

CHAPTER I

INTRODUCTION

1.1 Background

Following the development of the worldwide education focus, the 2013 curriculum, the one that is applied as the current nation' curriculum focuses on students centered learning, or students active active learning in which students are supposed to be able to actively explore knowledge, skills, as well as attitudes. The scientific approach model has been chosen to be used as a standard model for classroom instruction. It embedded 5 major activities that students must experience in the class which are observing, questioning, exploring, analyzing, and communicating (Hasan, 2013).

While most teachers make essay examinations that provides a section for discussion, rarely do this kind of activity gives a significant change towards the nature of passive learning experienced by students in the class. This kind of teaching and learning environment only enable students to process surface knowledge rather than a deeper level of knowledge and understanding (Marton & Saljo, 1976). According to Jaques (1991), the traditional teaching strategies only encourages students to focus in superficial indicators of a subject rather than on the essential and fundamental underlying principles which then neglecting the active learning or deep learning that students need to experience.

Active learning is defined as learning experiences in which students are thinking about the subject matter as they interact and form engagement with the instructor and each other (McKeachie, 1999; Gamson, 1991). This type of learning is crucial to all field and subjects as it is as well critical in the development of humanities and social sciences. While large class sizes insist that the lecturing strategy will likely to still be done due to its importance in learning process, this only strengthen the reason to increase the implementation of active learning to balance it off with passive learning whenever possible (McCarthy & Anderson 2000). However, in an analysis done by Waltz (2014), eventhough there is some evidence of generally positive impact on self-reported variables, the studies offered much less frequent reporting on academic achievement. Several

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studies that has been focusing on students' performance reported that when teachers or instruction provide more opportunities for the student to participate in learning, students will be more actively engaged in the topic that is being discussed (Stevenson & Gordon 2014).

Thinking is the outcome of the interaction between three components which includes the individual intelligence, their cognitive style, and their knowledge. However by the school age, students' intelligence and cognitive style may already be relatively fixed and even if those could be improved, the result will not be as significant. The component of knowledge so then become the only aspect that can be changed and developed (Riding, 1993). The development of this aspect of thinking can not be achieved unless students are actively involved in the learning process (Woolnough, 1988). Science learning in general has to be in a meaningful learning condition where students can engage to it and this condition can constantly make them wander in a continuous implementation and practice (Osborne & Collins, 2001). The provision of this condition is influenced by classroom teacher's attitude and the students' motivation in learning where teacher' ability to provide a suitable learning environment for their students will affect the students' motivation in learning as well as their academic achievement in science education (Tastan et al, 2017).

There is several research discuss the effectiveness of the implementation of active learning towards students' academic achievement such as in a research done by Shin, Hyun, & Kim (2014), where students in the active learning group were significantly having a better achievement in learning competency. Overall, active learning displayed more improvement in conceptual learning and understanding of scientific reasoning, a greater appreciation of science and its role in their lives, and greater motivation and involvement in learning activities (Udovic, Morris, Dickman, Postlethwait, & Wetherwax, 2002). Another research done by Yalcin (2016) shows that there is an improvement on students' scientific knowledge and science process skill after the implementation of active learning based science camp.

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Based on The Organisation for Economic Cooperation and Development (OECD) through a program named PISA, the country of Indonesia if compared to the mean score of all country joining the program in the science subject area, is grouped into the lower class level. The OECD average for mean score in PISA is 493, meanwhile Indonesia obtain only 403. Until the latest PISA conducted in 2015, Indonesia shows no significant improvement in terms of students performance in science subject area with only 3 points score difference in average (OECD, 2016).

Trends in International Mathematics and Science Study (TIMSS) is another kind of international rated survey that assess students' knowledge and skill in learning science and mathematics. In 2015, Indonesia join the survey and the result shows that Indonesian students are categorized as low performer in science subject. Indonesia was ranked 45th out of 48 other countries that join the program and only obtain the score of 397 meanwhile the international average is 600 points (Martaida, Bukit, & Ginting, 2017).

School science curriculum content, followed by teacher practice and the perception of science subject are what considered as key factors influencing students' motivation and interest in learning science. As the higher the education level, the amount of students taking up science class is decreasing. Most of the students who taking up science courses claim that they have a positive experiences during their school science compared to students who actually competent but decided to not taking up science course anymore (Shirazi, 2017). As science subject in general has been claimed as difficult to learn, physics subject specifically, is majorly affected by cultural arbitrary of students who claim that physics subject referred as a "male only subject" or masculine and difficult subject, which results in students to turn away from physics and ended up into choosing other science major (DeWitt, Archer, & Moore, 2018).

Students ability to process science has a central role in learning with understanding, wether in formal education or throughout life. Students with the skill to process science are able to understand and improve the meaning of knowledge that they have and explain the natural world. The development of

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science process skill and science knowledge construction is often separated in an ordinary classroom setting whereas, science knowledge is gained through science process (Michaels, Shouse, & Schweingruber, 2008). The rational and logical thinking skill that is used in science is represented by process skill. And that to produce a solution towards a problem, students need to act on information that is enabled by science process skill (Burns, Okey, & Wise, 1985). Teaching strategies and curriculum sequences aimed at teaching and enhancing science process skill has received much attention in science education. And on the other hand, the teaching strategies that promotes context-free skills and are domain independent has been subject to a lot of criticism due to the fact that meaningful context functions through the aspect of cognitive areas (Roth & Roychoudhury, 1993).

Researchers and historians of science have been reporting a similar focus on science curricula in which it encourages educators that hands-on activity should be embedded in science learning rather than memorizing a factual information of science matters (Anderson, 2002; Atkin & Black, 2003, Rudolph, 2002). The provision of the necessary resources for science learning as a part of practical activities that allows students to justify the learning resources or facts embedded in it, has been a widely accepted method in teaching science at secondary level (Thair & Treagust, 1999). The development of a conceptual understanding in science requires students to actively involved in processing information as a form of theoretical justification which is accompanied by inquiry approach in which became dominant in science education (Woolnough, 1988).

A further research could be implied from the previous research explained before, not only to the extent of increasing students' academic achievement, but also another skill that said to be involved in the implementation of active learning such as science process skill. Unlike previous researches, in this research, active learning is implemented through science block where students are learning by being involved in activities provided in different blocks or stations of Newton's Law provided by researcher and instructor. This research aims to implement science block as an active learning to facilitate students so that they can

optimize their learning according to the nation's curriculum and to analyze science process skill of students.

1.1 Research Problem

The research problem of this research is "How does the implementation of science block as an active learning affects students' academic achievement and science process skill in learning motion and force?". In attempt to answer the following research questions, this research is constructed.

1. How is the effect of active learning-based science block implementation towards students' academic achievement?
2. How is the profile of students' basic science process skill in learning motion and force?

1.2 Research Objectives

The objectives of this research are as follows:

1. To investigate the effect of active learning based science block towards students' academic achievement in learning motion and force.
2. To investigate the profile of students' basic science process skill.

1.3 Research Benefit

1. For Teachers

This study would be able to help teacher creating an unusual learning environment for students and provide an alternative way to conduct learning as well as improving their performance in teaching. It is hoped that teacher would be able to implement active learning in their classes to enhance the academic achievement of the students and further make students get used to a learning which requires the use of skills and will finally improve the students' process skill so that they can experience a meaningful learning and could help them solve problems related to real-life situation.

2. For Students

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This research would be able to provide students experience a new nuance of learning in which it could improve their understanding in the topic of motion and force as well as facilitating students to experience a meaningful learning by the usage of skills to acquire knowledge.

3. For Other Researchers

This study is hoped to allow other researcher to learn about positives outcome from conducting science block. And a further research is expected to investigate other positive outcomes that can be achieved through applying science block in school.

1.4 Organization Structure of Research Paper

This reserach contains 5 chapters that is organized as following:

1. Chapter I: Introduction

The first chapter of this research discuss the background of this research as well as reserach problems which are ought to be investigated in this research. It also includes the research questions, limitation of problems, research benefits, and the organizational structure of this research.

2. Chapter II: Literature Review

This chapter reviews the variables discussed in this research, which are science block, students' academic achievement, students' science process skill, and the nervous system.

3. Chapter III: Methodology

This chapter disscuss the research design and the research method applied in this research. It also contains population sample, operational definition, research instrument, instrument analysis, data collection, data analysis technique, research procedure, and research scheme.

4. Chapter IV: Result and Discussion

In this chapter, the result of the research is discussed regarding to the previous research about related variables and its interpretations.

5. Chapter V: Conclusion & Recommendation

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The conclusion of the research discussed in this chapter. Recommendation for further research is also contained in this chapter.

1.5 Limitation of Problem

The problems in this research is limited into the following:

1. Science block as an active learning is limited into instructional activities that involves students to do something and engage them into thinking about the activities (Bonwell & Eison, 1991).
2. Academic achievement of students is limited into the sstudents'' concept mastery where it involves the cognitive level that includes remembering (C1), understanding (C2), applying (C3), analyzing (C4), evaluating (C5), and hypothesizing (C6) based on Bloom Taxonomy in Krathwohl & Anderson (2009).
3. Science process skill as explained by Fowler in 1990, is students ability to process science that is grouped into basic and integrated process skill. The basic science process skills of students includes observing, inferring, measuring, communicating, classifying, and predicting.
4. The learning topic in this research, which is motion and force, is based on the 2013 curriculum which include Newton' I Law, Newton' II law, and Newton' III Law.

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