

Literatur Study: *Discovery Learning Teaching Model trough Somatic Auditory Visual Intelectual Approach in Mathematic Teaching*

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Abstract. *Discovery Learning (DL)* is a teaching model that demand the student to be active in it. *DL* required the students to find and overcome the problem given. In this case, students should be ready with the lesson. When *DL* applied, the students who have low level of mathematics ability will get difficulties in thinking and relating among concepts both in writing and speaking. Thus, it cause frustrating for them. On the other hand, in ideal mathematic learning process, students should be able to think critically so that they can apply their experience in their daily life. To resolve this situation the writer propose *Somatic Auditory Visual Intelectual (SAVI)* approach in the *DL* process as it can increase students' pshicomotoric and concentration. This approach focus on maximizing the use of students' five senses. The purpose of this study is to overcome the weaknesses of *DL* process. The result of this literature study is *DL* syntax which is provided by *SAVI* steps. So that obtained the combined *DL* sintax i.e preparation on *stimulation*, presenting data on *problem statement* and *data collection*, trying steps on *data processing* and *Verification*, and result presentation on *generalization*. Thereby, it could be easy to maximize the mathematics learning teaching through the application of *DL* model with *SAVI* approach.

INTRODUCTION

Mathematics as one of the basic science that has an important role in the effort mastery of science and Technology. According to Erman Suherman (2003: 58-59) mathematics is one of the very important basic science is taught to students so that (1) the student has the ability that can be converted through the use of mathematical activity; (2) students have mathematical knowledge as a preparation to move on to secondary education; (3) students have math skills as the improvement and extension of primary school mathematics to be used in everyday life; (4) students have a broad enough view and have an attitude logical, critical care, and discipline and appreciate the usefulness of mathematics. School mathematics has an important role for students, therefore, should be the learning of mathematics made it interesting. Moreover, mathematics is knowledge loaded with materials which can trigger the development of thinking ability particularly reasoning ability. This is because mathematics is knowledge which has deductive axiomatic characteristic, which need thinking ability and reasoning to understand it (Rohana, 2015).

The ideal learning is learning that engages students actively and emphasize on how that goal can be achieved. In this case learning how to organize, how to deliver learning content, and how to organize the interaction between learning resources that exist in order to function optimally, as well as in the study of mathematics. Some students may need an increase in the number or duration of models and examples as well as greater depth and explicitness within the demonstration of varied strategic behaviors (Pape, et al., 2003). In mathematics at school, there are several factors that are important to the achievement of mathematics learning. Such factors may include internal factors and external factors.

Internal factors are factors that originate from within the students such as attitudes, interests, motivation, self-confidence, etc. External factors are factors that come from outside the student such as the environment, learning

model, etc. In connection with the study of mathematics, applied learning model of educator is one factor that is vital to the learning process of mathematics students. Model interesting learning can make students feel happy to learn mathematics, but the facts on the ground a lot of students who find it difficult and even assume that mathematics is a boring lesson and scary. This is in line with Nuria Gil Ignacio, et al., It is a fact that, despite its utility and importance, mathematics is perceived by most pupil as difficult, boring, not very practical, abstract, etc., and its learning as requiring a "special ability" that is not always within everyone's reach. Moreover, for teachers to know science well is not sufficient to teach this subject (Duit, 2007)

Discovery learning (*DL*) is a learning model that involves the active participation of students in exploring and discovering their own knowledge and use it in problem solving. *DL* is a kind of student centered learning method, it does not mean instructors are useless in the learning model. Students apply their experience and knowledge to solve the problems, meanwhile, instructors should guide and encourage students to study deeply and effectively. This is in line with the mode of teaching method in mathematics seems to be important for students' development of mathematical proficiency (Samuelsson, 2011).

DL has several advantages that can train students to learn independently, to train students' reasoning ability, as well as involving students actively in learning activities to find themselves and to solve the problem without the help of others. However, upon the application of any vulnerability discovery learning for the less intelligent individuals will have difficulty in thinking or expressing the relationship between the concepts written or oral that are likely to cause frustration to the individual. While in mathematics, an individual is required to think critically in order to be able to apply what they have gained in everyday life.

To overcome these problems, it can be modified with *Somatic Auditory Visual Intellectual (SAVI)* approach. One approach that can be used to enhance the ability of mathematical reasoning and autonomy of student learning is *SAVI* approach, because *SAVI* approach more oriented to students that combines physical movement needed when learning mathematics with intellectual activity and involve several sensory functions important as the eyes, ears, mouth and brain so that it will have great impact on the learning. According Meiler (2002, 91-92) that the elements of a memorable *SAVI*, *Somatic*: learn to move and act, *Auditory*: learning to speak and hear, *Visual*: learn by observing describe, and *Intellectual*: learn to solve problems and think.

Based on the description of the background, it can be concluded that the learning model is one of the external factors that may affect the achievement of mathematics learning. *DL* model of learning is a learning model that requires students to take an active role in the learning that is by finding and solving the problems that have been given. Since there are weaknesses in the *DL*, then the model is modified with *SAVI* approach. *SAVI* approach is an approach that emphasizes that learning must take advantage of all the sensory organs possessed. Therefore, this study aims to determine how modifications of *DL* model with *SAVI* approach to overcome these weaknesses in mathematics.

REVIEW OF LITERATURE

Discovery Learning (*DL*)

Discovery learning (*DL*) is a learning process that the delivery of the material presented is incomplete and requires students to engage actively to find itself a concept or principle of not knowing. *DL* model is one that gives opportunities to the students to find any information without help from the teacher (Saab et al., 2005; Hosnan, 2014). *DL* is proven to improve their knowledge during the learning process (Martins & Oyebanji, 2000; Bajah & Asim, 2002). *DL* is a type of learning where learners construct their own knowledge by experimenting with a domain, and inferring rules from the results of these experiments (Wouter, 1999). Bicknell-Holmes and Hoffman (2000) describe the three main attributes of discovery learning as 1) exploring and problem solving to create, integrate, and generalize knowledge, 2) student driven, interest-based activities in which the student determines the sequence and frequency, and 3) activities to encourage integration of new knowledge into the learner's existing knowledge base.

DL has several advantages and disadvantages. (Hosnan, 2014) express some of the advantages of *DL* model, that is: helping students to improve and enhance the skills and cognitive processes; the knowledge gained through this model is very personal and powerful because it strengthens the understanding, memory, and transfer; can improve students' ability to solve problems; help students reinforce the concept itself, since obtaining the trust cooperate with each other; encourage students' active involvement; encourage students to think intuitively and formulate hypotheses themselves; trains students learn independently; students are active in teaching and learning activities, as he thinks and uses the ability to find the final result. Students take the opportunity to ask their friends at the instant if they find the material too difficult to understand (Syarifah, F. et al., 2012).

(Hosnan, 2014) Lack of *DL* model, which is time-consuming because the teachers are required to change the habits of teaching which is generally as a conduit of information to become a facilitator, motivator, and mentor;

rational thinking ability of students there are still Limited; not all students can follow the lessons in this way. In addition, a shortage of *DL* model is for students who are less intelligent will have difficulty in thinking or expressing the relationship between the concepts written or oral. Steps the model of *DL* is Stimulation, Problem statement, the data collection, the data processing, Verification, and Generalization.

1. *Stimulation*

At this stage, students are exposed to something that causes confusion, then proceeded to not give a generalization, that the desire to investigate itself. Teachers can start by asking questions, suggestions reading books, and other learning that lead to the preparation of problem solving.

2. *Problem statement*

Teachers give students the opportunity to identify issues relevant to the subject matter, then one of them is selected and formulated in the form of the hypothesis.

3. *Data collection*

This phase students are given the opportunity to collect a wide range of relevant information, read the literature, observing the objects, interviews, conduct their own trials to answer questions or to prove the truth of the hypothesis.

4. *Data processing*

This stage serves as the formation of concepts and generalizations, so that students will gain new knowledge of alternative answers that require logical proof.

5. *Verification*

At this stage, the students perform a careful examination to verify whether or not the hypothesis set out earlier by finding alternatives and associated with the data processing.

6. *Generalization*

Phase generalization is the process of drawing conclusions that can be used as a general principle and applies to all event or the same problems with regard to the outcome of Verification.

Somatis, Auditory, Visual, Intelektual (SAVI)

SAVI is learning which emphasizes that learning must take advantage of all the sensory organs of the students. *SAVI* is learning to approach learning with physical movement with intellectual activity and the use of all the senses that can have a big impact on learning. *SAVI* method trains students to interact with their friends, informants, and environment in order to obtain a variety of information. The information collected will later be utilized as the materials used in discussions. In this case, students are placed as the center of attention in instructional process as what the constructivist paradigm explains. The students construct their knowledge based on their own experience to formulate the best solution. In *SAVI* the themes that suit the needs of the students in order to create more active, creative, democratic, collaborative, and constructive learning situations are also required (Kurniawati, et al., 2013).

Learning approach is the way in which the implementation of the concept of learning can adapt course material to students (Mujiyem S. & Suparwati, 2011). *SAVI* elements include: Somatic, Auditory, Visual, and Intellectual. Somatic ie learning by moving and doing. Auditor is to learn to speak and listen. Visual is learned by observing. And the intellectual is to learn to solve problems and think. This is in line with the (Ayu & Utiya, 2012) (in Meier) states that Somatic is learning by moving and doping, Auditory is learning by talkin and hearing, Visual is learning by observasing and picturing, Intellectual is learning by problem solving and reflecting. *SAVI* approach integrates the four terms so that student and teacher can make condition class become enjoyable.

Somatic in the learning process of mathematics that students learn to act and act with the use of certain body parts such as hands, as needed when learning mathematics. There are several ways that can be used to optimize the somatic element in the process of learning mathematics that motion pictures flat handmade like drawing a circle; hand gestures complement mathematical tables; moving the various components of specific body correctly that support the learning process; gesture in demonstrating how to make a picture like drawing outside the circle tangent alliance in front of the class. Auditory in the learning process of mathematics that students learn by involving hearing ability and the ability to speak during the learning of mathematics. Some auditory activity in mathematics among others to discuss and communicate the subject matter of mathematics and attempts how to apply it; modeling an image as create an image circle and explain the picture to other students; listening to the material presented and summarizing what he hears.

Visual learning students learn mathematics is to observe an image or a table in mathematics and redefine the observations involving visual abilities. Some of the visual learning process that can be applied in mathematics among others at the picture like a picture of a circle and its elements and then interpret it through the completion of the students' worksheets. visualize the observations into a mathematical figure or table. Intellectuals in the learning process students learn mathematics is to improve the ability of thinking by solving problems related to

math. Some activities that can be done in an intellectual study is to solve the problem for example, solve the problem or math problems that exist in the student worksheet; analyze the experience or a case related to math; creating personal meaning for example, draw a conclusion from the study of mathematics.

Steps in *SAVI* approach that is students read the subject matter to be studied in a loud voice (auditory); students were divided into several groups (Somatic); each group observes media images provided by the teacher and discuss it (Visual); each group demonstrated the group's work in front of the other students (Intellectual). *SAVI* trains students to interact with their friends, informants, and Environment in order to obtain a variety of information. The information collected will later be utilized as the materials used in discussions. In the constructivist paradigm explains. The students construct their knowledge based on their own experience to formulate the best solution.

Some of them are related research studies conducted by Haerudin (2015) conclusion that the increase in mathematical reasoning skills students are learning to use *SAVI* approach is better than the students who use conventional learning. Further research conducted by Eni Dewi Kurniawati, et al. (2013) conclusion that *the thematic learning material using SAVI proved effective in improving the students speaking skills competence*. Further research conducted by Samsul Maarif (2016) conclusion that *the improvement of the students mathematical analogical ability using Discovery learning method is considered better than the expository group*. Research conducted by Akhsanul In'am (2017) was concluded *the students activities as stated in the approach may said to be well implemented*. Research carried out Shalin Hai-Jew (2008) showed that *the Discovery learning spaces may be created in Online learning tends Environment to encourage learner-directed Training and learning*. Research conducted by Samsul Maarif (2016) showed that the improvement of the students' mathematical analogical ability using discovery learning method is considered better than the expository group.

Based on the description of the *DL*, it can be a sense of the *DL* model is a learning process that requires students to be actively involved to find itself a concept or principle of not knowing. With *SAVI* approach that emphasizes learning that learning must take advantage of all the sensory organs of the students. Thus, it can be concluded that *SAVI* approach can complement measures *DL* teaching model.

RESULTS AND DISCUSSION

The link between *DL* teaching model with *SAVI* approach and learning of mathematics

As Bruner opinion, that "*Discovery Learning can be defined as the learning that takes place when the student is not presenter with subject matter in the final form, but rather is required to organize it him self*". Bruner is the basic idea of Piaget's opinion which states that children should play an active role in learning in the classroom. *DL* has the same principle of inquiry and problem solving. The difference is in *DL* is confronted with problems such student who engineered by teachers, whereas the problem is not the result of engineering inquiry, so students must put all thoughts and skills to get the findings in the matter through the research process. Problem solving is more emphasis on problem solving skills.

By applying the model of *DL* repeatedly self-discovery can improve the ability of the individual concerned. *DL* usage models want to change the conditions that passive to active learning and creative. Changing the teacher-oriented learning to student-oriented. Changing the expository mode of students who received the overall information from teacher to modes Discovery students find their own information.

In the learning process, Bruner concerned with the active participation of each student, and knows well the differences in ability. To support the learning process, the environment needs to facilitate the curiosity of students at the exploratory stage. This environment is called Discovery Learning Environment, that is environment in which students can explore, new discoveries are not yet known or understanding similar to those already known. This environment aims to enable students in the learning process can run well and be more creative. To facilitate a good learning process and creative should be based on the manipulation of the lesson material in accordance with the students' level of cognitive development. Manipulation of teaching materials aimed at facilitating students' ability to think (presenting what is understood) in accordance with the level of development.

In applying the model of *DL*, teachers act as mentors by providing opportunities for students to learn actively. Interest in *DL* models by Bruner is let the teacher provides the opportunity for students to become a problem solver, a scientist, historian or mathematician. Through these activities the students will master it, implement, and find things that are beneficial to themselves. As already mentioned before, that *DL* models have advantages and weaknesses.

1. The advantages of *DL*

- a. Helping students to improve and enhance the skills and cognitive processes. Discovery efforts are key in this process, depending on how learning someone.

- b. This learning model allows students to develop quickly and in accordance with their own pace.
 - c. This model can help students reinforce the concept it self, since obtaining the trust cooperate with others.
 - d. Centered on students and teachers alike contribute actively put ideas. Even teachers also can act as a student and as an investigator in the discussion situation.
 - e. Help students eliminate skepticism (doubts) because it leads to the final and certain truths or definitely.
 - f. Possible students learn by using a variety of learning resources.
 - g. Can develop their talents and skills of individuals.
2. The weaknesses of *DL*
- a. For students who are less intelligent, would have trouble abstract or think or express the relationship between concepts, written or oral.
 - b. This learning model is not efficient to teach the number of students that a lot, because it takes a long time to help them find a theory or other problem solving.
 - c. Does not provide opportunities to think that will be found by the students have been chosen beforehand by the teacher.

Since there are some weaknesses in the *DL* models, then the model can be modified with *SAVI* approach. This is evident in learning *DL* syntax modified with *SAVI* approach that is at the preparation stage in which there is stimulation, the delivery stage in which there is a problem statement and data collection, the training phase in which there are the data processing and verification, as well as the appearance of the stage in which there are generalization. The syntax among others:

Table 1: Syntax *DL* with *SAVI* Approach

Stage of <i>SAVI</i>	Step of <i>DL</i>
Preparation	<i>Stimulation</i>
Delivery (<i>somatis, auditory, visual</i>)	<i>problem statement</i>
Training (<i>somatis, auditory, visual</i>)	<i>data collection</i>
Appearances results (<i>intelektual</i>)	<i>data processing</i>
	<i>verification</i>
	<i>Generalization</i>

The research conducted by Eni Dewi Kurniawati, et al. (2013) conclusion that *the thematic learning material using SAVI proved effective in improving the students speaking skills competence*. Further research conducted by Samsul Maarif (2016) conclusion that *the improvement of the students mathematical analogical ability using Discovery learning method is considered better than the expository group*.

CONCLUSION

Discovery learning (*DL*) is one of the factors that influence the learning process of mathematics, so it can also affect the students' mathematics achievement. But there is a disadvantage that *DL* for students who are less intelligent will have trouble abstract or think or express relationships between concepts, written or oral. In this regard, there are approaches that can be modified with a model of *DL*, namely *SAVI* approach. *SAVI* is a learning approach that emphasizes that learning must take advantage of all the sensory organs of the students. Based on these descriptions, it can be concluded that the model of *DL* can be modified with *SAVI* approach to address weaknesses in *DL* model is by modifying the syntax section at the preparation stage in which there is stimulation, the delivery stage in which there is a problem statement and data collection, the training phase in which there are the data processing and verification, as well as the appearance of the stage in which there are generalization.

Teacher educators in this regard, is not expected to use the model of learning in mathematics in order to obtain an optimal learning achievement. By developing *DL* teaching model with *SAVI* approach, students will feel more comfortable, relaxed, but still can be serious in solving the problems given to him during the learning process, so that students would not think that math was scary and boring where this course will improve students' mathematics learning achievement becomes more optimal.

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