USING SELF-EXPLANATION STRATEGY TO IMPROVE STUDENTS' UNDERSTANDING OF THE TO BE LEARNED MATERIAL

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***Abstrak**:*

Teori belajar kognitif dan kostructivisme memiliki padangan yang berbeda dengan teori belajar tradisional. Anak didik tidak dipandang sebagai penerima informasi yang pasif, akan tetapi mereka secara aktif mengkonstruksi pengetahuan. Self-explanation adalah strategi belajar yang mendukung asumsi pembelajaran tersebut dan merupakan kegiatan konstruktif yang mendukung terintegrasinya pengetahuan baru dengan pengetahuan awal anak didik dengan baik. Penggunaan strategi ini dapat membantu anak didik memiliki representasi pengetahuan yang kompre-hensif, menfasilitasi pemahaman yang mendalam terhadap materi yang dipelajari, dan kemudahan dalam pengaksesan kembali informasi yang telah di simpan dalam memori.

Abstract:

Cognitive and constructivism learning theory have different views with traditional learning theory. Students are not viewed as passive recipients of information, but they actively construct knowledge. Self-explanation is a learning strategy that supports this learning assumption, and it is a constructive activity that supports the integration of new knowledge with prior knowledge of students well. The use of this strategy can help students to have a comprehensive knowledge representation facilitating in-depth understanding of the material being studied, and the ease in accessing back the information that is stored in memory.

Kata kunci:
Self-Explanation, Pandangan Belajar Kognitif, Transformasi Informasi Konstruktif, Pemahaman Mendalam

COGNITIVE psychology is emerged with a different view of learning from the traditional theory (behaviorism). Whereas, in the traditional theory learners are viewed as passive recipients of information, cognitive theory views learners as actively construct their knowledge. The cognitive view emphasized on the active mental processing of information on the part of the learners. In addition, the cognitivist also focus on transforming the information into more elaborated, interconnected pieces of information and more meaningful representation of knowledge.

The cognitivists argued that there should be change of the traditional strategy in learning activity because it seems that the traditional strategy such as rote learning does not facilitate learning because in the acquisition of

knowledge this strategy relies only on the recall of untransformed information from the text. According to psychologists this strategy does not promote deep understanding, because students are only prompted to memorize the material and are not prompted to understand it (Van Lehn and Jones, 1993: 1034-1039). The result of this strategy is that information is stored in isolated and disconnected structure. As a result, recall of the stored information can be very difficult. Therefore, cognitive theory emphasizes the importance of knowledge being organized in large, interconnected bodies, where pieces of knowledge are conceptually linked to other pieces (McGilly, 1994). This kind of knowledge organization may result in an easier recall of the stored information.

Psychologists propose that teachers should instruct students to use self-explanation in learning. Their research findings show that learning is more effective when students explain the to be learned instructional materials. This strategy allows learners to detect and fill the gaps in their domain knowledge (VanLehn and Jones: 1034-1039). They are constructive activities and encourage the integration of newly learned material with the existing knowledge (De Leeuw, Chiu, & Lavancher, 1994: 439-477).

Based on the explanation above, there seems to be the need for teachers to change their traditional teaching strategy by applying new strategy which have been proved to be very effective. Therefore, this paper aims at providing a good model in a teaching-learning process to improve the quality of teaching and the quality of students' learning by using self-explanation strategy. The questions that would be addressed here are: what is the problem of the application of teaching strategies in the classroom?, how can students' understanding of the to be learned materials improved using the self-explanation strategy? what may be a good model of applying the self-explanation strategy in a classroom?, and what is the assessment method used to evaluate students undestanding of an instructional material?.

Evaluating Teaching Strategies Applied in the Classroom

The teaching strategies that were applied in the classrooms is evaluated using the framework of the acquisition of knowledge based on the cognitive approach. Most of the teaching strategies applied in the classroom are teacher directed strategy, where students rely very much on teacher's explanation to acquire knowledge. Students became passive receivers of information and the teachers were the one who became very active. There appears to be activity where students asked questions. However, this is not enough for students to understand the newly learned-material more thoroughly and deeply. Besides, only a small number of students will ask questions during the process of teaching or lecturing. It is likely that it is very difficult to expect students to ask

question unless they are prompted to do so. Furthermore, the time is limited that all students' questions cannot be answered at one time.

In the evaluation method of some teachers, most of the questions are formulated merely to test students memory about a material and not to test their comprehension or understanding. It means that the teaching strategy that was applied is based on the rote learning. Consequently, students are likely to have problem when they deals with the process of utilization of knowledge as a result of having difficulties to retrieve the stored information.

There seems to be difficulties for teachers to change their evaluation methods that require students to give a deep comprehensive answer, since the rote learning that was used cannot promote deeper understanding of the to be learned materials. Deeper understanding here can be defined as students acquire knowledge in more meaningful and elaborated way. They link the new knowledge to their existing knowledge, and they can relate their knowledge to other domain of knowledge. In addition to that, the registered information can be retained. Therefore, to change the method of assessment, there is also a need to change to teaching strategy applied in the classroom.

Based on the facts above, it is assumed that the lack of students understanding of the materials is due to a substantial degree to the use of inappropriate strategy applied in the classroom. Therefore, there might be a need for teachers or lectures to modify their teaching strategy in order to improve the teaching-learning outcome. Of course, there are other problems that can contribute to effective learning, however, using self-explanation strategy can be a good way to help students master the to be learned material in more elaborated, meaningful, and provide deeper understanding.

Self-Explanation Strategy

The term “understanding” is one of the key terms of many educational objectives (Anderson and Faust, 1973). Therefore, in order that students can understand a newly learned material, they should apply appropriate strategy. The self-explanation strategy is one of the effective strategies that can improve students’ understanding of the to be learned materials.

Self-explanation strategy is defined as “a reflective activity explaining to oneself a learning material in order to understand facts from the material or to repair misunderstanding” (Kwon, Kumalasari, and Howland, 2011: 96). It is also known as “an effective metacognitive strategy of explaining the to-be-learnt material to oneself in order to understand the material” (Chen and Yeh, 2008: 179). When students apply this strategy (Roy and Chi, 2005), they are engaged in active constructive activities where they learn the material in a meaningful way and at the same time they can also monitor their

understanding effectively. It was stated that self explanation can improve students learning through the integration of new information with their existing prior knowledge (Dunlosky, Rawson, Marsh, Nathan, and Willingham, 2013: 4-58).

Through generating explanations, students are prompted to apply all the information about the principles, concepts, and definitions they have learned from a text. Therefore, their understanding of the material can be deeper and more complete. Furthermore, students also may gain additional information because while they explain an example, they refine or expand the conditions of an action, explicate the consequences of an action and many more (Chi, Bassok, Lewis, Reinmann and Glaser, 1989: 145-182).

Self explanation strategy facilitates students with deeper and complete understanding of the material because several cognitive mechanisms are involved during the process of applying this strategy. The mechanism involved are "*generating inferences to fill in missing information, integrating information within the study materials, integrating new information with prior knowledge, and monitoring and repairing faulty knowledge*" (Roy and Chi: 5). Therefore, it was stated that "*self-explaining is cognitively demanding but deeply constructive activity*" (Chen and Yeh: 179).

The findings from some researches have given empirical evidence of the effectiveness of self explanation strategy to improve students understan-ding of the to be learned material. For example, It was found that self-explana-tion strategy was a significant predictor of students transfer performance, that is, the students who used this stategy tended to monitor understanding deficiencies. This mean students can have complete undestanding of the material learned. They also found that the successful problem solvers outperformed the unsuccessful one, because they self-explained the to be learnt material more frequently (Chen and Yeh: 179).

There are many ways of prompting students to self-explain the to be learned materials. For example, some researchers have used worked-out examples to study maths and physics (Chi, Bassok, Lewis, Reinmann and Glaser: 145-182). While others used guided generating questions, the self-explanation strategy not only has been used to study physics and maths, but it also has been used to study an expository text. In a research, students were prompted to use self-explanation strategy in learning about the circulatory system in Biology and the results do show that by using this strategy the students understanding of the materials was enhanced. For example, when the students were given post-test questions, the students who used self-explanation while learning the material referred to the text less frequently than the students who did not use this strategy (Chi, Leeuw, Chiu, Lavancher: 1994).

This finding suggests that the students using a self-explanation strategy understood more compare to those who did not use self-explanation. There are three processing characteristics of self-explanation that help to make this strategy powerful; First, it is a constructive activity. Second, it encourages the integration of a newly learned materials with existing knowledge. Third, it is a powerful mechanism to remove conflict as s result of incorrect self-explanation or faulty initial mental model (Chi, Leeuw, Chiu, Lavancher, 1994). This, thereby prove that self-explanation is an effective strategy that enhance students learning.

Way of Instructing Students to Self-Explain

As stated in the previous section about one way to prompt students to use self-explanation is by providing some self-instructed questions to learn the to be learned material. However, since this strategy maybe new for students, it is a good idea for teacher to introduce and motivate them to use the strategy (Bielaczyc, Pirolli and Brown, 1995). To do this, teachers can tell students that self-explanation strategy can be used to learn an instructional material and this strategy have been proved to be used by high performance students. Therefore, using this strategy can enhanced their understanding of the material. The next step, teacher tells students how to use this strategy. In the initial stage, teacher can act as a model and if students become familiar with the strategy teacher can led students to do it by themselves.

Teachers can formulate questions for students to use self-explanation strategy to learn a chapter. The following is an example of formulating questions to understand a chapter from Anderson's book that is "meaning based representation" (Anderson, 1995).

Self-explanation questions:
Identify some forms of meaning based representation.
General approach:
- Do I understand the definition of each form?
- Do I understand the structure of each form?
- Do I understand the characteristics of each form?
- Do I understand how the forms function?

Looking for a particular form:
- How does this form help people to retrieve the stored information?
- How does this form influence human memory?
- Can I think of example of this form?

The formulation of the question above is also aimed that after reading the material and asking their self-questions, students can monitor their understanding of the material and their comprehension failure. For example, when students find that they cannot answer some of the questions above they may refer back to the text. However, if they still cannot get the answer, they may be motivated to ask their teacher to explain that for them or they may ask their peer. If students have been actively control their learning where they know how to plan, allocate resources, seek help, evaluate their own performance, and revise and correct their own work, it can be said that they are self-regulated learners (Paris and Ayres, 1994). In this case, they are actively direct themselves in learning and transform their mental ability into academic performance or skills related to their tasks (Zimmerman, 2008).

Models of Applying Self-Explanation Learning Strategy

There have been many ways of applying the self-explanation strategy in a classroom in a better way, among them are:

Providing Guided Learner-Generated Questions

Due to the incapability of students to generate high level questions, providing model of questions will be significant for students. Therefore, a model that can be used here is guided learner-generated questions. Most of the questions in King's model can be used by students to generate self-explanation. The questions can function to guide students to generate kinds of questions that elicit self-explanatory responses. In the questioning- answering procedure, students are provided with generic question stems which are shown below (King, 1994):

Type of questions	Examples
Generate application	How would you use ..... to.....?
Analyze relationship	How does .....effect.....?
Make prediction	What do you think would happen if .....?
Explain concepts	Explain why .....?
Compare and contrast	How are .....and ..... alike and different?
Evaluation	Which one is the best .....and why?
Activate and use relevant prior knowledge and experience	How does .....tie in with what we have learned before?
Develop examples	What is a new example of .....?

The significance feature of this model is prompting students to elaborate the to-be-learned material. In addition, this guided generated question is also designed to prompt students to relate to their prior knowledge. The reason to say this because when students are engaged in peer questioning activity where they respond to their peers high level questions, they are required to generate explanations and communicate those explanation to questioner (King, 1994). Students also sometimes are required to link their knowledge to the questioner's knowledge to make sense of their explanation. Furthermore, this strategy also give an autonomy to students to self-regulate their learning since this strategy allows learners to generate their own questions to suit their need of their comprehension.

Another important feature of this strategy is prompting students to generate thought provoking questions to develop a critical thinking which means that students ask questions about the content of a material such analyzing the relationship between main ideas in the text, link the information from the text to their prior knowledge or experience to give sense to the new materials. This because those ideas are processed more thoroughly and are constructed in extensive cognitive networks, therefore the result will be a better cognitive representation of a newly learned materials (King, 1994). This then will be very important because good representation of the information might result in easier recall of that information.

Using Self-Explanation Strategy in Large Classroom

Managing the classroom is an important thing to do before applying the self-explanation strategy in large classroom. In this case, there are many important points that may be considered by teachers. Firstly, the number of students is too much that teacher cannot attend to them all. Therefore, the instructional approach that is chosen should facilitate a condition where all students in the classroom can participate in a learning process. To help achieving this, the use of group will be important. Secondly, to expect students to learn cooperatively, in forming a group teacher should be aware of the conditions that may cause students not feel comfortable working with their groups. Thirdly, based on the fact that students may find difficulties asking questions during a learning process, there seems to be the need for teacher to anticipate this by providing guided questions that can help them in learning of the to be learned material and applied model of learning which facilitate this learning of strategy.

The learning procedure for group learning is that, in the first meeting, a teacher can explain to students that they are going to have group discussion during the course and all students are expected to participate in that activity

and work cooperatively. Teacher then divides students into group using the sociometric techniques. However, prior to that teacher can explain how groups will be constructed. Next, teachers can distribute the material, each group will have different topic or themes to be learned material. Teacher also explains how students use it in their group discussion.

In the groups procedure, there are two main activities; Firstly, small group discussion, where students learning a material by asking questions in reciprocal manner. The reciprocal teaching approach is ”reciprocal teaching teaches comprehension-fostering and comprehension-monitoring processes that facilitate learning from text” (McGilly, 1994). The technique was based on the analysis of the cognitive and metacognitive skills or strategy a person applies to comprehend a written text. Students take turn as a leader where they make predictions when reading, question themselves about a text, seek clarification when confused and finally summarize the content of a text (Pressley, Wood, Martin, King, and Menke, 1992). All of the activities in reciprocal teaching facilitate learning and prompt students to generate explanation during discussion. The role of teachers in reciprocal teaching is not a distributor of information, rather become guides and mentors. In addition, they also give praise and feedback.

However, since this learning strategy is may be new for some students, it will be good if teachers firstly model the activities to students before giving the responsibility to them. To do this, teachers choose some of the members of classroom, while the rest of students become observers. Teacher together with students taking turns as the leader and be responsible to led the discussion. Teacher sometimes takes the role of posing question and students explain it to him/her and others members of the group, gives clarification to what is not clear or what is questioned by other students. Students then exchange role with teacher, asking questions whereas teacher takes student's role. Eventually, all of students in the classroom will have chance to be participant in a small group discussion. At the end of each discussion, teacher together with students summarized the result of the discussion.

Secondly, an activity which is called "the jigsaw" (Aronson, Blaney, Stephan, Sikes, and Snapp, 1978). It is a strategy of learning where each of the group teaches others groups and become expertise in their specific topic or theme of the to be learned material. The following table describe the activities that students will do:

Activities within the small group discussion	- Students learn the material individually. In this stage, students can use the questions to self explain a material given to them.

	- In small cooperative groups, students engage in peer questioning, taking turns posing their questions to each other and answering each other question in reciprocal manner. - One member of the group records all the questions and answers made by the students during the questioning-answering process. - The last activity is the students summarize the result of the discussion of the content of the material.
Activities in classroom discussion	- Each group presents the result of their small group discussion. - Others groups are encouraged to ask questions after or during the presentation. - The group presenter assigns one as the leader who will present the result of their discussion, one as the recorder and the rest have the role to answer the questions posed by others groups. - At the end of the presentation, the students summarize all the important points about the materials.

Assessment Method

To assess the students understanding of the material through using self-explanation strategy, teachers can use Chi, et all's models, that is designing questions based on the four categories; First, verbatim questions, that is, a question asking about the structure, function, or simple knowledge about processes that is directly or explicitly presented in the text. Second, comprehension inferences, namely questions that asking students to integrate information from two or more lines of a text. Third, knowledge inferences, that is, questions asking students to generate new knowledge. In this case, students need to have a good understanding and relevant prior knowledge of the to be learned material. The last is implication questions, that is, questions which typically assessed students understanding of the implication of a fact or a problem. These four questions range from simple question with simple answer to more comprehensive questions with more comprehensive answer (Che, Leeuw, Chiu and Lavancher, 1994).

The following are an example of how to formulate the questions:

Example text: The superiority of memory for meaning indicates that people normally extract the meaning from linguistic messages and do not remember its exact wording (Anderson, 1995: 139). Category 1: Verbatim Question: Anderson talks about memory for verbal information. What does human extract from a linguistics messages?
Category 2: Comprehension inferences Question: Human extract meaningful information rather than less meaningful information. How can mnemonic techniques help a person to make the information more meaningful?
Category 3: Knowledge inferences Question: How do subjects mistakenly mention an object which does not find in an office such the subjects in Brewer and Treyer's experiment (Anderson: 156) and how do schema of a place influence the subjects' memory.
Category 4: Implication questions Question : Learning English vocabularies might be a difficult thing to do because the limitation of our memory to hold many words at the same time. How can a person learns many vocabularies and still can access those vocabularies after the retention period.

CONCLUSION

To conclude, it is very important for teachers now to see students as active participant during the classroom period rather than passive receiver of information. In other words, teacher-centered learning is no longer appropriate, but the process of learning should focus more on the student-centered approach. Therefore, it is the time for teachers to turn over the strategy to students and let them do the process of learning by themselves. The cognitive science as a branch of psychology has offered a new vision where it views the learners as constructors of knowledge. The representation of knowledge is very important according this theory, because it will determine the quality of the storing information and the easy access of them.

Self-explanation is a strategy that encourages this learning situation. If students use this strategy, this should help them to gain more complete

knowledge, and to enhance their understanding. In addition, the students can even gain additional knowledge through expanding the application of the principles, concepts or definitions from the material. Furthermore, using the self-regulating strategy can help learners to monitor their comprehension failures as they learn a material and to be able to evaluate the strategy that they have applied. Finally, it is expected that by applying the self-explanation strategy, students become active participant in the learning activities rather than become passive receiver of information.

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