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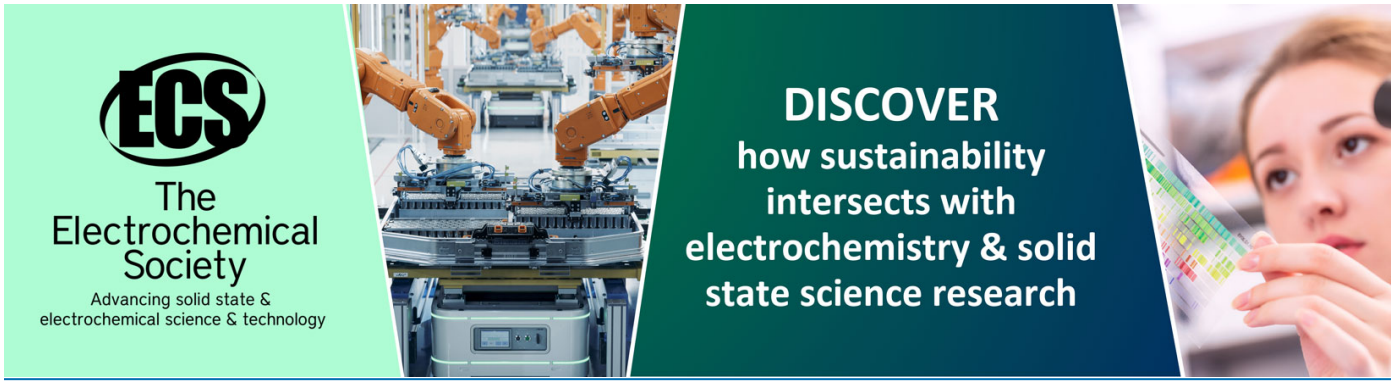

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Designing laboratory activities in elementary school oriented to scientific approach for teachers SD-Kreatif Bojonegoro

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Abstract. Important science lessons are introduced to elementary school students through inquiry. This training is important to do because one key determinant of succesful laboratory activities is teachers. This course aims to enable teachers to design an inquiry-based Laboratory Activity and be able to apply it in the classroom. The training was conducted at SD-Kreatif Bojonegoro by Modeling, Design Laboratory activities and Implementing. The results of Laboratory Activities designed to trace the seven aspects that can support the development of inquiry skills in either category. The teacher's response in this activity is positive. The conclusion of this training can improve the ability of teachers in designing and implementing laboratory activities of Science and then expected to positively affect the frequency of science laboratory activities. Usually teachers use learning by using this Laboratory Activity, it will be affected on the pattern of inquiry behavior to the students as well so that will achieve the expected goals. Teachers are expected to continue for other topics, even for other similarly characterized subjects. This habitation is important so that the teacher's skill in making Laboratory Activity continues to be well honed and useful for the students.

1. Introduction

Teachers' learning tends to teach like when teachers are taught lecturers during college. If the teacher is taught using the conventional method, then when the teacher also prefers to teach by the way of lecture method, although the learning is not suitable or less suitable for the students. Distinguishing the learned science is difficult for teachers, thus teaching it to the students [1]. The teacher should be given the opportunity to examine the nature of the subject matter, to understand not only what is known, but how facts, from which knowledge is acquired rationally. Understanding the basic conceptual sains and the ability to argue scientifically will provide a strong foundation for effective teaching rather then learning about the high material but superficial understanding [1].

Science learning in some elementary schools (SD), teachers generally perform the lecture method by the teacher directly, asking students to summarize the taught topics, or to ask students to read certain material, to compose papers in groups, then to present it in front of the class. Then the discussion, question and answer session about the contents of the paper. In discussion, question and answer session, students ask questions about things that considered unclear to the presenter group. The renderer group takes turns answering these questions. If the presenter group can not provide an

answer, than the moderator, one of the presenter groups, throws the question to the teacher. Furthermore, the teacher gives a direct answer to the students. During the lesson, laboratory activities or field activities are lacking. This kind of learning has weaknesses, among others: (a) the concept, principle or theoretical knowledge obtained by the students from the reading of a book or information from the teacher, is not the result of the discovery of the science process done by the students. As a result, the knowledge gained is limited to knowing, not understanding. Information obtained in this way will be more quickly forgotten; (b) students are more likely to study the topics that are part of their presentation tasks, while other topics are studied only. According to students, the way of learning is like they experience does not make them better understand the material.

Science is a collection of knowledge about the objects or symptoms of nature that have been tested the truth [2]. Science encompasses two aspects of science as a process, known as the scientific method and science as a product known as the body of knowledge [3]. Science also has scientific values or values of science inherent in scientific knowledge [3, 4]. Science as a process begins with observations of natural phenomena by way of work as is done by scientists [5]. Therefore, science learning should start from observation of natural phenomena. Through the scientific process can be developed students' scientific attitude. Such scientific attitudes include curiosity, respect for evidence, critical thinking, creative thinking, speaking based on concrete evidence or data, and care about the environment. Through the process of science can be developed skills to observe, explain, think, solve problems, and make decisions [6]. This is consistent with the purpose of learning science that is to educate students to be able to develop observation and experimentation and obedient principle thinking through: observing, understanding, and utilizing natural phenomena involving substances and energy [7].

It is suspected that the ability of teachers in designing inquiry laboratory activities is still low. This prediction is supported by the result of research [8] the science process of students and elementary school teachers are generally low (4.08% and 65.79%), and in elementary school of science process skill generally developed and integrated with deductive learning, this contradicts the scientific process skills that are taught through scientific inquiry learning to foster thinking, work and scientific ability and communicate it as an important aspect of life skills by emphasizing the provision of direct learning experiences through the use and development of process skills and scientific attitudes [7].

Based on the news uploaded by Tribunnews.Com Bojonegoro [9] stated that a total of 1,177 units of 4,397 classrooms of Bojonegoro District Primary School in damaged condition, in the data of the Education Office, the damage was categorized as moderate, mild to severe. Meanwhile, data from the recapitulation on the use of primary school Funds 2015 issued by the Directorate of Elementary School Development [10]. Bojonegoro Regency received rehabilitation of classrooms (12 SD, 42 classes) Rp 4,009,360.00, library room (14 SD, 14 Space) Rp 2,082,360.00 and ICT facilities (2 SD, 2 rooms) Rp 104,000,000.00, based on the two data sources mentioned above, it can be predicted that the future of Bojonegoro Regency Government in the development of education field will focus on the improvement of infrastructure in the form of rehabilitation of the classroom that will require substantial funds. Seeing the condition of infrastructure and rehabilitation done above it can be ascertained for infrastructure facilities of science laboratory activities in many elementary schools in Bojonegoro regency still can not be fulfilled.

How teacher will conduct inquiry laboratory activities, if the teacher does not have the means of infrastructure that support the activity and the teacher has not mastered the skills needed. Conversely, if teachers have the ability to design laboratory activities then teachers who have a laboratory will be motivated to carry out experiments, while teachers who do not have laboratory equipment can carry out experimental activities using the laboratory by utilizing the tools and materials available in the environment or use the help of Virtual Laboratory to be able operationalizing and having ability.

There are two main factors that can influence teachers to develop inquiry laboratory activities, namely ability and willingness factor. Therefore, in order to improve the quality of science education in Primary School is not necessary two things as follows. First, the improvement of the quality of teachers, especially in matters relating to the improvement of the ability to design and organize

laboratory activities based on inquiry. Second, the creation of conditions that can improve and keep teachers motivated to always seek learning science in elementary school quality.

Based on these two things: ability and willingness, this training is focused on increasing the quality of science teacher teachers in Creative Elementary School members of Bojonegoro District Teachers Meeting, with the aim to develop teachers' ability in designing inquiry laboratory activities in the form of Student Activity Sheets (LKS) for science subjects. This inquiry-based LKS at Creative Schools needs to be developed because of teacher's characteristics and students support for it.

This effort is important to do, because one of the factors determining the success of laboratory activities is the teacher [11], and the results of the training are expected to improve the ability of teachers in designing and implementing science laboratory activities, and then expected to positively affect the frequency of science laboratory activities in Primary school. With the use of teachers using the learning by using this inquiry LKS, it will be affected to the pattern of inquiry behavior to the students as well, so that will achieve expected goals [12, 13].

After the training activity in the newly SD-Kreatif is implemented, the teacher of the trainees is expected to have the ability: (1) Designing the laboratory activities of science in the form of Creative LKS based on Inquiry, (2) Implement science laboratory activity using Creative LKS based on Inquiry.

After the training activities at the Creative School are conducted, the participants are expected to benefit: (1) The result of the activities to be carried out is expected to be a pioneering activity of LKS development in elementary school for other subjects, (2) LKS generated can be made as a learning resource (real teaching) for the world of education in order to realize research-based education, (3) Motivate Primary School Teachers to pioneer create various Creative LKS to facilitate in studying certain material to students.

2. Method Implementation

The objective of providing skills training to make this Student Worksheet is the teachers of Primary School Creative and Primary School Mulyoagung members of MGMP Bojonegoro. The selection of the objectives of this activity is taken with the consideration of those direct actors and can provide information about the learning conditions in the real class. This LKS skill training course will work together between the Unesa Community and Universitas Terbuka's Community Service team with the elementary school teachers of the Bojonegoro MGMP. Implementation will be coordinated with Bojonegoro District Supervisor and Education Office.

Training activities through community service are also aimed at tracing aspects that can support the development of the capability of designing the laboratory activities, namely (1) determining the purpose of laboratory activities, (2) determining the type of experiment in accordance with the objectives, (3) determining the appropriate tools and laboratory materials with the required specifications, (4) determining the experimental circuit and describing the diagram, (5) plotting the experimental procedure and implementing it, (6) preparing an inquiry-based student worksheet, and (7) designing an evaluation of laboratory activities.

This program is considered successful if the trainees are able to design the laboratory activities in the form of Student Worksheet and the team of trainers successfully carry out the training of Designing the Laboratory Activities Oriented on Scientific Approach for the Primary School teachers of MGMP members in Bojonegoro Regency well.

Training methods and techniques for improving these skills are developed through three stages of training:

1. Modeling. Implementation of an example or modeling of science laboratory activities based on inquiry by a team of Community Service from Universitas Terbuka and Universitas Negeri Surabaya.
2. Duplication. The design of the inquiry laboratory activities by the trainees are the teachers of SD Kreatif and SDN Mulyoagung Bojonegoro Regency.

3. Implementation. Implementation of LKS draft results in the simulation of learning in each elementary school class of trainees.

In the implementation of activities carried out monitoring by both parties concerned and at the end of the activity carried out an evaluation of the implementation of activities and training results.

As described in the introduction that there is a lack of laboratory equipment which continues to be pursued by the government through the Bojonegoro education office. With the many problems of school facilities that are not necessarily insurmountable, but activities in the laboratory must keep running, then the teacher must be creative. These limitations should be a motivation to improve things.

Problems have been found and alternative troubleshooting has been offered then makes a plan to solve problems in the field. Elementary teachers will be awakened and will be easy to receive if counseling by way of direct practice or training activities that go directly to the target.

3. Results and Discussion

Training Activities conducted at SD Kreatif Jalan Mangga, campus complex of Universitas Terbuka in Bojonegoro Learning Group, which starts from July to November 2017 from three planned training stages has been successfully done with the following results.

3.1 Modeling

The execution of an example or modeling of Inquiry-based science laboratory activities by the team is designed to tackle seven aspects that can support the development of inquiry skills, namely: (1) Determining the purpose of laboratory activities. (2) Determine the type of experiment that fits the purpose. (3) Determine laboratory equipment and materials in accordance with the required specifications. (4) Determine the series of experiments and illustrate the diagrams. (5) Plan your own trial procedure and implement it. (6) Prepare an inquiry based on student workbook. (7) Design evaluation of laboratory activities. The ability of the instructor in modeling when this activity takes place can be seen in Table 1 below.

Table 1. Instructor Capabilities in Modeling.

No	Aspect Skill	Achievement			Fluency	
		high	medium	less	fluent	less
1	Determining the purpose of laboratory activities	80			80	
2	Determine the type of experiment that fits the purpose		72		75	
3	Determining laboratory equipment and materials in accordance with the required specifications		75		78	
4	Determine the series of experiments and illustrate the diagrams	85			78	
5	Plan your own trial procedure and implement it.	88				65
6	Prepare an inquiry based student workbook		72		80	
7	Designing evaluation of laboratory activities	85			82	

Modeling activities there are few constraints in terms of providing variations of tools and materials for laboratory activities in the form of lamps in the series and parallel circuits, the number of lights of a kind. This has little impact on the activities of planning your own trial procedures and carrying them out.

3.2. Duplication

The design of Laboratory Activities Inquiry in the form of LKS by the elementary school teachers of the training results can be seen in Table 2 below.

Table 2. Master's Ability in LKS Design.

No	Aspect Skill	Thruth			Activity	
		before	After	gain	Active	Passive
1	Determining the purpose of laboratory activities	40%	80%	40%	0.75	0.25
2	Determine the type of experiment that fits the purpose	30%	75%	45%	0.80	0.20
3	Determining laboratory equipment and materials in accordance with the required specifications	50%	80%	30%	0.85	0.15
4	Determine the series of experiments and illustrate the diagrams	25%	75%	50%	0.80	0.20
5	Plan your own trial procedure and implement it.	20%	65%	45%	0.70	0.30
6	Prepare an inquiry based student workbook	30%	60%	30%	0.60	0.40
7	Designing evaluation of laboratory activities	40%	80%	40%	0.75	0.25

Prior to the truth modeling in determining the skill aspect that is trained at highest 50%. In the components determine the laboratory tools and materials and the lowest on the component plan the experimental procedure itself (20%) and implement it. While the activity of participants in the training above 60% (proportion 0.60).

3.3. Implementation

The next training activity undertaken by the team is the implementation of the design result in the simulation of the learning in the elementary school, class of each participant. Real-time simulation was carried out in October 2017. In the implementation of monitoring activities by both parties, namely Team and Principal Elementary School and at the end of the evaluation, the implementation of activities and training results.

Student's response after applying LKS, result of what teacher designed in each class indicates that most of student feels new with LKS, feels guided and motivated with existence of laboratory equipment tangible like tools around them, available on market and cheap.

As in theb teacher's design in finding light relationship with the number of batteries that are used, it was easily observed and did because it uses large battery, battery container, big lamps, and tights that are commonly found in market, easy to find, and cheap.

4. Conclusion

Training through modeling, duplication, and implications can improve 7 aspects of inquiry skills by at least 30%. This training is important to do because the one of the determinants of the success of primary laboratory activities is teachers and training results can improve the ability of teachers in designing and carrying out science laboratory activities and then expected to positively affect the frequency of science laboratory activities in elementary school. Usually teachers use learning by using this inquiry LKS, it will be affected to the pattern of inquiry behavior to the students as well so that will achieve expected goals.

After the training activities at the Creative School are conducted, the trainees are expected to continue to make LKS-based inquiry for other science material topics, even for other similarly characterized subjects. This habitation is important so that teachers' skill in making LKS continues to be well honed and beneficial to their students.

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