Writing Material Using Inquiry Oriented Discovery Method on Learning Mathematics

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Abstract
Learning mathematics is always identified by learning about symbols or symbols, so in the learning required an effective method. One method of learning in mathematics, which until now is still considered a fairly effective method is the method of inquiry and discovery method. The inquiry method is a series of learning activities that maximally engage all students' ability to search and investigate in a systematic, critical, logical, analytical way so that they can formulate their own findings with confidence. In addition, the discovery method is a mental process, that is, students assimilate a concept or a principle in mathematics. The purpose of this paper, which discusses the writing of teaching materials using the Inquiry Method oriented of Discovery on learning Mathematics.

Keywords: Inquiry, Discovery, Mathematics Learning

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Introduction
Teaching material is an important component that must be prepared by the teacher before carrying out the learning activities. Completeness of teaching materials will help teachers and students in learning activities. More than that, teaching materials is a very decisive component for the achievement of learning objectives.

Teachers are required to be able to create quality teaching materials. Quality teaching materials that are intended is teaching materials that can answer the problems and meet the needs of students to achieve learning objectives. Therefore, teaching materials should be able to provide knowledge, skills, and values and attitudes that must be learned by students to achieve a predetermined standard of competence.

In this paper will be presented how the preparation of teaching materials inquiry-oriented discovery method. Discovery-oriented inquiries point to academic situations, where small groups of students attempt to find answers to inquiry topics. In these situations, students can find concepts or details of information.

Hamalik (2013: 220) says that this method can be implemented to the whole class as part of the inquiry activities, called a social inquiry. Although most inquiry methods are supported and used by educators, it does not mean that other methods are ignored or not used to achieve inquiry objectives.

According to Sanjaya (2009: 196), the inquiry is a form of student-oriented learning approach (student-centered approach). It is said that because, in this approach, students hold a very dominant role in the learning process.

Based on the above description than the title in this paper, namely Writing of Instructional Materials Using Inquiry-Oriented Inquiry Method In Mathematics Learning.
1. Teaching Materials

a. Understanding of Teaching Materials

There are some formulations about the meaning of teaching materials or referred to as learning materials, among others put forward by Gintings (2008: 152) that the learning materials, is a summary of material given and taught to students in the form of printed materials or in other forms stored in electronic files, both verbal and written. To strive for the students to have an initial understanding of the learning materials to be discussed, these learning materials should be submitted or distributed first to students before the learning and learning process is implemented. This is good to do because by learning it first, students are expected to participate actively during the learning and learning process.

Another understanding of instructional material proposed by Pannin (2001), he mentioned that the teaching materials as materials or lesson materials are arranged systematically, which used teachers and learners in the learning process. Prastowo (2011) said the understanding of teaching materials as all materials (information, tools, and text) systematically composed, which displays the complete figure of competence controlled by learners and used in the learning process with the aim of planning and reviewing the implementation of learning.

Based on some understanding as mentioned above, it can be concluded that the teaching material is a systematic arrangement of various forms of learning materials used as a guide for teachers and students in learning.

b. Functions and Benefits of Teaching Materials

The following is presented the functions and benefits of teaching materials according to Ditjen Dikdasmenum (2004: 1). There are three functions of teaching materials as follows:

a. Teaching materials are guidelines for teachers who will direct all activities in the learning and learning process, as well as a substance of competence that should be taught or trained to students.

b. Teaching materials are guidelines for students who will direct activities in the learning and learning process, as well as a substance that should be studied mastered.

c. Teaching material is a tool of evaluation of achievement of learning outcomes.

Then, the benefits of teaching materials such as:

a. Benefits for teachers

(1) Obtaining instructional materials in accordance with the curriculum requirements and in accordance with student learning needs.

(2) It does not depend on textbooks that are sometimes difficult to obtain.

(3) Enriching insight, because it is developed using various references.

(4) Increase the knowledge and experience of teachers in preparing the teaching materials.

(5) building effective learning communication between teachers and students, because students will feel more trust in their teachers and to themselves.

b. Benefits for learners

(1) Learning activities become more interesting.

(2) The opportunity to learn independently and reduce dependence on teacher attendance.

(3) Get ease in studying every competence that must be mastered.

Gintings (2008) says that the main benefits of the existence of learning materials are prepared for the implementation of learning and learning process, namely:

a. If given to students before the learning process and learning takes place when students can learn it first so that students can:

(1) Have sufficient entry ability to participate in learning and learning activities, so as to achieve maximum learning success.
(2) Students active in learning process, such as: in discussion, question and answer, group work, and others.

b. The process of learning and learning in the classroom runs more effectively and efficiently because the time available can be used as much as possible for the learning and learning activities are interactive such as question and answer, discussion, group work, and others.

c. Develop self-study activities at their ability.

2. Inquiry Method

Before being told about the method of inquiry. First, we much know what the method of teaching. The teaching method is a knowledge of how the teaching methods used by a teacher. In addition, it can be said that the teaching method is a presentation technique that is mastered by a teacher to teach or present learning materials to students in the class, either individually or in groups so that the lesson can be absorbed, understood and used by students well. The better a teaching method used by a teacher, the more effectively the achievement of the expected learning objectives.

The method of inquiry is a method of learning with its own initiative, which can be carried out individually or in small groups. The ideal inquiry situation in mathematics classes occurs when students formulate new mathematical principles through self-employment or in small groups with minimal direction from the teacher. The main role of teachers in inquiry lessons as a methodologist.

Implementation of inquiry within a class carried out by small groups, where each group member performs certain roles as follows (Hamalik: 2013: 221).

a. The group leader is responsible for starting the discussion, preparing the group for tasks and completing tasks, meeting with teachers to discuss the progress and needs of the group, describing information from the teacher to the group, and passing information to the class or to other groups.

b. The recorder: creates and maintains the group's written notes, papers, and writing materials, both made during discussions and distributes them to group members, and lists checklists and attendance lists of group members.

c. Discussion of the discussion (discussion monitor): seeks to ensure that the discussions take place smoothly and all opinions are presented and discussed in the discussion. Monitoring is required for discussion to take place in an open and supportive manner.

d. Prompter: nurturing members' mental discussions with techniques using a checklist of participation for all group members. Encourage each member to contribute and try to illustrate a more detailed explanation of the group members.

e. Summarizer: during the discussion and at the time of drawing conclusions at each inquiry meeting, summarize summarizes the key points that emerged and summarize specific tasks either complete or incomplete, inviting questions from the group to clarify the position of progress and group goals.

f. Advocate performs and provides a comparative opinion of the arguments conveyed in the discussion of those submitted by other groups.

Garton (Sutrisno: 2008) said the method of inquiry has 5 components such as;

a. Question

Learning usually begins with an opening question that provokes students 'curiosity or students' admiration for a phenomenon. To facilitate this process, the teacher entrusts the student to the possible hypotheses. Of all the ideas, one of the hypotheses relevant to the given problem was chosen. Students are given the opportunity to ask, which is intended as a guide to the core questions that students will solve. Furthermore, the teacher addresses the core questions or core issues that students must solve. To answer this question in accordance with Taxonomy Bloom, students are required to perform several steps such as evaluation, synthesis, and analysis. The answer to the core question cannot be found, for example in a textbook, but must be created or constructed.

b. Student Engagement
In the inquiry method, the student's active involvement is a must, while the teacher's role as a facilitator. Students do not passively write answers to questions in the field or answer questions at the end of the chapter of a book but are required to be involved in creating a product that shows students' understanding of concepts learned or in conducting an investigation.

c. Cooperative Interaction

Students are asked to communicate, work in pairs or in groups, and discuss ideas. In this case, students are not competing. The answer to the problem posed by the teacher can come in many forms, and it is possible that all answers are correct.

d. Performance Evaluation

In answering the problem, students are usually asked to create a product that can describe their knowledge of the problem being solved. The form of this product can be a slide presentation, graphics, posters, essays, and others.

e. Variety of Resources

Students can use a variety of learning resources, for example, textbooks, websites, television, videos, posters, expert interviews, and so on.

Furthermore, the method of inquiry must meet the four criteria is the clarity, suitability, accuracy, and complexity. After the teacher invites students to pose issues that are closely related to the subject matter to be taught, the student will be involved in the inquiry activity through the following 5 phases.

Phase 1: Students face problems deemed by students to challenge them.

Phase 2: Students collect data to examine the condition, the specific nature of the meticulous object and the testing of the problem situation at hand.

Phase 3: Students collect data to separate relevant variables, hypothesize an experiment to test the hypothesis to obtain a causal relationship.

Phase 4: Formulate the invention of inquiry to obtain a more formal explanation, statement, or principle.

Phase 5: Analyze the inquiry process, strategies undertaken by teachers and students. The Analysis is needed to help students focus on seeking cause and effect.

3. Discovery Method

Discovery is a mental process of students that can assimilate a concept or a principle in mathematics. The mental processes are intended here, such as: observing, categorizing, analyzing, and making conclusions. Understanding the concept in mathematics, which is an abstract idea used to classify or classify a set of objects. Whether a particular object is an example or not example, for example, the "triangle" the name of an abstract concept, while the "natural number" names a more complex concept. Then, definition in mathematics concept which is a complex mathematical object. Principles can consist of several facts, some concepts connected by a relation or operation. In other words, the principle is the relationship between the various basic objects of mathematics, for example, nature, theorem, and so on.

Some of the advantages and disadvantages of discovery method according to Suherman, et al (2001: 179) as follows.

Advantages of discovery method:

a. Students are active in learning activities because they think and use their ability to find the end result.

b. The student understands the true subject matter because he has experienced the process of finding it himself. Something acquired in this way takes longer to remember.

c. Self-discovery raises a sense of satisfaction. This inner satisfaction encourages the desire to make another discovery so that interest in learning increases.
d. Students who acquire knowledge by discovery method will be better able to transfer their knowledge to various contexts.
e. This method trains students to learn more by themselves.

The disadvantage of the discovery method, which requires a longer learning time compared to learning to receive. To reduce the weakness is needed teacher assistance. Teacher help can start by asking a few questions and by providing information briefly. The questions and information can be contained in the student worksheet (LKS) prepared by the teacher before the lesson begins.

4. Writing of Instructional Materials Using Discovery-Oriented Inquiry Method In Mathematics Learning

Inquiry is another greeting for the inquiry method. Learning by this method is a learning activity that involves students to search and investigate something systematically, critically, logically, and analytically so that they can find their own discovery with confidence.

Mulyasa (Hamzah, et al, 2014: 271) said that the method of inquiry is a method that can lead learners to realize what has been obtained during learning. Inquiry places learners as active learning subjects. Although this method is centered on the activities of learners, the teacher still plays an important role in designing the learning experience. Teachers are obliged to lead learners in doing activities. Sometimes teachers need to provide explanations, ask questions, make comments and through the creation of a conducive climate, using varying media facilities and learning materials.

According to Sanjaya (2009: 196), the method of inquiry is a series of learning activities that emphasize the critical thinking process and analytical to seek and find their own answers to a questionable problem. The thought process itself is usually done through question and answer between teachers and students.

Hamalik (2013: 219) says, there are some formulations about teaching based on inquiry. Among these formulas is "discovery occurs when the individual is involved, especially in the use of his mental processes to discover some concepts and principles." This formula illustrates that discovery is done through mental processes, ie observation, classification, measurement, prediction, and discovery. Inquire teaching is formed on the basis of discovery because a student must use his ability to discovery with other abilities.

Based on the above opinion, the inquiry is defined as a method that gives students the freedom to learn actively, analytically, and creatively in solving mathematical problems.

Furthermore, Hamalik (2013: 220) says, discovery-oriented inquiry refers to academic situations where small groups of students (generally 4 to 5 members) seek answers to inquiry topics. In these situations, students can find concepts or details of information. This model can be implemented by all classes as part of the inquiry activities. The assumptions underlying the inquiry are as follows.

a. The critical thinking and deductive thinking skills used to pertain to the collection of data related to the hypothetical group.
b. Benefits for students from group experience where they communicate, share responsibility, and collectively seek knowledge.
c. Learning activities are presented with the spirit of various inquiries and discovery to increase motivation and participation.

The instrumental strategy can be successful if the teacher takes into account the following criteria.

a. Clearly, define inquiry topics that are considered beneficial to students.
b. Form groups with due regard to the balance of academic and social aspects.
c. Describe the task and provide feedback to the group in a responsive and timely manner.
d. Interventions to ensure healthy interaction between persons and progress in the implementation of tasks.
e. Evaluate in various ways to assess group progress and results achieved.
Based on the above description, in this paper, the authors agree with Hamalik, namely that the discovery-oriented inquiry is an academic situation, where small groups of students consisting of 4 to 5 people, trying to find answers to the topics of inquiry.

In order for teaching materials on learning mathematics by using discovery-oriented inquiry, the method can generate interest in learning for students, it is necessary some criteria as follows.

a. The teaching materials are based on flexible learning patterns, by describing competencies and indicators.
b. Compiled based on student needs and competency standards to be achieved.
c. Provide students with training opportunities.
d. Accommodate student learning difficulties.
e. Always provide a summary.
f. The style is communicative and semi-formal.
g. Density-based on student needs.
h. Have mechanisms to collect feedback from students.
i. Explains how to learn the teaching materials

The role of teaching materials in mathematics learning using discovery-oriented inquiry method as follows.

a. Students can learn without having to have another teacher or student friend
b. Students can study anytime and anywhere
c. Students can learn at their own thinking
d. Students can learn in order

Conclusion

Based on the description it can be concluded that the writing of teaching materials using discovery-oriented inquiry method in learning mathematics aims to train the ability of students to be able to construct knowledge in learning mathematics so that learning can be meaningful for him. In addition, students are trained to be able to appreciate alternatives that may be different from those already existed and have been believed to be true.

Bibliography