

Instructional Model Cognitive Strategies Based to Enhance Higher Order Thinking of the Students with Cognitive Expressing Difficulties

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Abstract- This research aimed to find out instructional model cognitive strategies based led to increase the higher order thinking abilities of the students with cognitive expressing difficulties. The reason to do this research is because the emptiness of the research findings dealing with the instructional model cognitive strategies based to enhance higher order thinking of the students with cognitive expressing difficulties. Consequently, the rapid change at higher education teaching and learning approach will not be able to follow by the students with cognitive expressing difficulties. Furthermore, the condition will prevent the students to reach educational goals, as far as, they can achieve. Mix method research is conducted in the form of action research which involves quantitative research method aimed to get to know the increase of the students' higher order thinking and qualitative research method led to get information of the instructional process which applied to develop the students' higher order thinking. the research sample are 40 undergraduate students. qualitative research data analysis are analyzed in order to identified the existing of conceptual frameworks underlined the case studies' problems solving, critical thinking, productive thinking and creative thinking, as well as, cognitive strategies based instructional approach used during learning and teaching process. qualitative data analysis come out with cognitive strategies instructional model for increasing higher order thinking of the students with cognitive expressing difficulties. quantitative research data analysis revealed that the higher order thinking abilities of the students are increased in average 228.28 % after participating the cognitive strategies based instructional approach.

Keywords: cognitive strategies 1; instructional model 2; the higher order thinking 3; cognitive expressing disabilities 4; mix method research 5.

I. INTRODUCTION

Cognitive is the inner process which happened in human brain during thinking[1]. In lined with this Gagne [2] mentioned that cognitive is related to the abilities of the people to do information processing and organized the information in order to have meaning and to be used to solve problems or to understand any conditions around them. However, some of people cannot do the activities well, due to their difficulties in doing cognitive activities to process the information. It is called as cognitive expressing difficulties. Cognitive expressing difficulties is one of the forms of learning disabilities [3]Therefore, the individuals concerned are not able to perform cognitive tasks, particularly, higher order thinking tasks. Cognitive expressing disabilities haveto be solved as soon as possible, because the difficulties create other difficulties in academic areas and in day to day life activities, as well as, future life [4]. Furthermore, Taylor and Brush in Jamaris [5] stated that learning disabilities are the causes of failure to improve the quality of life of the individuals concerned. Until the present, researches on cognitive and instruction have been done by some researches. Among them are Geary [6]who reports about role of cognitive theory in the study of learning disability in mathematics. Other researchers interested in cognitive tutoring induces widespread neuroplasticity and remediates brain function in children with mathematical learning disabilities[7], as well as, Pressley and Hmas[8] study about cognitive strategies instruction from basic research to classroom instruction.

In lined with the researches which have been described previously, there are no any studies dealt with the instructional model cognitive strategies based led to enhance higher order thinking abilities of the students with cognitive expressing difficulties. Therefore, this research is a break through led to come out with novelty in field of cognitive based instruction for students with cognitive expressing difficulties at university.

Other reasons underlined the previous logical reasons are in the present, it is seen that with the facilities provided by technological developments and with the changes in the labor demand in the market, undergraduate education and postgraduate education given at universities are now in a rapid change [9]. Within the scope of this change, new concepts have occurred, and one of these concepts is learning spaces, which defines new learning environments [10].

Based on the previous reasons, the aims of this research are to find out the cognitive strategies based instruction model for empowering higher order thinking abilities of the students with cognitive expressing difficulties. In line with this, the research is also aimed to get scientific information of the effectiveness of the instructional model cognitive based strategies in improving the students higher order thinking abilities.

II. LITERATURE REVIEW

As a part of learning disabilities, cognitive expressing difficulties [11] present themselves in various forms of difficulties in memory retention and perception process which triggered cognitive process obstacles which manifested in the forms of inability in learning and in solving problems, as well as, difficulties in cognitive operation [12]. This difficulty is caused by minimal brain disfunction [13]. Difficulties in cognitive operating can be seen from the abilities in processing information, which involves receiving information, identified information, organizing information and taking action or solve problems in accordance to the result of organizing information. Therefore, the abilities in solving problem effectively are the result of the abilities in processing information well. Meanwhile, the abilities are triggered by the abilities in making connection between concept formations and concept associations which led to come out with meaning full information. These abilities influenced the process of higher order thinking which involved critical thinking, productive thinking and creative thinking [14]. In lined with this, concept formation are divided into two stages , as followed : rule egg process which include any concepts which are collected and arranged through inductive experiences process and egg-rule process which involves any concepts which are collected and arranged through deductive experience process[15]. Any difficulties in doing rule-egg and egg-rule process influence the abilities in processing information and trigger thinking difficulties.

Cognitive strategies deal with the process of arranging, monitoring and evaluating thinking process to accomplish goal in solving problems [16] which ranged from lower order thinking process up to higher order thinking process. Therefore, cognitive strategies are tools to think effectively, because they contained task thinking structures. Furthermore, cognitive strategies are useful tools to help students. Especially, the students with cognitive expressing difficulties to improve their thinking process, both lower order thinking and higher order thinking . Consequently, cognitive strategies based instruction supported thinking processes to empower the students to accomplish their learning tasks[17].

Gagne [18] stated that cognitive strategies related to thinking activities structures which arranged from intellectual hierarchies. Intellectual hierarchies are systematically structured from lower order thinking operation up to higher order thinking operation. All the intellectual hierarchie include : stage one, discrimination is prerequisite for concrete concept, stage 2, concrete concept is prerequisite for defined concept, stage 3, defined concept is prerequisite for rules, stage 4, rules is prerequisite for higher order rules, stage 5, higher order is prerequisite for stage 6, problem solving [19] [20]

Higher order thinking abilities manifested in the form of abilities in doing analysis, synthesis and evaluating of receiving information, in order, to get the meaning of the information concerned for solving problems [21] [22]. Those abilities transform themselves into abilities to do critical thinking productive thinking and creative thinking. Hudgin [23] described that critical thinking is a form of higher order thinking which constructed based on the understanding of problems or statements, as well as, empirical facts. All of them can be identified from: exploring any related facts which

supported by any statements or any summaries, evaluating any statements, in order, to get to know relation or different among them, evaluating inductive process based policies, evaluating the conformation of the relation between statements and theories, evaluating the back ground underlined any circumstances which cause any problems [24].

Productive thinking the abilities dealt with exploring process aimed to change classification or to reconceptualized the meaning, ideas or solutions which influence the problem solving process[25]. Creative thinking concern with abilities in finding key of ideas which have not been known previously Creative thinking is a kind of higher order thinking which is supported by divergent thinking abilities. This kind of thinking characterized is by originality which involves abilities in creating any ideas which previously have not been existed, flexibility dealt with abilities in finding any relations among existing ideas aimed to have something new, elaboration includes the abilities to enlarge any existing ideas, fluently is relating to the abilities in promoting the implication of the existing ideas [26]

Cognitive strategies based instruction is one of the instructional approaches, in which, it is emphasized on thinking abilities improvement through learning how to think [27]. In lined with this, instructional approach is a tool to make students able to direct and to manage their own thinking activities strategically, as well as, productive learning abilities. Furthermore, cognitive strategies instruction approach allows students to interact with the materials to be learn by manipulating them mentally, as in making mental images or relating new information to previously acquired concepts or skills or physically, such as, grouping items to be learned in meaningful categories or taking notes on or making summaries of important information to be remembered[28]. Therefore, cognitive strategies based instruction model is in lined with successful learning.

Research results state that cognitive strategies based instruction can be used to any students. It is because, the instructional approach strengthen memory retention, motivation, and positive attitude of the students toward learning. Furthermore, cognitive strategies direct student to improve their thinking abilities [29]

Cognitive strategies based instruction can be implement in the form of cognitive behavior modification (CBM), in which, it can be applied in various forms of cognitive strategies, among them are SQ3R which involves: S = survey, Q = question, 3 R = read, review and resolve . SOLVESIT which consists of : S= say the problem in your way, O=omit unnecessary detail, L =listen for the key vocabulary, V=vocabulary with suggest procedure to use, E= equation, write the problem as math equation, S= solve the equation, I= indicate the answer, and T= test the answer against the original question [30]. Furthermore, cognitive strategies can be done by: applying PQARS which includes : P= preview, Q=question, R=read, S =summarize [31]. Another cognitive strategies which known as KWL which consists of : K= what I know, W = what I want to find out and L = what I learn.

Beside all the cognitive strategies based instruction which have been mention previously, the instructional approach can also be constructed by applying Gagne's intellectual hierarchies[32], in which , it structures thinking process systematically from lower order thinking operation up to higher order thinking operation. Consequently, the cognitive based instructional model allows the implementation of expository instructional based approach which is leaded to enhance the students' lower order thinking and inquiry, as well as, discovery instructional based approach which is aimed to develop the students' higher order thinking through inquiry process.

The abilities in doing inquiry is reflection of inductive based higher order thinking operation which implemented by trial and error [33] Furthermore, inquiry abilities are identified by various abilities, as followed, finding problems, promoting prediction based on exiting knowledge and skills, formulating hypothesis, checking the hypothesis, collecting is aimed to test the effectiveness of the hypothesis, deciding if the data can be proof to test the effectiveness of the hypothesis leaded to solve problems [34].

Based on the critical analysis of related theories and research results which have been described previously, it is necessary to do some research which are leaded to construct instructional model which are focused on cognitive strategies based instruction to empower thinking abilities

III. METHOD

Based on research questions and research aims this study use mixmethodresearch which packed in the form of action research, especially, Martini Jamaris' Action Research Model [35], as shown in figure 1.

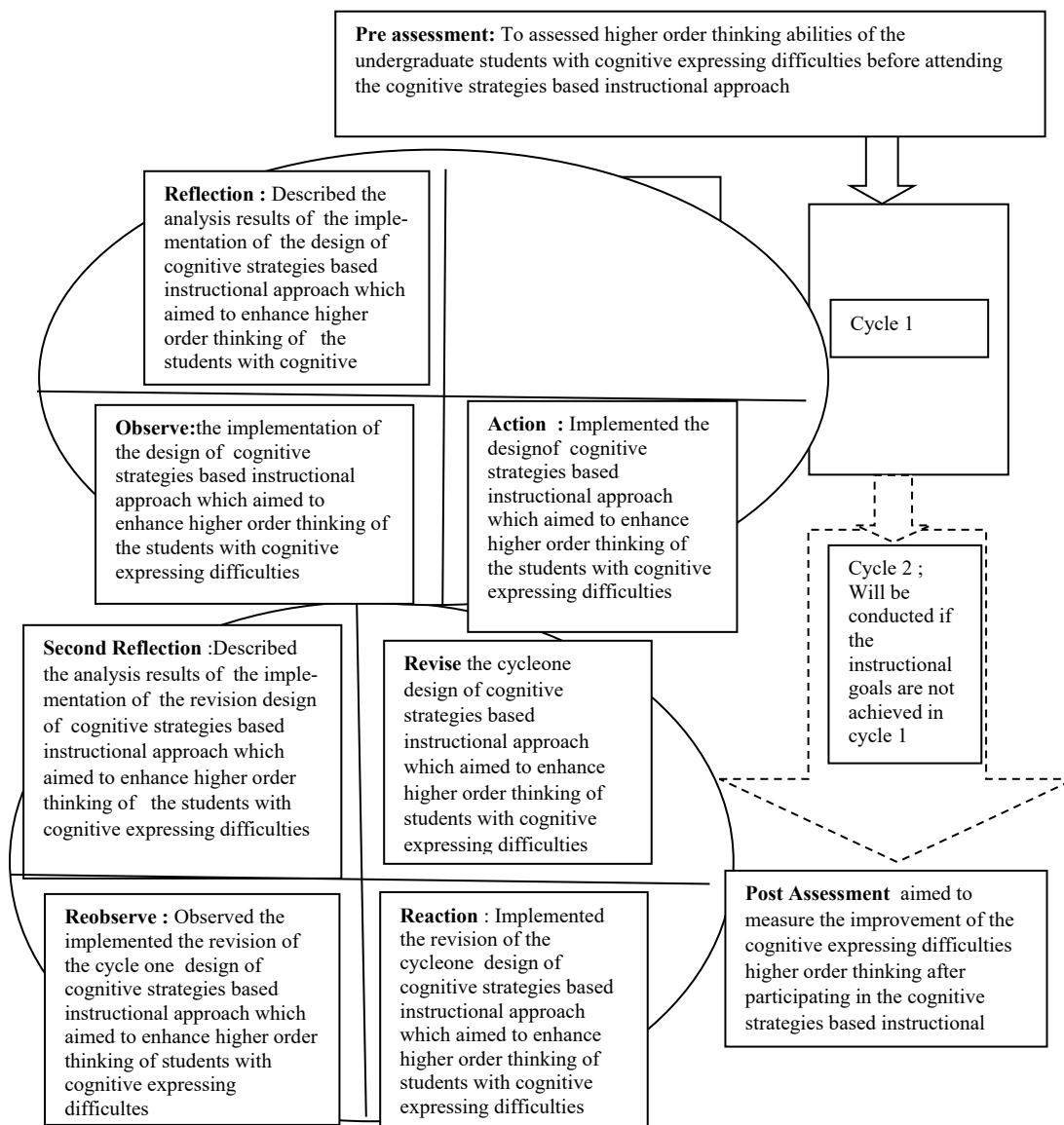


Figure 1. Martini Jamaris' Action Research Model

Research population are the students of State Univerisy of Jakarta. Sample of the research are selected by applying multistateges random sampling. Sample amount are 40 students who are decided based on the implementation of Copeoper& Emory sample technique [36]. Due to the effectiveness of the research activities, consequently, the participants of the research are divided into five groups.

In accordance to the action research method used in this study, data analysis is conducted in the form of quantitative research data analysis and qualitative research data analysis. Therefore, to do effective data analysis, standard measured have been constructed for both data analysis, as described in table 1.

To apply the standard measured, data collections are conducted in three layers, as followed, firstly, text of case study is given to the students, secondly, the students solve the case study's problems, thirdly, the students' answers in solving the case study's problems are analyzed in order to identified the existed of conceptual frameworks underlied the case study's problems, critical thinking, productive thinking and creative thinking, as well as, cognitive strategies based instructional approach used during learning and teaching process.

In lined with the aims of the research, in which, one of them is to get to know the increase of higher order thinking of the students with cognitive expressing difficulties after attending cognitive strategies based instructional approach, therefore, standard measured to assess the improvement of the students' higher order thinking is constructed as shown in table 1.

The standard measured in table 1 are used to collect quantitative data through pre test, formative test and post test which led to have information about the increase of higher order thinking abilities the students with cognitive expressing difficulties before, during and after cognitive strategies based instructional approach.

Table 1: Standard Measured of Students' Higher Order Thinking

No	Higher Order Thinking Classification	Learning Achievement	Skor
1	Excellent (consistently exist accompanied with detail accurate descriptions)	81-100	5
2	Good (consistently exist with accurate description)	71-80	4
3	Average (consistently exist with limited description)	61-70	3
4	Bellow average (exist with inaccurate description)	51-60	2
5	Far bellow average (inconsistently exist with inaccurate description)	41-50	1

Qualitative data analysis are conducted by using Spready qualitative data analysis which have been modified by Martini Jamaris[37], as shown in table 2.

Table2 . Qualitative Data Analysis

Included Term	Semantic Relation	Cover Term
Critical thinking	} is part of →	Higher order thinking
Productive thinking		
Creative thinking		
Giving explanations	} is part of →	Expository Approach Instruction
Asking questions		
Directing students activities		
Doing library research	} is part of →	Inquiry Approach Instruction
Doing case studies		
Designing independent study program		

In collecting qualitative data, field notes sheet is constructed, in order, to record the various real instructional events led to fulfill the requirements of qualitative research. Consequently, coding system and the field notes is also developed, as described in table 3 and table 3, as followed:

Table 3: Research Data Coding

Code	Data Categories
Kkritis	Critical thinking abilities
Kproduktif	Productive thinking abilities
Kkreatif	Creative thinking abilities
Expap	Expository Approach Instruction
Inqap	Inquiry Approach Instruction

The implementation of field notes sheet during qualitative data collection are showed in the following table 4.

Table 4. Field Notes Sheet of Data Collection

Students' Statements	Researcher Reflection	Cover Terms	Codes
“ In my opinion it is not learning disabilities, because the cause of unfocused in studying is feeling sad. Learning disabilities is a condition caused by minimal brain disfunction manifested in information processing disabilities. Furthermore, it caused difficulties in doing academic tasks”	Students's statements consist of his abilities in showing supporting evident concerning learning disabilities	Critical thinking	Kkritis 01
“ In order to increase the students abilities in processing information, task analysis have to be designed and conducted was related with vocabularies development “	Students's statements consist of his abilities in critical thinking, productive thinking, and creative thinking, in which she showed her abilities in promoting ideas and solutions in solving case studies problems	Critical thinking, productive thinking, creative thinking	Kkritis 02 Kproduktif 02, Kkreatif 02

IV. RESULTS AND DISCUSSION

In lined with the characteristics of mix method research, the research results are divided into two categories, firstly, quantitative research results which come out with the increase of higher order thinking of the students with cognitive expressing disabilities after participating cognitive strategies based instructional approach, secondly, qualitative research leded to find out the cognitive strategies based instructional model for improving higher order thinking of the students with cognitive expressing disabilities, as shown in figure 2, in the previous page. instructional approach, secondly, qualitative research leded to find out the cognitive strategies based instructional model for improving higher order thinking of the students with cognitive expressing disabilities, as shown in figure 2. Quantitative data analysis reveals that higher order thinking of the students with cognitive expressing difficulties increased after participating cognitive strategies based instructional approach. In detailed, the increase as shown in table 5, as followed

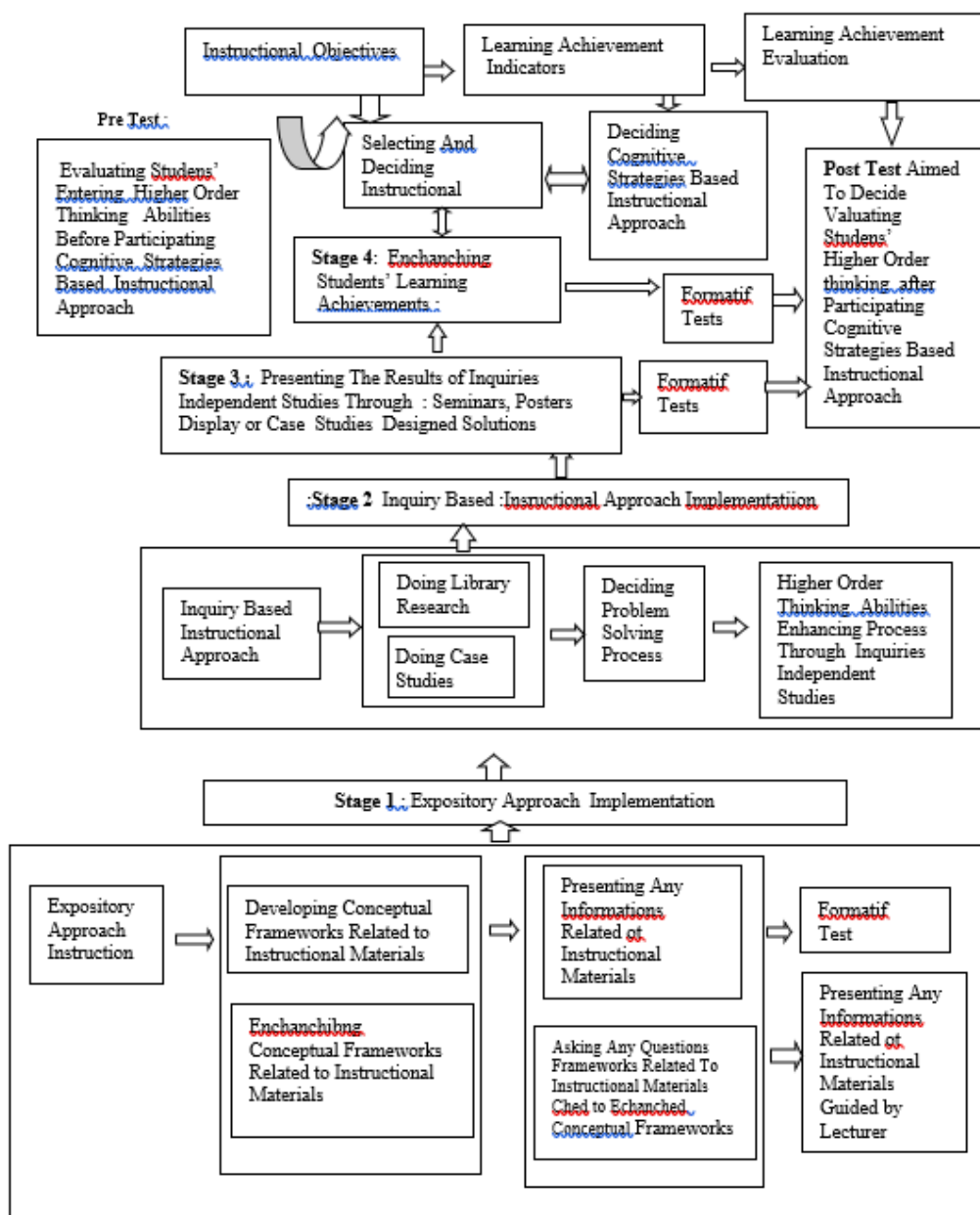


Figure 2.: Cognitive Strategies Based Instructional Model

Table 5 : The Improvement of Higher Order Thinking of The Students with Cognitive Expressing Difficulties

Group	Average Pre Assessment Score	Average Post Assessment Score	Average Score Improvement
1	1.65	3.7	224.24 %
2	1.65	3.9	236.36 %
3	1.9	3.53	185.79 %
4.	2.0	3.9	195 %
5	0.5	1.5	300 %
(consisted of 2 special need students)			
Average Score Improvement of the 5 groups			228.28 %

V. DISCUSSION

The research results implied that cognitive strategies based instructional model to enhance higher order thinking of the students with cognitive expressing difficulties come out with effective results. The effectiveness of instructional model is reflected from the improvement of students higher order thinking abilities. In lined with table 5, the students higher order thinking improve about 228.28% in average. It is because the model accomodated the instructional strategies, starting from expository instructional approach aimed to enchanced conceptual framework of the students up to inquiry instructional approach leded to empower higher order thinking abilities of the students with cognitive expressing difficuties.

As described in previous pages that the research come out with the instructional model cognitive strategies based to enhance higher order thinking of the students with cognitive expressing difficulties, in which, the model have never been found by previous researchers. Therefore, the research findings contained some novelties in the cognitive based instruction. Furthermore, it is regarded as a break through in the related field.

Based on the facts that until the present, there are no research reports about instructional model cognitive strategies based to enhance higher order thinking of the students with cognitive expressing difficulties. Consequently, it is difficult to comperere the result of this research to other research results in related field. Therefore, the research results discussion are focussed on the relation of the research results to any related theories and the related research results which have been found previously.

The research findings[38] [39] [40]about theory of learning and thinkingand proved by Gagne [41],theory of cognitive strategies intellectual hierarchies, in which, he stated that instruction cognitive strategies based have to be arranged systematically [42] . In line with Gagne the instructional model, Greeno, Collins, & Resnick van Dijk &Kintsch[43]describe abouttheory of cognitive operation, as well as, cognitive theory of inquiry teaching, and Woolfolk & McCune Nocilich's theory of concept formationAll of them supported the the research findings [44] [45][46][47].

The reasons underlied this rational description are the instructional model cognitive strategies based involved interactive components which consist of :assessing higher order thinking abilities of the students before participating the cognitive strategies based instructional approach , deciding instructional goals, deciding students' learning achievement, deciding instructional strategies, deciding instructional materials, deciding instructional evaluation , and deciding instructional feed back as shown in figure 2. All of them are the reflection of synthesized of the theories and research results which have been described previously.The research finding dealing with the intructional model which involves interactive componens are also supported by Suardana [48] and Wei Fang [49]

VI. CONCLUSION

In accordance to the research results, it is concluded that cognitive strategies based instructional model is effective for improving higher order thinking of the students with cognitive expressing difficulties. It is proven by the improvements of higher order thinking of the students with cognitive expressing difficulties after participating cognitive strategies based instructional model.

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