Tata Kelola Perbelajaran Berbasis Proyek Pada Pokok Bahasan Bahan Alam Meningkatkan Kreatifitas Siswa Kelas VIII SMP Negeri 1 Sigumpar

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Abstrak

Kata Kunci: Proyek, Pembelajaran, STEM, Kreatif

Project-Based Learning Governance on Natural Materials Improving the Creativity of Class VIII Students of SMP Negeri 1 Sigumpar

Abstract
This research is motivated by the low participation of students of SMP Negeri 1 Sigumpar in participating in the scientific work competition which is their own innovation. All this time, many people think that the students from the countryside are uncreative and difficult to make innovation, and also some people think that the students of Junior High School are too early to start the research. According to Bloom and Anderson’s taxonomy, creative competence is not only for the high school level, but has started even at the elementary school level. By learning to create something out of materials that exist in the surroundings, the construction of the child’s thinking will be formed and will be increasingly critical and innovative. Science, Technology, Engineering, and Mathematics (STEM)-based learning really need to be empowered from an early age. This is in accordance with the demands for independent learning that the government is currently planning. STEM-based learning makes students free to be creative and apply their ideas and creations. This research was conducted at SMP N 1 Sigumpar with the aim of finding out whether the application of the project-based learning model on the subject was effective. Nature can be a material for students' innovative work and improve student learning outcomes. The method of this research used a quasi-experimental research design with one group pretest – posttest design. The data collection method that used in this study was a questionnaire, questions and observations in class VIII A as many as 30 students. Data analysis was carried out by descriptive and qualitative. The results showed that the project-based learning increases student creativity and learning results. So that this learning method is very good to be applied because based on the experience of students the more enthusiastic about learning.
INTRODUCTION

The scientific method will make a person think based on scientific evidence. In daily life, a student who already understands scientific concepts and procedures will be better able to solve the problems scientifically and responsibly. Teaching the scientific foundations is emphasized to students from school age, especially at the junior high school level. Understanding this scientific method can make students creative and innovative. A person learns much better through their active involvement in the learning process such as think about what is learned and then applying what has been learned in real situations (2013, Yulianti).

Nugraheni (2018) the reality in the field showed that the students not only have to understand the existing theory but how to be more creative to produce a product/work that can be used in helping the learning process and at the same time works that can be utilized by the community. In other words, students will be trained to be creative and critical from an early age. However, teachers still do not understand the meaning of creativity and how to improve it in the educational environment. One of the efforts to innovate teaching materials is to use learning models and media. One of the models that can be applied is the project-based learning model. Project-Based Learning (project-based learning) is a learning model that uses projects as the core of learning (Kemendikbud, 2014). Students explore, assess, interpret, synthesize and exchange information to produce various forms of activities.

Abidin (2014: 167) states that the project-based learning model is a learning model that directly involves students in the learning process through research activities to work on and complete a particular learning project. Hosnan (2014: 321) defines the project-based learning model as a learning model that uses projects/activities as a means of learning to achieve competence in attitudes, knowledge, and skills as well as the construction of students' thinking that is orderly and does not jump to a conclusion. The emphasis of learning is focused on student activities to solve problems by applying scientific principles as a whole, analyzing problems, making designs, to presenting products or tools found based on real experiences carried out by themselves.

The project-based learning model is chosen in science learning because students are trained to design projects and make their products according to students creativity, then explain the results of the products that have been made in front of their friends, so that learning becomes more meaningful and interesting. This is in accordance with the focus of the project-based learning model (MPBP) which is on the main concepts and principles of a discipline, involving students in problem-solving activities and other meaningful tasks, providing opportunities for students to work autonomously in constructing their learning, themselves, and culminating in producing student work products.

Currently, learning needs to keep up with the times in the era of globalization by integrating Science, Technology, Engineering, and Mathematics (STEM). The linkages between science and technology or other sciences cannot be separated in science learning. STEM is a discipline that is closely related to one another. Science requires mathematics as a tool in processing the data obtained, while technology and engineering are applications of science in the form of design. The STEM approach to learning is expected to produce meaningful learning for students through the systematic integration of knowledge, concepts, and skills. Some of the benefits of the STEM approach make students better problem solving, innovators, inventors, independent, logical thinkers, and technological literacy. Interesting and motivating learning; can help understand teaching materials, and form creative attitudes, and students are increasingly aware of the importance of protecting the environment. Students feel happy to work in groups so they want PjBL STEM learning to be re-applied to other materials (Afriana, 2016).

Entering the era of the industrial revolution 4.0, education specifically in science learning has
the responsibility to create intelligent, responsible, and adaptive humans to the times (Arnyana, 2018). Mastery of the basics of science and mathematics is also believed to be owned by every individual living in the 21st century. Mastery of the basics of science and mathematics can be obtained through STEM education (Science, Technology, Engineering, and Mathematics). Science and mathematics are considered appropriate to be vehicles for carrying STEM education, because these two subjects are the main subjects in primary and secondary education, and become the basis for students to enter careers in STEM disciplines that are seen as fundamental to technological innovation and economic productivity. (Word, 2015, p.6)

Kennedy and Odell (in Kelley, 2016) show that high-quality STEM education must include several concepts in it, namely: (a) integration between technology and engineering into science and mathematics in it; (b) promoting scientific inquiry and clear engineering design, including coherent mathematics and science instruction; (c) a collaborative approach to learning, connecting students with educators through STEM; (d) Provide free global and multi-perspective perspectives; (e) Combining learning with strategies such as project-based learning, providing formal and informal learning experiences; (f) Incorporating technology that is in accordance with students’ abilities to improve learning.

Toba Regency is rich in natural wealth and has the potential to be used as STEM learning materials in learning. Connecting to STEM-based learning with local wisdom will provide many benefits for students from various aspects. Local wisdom is a culture or activity in an area and trusted by the community until it is carried out for generations (Alviah, 2015). Cultural wealth that has not studied scientifically can be a source of inspiration for students to create a project that will be implemented in learning.

Natural Sciences (IPA) is a subject that looks for the relationship between nature and mathematical concepts, technological designs that can be proven true so that science is an invention of concepts or facts that exist in nature. The results of a preliminary study on STEM-based science learning integrated with project-based learning have not been widely carried out at the junior high school level. The study time available at the school was deemed insufficient for students to complete the project because other learning materials had to be delivered. With limited time at school, many teachers only use the lecture method to achieve the curriculum. With STEM learning, students do not only work on projects at school but can work on them outside of school hours and will be very interesting for students.

**METHOD**

This research was conducted at SMP Negeri 1 Sigumpar from January 2020-March 2020. The sample of this research was class 8A consist of 30 students of SMP Negeri 1 Sigumpar class VIII. This research was conducted using the Quasi Experiment method, whereby the research design used a one-group pretest-posttest design by Cresswell, (2008).

Project planning was prepared with students by discussing the potential that exists in the surrounding environment. Projects were done in groups and students are free to be creative according to the material being studied. During project work, students are free to consult with the teacher. The project results are presented to be assessed and the best will be entered into a research competition. Assessment includes creativity, usefulness, and teamwork. At the end of the learning, students were tested cognitively with written questions. To find out about student learning activities, attitude observations were carried out. In short, the research design is

**FINDINGS AND DICISSION**

Learning is carried out in 3 meetings according to the lesson plan. Students are divided into 5 project groups. Project planning is carried out in group discussions and is guided by the teacher. The project process from the beginning is made in the form of a Time Line.
After the project is completed and a project assessment is carried out.

The first meeting went well by carrying out a pretest which will be used as a reference to determine the level of students’ initial concept knowledge about Natural Materials. The meeting was held online during the COVID-19 pandemic. The pretest questions used were 10 questions that were valid and reliable. The pre-test was carried out using google form questions combined with google meet.

The second meeting was held face-to-face limited after dividing the student workgroups. The second meeting was held by six sessions of discussion to plan the stages of the project and STEM for each group. At this second meeting, students used various literacy sources obtained from research journals accessed via the internet. The concept of natural materials was very interesting to be associated with problems that often occur in the daily environment. Each group plans their project with structured stages to be done together with simple tools and materials. Research or projects carried out by students include aspects of science, technology, engineering, and mathematics. The selection of students' STEM projects refers to the application of scientifically studied local wisdom. Based on the initial group division, students can create 6 different projects according to the theme of Natural Materials.

The project work process was carried out with a limited tools and materials. Students are required to be able to take advantage of existing tools and design replacement tools with designs that still work. As in the picture above, students use a used hose instead of a condenser and connect it to water in the distillation process. To find out the students’ initial abilities on the subject of Natural Materials, a pretest was carried out using questions that had been tested for validity and reliability.

<table>
<thead>
<tr>
<th>Test</th>
<th>Score ideal</th>
<th>Score Max</th>
<th>Score Min</th>
<th>(G)</th>
<th>Des</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>100</td>
<td>54</td>
<td>32</td>
<td>0.67</td>
<td>Moderate</td>
</tr>
<tr>
<td>Post-test</td>
<td>100</td>
<td>88</td>
<td>46</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

With a Gain value of 0.67 in the moderate category. Based on this value, it can be seen an increase in students’ conceptual understanding after STEM learning. The increase in students’ understanding of concepts is caused by students directly working on something that is real around them. This is in line with research conducted by (Ekohariadi & Salim, 2010, p. 42), which states that the high and low attitudes of students towards science are influenced by several things including the work that students want, teaching and learning activities outside the classroom, and
the amount of time they spend used to learn real science.

From the results of this STEM-based learning, there are 5 types of products produced by students and discus local wisdom. The five student project products are: (1). Tuba Saba anti-mosquito DHF lotion, (2). Selay Sansit, (3). Borax indicator from Rondang flower,(4). Tourism Solu from Used Bottles, (5). Ihan Batak is not cooked. These five projects were studied scientifically by students in groups using various literature sources. Generally, project-based learning includes three stages, namely project planning, project implementation, and project evaluation. This is in line with research conducted by Robinson (2013). The results of his research indicate that project-based learning can improve student learning outcomes in audio media development courses. Through this research, students also appear to be more active in learning, more motivated to learn and have higher collaboration among students. Through this research, researchers get an idea that good learning media is needed in improving the quality of learning.

The summary of observational data to determine student activities during STEM integrated PjBL learning is presented in the following Table 1.

<table>
<thead>
<tr>
<th>Component</th>
<th>Indicator</th>
<th>Student Activities Mean</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral activity</td>
<td>Delivering opinion on the discussion</td>
<td>85,0</td>
<td>Very Active</td>
</tr>
<tr>
<td></td>
<td>Give questions related to the subject</td>
<td>85,5</td>
<td>Very active</td>
</tr>
<tr>
<td>Mental activity</td>
<td>Able to deliver of opinion</td>
<td>87,5</td>
<td>Very active</td>
</tr>
<tr>
<td>Writing activity</td>
<td>Take notes on subject matter based on the project made</td>
<td>85,0</td>
<td>Very active</td>
</tr>
<tr>
<td>Visual activity</td>
<td>Students observe various components</td>
<td>88,5</td>
<td>Very active</td>
</tr>
</tbody>
</table>

The Average of the score activities 86,2 Very active

With an average student activity of 86.2 which is categorized as very active, the learning process is very active and trains students to be brave. According to observations during the project, students were very active and felt interested in making something with their own thoughts. Working in groups gives students the opportunity to more freely discuss with their peers.

With STEM learning, students’ literary abilities increase and the teacher also teaches students with scientific thinking constructions from an early age. During project implementation, students and their teamwork together and discuss to solve the problems they face. Learning the scientific stages and working in groups will support the readiness of students to face their future and based on the student learning motivation questionnaire obtained.

Tabel 1. Style dan Fungsinya

<table>
<thead>
<tr>
<th>No.</th>
<th>Nama Style</th>
<th>Fungsi</th>
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<tr>
<td>10</td>
<td>JPMS_Reference</td>
<td>Daftar Pustaka</td>
</tr>
</tbody>
</table>

Hasil berupa gambar, atau data yang dibuat gambar/skema/grafik/diagram/sebangsa-nya, pemaparannya juga mengikuti aturan yang ada; judul atau nama gambar ditaruh di bawah gambar, dari kiri, dan diberi jarak 1 spasi dari gambar. Bila lebih dari 1 baris, antarbaris diberi spasi tunggal. Sebagai contoh, dapat dilihat pada Gambar 1.
Pembahasan difokuskan pada mengaitkan data dan hasil analisinya dengan permasalahan atau tujuan penelitian dan konteks teoretis yang lebih luas. Dapat juga pembahasan merupakan jawaban pertanyaan mengapa ditemukan fakta seperti pada data.

Pembahasan ditulis melekat dengan data yang dibahas. Pembahasan diusahakan tidak terpisah dengan data yang dibahas. Proporsi untuk bagian Hasil adalah 35% dan Pembahasan 35% dari keseluruhan manuscript.

CONCLUSION

Based on research data and analysis, it can be concluded that the application of STEM-based learning by using projects in science learning can increase students' mastery of concepts in Natural Materials material in SMP class VIII with a medium category. The STEM learning model increases student learning activities in the very active category.

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