in service teachers in Child Development Center. The research results showed that these affected to early childhood in service teachers' pedagogical proficiency, and also formatted attitudes to their professional and self-efficacy. This could raise the teaching quality and early childhood students' quality of learning.

3. Using module for teaching metacognitive skills for early childhood in service teachers from manual will provide self-experience serving. It was like self-studying from sets of manual of self-experience serving. When comparing pretest and posttest results, posttest score of metacognitive skills was higher than pretest score. This meant early childhood in-service teachers could develop their metacognitive skills themselves by practicing, trying various sets of instructional materials and they could evaluate results after usage.

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