

PAPER • OPEN ACCESS

Development of Science Learning with Project Based Learning on Science Process Skill : A Needs Analysis Study

To cite this article: Nuraini and Wawan Muliawan 2020 *J. Phys.: Conf. Ser.* **1539** 012055

View the [article online](#) for updates and enhancements.

You may also like

- [Use of the Science Technology and Society \(STS\) model with the help of Facebook in science learning for junior high school students](#)
C Poluakan, Y V Kapubau, N W Suryani et al.
- [Effectiveness of local wisdom integrated \(LWI\) learning model to improve scientific communication skills of junior high school students in science learning](#)
I N Dewi, M Ibrahim, S Poedjiastoeti et al.
- [The 21 st century science learning: HOTS and digital literacy among junior high school students in Semarang, Indonesia](#)
Yeni Widiyawati, Indri Nurwahidah, Dwi Septiana Sari et al.



The Electrochemical Society

Advancing solid state & electrochemical science & technology

DISCOVER
how sustainability
intersects with
electrochemistry & solid
state science research



Development of Science Learning with Project Based Learning on Science Process Skill : A Needs Analysis Study

Nuraini¹, Wawan Muliawan¹

¹Departement of Biology Education, Hamzanwady University

Corresponding Author : aininur_1976@yahoo.com

Abstract : The purpose of this study are: (1) To determine the characteristics of science learning that have been carried out by junior high school teachers in East Lombok , (2). Developing a science learning design model for junior high school by learning Science Process Skill-based Projects, (3) Science teaching materials are arranged in the form of student books. This type of research is the research development of the Dick and Carey model, which is planned for 2 (two) years. The research design in the first year was a needs analysis conducted through a survey to obtain data on the needs for the characteristics and models of junior high school science teaching that have been carried out by teachers in East Lombok as well as compiling a draft of a student's learning design and book draft (LKS) with learning based on a Science Process Skill Project. The instrument used was a questionnaire with research subjects of science teachers and junior high school students in East Lombok . The data collected was then analyzed using descriptive analysis techniques. Based on the results of a survey of student characteristics, it can be concluded that (1) 75% of students said that science learning in the classroom was less enjoyable and 13.9% pleasant and 11.1% even tended to be boring, (2) 77.8%. Students have difficulty in solving problems that are abstract, (3) 95% of students are more interested in learning science associated with everyday problems, (4) 75% of students have not been able to think about science problems..

Keywords : Science Learning, Project Based Learning. Process Science Skill

1. Introduction

Science learning is still dominated by the behavioristic paradigm which considers knowledge to be memorized facts and the teacher as the main source of knowledge. Teachers must develop opportunities for students to interact with the teacher, fellow students, and the environment to construct knowledge [1]. This means that the teacher has a very large role in building student understanding by emphasizing more on student activity in learning and providing meaningful learning for students. Learning as learning is also the basis for future progress in society [2]. The development of science process skills in the learning process is rarely done, the teacher does not involve students in learning much like conducting experiments. Besides that the teacher needs to grow the science process skills, and build student understanding by putting more emphasis on student involvement in learning and providing meaningful learning for students. The teacher does not involve students in learning much like conducting experiments. Science learning is also widely taught by memorization by most teachers so students do not get meaningful learning. The teacher must develop opportunities for students to interact with the teacher, fellow students, and the environment to construct their own knowledge. In the learning process, the teacher must have a strategy so that students work effectively and efficiently, precisely at the expected goals. Science process skills are scientific knowledge that is used to develop students' abilities in solving learning problems, to find knowledge, understand the environment with the concepts they have so they can build their personalities. Students who have been trained with science skills will have honest personalities, and are thorough, so that they are able to socialize with the community. Learning strategies are ways that will be chosen and used by a teacher to deliver learning material so that it will make it easier for students to accept and understand learning



material, which ultimately can be mastered at the end of learning activities. To obtain the expected learning outcomes, teachers need to use appropriate learning strategies in learning [3].

Project Based Learning is a learning model that gives teachers the opportunity to manage learning in the classroom by involving project work [4]. Implementing project-based learning in the classroom may be daunting for experienced teachers and even more overwhelming for novices. Project based learning is the dominant activity. Students access content when required, but the teacher prepares much of it [6]. Project Based Learning (PBL) part of this class is achieved through requiring students to design and develop a non-trivial embedded system or device that performs some real-world useful functions[7]. Project-Based Learning is a method in which students engage in intellectually challenging tasks that drive inquiry questions through gaining content knowledge and academic skills to solve complex problems and informatively defend their solution and outcomes [8]. The Project-based Learning Model provides a scaffold or structure for students to engage in each of these practices by taking the steps to develop and implement a project [9]. Project learning involves more students than an educator in which students are approached or introduced to the real work atmosphere and meaning that they actually encounter around the environment. When students learn by engaging in real-world projects, nearly every aspect of their experience changes. This means that project-based learning strategies can change the traditional classroom learning process into learning that gives students the opportunity to use the surrounding environment as a learning experience that has the potential to facilitate their understanding. The learners are more autonomous as they construct personally-meaningful artifacts that are representations of their learning Project-based learning emphasizes the interrelationship between concepts with children's day experiences day so students can contact and the concepts they already have with the new knowledge they have gained. Characteristics of project-based learning include (1) the existence of activities that produce products or works, (2) the concept of learning materials related to daily life, (3) learning can be done in the classroom or outside the classroom, (4) students design the activities or products produced, (5) assessment is carried out since the planning activities, the process until the results [10]. Important components in Project Based Learning are: (1) a project overview and rationale, (2) a set of clearly defined learning objectives and key concepts, (3) a list of materials and resources; a set of enabling tasks, (4) and assessment criteria and rubrics [11]. Project learning steps consist of: a) starts with essential questions, takes topics that correspond to real-world realities and starts with an in-depth investigation, b) Planning project work rules, planning contains rules, choosing activities that can support in answering essential questions, c) making a schedule activities, educators and students collaboratively arrange a schedule of activities in completing the project, d) monitor the progress of the students' projects, monitor the activities of students while completing the project, e) assessment of student work, assessments are carried out to assist educators in measuring the achievement of standards, f) evaluating students' learning experiences, at the end of the learning process, educators and students reflect on the activities and results of projects that have been carried out [12]. The emphasis of learning is focused on students in solving problems by applying knowledge, making, researching, analyzing to presenting products. This learning places more emphasis on learning activities that require a long time or a long duration, are student-centered and are integrated with actual practice or discovery findings. Project-based learning has enormous potential to make learning more interesting, meaningful for students and encourage students to construct knowledge and skills in a personal way.

Science process skills are defined as insights or examples of intellectual, social and physical knowledge development that originate from fundamental abilities that are in principle already available to students [13]. Science process skill levels of science teachers were analyzed in two stages, namely, basic and integrated process skills in order to give more detailed [14]. Science process skills can be divided into two, namely the basic science process skills and integrated science process skills. Basic science process skills include observing, classifying, measuring and using numbers, making inferences, predicting, communicating and using the relations of space and time. While the integrated science process skills consists of interpreting data, operational definition, control variables, make hypotheses and experimenting [15]. There was a significant relationship between science process

skills among teachers and their attitudes toward science [16]. These skills need to be realized by teachers that it is important in the learning of science and it serve as a scaffold to other cognitive skills such as logical thinking, reasoning and problem solving skills. It is especially important that instruction to the task is clear and useful [17]. The teachers should note some of the problems in the skills where there was indication that the student's level of possession of the science process skills was low. This is important because it will enable the teachers to encourage the students who may be deficient on those relevant skills [18]. Developing the science process skills students will be able to discover and develop their own facts, concepts and add, develop the attitudes and values demanded [19]. Process skills of science are basic and critical components of the process of conducting study of science under the guidance of a teacher [20]. Science processes are skills that focus on the learning process to develop students' skills in understanding the knowledge or concepts, independently discovering and developing necessary facts, concepts, and values [21]. It means that the science process skills are a basic and important component of the learning process under the guidance of the teacher which takes place during the learning process. Basic components of science process skills, including: (1) Observing. Using one or more of the five senses to notice the characteristics of objects or events, (2) Communicating. Conveying information through language, pictures or other means of representation, (3) Classifying. Putting things into categories according to certain characteristics, (4) Measuring. Making quantitative observations by comparing things to one another or to a unit of measure, (5) Relating objects in space and time. Using the relationships of space and time in describing and comparing shapes, locations, motions, and patterns [22]. The interaction between the development of science process skills with facts, concepts, and principles of science, will eventually develop the attitudes and values of scientists in students [23]. Science process skills are the basis of solving problems by applying scientific methods [24]. Based on the understanding related to the science process skills stated above it can be concluded that the science process skills are aspects of intellectual activities that are normally carried out by students in solving problems, which can be learned and developed to instill students' scientific attitudes through the teaching and learning process. Science process skills are intellectual knowledge that is used to understand any phenomenon, where these skills are needed to acquire, develop and apply concepts, legal principles and scientific theories. Based on the description above, the specific objectives of this study are: (1) To find out the characteristics of science learning used by the first Middle School teachers in East Lombok Regency, (2). Develop a science learning plan for SMP with a project learning strategy based on science process skills.

2. Research Method

This type of research is a needs analysis conducted with a survey to obtain data on the characteristics of natural science learning and compile a draft of a student's learning design and book draft (LKS) with the Science Process Skill-based Project learning. The research subjects to obtain data on the elements that contain the junior high school science learning strategies that have been carried out by teachers in East Lombok are junior high school science teachers and students. Location of the study was conducted in 15 districts in East Lombok Regency and each district was randomly selected 3 schools. The collected data consisted of needs assessment data which included the characteristics of natural science learning from 45 junior high schools in East Lombok and then analyzed using descriptive analysis.

3. Result and Discussion

3.1 Survey about Student Characteristics

Based on the survey results of student characteristics it can be concluded that (1) There are 75% of students saying that learning science in the classroom is less fun and 13.9% fun and 11.1% even boring, (2) There are 77.8% students have difficulty in solving problems that are abstract, (3) There are 95% of students more interested in learning science if the material is associated with everyday problems or with real life.

3.2 Survey about Teacher Competency

Based on the survey results it is known that in carrying out learning activities, a survey of teacher competencies is known that in carrying out learning activities, it is known that 33.3% of teachers explain the concept of science by utilizing the environment or contextual, 66% of teachers explain the concept of science using the lecture method, 50% of teachers deliver subject matter with a contextual approach, and only 25% of teachers deliver learning material using the project method, and 61.1% of teachers in presenting learning are considered less attractive even 16.7% of teachers are not interesting in presenting learning.

3.3 Survey about the Characteristics of Natural Sciences Problems

Based on the survey results obtained on the characteristics of science learning problems, 77.8% of students had difficulty understanding science problems related to conceptual understanding, and only 13.9% of students had difficulty with real-life problems and 83% of students had difficulty with problems that are both conceptual and real life

3.4 Survey about Learning Devices

While the results of a survey about the problems faced 75% of students have problems in solving science problems, 55.6% more memorize in understanding the concepts of science concepts, 52.8% of students say that they rarely get skills in solving science problems and there are 77.8 % of students have difficulty in solving problems of a conceptual nature Based on the survey results obtained 49% of teachers have difficulty getting books in accordance with the applicable mathematics curriculum, 95% of teachers use lesson plans in learning, 97% of teachers use LKS in learning, 72% of teachers use teaching aids in learning, and 65% of teachers use computers in learning.

Based on the results of the research above, students generally consider science learning as memorizing subjects so that students consider it to be a less pleasant subject, in addition they also have difficulty in solving contextual science problems, this wrong student perception needs to be changed among students who consider Science is memorizing and boring. The learning methods implemented by teachers in the classroom are dominated by lecture activities and answering questions, or thick learning nuanced teacher centered. Such learning is considered by students as learning that is not interesting enough to be boring. Students often experience difficulties in learning, especially understanding the concepts of science, even many students who have difficulty understanding the direct problems that are related to real life though. This situation is very ironic, because they should theoretically be able to apply their thinking ability, this indicates they are weak in their ability to solve science problems. As a result of this the level of student understanding of subject matter becomes inclined not in line with expectations. Most students are never taught by their teacher to develop skills to solve science problems. This is because teachers prefer conventional learning models compared to Project based Learning.

4. Conclusion

Based on the findings and data analysis, it can be concluded: (1) the majority of teachers at SMPN in East Lombok have not used a science learning model that is student-centered and tends to be dominant in learning. (2) Teachers and students in East Lombok Regency need learning resources in the form of worksheets that can help students understand the concepts, laws and principles of science. (3) It is necessary to develop a worksheet based on the Skill model based on the science process in learning science.

References

- [1] Tung Khao Yao 2016 *Pembelajaran dan Perkembangan Belajar* Jakarta Permata Puri Media
- [2] Gredler 2009 *Learning and Instruction They into Practice*. London: Pearson

- [3] Hamzah 2014 *Variabel Penelitian dalam Pendidikan dan Pembelajaran*, Jakarta PT Ina Publikatama
- [4] Wena 2014 *Strategi Pembelajaran Inovatif Kontemporer* Jakarta PT Bumi Aksara
- [5] Michael M Grant 2003 Getting a Grip on Project-Based Learning Theory, Cases and Recommendations Meridian A Middle School Computer Technologies Journal Vol. 5(1)
- [6] Julie E Mill 2003 Engineering Education is Problem Based or Project Based Learning The Answer Australia asian Journal of Engineering Education Vol. 4(1)
- [7] Sababha 2016 Project-Based Learning to Enhance Teaching Embedded Systems. Eurasia Journal of Mathematics, Science & Technology Education Vol 12(9)
- [8] Movahedzadeh F, Patwell R, Rieker J. E, & Gonzalez T 2012 Project-Based Learning to Promote Effective Learning in Biotechnology Courses. *Education Research International* 1–8.
- [9] Baker, E., Trygg, B. B., Otto, P., Tudor, M., Lynne Ferguson, L Trygg, B Otto, P Tudor, M Ferguson L, & Ferguson L 2004 Project-based Learning Model: Relevant Learning for the 21st Century. *Pacific Education Institute* 1–70
- [10] Hosnan Kosasih 2014 Pendekatan Saintifik dan Kontekstual Dalam Pembelajaran Abad 21 Bogor Ghalia Indonesia
- [11] Roessingh 2011 Project-Based Learning and Pedagogy in Teacher Preparation: Staking Out the Theoretical Mid-Ground, International Journal of Teaching and Learning in Higher Education Vol. 23(1)
- [12] Ozer dan Ozkan 2013 *The Effect of Project Based Learning Method on Science Process Skills of Prospective Teachers of Science Education in Biology Lessons* Journal of Educational Sciences Vol 5(3)
- [13] Tawil dan Liliasari 2014 Pengetahuan Pengetahuan Sains dan Implementasinya dalam pembelajaran IPA Makasar Unhas
- [14] Bulent A 2015 The investigation of science process skills of science teachers in terms of some variables *Educational Research and Reviews* 10(5), 582–594 Prof, A., & Akani, O. (2015). Levels of Possession of Science Process Skills by Final Year Students of Colleges of Education in South-Eastern States of. *Levels of Possession of Science Process Skills by Final Year Students of Colleges of Education in South-Eastern States Of*, 6(27), 94–102.
- [17] Rauf, R A A, Rasul, M S., Mansor, A N, Othman, Z, & Lyndon N 2013 Inculcation of science process skills in a science classroom *Asian Social Science* 9(8) 47–57
- [18] Akani 2015 Levels of Possession of Science Process Skills by Final Year Students of Colleges of Education in South-Eastern States of. *Levels of Possession of Science Process Skills by Final Year Students of Colleges of Education in South-Eastern States Of*, 6(27), 94–102.
- [19] Semiawan, Conny 2002 Pendekatan Pengetahuan Proses Jakarta Gramedia
- [20] Ango Mary 2002 Mastery of Science Process Skills and Their Effective Use in the Teaching of Science. International Journal of Educology, Vol 16(10)
- [21] Siahaan Suryani 2017 *Improving Students' Science Process Skills through Simple Computer Simulations on Linear Motion Conceptions* Journal of Physics Conference Series 812
- [22] Linda Jones 1993 *Engaging Children in Science*, New York Marcimilan Publishing Company
- [23] Dimiyati 2009 *Belajar dan Pembelajaran*, Jakarta PT. Rineka Cipta
- [24] Maknun 2012 Praktikum Ekologi Berbasis Proyek Media Pembekalan Pengetahuan Esensial Laboratorium Jurnal Pendidikan MIPA Vol.13(1) Universitas Lampung