CHAPTER I
INTRODUCTION

1.1 Research Background

In Indonesia, some science teachers tend to explain the phenomena to the students, hoping they will be able to master the concept with no chance to observe and to experience the phenomena directly in nature, as the teacher put less attention on it. This ends up making the students act as information receivers meanwhile the teacher plays the information provider role (Vebrianto, 2005). This is a serious problem that both teachers and students need to team up to solve. Because students' minds toward subjects are extremely powerful. Their thinking is more than teachers have ever expected. They often question unexpected particular things, especially in science teaching-learning.

The 21st-century skills are seen as the omnipresent topic in nowadays science education talks. Various skills are mentioned under the title of the 21st-century skills: resolving problems, making decisions, recognizing risks, and managing changes in science, as well as increasing the confidence of people about the value of science in everyday life. To achieve those skills, science teaching is supposed to be experienced by the students. They must live the process of organizing problems, projects, investigations, and experiments to capture them in their situation. Since the students are expected to experience science teaching directly, the role of the teacher is going to be more crucial, they are not only limited as a "talking head", but ascend as a coach, guide, consultant, mentor, and even co-learner (Hurd, 2000).

Regarding this issue, teachers are anticipated to provide a meaningful worksheet as one of the ways to answer the challenge is 21st-century skills through science learning. The reality found in the field does not match what was expected, some teachers have not mastered the creation of student worksheets in the relation between the content of the topic that is learned in the class with the skills that are promoted in 21st-century skills. This is proved by a study conducted in Mataram where the worksheets the teachers made have not represent high order thinking skills as what is stated in one of the 21st-century skills. The worksheets did not state a clear objective as they only consisted of steps to do an investigation. This fact resulted in not achieving the learning process according to the expectations of 21st-

century learning so that there was a need for improvements to the worksheets (Makhrus et al., 2018).

In the recent PISA test held back in 2018, Indonesia secures its place in 72nd rank out of 77 participating countries which means that the overall score is still below the average (OECD, 2018). The score of Indonesia in three different fields namely reading, mathematics, and science are 371, 379, and 396 consecutively. While in the previous test in 2015 Indonesia got 397 for reading, 386 for mathematics, and 403 for science which indicated that Indonesia's ranking is getting lower (Tohir, 2019). This outcome can be seen as a consideration to improve the quality of science learning by upgrading the old teaching method to student-centred learning.

SWOT is the acronym of Strength, Weakness, Opportunity, and Thread where these four elements are the core of this tool analysis. SWOT analysis usually comes in a 2×2 table or 4-quadrant grid where strength and weakness are placed on the top left and right, followed by opportunities and thread on the bottom grid. Become the widely used tool in strategic planning, SWOT analysis can be applied flexibly in various organisations, companies, or even small groups as it offers a simple detail of how the evaluation of the industry happened. Even though the tool is widely used these days, the beginning of SWOT analysis remains unknown (Helms & Nixon, 2010).

Curriculum 2013 has been adapted in the Indonesian Educational System for a few years already. Based on the core competence and basic competence of the curriculum, it can be seen that the students are asked to participate more actively. In this renewed curriculum also, the students are expected to be excellent in every aspect of science learning, especially the soft skills such as processing data, and reasoning (Ministry of Education, Culture, Research, 2016). To make it happen, Curriculum 2013 must be implemented optimally by the teacher especially as the party the students interact directly during the learning process (Tanti et al., 2020).

The reality is not as ideal as what is expected. Many obstacles had been experienced even though the achievements that occurred could not be said to have failed during the implementation of the curriculum, especially in the science teaching-learning process. Hariana (2015) stated that one of the factors that hamper

the implementation of Curriculum 2013 is inadequate facilities and infrastructure. Teachers expected that the facilities and infrastructures in school need to be improved to create a more innovative and creative learning atmosphere (Neolaka et al., 2016). In another study, the execution of Curriculum 2013 has not been implemented optimally because not all of the teachers are aware of learning model variation like inquiry or discovery model for some reasons such as the number of students in a class, differences of students' character, and time allocation on preparing the materials (Agustina, 2018). This situation is getting worse by the fact that some teachers are less computer literate. Besides that, a lot of schools still do not have laboratory assistant who stays full time to take care of the laboratory. Most schools' laboratory assistant is a science teacher (Suluh & Ate, 2019).

Raj & Devi (2014) stated that Science Process Skills (SPS) are described as multi-discipline science skills where the scientists can mirror their behaviour toward science. The presence of Science Process Skills also encourages the students in increasing their participation in science class, assist the students in raising their responsibility –since science is about research and methods–, and sustain them to behave like a scientist. Besides, Science Process Skills allow the students to dig in information, thinking based on the problem, and how to make a solution toward it (Karamustafaoğlu, 2011). One of the intersections between 21st-century skills and Science Process skills (SPS) is stated in the sentence above: students are asked to resolve problems based on the phenomena they found in science class.

Science Process Skills are divided into two groups: Basic Science Process Skills, and Integrated Science Process Skill. Observing, classifying, testing and using numbers, constructing space-time relationships, and predicting are the indicators that are grouped in Basic Science Process Skill; meanwhile, the indicator of to make an experiment, to hypothesize, to identify and control variables, to interpret data, and to obtain results are included in Integrated Science Process Skill (Karamustafaoğlu, 2011).

Science educators have been considering that Science Process Skills are supposed to be the main objective of all education levels in science teaching (Gagne, 1965; Germann et al., 1996), as stated by Harlen (1999), the main objective of teaching science education has to be the development of science process skill.

Multiple choice questions, questionnaires, and even student-centred lab activity can be done to assess the students' skills in learning science. Based on the statement, it also can be concluded that choosing various models, learning approaches, and appropriate methods can improve the students' science process skills (Safaah et al., 2017).

Science process skills have been researched and implemented for so many years. Researchers around the world have been studying the method or strategy to improve students' science process skills. Its application in the learning process also varies in many topics in biology, physics, or even chemistry. Even so, not all indicators of science process skills are exercised equally. One of the causes is the limited sources from the previous research.

A case study related to the application of Science Process Skills in Indonesia was done by Sukarno, Permanasari, & Hamidah (2013) about The Profile of Science Process Skill Students in Jambi. 322 8th grade junior high school students from 10 (ten) schools were involved in this study. In the study, students' skills of inferring, observing, predicting, measuring and classifying were tested by using 20 multiple questions and showed that the average ability of Science Process Skills of students in Jambi is still relatively low regardless of the factors which influence behind. This proved that science process skills have not been able to be taught immaculately.

Another study by Khaeruddin et al. (2016) stated that the students' science process skills score can be maximized by engaging the students with the material that will be discussed. The teacher can stimulate the students by asking and discussing few questions that led to a problem before the students are asked to experiment, discuss with the group and presenting the result based on the data they have collected. In the study, the pre-test and post-test shows a different score of 44.02 on average from twelve science process skills indicators: formulating a problem, constructing hypotheses, identifying variables, defining operational variables, making an experiment, creating tables, making a chart, interpreting graphs, analysing, inferring, and concluding.

Sejati et al. (2020) underwent a descriptive study to profile the ability of junior high school grade 8 students in a public school in South Tangerang City. In

the study, the students' science process skills score is obtained by giving out three multiple-choice questions for each indicator tested. The indicators tested are observation, classification, prediction, asking, composing hypothesis, designing an experiment, using tools, interpreting, applying the concept, and communicating. On average, the students can make up to 61% of the score obtained. Even though the result obtained shows that more than half of the students can undertake science process skills, the researchers hope that improvement of some science process skills is executed in the future.

Additional research is conducted by Martiningsih et al. (2019). The study that included 46 (forty-six) students from 2 (two) classes as the sample for the research showed that the students' science process skills in four indicators namely observing, classification, interpreting, and communication increased by several per cent by implementing a module based on scientific contextual learning in learning additive substances in physics. The researcher expressed that the performance of the students' science process skills is getting better because students experience higher learning quality.

Within this study, the researcher expects that the students' science process skills are put into notice more seriously. One of the ways to improve the students' science process skills is to make optimal use of the worksheets. Therefore, the development of the worksheets as well as its optimization in providing science process skills-based activities is expected to match the students' needs toward science learning in facing 21st-century challenges so that they can compete with the youth globally. In this research, the researcher tried to profile the occurrence of science process skills indicators in the worksheet as a way to support teachers in preparing and delivering learning materials, which indirectly also helps students to practice their science process skills.

1.2 Research Problem

Based on the research background that has been explained, the research problem of this study is "How is The Analysis of Science Process Skills on Science Worksheet for Junior High School?"

1.3 Research Questions

Several questions can be developed based on the research problem above, they are:

1) How is the SWOT analysis of science worksheets for junior high school?
2) How is the analysis of basic science process skills in grade 7, 8, and 9 science worksheets for junior high school?
3) How is the analysis of integrated science process skills in grade 7, 8, and 9 science worksheets for junior high school?

1.4 Limitation of Problem

To make the research focus, there are two main limitations of the problem in this study.

1) Science Worksheet

   The worksheets that are used as the instrument in this study are adapted from the national science textbook from grade 7 semester I to grade 9 semester II.
2) The Science Process Skills that are analysed in this research are based on the study of Karamustafaoğlu (2011) which are divided into two groups: basic and integrated science process skills.
   a) Basic Science Process Skills include observation, classification, testing and using the number, constructing space-time relationships, and prediction.
   b) Integrated Science Process Skills cover five indicators which are to make an experiment, to hypothesize, to identify and control variables, to interpret data, and to obtain a result.

1.5 Research Objectives

The objectives of this research are divided into general and specific objectives. The general objective based on the research problem that has been mentioned is to analyse the science process skills on the science worksheet for junior high school. The specific objectives of this research are mentioned as follows:

1) To analyse the basic science process skills on grade 7, 8, and 9 science worksheets for junior high school.

2) To analyse the integrated science process skills on grade 7, 8, and 9 science worksheets for junior high school.
3) To analyse the worksheets on junior high school science textbooks by using SWOT analysis.

1.6 Research Benefit

Few benefits hopefully can be obtained from this research, they are:

1) For science teachers, this study is expected to give a new viewpoint and experience in regards to teach science process skills to the students by using worksheets provided in the textbooks since teachers nowadays are expected to be more creative and innovative in delivering the materials as well as in assessing the student. Even though the worksheets still lack in some aspects, adapting some points from them is not a waste of time and effort.
2) For students, they are given chance to experience a different type of activity in learning science. Common science teaching learning relies on the lecturing process regardless of the topic the students have in learning science. Doing observation is one of the activities that can be done to measure as well as to exercise the students' science process skills in observing natural phenomena.
3) For other researchers, this study may be used as a supporting study to do further research related to the science process skills in junior high school students especially its adaptation in the worksheet.
4) For the book author, the result of this research can be used as a consideration to put the science process skills indicators on worksheets evenly. It is still possible to insert the least indicators into the worksheets.

1.7 Organizational Structure of Research Paper

In arranging the research paper, there is a structure that leads the information along with the study. The structure is put into order as explained as follows:

1) Chapter I is the introduction that includes the research background which discusses the base of this research, research questions, limitation of the problem, the objectives of the research; benefits of the research, and organizational structure of the paper.
2) Chapter II contains a literature review of science process skills in general, indicators in basic and integrated science process skills that are used in this

research, which were already mentioned in research questions in Chapter I as well as the profile of science books which worksheets are obtained from.

3) Chapter III discusses the research method, followed by research subject, operational definitions that include a brief definition of science process skills and the detailed indicators, research instrument, data analysis, followed by procedure of the research which steps is concluded in 3 (three) main stages (preparation stage, implementation stage, and completion stage), completed with a flowchart that is drawn to give the visual representation of how the research steps are conducted.
4) Chapter IV explains the SWOT analysis of science worksheets, the result of the research based on the data processing and data analysis following the research questions as stated in Chapter I, and the discussions of the research results to answer the questions that have been stated before.
5) Chapter V compiles the conclusion, implications, and recommendations of this research.