

CHAPTER I

INTRODUCTION

1.1 Background of The Study

Natural Science education is recommended to be directed using a Learning approach based on Science Technology Engineering and Mathematics or STEM. Of course, in this day, learning Science Technology Engineering and Mathematics is necessary considering that Learning with Science Technology Engineering and Mathematics aims to provide opportunities for teachers in developing Natural Science learning to be more facilitated and directed to self-development in terms of creativity and product innovation for students (Maulana, 2020).

The implementation of the 2013 curriculum by the government is expected to help in preparing students skills in facing the development of the 21st century such as the ability to think critically, collaboration and the ability to think creatively (Murti, 2023). Concepts are the basis for higher mental processes for formulating principles and generalizations. Solving the problem, a student must know the relevant rules and these rules are based on the concepts acquire. The 2013 curriculum, the government accommodates students with student centered, namely in the era of revolution 4.0 meets the demands of the 21st century, one of the demands of the 21st century is creativity. The 2013 curriculum is able to develop students potential to become creative individuals and be able to compete globally by having the skills to create new ideas obtained from creative thinking (Kemendikbud, 2016). Learning with STEM approach is able to improve students thinking ability in learning. The 2013 curriculum is applied with an approach that is able to integrate all elements of learning for the skills of more advanced learning and maximum learning in learning outcomes so that teachers and students are able to have a role in the learning aspects in the classroom (Murwianto, 2017).

The change in curriculum from the 2013 revised curriculum to the independent learning curriculum (Kurikulum Merdeka) made changes to approaches, strategies, methods and learning models. The main problem in the 2013 curriculum is that the target of completing the material and the 2013 curriculum has not provided providing flexibility for students to increase creativity and innovation according to the needs of their environment so that a flexible curriculum is needed (Permendikbud, 2016).

Students creative thinking skills can be realized by providing knowledge to students at each level of education and training them to think creatively. Creative nature will grow in children if they are trained, accustomed to exploring and looking for new things that are exploratory by adding understanding and responses and solving problems (Azmin and Nasir, 2019). Although creativity can be developed through practice, in fact in science learning, the learning process in the classroom is still directed to the skills of memorizing information, while high-level thought processes including creative thinking are still rarely trained. This achievement is certainly the result of learning conditions that are still conventional and have not yet developed fostering student creativity, namely how to actually learn (Amiruddin et al., 2021).

Creative thinking orientation consists of 4 indicators, namely fluency, flexibility, originality, and elaboration. Fluency is the number of logically correct responses, flexibility is the number of categories of responses that vary, originality is an unusual but relevant consideration of new responses, and elaboration is the sum of the details used to extend the response. These four indicators are indicators of creative thinking that can stimulate students in solving problems. In particular, problems that occur in everyday life in science learning (Almeida *et al.*, 2008). Conventional learning model methods are a major factor compared to other factors that skills students difficulty in developing creative thinking skills. It is necessary to increase the potential of human resources from the individual side in the era of Information Technology, and among the benefits is learning by applying STEM learning (Suwardi, 2021).

Science has a strong structure and relationship between concepts that allows students to be skilled in rational thinking and thinking actively with ideational skills, so that if students can understand science learning well, it can equip students to think creatively in solving problems that occur in the surrounding environment (Pane, 2014). Creative thinking has a higher level than critical thinking. Creative thinking skills must have critical thinking skills. People who have creative thinking skills or often also called divergent thinking have high creativity and are beneficial to many people. Therefore this creative thinking skills is very important to be taught in schools (Krulik & Rudnick, 1996). The ability to think creatively according to Johnson (2013) is the ability by which students generate new ideas resulting from new understandings So that students who have the ability to think creatively was able to find solutions in a new way.

In the learning process, teachers must have learning strategies that can make students learn effectively and efficiently so that learning goals can be achieved. Teachers as educators and leaders in the learning process are required to be able to adapt to the era of the industrial revolution 4.0. In this 4.0 era, students must be equipped with abilities and skills, namely creative, innovative, collaborating and communicating. In the era of education 4.0 students are required to have the ability to use technology both in terms of finding, managing, communicating and conveying information (Lubis, 2019).

One of the reasons creativity is important to be developed in students is being able to know how to express themselves through their work using the techniques they master, introducing ways to find alternative problem solving, making children have an attitude of openness to various experiences, and making children have self-satisfaction with what they do and an attitude of respect for the work of others (Munandar, 2006). The creative thinking Skills is approved by the one whose the student understand for. Creative thinking is a way to generate new information and produce a unique end product. Creative thinking is the effort of our brain to connect objects or ideas that were previously unrelated (Siang et al., 2020).

The importance of creative thinking in learning is a form of understanding, activeness and the ability to think creatively is an ability that a person has in order to create something new, both in the form of an idea and a real work that is definitely different from before (Noviyana, 2017). Four characters who follow creativity, namely always thinking and imagining, doing activities that focus on goals, undergoing processes that produce something original, and producing something of value according to the goal (Scoffham, 2013). Creative thinking helps students in adjusting to change. The more creative a person is, the more alternative the solution, by creating people can realize (actualize) themselves, and self-embodiment or actualization is a basic need at the highest level in human life. Creativity or creative thinking as the ability to see an assortment of possible finishers as the ability to see various possible solutions to a problem (Munandar, 2009).

Creative thinking involves students to always ask questions and always be curious in every way, besides encouraging students to always think about finding out about the problems that have been determined to be discussed together, which is related to the discussion. Creative thinking is a way to broaden horizons in students, so that every student is required to have a high degree of creative thinking. Of course, the creative thinking ability that students have is able to hone themselves to create decisions from many thought directions in finding solutions to every problem (Ananda, 2019).

Learning that requires student creativity is indispensable for the continuity of student understanding in the classroom. Creative thinking skills are also being developed for the renewal of students learning in the classroom Learning activities that apply creative thinking skills can produce something new in the form of both ideas and real work, The creative thinking skills should to gain the Competency and Skills learning of student, that education can give attention to the development of thinking skills. Students can develop their creative thinking skills through classroom learning so that habits are needed to be able to form these characters, creative thinking skills can be applied in learning. (Partnership 21st Century Skills, 2010).

Creative Thinking skills are individual skills in using their thought processes to produce new, constructive, and good ideas based on concepts, and principles of rational and perceptual principles, and individual intuition. Students who have high metacognitive awareness was successful in learning. In the 2013 Curriculum metacognitive skills are highly demanded to be possessed by students. In the core competencies of the skills real, the skills that must be met is creative thinking. According to Sari et al., (2018) said that science needs to be given to all students starting from school to equip students with critical, innovative and creative skills, so the use of learning models must also be appropriate in determining student creativity with their abilities in learning in the classroom.

Based on the results of pre-research conducted with observation and interview techniques on October 2022 at SMP Negeri 37 Medan, several obstacles were found in learning in classroom learning, such as having to be given a stimulus or encouragement to ask and respond to learning and students who passively do not want to respond to learning and in asking questions that are not yet understood in learning, The conventional model lack of understanding of the material as well as interaction with the teacher at the time of learning. In fact, students creative thinking ability can be said to be still untrained. This fact occurs due to several factors, including learning activities are still focused on teachers, teachers are not creative and innovative in using learning models during the teaching process in the classroom. Science teachers at SMP Negeri 37 Medan, namely Learning that uses a scientific approach with the lecture method presented by the teacher does not arouse the curiosity of students and students are less active in in providing responses as well as not being able to ask questions about information that is not understood from what is observed or questions to obtain information. Students also respond less to classroom learning with a variety of other responses if given case examples on existing learning. The application of this learning, students do not show learning indicators by using students creative thinking skills based on indicators of Building on the knowledge students already have, arouses curiosity, looking at different angles of information and forecasting limited information.

In classroom learning activities, it is proven that the lack of creative thinking skills is evidenced by the lack of ability to answer questions about the material, cognitive learning outcomes of students who achieve Minimum Completion Criteria or KKM, from all students or 16 people with KKM science subjects, namely 75 which are determined based on school standards and the quality of learning carried out. Material-related learning affects student learning outcomes and creative thinking skills, such as finding and digging for information, asking questions and responding to learning delivered by teachers. The approach used in learning presented by teachers based on the results of interviews is a scientific approach.

The approach to learning is also followed by the application of learning models to be able to achieve learning objectives with the existing Learning Step Steps. aims to achieve specific goals by applying predetermined steps (Rusman, 2017). A learning model that can be applied is the STEM Project-Based Learning model. Through the learning approach that was carried out, namely STEM, it is very useful to improve students creative thinking skills by encouraging students to discover and explore new things and information that encourage students to actively ask questions and opinions in class and the projects carried out.

An interactive approach taken with the application of various fields of science, namely STEM. STEM which consists of elements of Science, Technology, Engineering and Mathematics is based on learning with the proximity carried out is able to collect and analyze problem solving and relationships between problems (Handayani, 2014). The PjBL Learning Model will make students develop projects on related materials so that they are able to develop students creative thinking skills. The STEM-PjBL learning model can train the students thinking skills. STEM-PjBL is proven to arouse students curiosity and trigger creative imagination. In STEM-PjBL learning, students are invited to do meaningful learning in understanding a concept. Students are invited to explore through a project activity, so that students are actively involved in the process (Ismayani, 2016).

The environmental pollution topic contained in class VII junior high school has a relationship with the project learning model because students are able to connect information with information from different disciplines, which is triggered by students curiosity and curiosity about the environment and existing pollution. Real-life-based learning activities assist students in realizing the importance of theory and science in natural resource management. applied to the inside Because of the written communication skills in the content and writing language, students can write down an idea of the right solution to overcome the problem of environmental pollution. In the learning process, the teacher guides students in small groups to develop various solutions to given problems, encourages collaborative learning and strengthens critical thinking, creative and communication skills (Sumarni et al., 2019).

The results of previous research for learning with the STEM-PjBL Model can improve critical thinking skills, especially the creative skills namely in the research of Furi et.al. (2018), namely learning with the STEM-PjBL model with learning with product formulation and design that has been carried out by students to bring out creative ideas of students, design work procedures that was carried out by making process diagrams, designing the resulting development processes and products. Research conducted by Ani Ismayani (2016) states that learning the Project-Based Learning model with a STEM approach has a significant effect on creative thinking skills by exploring through a project activity, so that students are actively involved. PjBL learning is learning that uses comprehensive learning with the design of the student learning environment or classroom atmosphere to investigate problems to learning materials and carry out learning tasks (Sistem Pendidikan Nasional, 2003).

Based on the description above, to find out the effect of the STEM-PjBL model, the researcher conducted a study with the title "The Effect of STEM-PjBL Model on Students Creative Thinking Skills in Environmental pollution topic of SMP Negeri 37 Medan."

1.2 Problem Identification

Based on the background above, problems can be identified:

1. Classroom learning by teachers and students who use conventional learning model methods so as not to improve students creative thinking skills in science learning at SMP Negeri 37 Medan.
2. Low student learning outcomes due to learning that does not asking questions, giving responses, and asking about renewable things as well as variations in responses related to material in the learning process of science subject students in the 7th grade at SMP Negeri 37 Medan.
3. Low creative thinking skills of students in science learning at SMP Negeri 37 Medan with less active students in the learning process in class, such as looking for information and asking questions and responding to teachers related to material on science learning at SMP Negeri 37 Medan.

1.3 Scope of Study

Based on the identification of the problems that have been described, The scope of this research is The Effect of STEM-PjBL (Science Technology, Engineering and Mathematics-Project Based Learning) Model on Students Creative Thinking Skills in Environmental pollution topic of SMP Negeri 37 Medan.

1.4 Limitation of Problems

Based on the identification of the problems that have been described, the researcher provides boundaries so that they are not too broad and do not deviate from the research objectives, and directed and goals can be achieved. The limitations of the problems in this study are as follows:

1. STEM approach with the PjBL Model on learning that was made to science material at SMP Negeri 37 Medan.
2. The Population Class used is 7th Grade of SMP Negeri 37 Medan.
3. The material used is specifically for learning with the STEM-PjBL Model, material is Environmental Pollution
4. Approach of Students creative thinking skills are according to indicators of building on the knowledge students, arouses curiosity, looking at different angles of information and forecasting limited information

5. Research time in the even semester of 7th Grade of SMP Negeri 37 Medan.

1.5 Research Questions

Based on the identification of the problems that have been described, the formulation of the problems in this study is as follows:

1. Is STEM-PjBL model affect on students creative thinking skills compared to the students who are taught using conventional learning model in environmental pollution topic of SMP Negeri 37 Medan?
2. Is students result of the students creative thinking skills who are taught by STEM-PjBL model learning of environmental pollution topic higher compared to the students creative thinking skills who are taught using conventional learning model in environmental pollution topic of SMP Negeri 37 Medan?

1.6 Study Objectives

The objectives of this study are as follows:

1. For the STEM-PjBL model affect on students creative thinking skills compared to the students who are taught using conventional learning model in environmental pollution topic of SMP Negeri 37 Medan.
2. Knowing the students result of the students creative thinking skills used STEM-PjBL model learning of environmental pollution topic higher compared to the students creative thinking skills taught by conventional learning model in environmental pollution topic of SMP Negeri 37 Medan.

1.7 Research Purposes

In accordance with the formulation of the problem, the benefits of this research are:

1. For schools, the results of this research can contribute in the form of teaching used to improve the quality of learning and improve the quality of graduates for school progress.
2. For teachers, the results of this study can provide more innovative options As STEM-PjBL model that is able to improve students creative thinking skills and be able to teach them in environmental pollution topic.
3. For students, the results of this study can provide alternative teaching materials that can provide student-centered learning so that learning is more

interesting and able to develop students creative thinking skills and be able to apply them in environmental pollution topic.

4. For other researchers, as a comparison or reference material for researchers who are interested in researching the STEM-PjBL model.



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