# Influence Cognitive Strategies, Metacognitive Strategies And Experience Success In Mathematics Achievement Through Self-Efficacy In V Grade Elementary School In East Jakarta

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# **ABSTRACT**

Math learning achievement is one of the subjects that students often complain, because of various difficulties. The V-class students already have completed math problems in story form, which involves a basic but complex mathematical operations in the semantics. Cognitive skills are the skills to process information displayed by the existing knowledge. The aim of purpose this study was to test the theoretical model influence of cognitive and metacognitive strategies and the influence of mathematics to experience success in mathematics achievement through self-efficacy fit with the data. Metodology of this research we use Structural Equation Modeling (SEM) with measurement model and structural model. Population was students in V grade Elementary School East Jakarta with 248 samples students. The results of the hypothetical model and the structural relations hypotheses are fit and significant, meaning the model is received.

**Key Words**: Kognitif, Metakognitif, experience success of mathematics, self-efficacy.

**JEL Code**: A21, I21, I25

#### I. INTRODUCTION

Mathematics is one of some subjects or lessons in the school that be taught from elementary school University. Since the era of childhood to old age, individual certainty related to mathemathic. For example total of money that must be paid when someone is shopping, divide the cake to somebody who come to the party, is some examples from the activity of mathematics. Mathematics is one of some knowledge and skill that be learnt in the school. The subject of mathematics that be given in elementary school have a function in order to develop the ability in communicating by using numeric and symbols and also the sharpness of logical that can assist in making clear and solving the problem in daily life (Kridel & Kridel, 2012).

There are so many enough the school age kids who do not like mathematics subject, meanwhile mathematics be used continually in daily life. The kid often claim the subject of mathematics as the difficult subject that there are so many kids become confuse and frustration in this subject be compared by other subject. This matter because the students do not mastering the concept of mathematics and also procedure in the beginning level (Ormrod, 2006). They do not have the clear basic concept in learning mathematic well. This matter will make more complex of abstract and procedure, so that the learning of mathematics is meaningless. There are two kinds that make the student do not like mathematics subject. First, The kid does not like because its subject is not interest. Second, The kid has the problem by themselves in learning and implementing the tasks of mathematics.

The learning be conceptualized as the process of constructive whereas the kids attempt in constructing the new knowledge of mathematic that be gotten by the knowledge that ever gotten by (Montague, 2010). A learning will more meaningful if the result of learning that be gotten in the school can be used in solving the mathematics subject which are variative enough. To study mathematics will more meaningful if the student can apply it in factual situation. One of some method in training it is by the giving the exercise of mathematics in form of story.

(Immanuel, Pillai, Vivekandan, Kurup, & Srinath, 2003) state whereas the purpose of mathematics problem solving is to train the student in applying the knowledge, skill and strategy in solving the problem that be presented in form of story. This mater is the same as the opinion of (Fuchs et al., 2003). But this function is not the same as with the factual condition because in the final level of elementary school there are so many student who can not observe the application from knowledge of mathematics in daily situation. Generally when the student is in elementary school in fifth grade, the material of mathematics that be gotten will more variative and more difficult. Base on the interview to some teacher of elementary school be known whereas in the fact in fifth grade often student who get value which is not so bad level be compared by the previous level mathematics grade. It is possible for this condition can be observed from their ability in solving the problem of mathematics in form of story, that involve the operational of fundamental mathematics but complex in the matter of semantics.

According to (Montague, 2010), Basically their researches use four formula steps namely read the exercise, to decide what calculation operational that must be done, to calculate and to check the answer again. Student who has the problem in solving mathematics exercise can because of namely the difficulty in reading the difficulty in logical thinking and also because of more focused in calculation not in understanding why such calculation is important be done (Ucus, 2015). According to Hiebert dan Carpenter (Montague, 2010) in solving the mathematics problem, meta cognition hold an important role. On the other hand meta cognition facilitate the alternative and allocation the technical and strategy for solving the task and when the kid is in elementary school, they have the strategy that be used in learning or solving the problem of mathematics. Strategy appear slowly and more and more increase in frequency and its effectivity level to the kid fells competent and make sure by one of some strategies in solving the problem correctly, to monitor the progression that related to the purpose of problem and to know or to realize when the solving of problem have been reached (Ormrod, 2006).

(Montague, 2010), state whereas in solving the problem of mathematics be needed cognitive and meta cofgnitive strategy. Cognitive and meta cognitive strategy model that be described by Montague consist of read, paraphrase, visualize, hypothesis, estimate, compute, check. Beside cognitive strategy Montague also describe meta cognitive strategy, namel; y to build the consciousness and regulation of cognitive strategy including in it self-instruction (to say by itself what must be done), self-questioning, self-monitoring (to do the checking out by self-regulation learning) namely it is self ability in regulating the understanding, to chose the strategy in processing the information and to implement the process of study constantly. ("Handbook of educational psychology," 2013) define self-regulation learning as the level of meta cognitive from individual in reaching the purpose of study.

(Deemer, Thoman, Chase, & Smith, 2014) and (Deemer et al., 2014) describe whereas self-efficacy influence self-regulation in some steps. First, self-efficacy influence in the purpose that will be reached. Second self-efficacy influence in the activity that be reached. Thirdly have self-efficacy like the belief whereas some one can success. Because of that self-efficacy hold an important role in study process Such both

strategies is high role in building student study process mainly in the subject of mathematics Student by the result of mathematics study which is high always do his/her task well and persistent in learning mathematics, factually they have self-efficacy which is high to study (Papari, Kazemeini, & Fattahi, 2013). Self-efficacy is very important moderator in reaching the achievement (Farrell, Fry, & Risse, 2016). Some one who have an ability in doing the attempt as the process in reaching what that become the purpose

There are so many researches point out whereas self-efficacy have correlation to the attempt, to do the tasks persistently (Friedlingstein et al., 2014). Someone Sby high self-efficacy believe can attempt in solving the difficulty and persistent in reaching the purpose skill.

The experience of successful of someone ios one of some source the establishment the assessment of self-efficacy. The successful will increase self-efficacy and the failure will decrease *self*-efficacy. The experience of successful be measured through the previous knowledge which is structured, the difficulty of task, the attempt that have been done, selective self monitoring and the result that have been reached (Said, Hassan, Musa, & Rahman, 2014).

The result of job of someone in solving the task is very influence source of information becase base on factual experience in mastering the task. A successful that be gotten increase will increase the belief of someone about their ability in finishing the task on the other hand which is often be faced will create the low of perception of someone about their ability in finishing the task.

The writer is doing this research in the elementary school in fifth grade by assumption whereas the student of elementary school in fifth grade begin felling difficulty in subject of mathematics, because the problem of mathematics have been in story form so that be needed the understanding of student and also entirely about concepts of of mathematics through the understanding of cognitive and meta cognitive.

According to (Montague, 2010), basically their researches use use four formula steps, namely to read the exercise, to decide the operational of calculation about what that must be done, to chalculate and to check the answer again. The student who has the problem in solving the mathematics exercise can because namely the

difficulty in reading, the difficulty in logical thinking, and also because mathematics education is more focusd on calculation not in understanding why calculation is important be done (Relman, Choffnes, & Mack, 2013). According to (Montague, 2010) in solving the mathematics problem, meta cognition have an important role. On the other hand meta cognition facilitate the alternative and allocate the technique and strategy for finishing the task and when the kid is in the elementary school in fifth grade, they have a strategy that be chosen in learning or solvinhg a problem. Strategy appear step by step and slowly and more and more increase about frequency and effectivity, until the kid fells competent and make sure by one of some strategy in solving the problem correctly, to monitor the progression that related to the purpose of problem, and to know and to realize when the solving of problem (Ormrod, 2006).

(Montague, 2010), state whereas solving the problem of mathematics be needed cognitive and meta cognitive strategy. Cognitive strategy model that be described by Montague consist of read, paraphrase, visualize, hypothesis, estimate, compute, check. Beside cognitive strategy Montague also describe meta cognitive strategy, namely to build the consciousness and regulation of cognitive strategy including in it self-instruction (self telling what must be done), *self*-questioning, self-monitoring. On the other hand Montague describe cognitive process that must be done and meta cognitive process as reflective strategy (to monitor what is being done and what have been done) which is by Montague usually be mentioned by Self-Regulation Strategy. In one of some researches of Montague, the student who has learning disability be taught cognitive and meta cognitive strategy to be able to solve the problem of mathematics in form of story.

Cognitive and meta cognitive strategy is a strategy in solving the problem mainly study problem through the steps of structured problem, plogical solving and solving base on study experience. The structured solving is to do the process of learning through the , reading exercise, to decide the operational and to calculate. The logical solving, tends to what is the problem, its solving strategy about how and what can be apply it in daily life. The solving base on study experience that be done, be trained repeatly so that be founded a problem solving such repeatlt study experience such three strategy steps related to self-regulation learning namely self ability to regulate the

understanding, to choose the information strategy process and to implement study process constantly (Mather & Seifert, 2011) define self-regulation learning as the level of meta cognition of individual in study process in reaching the target dalam mencapai tujuan belajar.

(Prebensen & Xie, 2017) describe whereas self-efficacy influence self-regulation in some step. Firstly, self-efficacy influence to the purpose that wil be reached. Secondly, self-efficacy influence to the activity that be reached. Thirdly, have self-efficacy is the certainty whereas some one can be success. So that self-efficacy hold an important role in study process. Both such strategies have a high role in student study process mainly in mathematics subject. Student by the result mathematys study which is high always doing the tasks well and persistently in learning mathematics, factually they have high self-efficacy to study (Deemer et al., 2014). Self-efficacy is very important moderator in reaching the achievement (Samir, 2011). Someone who has self-efficacy believe whereas he/she has an ability in doing the attempt as process in reaching what that become the purpose.

There are so many researches point out whereas self-efficacy have a correlation to the attempt in doing the tasks persistently (Immanuel et al., 2003) someone by high self-efficacy believe can attempt in solving the difficulties and persistent in reaching the purposed target.

The experience of successful of someone is one of some sources of its established the assessment of self-efficacy. The successful will increase self-efficacy and the failure will decrease self-efficacy. The experience of successful be measured through the previous structured knowledge, the difficulty of task, the attempt that have been done, selective self monitoring and reached result (Bandura, 1978).

Result of job of someone in finishing the task is very influence source of information because base on the experience which is factual in mastering the task. A successful that be gotten will increase the belief of someone about their ability in finishing the task meanwhile on the other hand the failure that often be faced will create about low perception of someone about his/her ability in finishing the task.

This research is arranged by the writer in Elementary school fifth grade by assumption whereas the student of these school begin fell difficulty in subject of

mathematics, because the exercise items of mathematics have been in story form so that be needed the under standing of student entire about concepts of mathematics through the understanding about cognitive and meta cognitive.

#### II. LITERATURE REVIEW

From discussion of cognitive and meta cognitive theory can be made thinking frame to Thinking Frame to Hypothesis

- 1. The achievement of mathematics study is an ability of individual in understanding the exercise in mathematics subject and highly depend on how individual can solve the exercises of mathematics that be given by teacher in the school in solving such mathematics exercise, making the occurance picture in story exercise, and temporary conclusion in solving steps of exercise, after that doing computation or calculation which is realization of the step that have been concluded temporarily. This process is cognitive strategy as be described by (Montague, 2010). From such description can be observed clearly whereas the achievement of mathematics study is influenced highly by cognition. Because of that can be applied the hypothesis whereas there is cognitive strategy direct influence to the achievement of mathematics study.
- 2. The knowledge of meta cognitive by the expert be described as the consciousness of individual to its cognition, more clearly Montague (2008), describe whereas cognitive process as the strategy that must be done and meta cognitive is to control what is being done and what have been done. In this matter whereas meta cognitive is high level cognition that be used to monitor and to regulate the process cognitive process such as the logical, understanding in solving the problem. A research that be described (Montague, 2010) be founded whereas the sudent who have a difficulty in mathematics subject in the fact they are less highly in regulating its meta cognitive process. Because of that it can be applied the hypothesis whereas there is direct influence of direct meta cognitive to the achievement mathematics study.

- 3. Self-efficacy is supporting factor in reaching the achievement of mathematics study. Student who have high self-efficacy can minimize the dificulty that be faced because such student make sure that can solve the task well. Indicator of self-efficacy generality, strength, and level, by generality mean individual has a belief about his/her ability in attempting in reaching what is the target that be connected, by strength high of certainty level about the ability in fulfilling the responsibility and level means level of difficulty if the burdened problem, of course can be applied the hypothesis there is direct influence and meaningfull to the mathematics study achievement.
- 4. Mathematics that is story exercise form is the sequence procedure (infrastructure). For example can not solve the mathematics exercise, if do not success in solving the mathmatics exercise which is more easier, the student can not calculate the distribution if do not mastering multyply method, and do not calculate multiply method, if do not mastering in plus method. Because of that the experience of success in ability of calculating influence self-efficacy of student. The experience of successful in mathe, matics subject also is the supporting construction of self-efficacy. Because of that can applied the hypothesis, there is direct influence of successful experience in mathematics subject to mathematics study achievement through self-efficacy.
- 5. Cognitively, the solving of mathematics exercise needs an ability in understanding the exercise, after that is making the picture (visualization) the occurrence in story exercise, and to hypothize the steps in solving, after that to do the calculation (computation). The solving of mathematics problem is a complex activity and involve some process step and also strategy of skill. Strategy be needed in solving the problem of exercise of mathematics. Meta cognitively the solving of mathematics exercise needs the student who have been feel ever doing the exercise after that to ask again the correctness of its calculation, or re-research its calculation and to choose the felling "free" or "satisfy" or "have ben finish" If the abilities of this procedure do not implemented such individu do not sure that he/she able to implement the ability of such cognitive and meta cognitive. The ability of procedure that be done repeatedly so that it has successful

experience through self-efficacy which is strong make the influence in his/her achievement of study. Because of that can be applied theoretic model hypothesis that consist of strategy of cognitive, meta cognitive and successful experience in m,athematics and self-efficacy as moderator be used to predict the variable of achievement of mathemagics study.

From such hypothesis can be applied theoritical model that can be tested about its suitability to empirical data.

#### III. METHODOLOGY

Population of research is the student of elementary school of fifth grade of in territory of East Jakarta involve The state school and private.

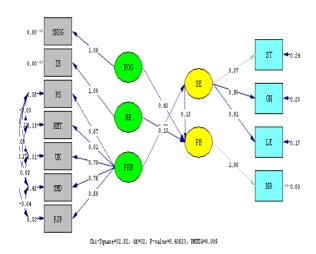
The government make the validation of the same opportunity namely namely the curriculum policy for teaching-study process and the minimal of finishing of achievement which is valid in private school and also state school. Such characteristic is valid for the step of testing the measure tool and also research data taken step. Total of population Jumlah of fifth of elementary school East Jakarta Timur b is about  $\pm 1595$  students. For the sampl of research be raken about more than 248 student use cluster random sampling, randomly sample sequence from the territory to sub district after that Kelurahan taken by randomly 248 students of fifth grade of elementary school in kelurahan Cipinang Muara, and taken about  $\pm 100$  students for the testing of research measure tool.

The testing of measure tool of cognitive and meta cognitive strategybe done repeatedly so that be gotten a measure tool contain of the exercises of mathematics, if that measure how about cognitive and meta cognitive from the student of elementary school fifth grade, after that be calculated the validity and reliability of such measure tool. After that The following be described research measure instrument entirely.

#### IV. RESULTI AND DISCUSSION

### **4.1. Result**

The description of hypothetic model test result that have been tested about its suitability (fit) will be presented in visualization in Hybrid model in Figure 1.



# Picture 1. Model Hybrid Model (Standardized Solution)

The resul of suitability testing to hypothetic model have fit index about: CFI = 1.00, RMSEA = 0.008, GFI = 0.98, NFI = 0.99, AGFI = 0.95. it means disertation hypothetic model can be received as suitable model (fit) by data in the field. This matter means whereas "meta cognitive, cognitive strategy influence to acievement of mathematics study and influence of successful experience in mathematics to the acievewmen of mathematics study through mediator of self-efficacy in fif grade of elementary schoo in terri tory of East Jakarta fits to empirical data". Hypothesis model can be received and suitable (fit) to data so that the main claim in this reseach namely theory model that is fit as suitable to the data in the field have ben success be implemented. Hypothetics mode test data analysis result is written down in table 5. As follows and its calculation can be observed in the attachment.

Table 1. Result of Hypothewtics ModelTest

	df	CFI	RMSEA	GFI	NFI	AGFI
Criteria of good fit		>0.9	< 0.08	>0.9	>0.9	>0.9
Hypothetics Model		1.00	0.008	0.98	0.99	0.95

After hypothetics model is suitable (goodness of fit) as be ilustrated above, so that structural relation hypothesis test inter variable can be done. The result of significant test (t value point out all of parameter coeffisient which is exist in hypothetics model have t value  $\geq 1.96$ . This matter means hypothesis that be tested have valid and significan parameter so that can be received. It means structural relation both direct and indirect of five variables of research can be continued about its testingas follows

# Hypothesis 1

Cognitive, meta cognitive, successful experience in mathematics and self-efficacy as fit moderator by empirical data, by sequence path coefficient nmely, r = 0.43; r = 0.15; r = 0.98; r = 0.15.

# Hypothesis 2

There is direct influence of self-efficacy variable to the achievement of mathematics study which is fit by empirical data. Base on data result that be gotten r = 0.15. By t = 2.54 > 1.96. It means there is positive and significant influence between self-efficacy by the achievement f mathematics study, so that hypothesis 2 can be received.

# Hypothesis 3

There is direct influence of cognitive variable to the achievement of mathematics study which is fit to empirical data. Base on data result be gotten r = 0.43, by t = 7.13 > 1.96, it means there is direct influence, so that hypothesis 3 be received.

# Hypothesis 4

There is direct influence of metacognitive variable to the achievement of mathematics study which is fit to empirical data. Base on data result be gotten r = 0.15, by t = 2.53 > 1.96, there is direct influence, so that hypothesis 4 be received.

# Hipotesis 5

There is direct influence of successful experience variable to the achievement of mathematics study through self-efficacy which is fit empirical data. Base ondata result be gotten r = 0.98, by t = 15.90 > 1.96, it means there is direct influence, so that hypothesis 5 is received.

#### 4.2. Discussion

The result of reseach about the research of cognitive and meta cognitive strategy to the achievement of mathematics study and the successful experience in mathematics to the achievement of mathematics study through self-efficacy is suitable (fit) by data, it means hypothetic model be received. Respodent of research are about 248 students is the student of fifth grade of elementary school in territory of east jakarta, there are six elementary school by total clas is about 8 classes that have been taken for the research data.

- 1. Cognitiv, meta cognitive strategy and self-efficacy predict variable of achievement of mathematics study fit to the empirical data, base on anakysis be gottem R<sup>2</sup> = 0.21. Because of that cognitive, meta cognitive strategy and self-efficacy contribute about 21% p to the achievement of mathematics study that be supported t= 11.09>1.96 means cognitive, meta cognitive strategy and self-efficacy have significant role to achievement of mathematics study. Cognitive and meta cognitive strategy and self-efficacy collective contribute to the study achievement is about 21%, meanwhile if be observed the contribution to cognitive itself to the achievement of study is high enough, it is also for meta cognitive to the achievement of study achievement, so that cognitive and meta cognitive strategy for the student of fifth grade of elementary school directly in the reaching of achievement not through self-efficacy.
- 2. Self-efficacy have direct influence to the achievement of mathematics study analysis be gottem  $R^2 = 0.15$ . Because of that self-efficacy give the contribution the achievement of study for student is about 15%, mean of self-efficacy average is about 3.61 by scale about 1-5, because of that student has self-efficacy average above the noirmal limitation, can be concluded whereas in the student of fifth grade of elementary school. Self-efficacy is the behavior of student which is defended permanently highly in supporting his/her study achievement.
- 3. Cognitive strategy have direct influence the achievement of mathematics study, base on analysis be gottem  $R^2 = 0.43$ , it means cognitive strategy give the

contribution to the achievement of study is about 43%, because of that can be concluded whereas almost a high part of the achievement of mathematics study of student of fifth grade of elementary school always use cognitive strategy namely to do study strategy through step in knowing concept, to memorize the concept and to apply in calculation form through story exercise form (Anderson & Krathwohl, 2001).

- 4. Meta cognitif have direct influence to the achievement od mathematics study base on the analyses be gotten R = 0.15, it means meta cognitive give the contribution to the study achievement is about 15%, because of that can be conclud whereas meta cognitive strategy do not be used compeletely by the student of fifth grade of elementary school, this matter because th age about 9-11 years old is the concrete operational development age formal operational (Piaget, 1980). Because of that the student still in transition era from concrete thinking to formal thinking.
- 5. The successful experience have direct influence to self-efficacy, base on analysis be gotten R =0.98, it means the successfu experience give the contribution to self-efficacy is about 98%, because of that can be concluded whereas the student has high self-efficacy because also has high successful experience. In theory of (Bandura,1982) come from self-efficacy is successful experience. Successful experience is supporting in order that some one can have high self-efficacy.

#### V. CONCLUSION

Base on the analysis result for data in testing of theoritical model influence the cognitive, meta cognitive strategy to the achievement of mathematics study and the influence of successful experience in the achievement of mathematics study mathematics through self-efficacy in fifth grade of elementary school in territory of east jakarta, also

also to test the relations of involved variable in the research so that can be concluded the result of dissertation research as follows.

- 1. Theoritical model influence cognitive, meta cognitive strategy to the achievement of mathematics study and influence the successful experience to the achievement of mathematics study through self-efficacy is suitable (fit) by data. Because of that theoritical model hypothesis can be received.
- 2. Base on the result of theoritical model is suitable (fit) to field data, it means theoritical model is received, so that structural relation intervariable can be concluded as follows:
  - a. Cognitive strategy influence directly, positive and significant to the achievement mathematics study. In this matter can be meant where as the more higher of value of cognitive strategy so that the achievement of mathematics study also more higher.
  - b. Meta cognitive strategy influence directly, positive and significant to the achievement mathematics study. In this matter can be meant where as the more higher of value of meta cognitive strategy so that the achievement of mathematics study also more higher.
  - c. The successful experience influence directlt, positive and significant to the achievement mathematics study through self-efficacy. Can be meant whereas the value of successful experience to the achievement of mathematic study through self-efficacy, so that the value of achievement of mathematics study also more higher.
  - d. Self-efficacy influence direct, positive and significant to the achievement mathematics study. Can be meant whereas more higher for the value of self-efficacy so that the achievement of mathematics also more higher.

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