Development Book of Science Process Skills Through Problem Based Learning Models Improving Creative Thinking Ability

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Abstract: Teaching requires new innovations to apply learning to be more varied and competent in their fields, so that they have creative, active, and innovative effects on elementary school teacher education students. As prospective teachers, they are guided to make creative innovations in learning. In line with that, this research was conducted to see the ability of students to think creatively by developing textbooks for science process skills through a problem based learning model. This research method is descriptive quantitative, namely assessing and defining students' science process skills on creative thinking skills through problem based learning models. The Science Process Skills Textbook (KPS) is a book used by students in the basic science concepts course. Some of the material discussed in the science process skills book includes: Living things and their environment, organ systems in humans, the importance of healthy living, the concept of matter and its nature, the earth and the universe. Learning is done through a problem based learning model. The level of students' creative thinking skills achieved is very significant, seen from the learning outcomes, the average achievement value is 4.1%, the category is satisfactory. This achievement is carried out through online learning based on the developed science process skills book. The novelty achieved is the practicality and effectiveness of a valid, practical and effective science process skill book that can be used as a student handbook. Science process skills books that can be taught online have a practical and effective appeal and improve students' creative thinking skills so that the teaching and learning process runs actively, flexibly and efficiently during learning.

Keywords: *Science Process Skills, Problem Based Learning, Creative Thinking.*

Introduction

The implementation of online learning in Indonesia changes the way people think to be more creative and innovative in the learning and teaching process. The government's efforts to break the chain of the spread of Covid-19 through education, namely learning is carried out online or (online) also called distance learning (PJJ), where students are required to be technology literate and lecturers can use online applications in online learning to achieve current educational goals. (Zhafira, 2020). The purpose of distance learning or PJJ that has been implemented by educational institutions is for students to study and work from home with the supervision and guidance of lecturers using online learning applications, (Firyal, 2020). In this way, students have technological knowledge through lecturer guidance through a zoom application known as PJJ distance learning.

Elementary school teacher education students are prospective elementary school teacher students who are guided as teachers who have a high dedication to creativity and learning innovation that will be applied to elementary school students. While elementary school students are the level where students are in a state of very rapid cognitive development and teachers are the mainstay for the development of these students, (Mayang et al., 2021). Teachers play an important role in improving the quality of learning, both the quality of the process and the quality of graduates, (Mulyasa, 2016). Mastery of teaching materials and models that are currently carried out by teachers are still weak and hinder the improvement of the quality of education.(Mulyasa, 2013). The learning pattern that is centered on the lecturer (teacher centeredapproach) is changed to be centered on the student (student centered approach). Education must be able to unite attitudes, thoughts, behavior, conscience, and faith into a single unit.(Mulyasa, 2011). Quality education in addition to being developed through transformation, empowerment of human potential towards the level of perfection,(Mulyasa, Iskandar, 2016).

Theoritical Review

Views and opinions of several figures on education: 1) Ki Hajar Dewantara (1889-1959), "Education in general is an effort to promote character, mind (intellect), and the body in harmony with the natural environment and society., 2) John Stuart Mill (FilsufInggris, 1806-1873 M), Education includes everything that is done by himself and for himself or done by others for himself, with the aim of getting closer to the level of perfection. 3) Edgar Dalle, Education is a conscious effort made by the family, community, and government through guidance, teaching and training activities that take place at school and outside school throughout life to prepare students to play their roles in various living environments for the future., (Dalle

Molle, Kuipers, and Edgar 1988), 4) Plato explained that education helps the development of the body and mind with something that allows for the achievement of perfection in learning, (Murphy, 2015). 5) Al-Farabi's (1986) view is that education is how humans acquire knowledge that is based on its physiological side, nutritive power, imaginative power, sensory power, and rational power that affects human development in a hierarchical manner.

Piaget (1954) understand the development of children's knowledge in the world, develop from time to time through interaction with the outside world and observe the interaction of the development of their environment,(Putra, 2013). Piaget, understand how children create concepts of knowledge to shape their perceptions, cognitions, and judgments about the world and their environment,(Langford and Langford 2018). Piaget (1954), explain the cognitive and constructivist perspectives making the foundation of the problem based learning model a knowledge (cognitive),(Arends 2012). Psychologist first, Jean Piaget, argued that every person/individual always adapts to the environment, (Ramdhani 2017). Jean Piaget also teaches children how to think creatively and process related to their intellectual development, (Arends and Kilcher 2010).

Science education is studied as a vehicle for students to learn more about nature and apply it to everyday life (Suyanti, 2019).Efforts to improve the quality of education and the quantity of teaching and learning processes as well as the ability of lecturers to develop scientific literacy and digital technology, namely getting used to living independently with technology, (Xu et al., 2020). Technology makes lecturers and students able to think critically,(Liliasari 2012), creative thinking,(Retno, 2016), logical thinking,(Hofer and Swan 2014)and have digital literacy skills,(Luthans 2012). Students are able to solve problems in learning,(Surya, at, al 2018), be reflective,(Yus 2017), and resilient in responding to problems and issues in society caused by the impact of technological developments on science,(Carin, A.A. & Sund, 2016; Siswono, 2017; Rahayu, 2017).Technological progress is a process of interaction,(Krahenbuhl 2019)and the reach of human thought is able to reach all levels of society in any part of the world and become increasingly open,(Daryanto Setiawan, 2017; Pangondian R. A. et al., 2019). The ability to think creatively in technology means being able to construct how to think long term,(Bruce, Weil, and Calhoun 2015), and have the ability of science process skills both students and lecturers,(Tantu and Christi 2020).

Method

The research method uses descriptive quantitative, namely looking at student learning outcomes which are oriented to the development of science process skills books developed through a problem based learning model. The PBL model provides opportunities for students to be creative and determine attitudes in solving learning problems based on science process skills books. The PBL model is used in science materials related to problem solving. Students contribute to learning in the form of practicums carried out both indoors and outdoors. The role of problem based learning is in the form of assignments from the material and students carry out a practicum, so that students' creative thinking skills will be created and are able to solve learning problems effectively.

This research was conducted at the Bina BangsaGetsempena Banda Aceh of University and was supported by 45 students in class A as the control class and 45 students in class B as the experimental class. The distribution of student assessment questionnaires on science process skills books resulted in the value of learning outcomes. Students gain knowledge through collaboration, namely by discussing among themselves and playing an important role in group assignments. Learning will take place conducive and produce the desired learning achievement in accordance with the curriculum. Students' creative thinking ability increases as the purpose of this research. The conceptual framework for research development is described as follows:
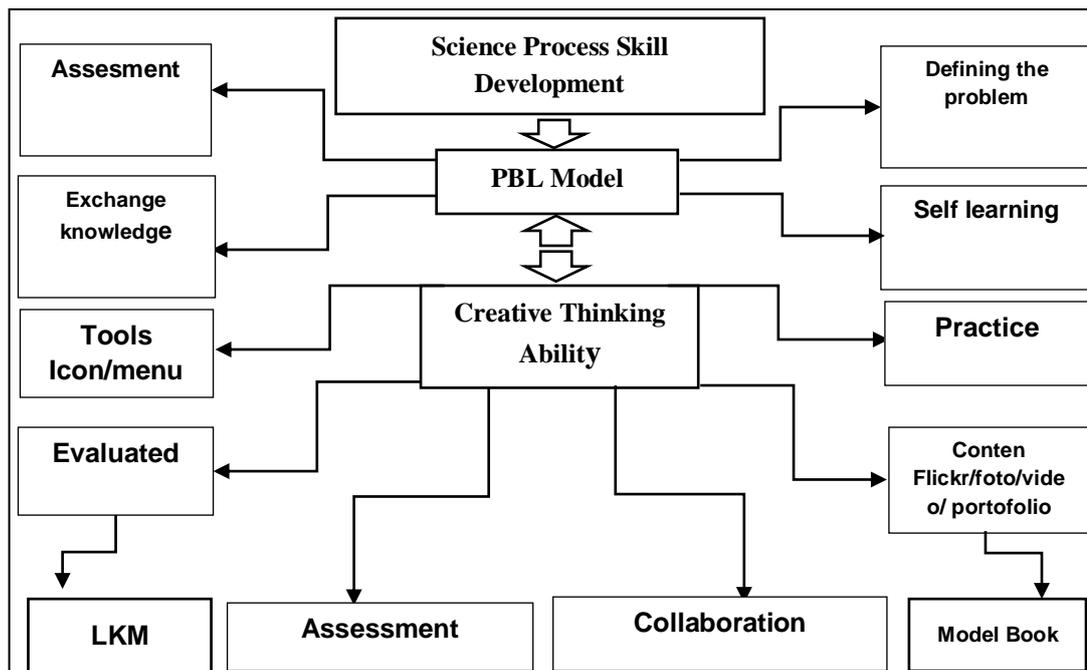
Table: 2.1 Research Framework

The concept of research development with the aim of students having creative thinking skills based on science process skills books through the PBL model to improve students' creative thinking skills. Through the PBL model of assessment given by lecturers to students as the acquisition of learning outcomes.

Discussion

       The development of science process skills books developed through the PBL model is one

       Way to improve students' creative thinking skills. Directing and developing students' knowledge talents to think creatively orally, in writing and to solve learning problems professionally both in groups and individually. Furthermore, students are given direction to be able to do designs in developing creative thinking on performance, projects and portfolio reporting in group and individual practicums. Furthermore, students are expected to have a scientific attitude with the habit of analyzing problems in everyday life through the stages of observation, self-assessment, and assessment between colleagues so that collaboration occurs and has high thinking order skills (HOTS). The picture below proves that students are able to manage the class as directed by the lecturer to develop their scientific talents that are adapted to the material being studied, namely through the PBL model.


Picture: 2.1 Teaching of the Solar System

       Students are able to manage and solve all learning problems. Based on the science process skills book so that students are able to draw conclusions from the results of the development of learning projects through implementation and creative creations.

Picture: 2.2 Location of the Solar System

Science process skills that are poured into the implementation of learning have creative benchmarks for students. The picture above explains that with the Solar System material, students can know and identify the layout of celestial bodies in space. Through tests and practices, students have high scientific process skills and provide solutions to problems that arise in learning. Several assessments for the development of science process skills were carried out based on book indicators as learning guidelines. The indicator aspects of each material are tested from the main competencies, content indicators, content grammar, activity steps, and assessment of closing activities.
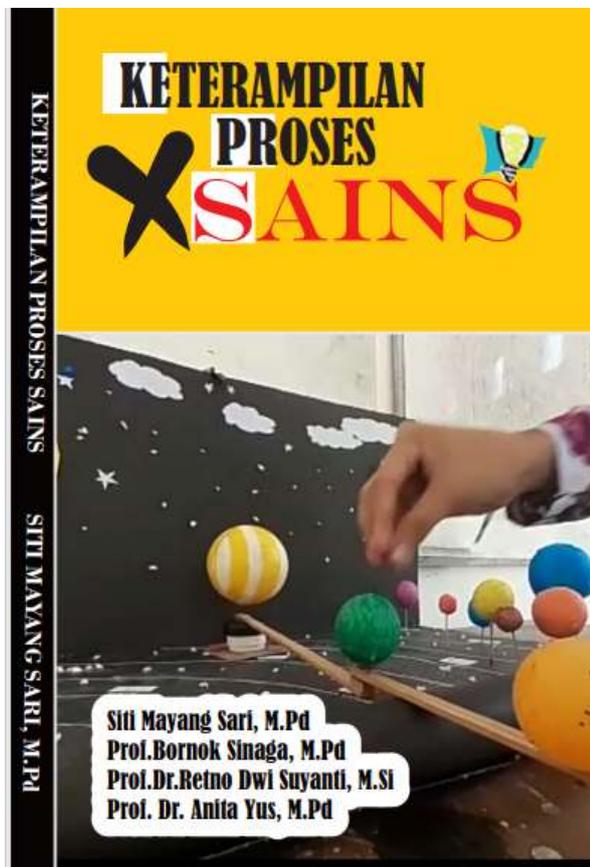
Picture: 2.3 Science Process Skills Book

The assessment of the aspects of each indicator has a category, is: very worthy of number 4, worthy of number 3, less worthy of number 2 and very less worthy of number 1.

Research Result

Tabel: 1.1 Average Value of Book Indicator Aspect Validators

No	Assessment	I	II	III	IV	V	VI	VII	Average
1	Material suitabilty	5,0	3,7	4,3	4,3	4,3	4,3	4,0	4,3
2	Accuracy	5,0	4,0	4,7	4,3	4,0	4,3	4,3	4,4

	content								
3	Recency	4,5	4	4,5	5	3,5	4	4,5	4,3
4	Practice	5,0	3,0	4,5	4,5	4,0	4,0	4,5	4,2
5	Supporter	4,6	3,5	4,3	4,8	3,8	4,0	4,5	4,2
Average of validation									4,3

The average indicator is obtained from the results of the assessment scores of each aspect that is assessed with the assessment criteria on the validation instrument. The results of the sum and distribution of the results of each indicator provided by experts and user practitioners. Furthermore, the average value of indicator 1 has a value of 4.3 with a very decent category, indicator 2 with a value of 4.2 is declared very feasible, indicator 3 scores 4.3 with a very decent category, indicator 4 scores 4.3 with a category very decent, indicator 5 the acquisition value of 4.3 with a very decent score. The science process skills book as a book for students is very feasible to use. The percentage of assessment from the indicator aspect is illustrated in the diagram below:
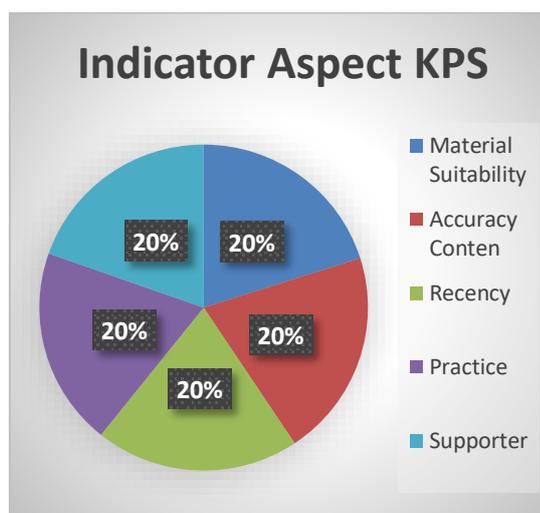
Grafik: 1.1 Indicator Aspect KPS

The achievement of student learning outcomes can be seen from the Normality test of students' creative thinking abilities on student learning outcomes in the control class and experimental class as follows:

Table: 2.1 Normality Test

Creative Thinking Experiment Class	
Asymp. Sig. (2-tailed)	.446
Creative Thingking Class Control	
Asymp. Sig. (2-tailed)	.637

It can be seen that both classes are at the normal distribution level. It is marked with a value. sig>0.05. Thus, it can be continued to carry out statistical tests from the sample data obtained. This test is carried out clearly to see the initial conditions of the distribution of data acquisition with the assumption that the two classes are normally distributed.

Conclusion

Science process skills book (KPS) has an effect on the sustainability of the online learning system. Online-based learning requires proper guidance and direction from lecturers for students in order to increase students' creative thinking skills in managing learning with problem-based learning prioritizing collaboration and collaboration between students. Science process skills books make learning flexible and get good learning outcomes, providing students with technology knowledge with online-based learning.

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