IMPROVING THE LEARNING ACTIVITIES BY IMPLEMENTING THE SCIENTIFIC APPROACH THROUGH DISCOVERY LEARNING MODEL

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Info Artikel	Abstract
Sejarah Artikel: Diterima Mei 2016 Disetujui Mei 2016 Dipublikasikan Juni 2016 *Keywords:* *Learning Activities,* *Scientific Approach,* *Discovery Learning*	The objectives of the study were to describe the planning, implementation, observation and reflection, to evaluate and identify the constraints and solutions at each cycle and also to find out the learning outcomes achieved with scientific approach through the discovery learning model for 2nd grade students at SMP 2 Kudus. It was a descriptive qualitative study. The research result showed that the students' activity was **enough** on the first cycle and **good** on the second cycle. The average mean score of the written test on the first first cycles B- and A- on the second cycle. If it was seen from the minimum completeness criterion (KKM), there were 19 students with the percentage of acquisition was 55% on the 1st cycle and there were 32 students with the percentage of acquisition was 93% on the 2nd cycle. The observation results showed that scientific approach gave improvement of students' activities on the first cycle and the second cycle. The results obtained from the use of scientific approach through the discovery learning model to improve the activity was good, but it needs to be observed continuously on students' attitudes, skills and knowledge in school life.

PENINGKATAN AKTIVITAS BELAJAR DENGAN MENERAPKAN PENDEKATAN *SCIENTIFIC* MELALUI MODEL *DISCOVERY LEARNING*

Abstrak

Penelitian ini bertujuan untuk mendeskripsikan Perencanaan, Pelaksanaan, observasi dan refleksi serta mengevaluasi, mengidentifikasi kendala dan solusi dalam mengatasi kendala tiap siklusnya serta mengetahui hasil yang dicapai dalam pembelajaran pendekatan *scientific* melalui model *Discovery Learning* pada peserta didik kelas VII E di SMP 2 Kudus. Bentuk penelitian ini adalah deskriptif kualitatif. Hasil penelitian bedasarkan pada siklus I tingkat aktivitas peserta didik menunjukan rata-rata capaian optimum **cukup**, pada siklus II tingkat aktivitas peserta didik menunjuka rata-rata capaian optimum **Baik**. Perolehan rata-rata skor rerata tes tertulis pada siklus I adalah B- dan pada siklus II rata-rata skor rerata adalah A-. Apabila dilihat dari Kriteria Ketuntasan Minimal (KKM) hasil peserta didik pada siklus 1 yang mencapai KKM sebanyak 19 peserta didik dengan presentase perolehan 55% dan pada siklus ke II peserta didik yang mencapai KKM sebanyak 32 peserta didik dengan perolehan presentase sebanyak 93 %. Hasil observasi pembelajaran pendekatan *scientific* pada siklus I dan Siklus II terhadap Aktivitas guru menunjukkan adanya peningkatan. Hasil yang diperoleh dari penggunaan pendekatan *scientific* melalui *model Discovery Learning* dalam upaya peningkatan aktivitas sudah baik, namun perlu dibarengi dengan pengamatan yang berkesinambungan terhadap sikap, keterampilan dan pengetahuan peserta didik dalam kehidupan di sekolah.

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INTRODUCTION

The success of Curriculum 2013 could be gained by the mindsets change from the teachers, students and community associated with the approach, strategies, methods, techniques and tactics of teaching. It was a case because Curriculum 2013 was different from that previously applied (KTSP 2006). Teachers were expected to have a deep knowledge of Curriculum 2013 which allowed teachers to implement the approaches, strategies, methods techniques and tactics which were appropriate to the curriculum.

The knowledge or information about Curriculum 2013 can be obtained by the teachers through training or the teachers' initiative because as students, they were required to be motivated and consistent to continue or to enrich their knowledge as a part of their sincerity to be the teacher. The past learning was teacher-centered, so it was one-way communication.

One way learning was considered no longer effective and efficient because the teacher transferred the knowledge to students through lecture method which would certainly make the boring learning, because students tended to be passive and received lessons dependently without any efforts to seek it. Moreover, if the teacher dictated students so students were used to receive lessons without any attempts to find out, find themselves, and solve problems on their own.

Implementation of Curriculum 2013 emphasized more on students-centered lerning where students were expected as the learning center with two –ways communication; i.e. the teachers was the facilitator in the teaching-learning process. The teachers needed to try learning strategies which were not implemented yet, i.e. the learning approach which made students participate more actively so students' activities in the learning much more dominant than the teacher's activities. The democratic principle formulated in the education mission was realized in the learning which did not put the Social Science teachers as the subject and a learning resource center in conventional learning. The creative, innovative and fun principles were also revealed in learning activities of Curriculum 2013 based on scientific consisting of five stages of learning, namely: observing, questioning, collecting the information, reasoning and communicating which could be continued to the stage of creation.

Based on the explanation above, the researcher conducted a classroom action research using a scientific approach through discovery learning model to increase students' activities for 2nd grade students of SMP 2 Kudus at social study lesson with the learning material of population growth and population density.

Based on Mulyono (2000), the definition of activity was "any activity or liveliness". So everything both physical and non-physical activities were the activities. Meanwhile, according to Hamalik (2008), learning was a process of individual behavior change through interaction with the environment. The aspects of these behaviors were: knowledge, understanding, habits, skills, appreciation, emotional, social relationships, physical, ethical or moral character and attitude, so the learning activity was one of indicators of students' desire to learn.

Learning activity was an activity which led to the learning process such as; observing, asking questions, presenting their views, doing the tasks, answering the teacher's questions and cooperating with other students, and being responsible of a given task. It made the classroom atmosphere becomes fresh and conducive, where each student could show his own ability. Learning activities arising from students would lead to

the development of their knowledge and skills which consequently improved students' learning achievement. The indicators of students' activity could be seen from; First, most students were involved in the learning activities; second, the learning activity was dominated by students' activities; Third, most students were able to do the assignment on Students' Worksheet through discovery learning model. Some experts believed that scientific approaches could make students more active in constructing their knowledge and skills and could also encourage students investigate/observe to find the facts of a phenomenon or an event. It means that in the learning process, students learned to be accustomed to find the scientific truth, they were not invited to give opinions of a phenomenon. Students were trained to think logically, continuously and systematically, using the High Order Thingking (HOT). Combie White (1997) in his book entitled "Curriculum Innovation; A Celebration of Classroom Practice" had reminded us the importance of giving learning for students about the facts. "Nothing is more important than the fact," as he said.

Permendikbud No. 65 in 2013 on the Process Standard of Primary and Secondary Education has hinted about the need for a learning process which was guided by the scientific approach/principle. Curriculum 2013 based on the scientific learning approach basically consisting of five stages of learning, namely: observing, questioning, trying, collecting the information, reasoning/ analyzing, and communicating and if it was possible it was continued to the creating stage.
In this study, one learning model in the Curriculum 2013 was discovery learning model. The learning model of discovery-inquiry learning was a learning process which happened if students were not provided with the final lesson, but it was

expected that students were able to organize their own learning outcomes, as the learning model. Augmenting the extant research on knowledge with an investigation of how learning affects opportunity identification is important because, depending on how individuals use their knowledge, it can be either a bridge on the road to entrepreneurship or a detour that takes them on a fruitless path (Ward, as cited in Corbett 2007). It changed the learning from teacher-oriented to student oriented learning. In discovery learning, teachers should provide the opportunities for students to be a problem solver, a scientist, a historian, or an expert. The learning materials were not presented its final form, but students were required to carry out various activities to gather information, to compare, to categorize, to analyze, to integrate, to reorganize material, and to make conclusions. (Implementation of Curriculum 2013, the Materials of Teacher Training, Social Sciences for SMP, the Ministry of Education and Culture, 2013).

Based on Carin in Aprilia (2014), Guided Discovery model was a harmonious combination process which was teacher-centered and students- centered. In this model, the teacher gave students the freedom to find the concept, because if they found it by themselves, they would understand it well and they could remember it longer. Wheereas; the teacher could provide guidance or instructions. This model let students investigate and solve problems independently. Rohim (2014) said that to solve the learning problem, the efforts were required; such as improving the learning strategy which could facilitate the communication among students and students and teachers with students, so students could think creatively and critically.

Purwanto (2012) said that critical thinking was a high order thinking needed in the public life. Human beings were always

faced with the problems so it was needed tha data to make logical decisions. Making the right decision was required in critical thinking skill because sometimes; there was something which should not be trusted for granted at once. As it was said that: Students, working in a collaborative environment can make the discovery learning processes explicit, which can lead to a positive contribution to these processes (Okada & Simon as cite in Saab 2007).

Kusumawati (2014), through discovery learning model, the role of the teacher was the facilitator and the learning resource in the classroom, then students were more interested to learn the material because students could find their own way to understand the material. The process of discovery which was done by students in solving the problems presented in the learning process made students remember the lesson because students have their own discovery activities. It was expected that students happy and active in the learning process so students' mastery and understanding of the material were optimized, then automatically students' learning outcomes went up. Students who tend to use the tools of discovery effectively have low dependency needs. Certainly, independent learning is common enough in the day-to-day lives of most people, but such unsupervised students engage in self-learning regularly, and they act in a purposive and self-disciplined way. Adult students tend to become more self-directed in their learning as they mature (Knowles, 1970, 1980, as cited in Hai-Jew 2012). Klahr and Nigam's as cited in Dean (2007) intention is to demonstrate that direct instruction is a more effective means of acquiring the control-of-variables strategy than is "discovery learning," which they define as the student discovering or constructing this skill for himself or herself.

Ilmi (2012) said that guided discovery was a learning method which led students have activities which could develop their science process skills in which students were guided to find and investigate the concept of science so, students' knowledge and skills were not the result of remembering the facts but finding the facts by their own findings.

Yulianto (2007) said that the benefits of discovery learning method were 1) to answer the problems without expecting someone to give answers, so it was able to develop students' confidence and, 2) to handle the problems which happened around the students' environment, which could improve students' knowledge through: a. Supporting the active learning by reconstructing the knowledge rather than receiving the authority. b. The method was underlied the assumption through the learning process not only the facts c. The active learning was the accountability means and put the problem as the basis for learning.

Every individual has the different ability to solve problem because it was related to the strategies of each individual (Hartono in Sulityowati (2012)). There were many problem-solving strategies. Wena in Sulistyowati (2012) mentioned one of the strategies used to solve the problems; i.e. a systematic approach to problem solving. It was the instruction to perform an action which helped someone to solve a problem. In more detail, Mattes in Wena in Sulityowati (2012) said that the systematic approach to problem solving had four steps taken in solving the problems, i.e.: 1) analyzing the problem to determine the students' ability to understand the problem, 2) transforming the problem to determine students' ability in making the settlement plan, 3) operating the problem to determine the students' ability to implement the settlement plan, and 4) interpreting the problem to know the students' ability to check the results of problem-solving

Prihandika (2014) stated that discovery method was chosen for teaching because the

teacher could manage the learning process so students could acquire knowledge which was previously unknown, and in this learning, students could discover the concepts and observe and try by themselves in the teaching process. In this method, the teacher guided students to get the materials.

Hamalik (2008) stated that the learning outcome is the behavioral changes in a person which can be observed and measured in the form of knowledge, attitudes and skills. The change can be interpreted as the improvement and development from previously did not know became knew. There were many kinds of assessment techniques to measure student learning outcomes and process knowledge in the learning activities (authentic context) which was one of the principles of assessment on learning discovery did not just assess what was known by students, but also assessed what students did. To meet these needs, so authentic assessment was done. Assessment techniques which was categorized into authentic assessment was performance assessment, the systematic observation and portfolios (Department of Education, 2002: 25). The performance assessment was used to determine the students' ability to solve the problems in a particular context. Then; systematic observation was used to determine the impact of learning activities on the students' attitudes. If it was compared with traditional evaluation techniques, authentic evaluation strategy was a revolution. The major changes made on the evaluation targets and evaluation techniques. The goal was changed from measuring how much students' knowledge to how students could use their knowledge to solve the real-life problems. Because of this change targets, the technique was changed from pencil and paper test techniques toward work tests with the observation as the main technique.

METHOD

It was a classroom action research. The study was designed for 4 stages; they were planning, implementation, observation, and reflection. The research was conducted in two cycles and implemented in SMP 2 Kudus, in the academic year of 2014/2015. The subjects of the study were students on the 2nd grade at Class E; they were 34 students and, they were 2 peers as the collaborators. The data were from the primary data collected in the form of assessment criteria and activities document of the scores of students' learning outcomes with a certain scoring guidelines.

Organizing science education around collaborative inquiry and modeling activities requires innovative, student-centered forms of instructional support. Collaborative discovery learning environments are a potentially powerful means to offer this type of support, provided that their design meets certain criteria. One obvious demand concerns the presence of tools students can use to explore a task domain through experimentation. Yet merely doing experiments does not capture the full range of scientists activities, nor will it develop deeply rooted, transferable knowledge and skills. Structural changes in domain knowledge require reflection in conjunction with modeling, and reflection is a natural component of the social interaction that occurs in collaboration (Penner, as cited in Joolingen, 2005).

The sources of the data were: (1) Students, about the students' activities in the teaching-learning process of Social Science using the scientific approach through the discovery learning model. (2) The teacher, about the Social Science teacher's activities in managing the teaching-learning process using the scientific approach through discovery learning model, and (3) the score

documents of students' learning outcomes. The data were collected by the research instruments; students' questionnaire of self-assessment, observation, and documentation. The questionnaire was used by the lists of rating scale and rubric. The observation focused on the implementation of social study learning using the scientific approach through the discovery learning model. The field notes made by recording the real events happened in the teaching and learning ctivities both descriptive and reflective records. And, documentation was done by documenting the verbal activities and photos.

The data were analyzed by qualitative data analysis techniques; data collection, data reduction (there were categorization and classification) and data verification, and drawing the conclusion. The success of action was determined by two reviews, the learning process and the learning outcomes. The success of learning process was from the students' learning activities and the learning outcomes were from students' written test. Miles and Huberman in their book (Sugiyono, 2012: 183), suggestsed that activities in the qualitative data analysis were performed interactively and continuously at every stage of the research so the data were complete and saturated. Once the data were collected, they were analyzed qualitatively using data reduction, data presentation, summing up the data and verification; it was interpreting the data involving the researcher's analysis.

Kusmaryono (2015) said that the learning was effective if it fulfilled at least two of three criteria: (1) students gave positive responses to the learning; (2) Student reached the classical mastery learning; (3) achiving the learning objectives indicated by improving students' learning outcomes. The effectiveness of a learning method used by the teacher in the teaching-learning process might need to be tested and compared with other methods on the same subject matter.

Action Planning

A class action research was a structured classroom learning, and it should be prospective and visionaire by taking into account the unexpected events. The plan should be flexible to adapt the unpredictable constraints. To solve the problems on the initial conditions, the teacher made planning by creating the lesson plan using the scientific approach through the discovery learning model, preparing the learning media as the supporting material through students' worksheet 1 to know individual activities and students' worksheet 2 to know group activities which emphasized on observing the activity, questioning, collecting the information, reasoning, and communicating to their friends. Then; the teacher made the observation sheet to monitor the learning activities, and made the evaluation tool to determine the students' success.

Implementation

During the implementation, the Social Science teacher in the classroom implemented the scientific approach through the discovery learning. The steps of the implementation were based on Curriculum in 2013 and the results were expected to increase students' achievement.

The implementation was done by the Social Science teacher. It was done for 6 meetings (12 hours of learning). It was done to to find out how was the contribution of the scientific approach of the discovery learning model for 2nd grade students at SMP 2 Kudus. The implementation was begun with the warming up activities, main activities and closing activities to evaluate students' learning activities.

Observation

Observation was done during the research. It was needed to record the conditions happened on the study from the beginning, until the ending of implementation of the action research. Observation was done together with the

implementation. The data taken were the self-assessment questionnaire of students, students' learning activities. The data were about the implementing actions and the plan which had been made, and the impact of the process and outcomes collected through many observation instruments developed by researcher.

Reflection

Reflection was done through the changes acquired during the teaching-learning process through the discovery learning model. Then, the changes were discusses to be followed up. Reflection stage was a stage for processing the data acquired in observation. Then, data were interpreted, analyzed, and synthesized. In the process of reflection, all observation results were considered and compared so the conclusions were valid. The process of reflection was important to determine the success of the class action research.

RESULTS AND DISCUSSION

Based on the questionnaire for students, the initial conditions of students' activities was less optimum, and students' learning outcomes was below the the minimum completeness criteria (KKM). It happened because students were less active and did not involve in the teaching-learning activities. Students were just sitting, listening and occasionally answering the teacher's questions. Students did the tasks supervised by the teacher. Although students may complete the duty but students did not master the concept as the basis of their own knowledge. Thus; students' knowledge was easily forgotten.

In the process of learning, the discovery learning model could increase students' activities and improve students' learning outcomes. It can be seen from the observation sheet for students' activities if there were some improvements of students' learning activities on the first cycle. Then, it was improved on the second cycle by making smaller groups to make students responsible. The comparison of cycle 1 and cycle 2 can be seen on the table 1.

Based on table 1, it can be concluded that the learning model through the scientific approach of the discovery learning model could enhance students' learning activities on Social Science.

Based on the teacher's activities, it can be concluded that the scientific approach through the discovery learning model on a large group was enough to be implemented by the teacher. Students could observe, ask question, try, gather the information, reason/ analyze, and communicate the information. Although the teacher could motivate and led to the contextual learning, but the creation stage was not happened. Then, the implementation was improved on the 2nd cycle and the learning could lead students to observe, ask question, try, gather the information, reason/ analyze, and communicate the information and even create. Students are led to contextual learning as seen in the questions formulated in the learning.

Based on the written test data, students' learning outcomes increased compared to the first cycle, as shown in Table 3.

Based on table 3, it can be concluded that the Discovery Learning Model could improve students' learning outcomes on Social Science. The reflection comparison of students' learning outcomes on first cycle and II can be seen in the table 4.

Table 1. Comparison of Learning Activity between the First Cycle and the Second Cycle

Cycle 1				Second cycle			
Discussion		Presentation		Discussion		Presentation	
Letter	The Total Students	Letter	The Total Students	Letter	The Total Students	Letter	The Total Students
A	-	A	-	A	4	A	1
A-	-	A-	1	A-	6	A-	6
B+	-	B+	3	B+	11	B+	11
B	3	B	5	B	6	B	4
B-	3	B-	6	B-	7	B-	8
C+	17	C+	16	C+	-	C+	12
C	1	C	3	C	-	C	-
C-	10	C-	-	C-	-	C-	-
D+	-	D+	-	D+	-	D+	-
D	-	D	-	D	-	D	-

Table 2. The Reflection of Learning Activities on the First cycle and the Second Cycle

First cycle	Second cycle	Reflection
Students were more active on their activities because they were invited to observe, ask question, gather the information form various resources.	Students' activities went up if it was compared to the cycle 1. Students were invited to observe, ask question, gather the information form various resources.	Students' learning activities increased on the 2nd cycle because students are placed on small group so they could be responsible.

Tabel 3. The Comparison of Students' Learning Outcomes on the First Cycle and the Second Cycle

First cycle			Second cycle		
Mean	Letter	The Total Students	Mean	Letter	The Total Students
$3.85 < X \leq 4.00$	A	-	$3.85 < X \leq 4.00$	A	1
$3.51 < X \leq 3.84$	A-	10	$3.51 < X \leq 3.84$	A-	17
$3.18 < X \leq 3.50$	B+	9	$3.18 < X \leq 3.50$	B+	14
$2.85 < X \leq 3.17$	B	8	$2.85 < X \leq 3.17$	B	2
$2.51 < X \leq 2.84$	B-	7	$2.51 < X \leq 2.84$	B-	-
$2.18 < X \leq 2.50$	C+	-	$2.18 < X \leq 2.50$	C+	-
$1.85 < X \leq 2.17$	C	-	$1.85 < X \leq 2.17$	C	-
$1.51 < X \leq 1.84$	C-	-	$1.51 < X \leq 1.84$	C-	-
$1.18 < X \leq 1.50$	D+	-	$1.18 < X \leq 1.50$	D+	-
$1.00 < X \leq 1.17$	D	-	$1.00 < X \leq 1.17$	D	-

Table 4. The Reflection Comparison of Students' Learning Outcomes on the First Cycle and the Second Cycle

Cycle I	Cycle II	Reflection
There were 19 of 34 students who reached the Minimum Completeness Criteria (KKM) based on the written test on the 1st cycle.	There were 32 of 34 students who reached the Minimum Completeness Criteria (KKM) based on the written test on the 2nd cycle.	There were 19 students who passed the minimum completeness criteria and it became 32 students. It can be concluded that the scientific approach through the discovery learning model for small groups could improve students' learning activities and be more responsible so they had the active roles in learning.

CONCLUSION

Through the discovery learning model which was implemented on the first first with big groups of 6-7 students and on the second cycle, there were only 4 students each group. The condition could increase students' activities and students' learning outcomes in Social Science in the materials of the population growth and density in the Academic Year of 2014/2015. It was only lack of students' activities on the initial condition and good student' activities on the last cycle which consequently students' learning outcomes. There were only 10 students (27%) who passed the KKM on the initial conditions, then increased up to 19 students on the first cycle and lastly, 32 students (93%) on the second cycle.

The implications of learning with the scientific approach through discovery learning model gave benefits for students because it could increase students' activities and students' learning outcomes in Social Science in the materials of the population growth and density for the 2nd grade students at SMP 2 Kudus at the first semester in the academic year of 2014/2015.

SUGGESTIONS

After carrying out the class action research, it is suggested for the teachers to use the scientific approach in the teaching-learning process of Social Science, and for the policy makers of education to provide guidance for the teachers to implement the discovery learning model because it can increase students' activities and students' learning outcomes on Social Science in which students were previously less creative to express their opinions.

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