CHAPTER I
INTRODUCTION

1.1. Background Problem

The rapid advancement of science and technology development along with the turn of the 21st century has pushed the education system to focus on producing a creative, innovative, and forward-thinking generation (Syamsuar and Reflianto, 2019). Kemendikbud (2017) claims that to compete in the 21st century, students must possess the capacity to collaborate, communicate, creativity, and critical thinking. The 2018 PISA survey assessed 600,000 15-year-old students from 79 countries. Based on this survey, Indonesian students scored 379 in mathematics, placing them seventh from the bottom, while the average maths and science score for OECD members was 489. The score shows that Indonesian students' ability for critical thinking is quite low, in the sense that the abilities and the application of mathematical communication, problem-solving, and reasoning of Indonesian students are not optimal. PISA evaluates and measures the ability of students to perform analysis, reasoning, and effectiveness in communicating knowledge and thinking skills, as well as solving and interpreting real-life problem-solving.

Critical thinking aims to discover concepts independently which involves examining, connecting, and evaluating all aspects of a situation or problem (Kemendikbud, 2016). Critical thinking skill is truly required by students in this 21st century. Critical thinking abilities can be influenced by a variety of factors, such as an open mind, a strong sense of curiosity, and high motivation. The ability of critical thinking allows students to analyze thoughts to ensure that they have made a choice and draw a clever conclusion (Azizah, et al., 2022). According to Jamaluddin, et al. (2020), students who have good critical thinking abilities are able to produce cautious while deciding whether to accept or reject a proposition as true or untrue. Developing critical thinking skills is an integration of several parts of skill development, such as observation, analysis, reasoning, judgment, decision-making, and persuasion. The ability of students to solve complicated problems successfully will increase as these talents are developed in students.

Chemistry is one of the mandatory subjects in the learning curriculum of SMA and MA. A lot of students have difficulties understanding the concept of chemistry, this is in line with the research conducted by Kustianingsig and Muchlis (2021) which states that a pre-research questionnaire revealed that 90.9% of students considered chemistry as a challenging subject to learn. One of the chemistry materials that is difficult to learn is reaction rates. This statement is proven by the pre-research result which shows that as many as 75% or 25 out of 33 students consider the reaction rate material to be a difficult material to study (Cahyani & Azizah, 2019).

The current learning system promotes constructivism, uses teachers as facilitators, and allows students to learn independently. Kirna (in Muwadatur Rohmah, 2019), an inquiry approach can provide initial knowledge and be used to develop conceptual understanding. Learning cycle 7-E is a model that applies an inquiry-based approach and is student-centered. Learning cycle 7-E expects the ability to learn independently, and actively, reflect on findings, interpret prior knowledge, and predict findings in new situations. Learning cycle 7-E is based on constructivism, namely the success of students' learning which not only depends on the learning environment or conditions but also the students' initial knowledge and calls for making students actively interact with one another and teachers can organize and provide the necessary facilities, so that knowledge power will increase. Students who participate actively in their education demonstrate that they are capable of receiving maximum knowledge (Kustianingsih and Muchlis, 2021). Eisenkraft (in Khasanah, 2018) states that the stages in the 7-E Learning cycle learning model include elicit (explore initial knowledge), engage (motivate), explore (observe and investigate), explain (communicate), elaborate (application of concepts), evaluate (assessment), and extend (applying the concept).

Improving students' critical thinking skills surely requires variations in learning mechanisms, one of which is by using learning tools. It is necessary to make interesting and innovative improvements to learning instruments to innovate teaching and learning activities (Babang, 2020). One of the learning tools that demand a modification is student worksheets which could help students integrate physical and mental activity during the learning process.

The development of student worksheets is unable to be separated from the learning model so the activities in student worksheets are able to achieve learning objectives, namely to improve students' critical thinking skills. One appropriate learning model is Learning Cycle 7-E. Learning Cycle 7-E whose basic development in inquiry so that students can build the concepts that they will learn through exploration and elaboration steps which makes learning more interesting, They find their path in understanding a concept, thus bringing out critical thinking abilities (Utami & Aznam, 2020). The usage of student worksheets with the Learning Cycle 7-E model could provide complete learning, which is a combination of activities that involves visual, oral, mental, and writing skills (Rukmana & Alimah, 2019).

Research conducted by Firdaus & Wilujeng (2018) states that student worksheets could improve critical thinking abilities by 0.43 which includes in the medium category. Meanwhile, based on research results by Utami & Aznam (2020) that student worksheets based on Learning Cycle 7-E were effective in increasing students' critical thinking abilities because the independent sample t-test results obtained that showed a Sig (2-tailed) significance of 0,000 (<0,05).

Based on the previously explained background problem, the researcher is interested in conducting research with the title **"Development of Student Worksheet Oriented Learning Cycle 7-E to Improve Students' Critical Thinking Skills in Reaction Rate Materials"**. Student worksheet developed is expected to assist students in possessing critical thinking abilities, remembering, and understanding the material well.

1.2. Problem Identification

Based on the description of the background problem above, the problems in this research could be identified as follows.

1. Students' critical thinking skills are still low
2. Students have a difficult time understanding Chemistry materials, especially reaction rates
3. Not many student worksheets that orientate on Learning Cycle 7-E have been found as a companion and support resource for learning

1.3. Scope of Research

The scope of the problem is in line with the problem identification in this research, as seen as follows.

1. This research developed learning media in the form of Learning Cycle 7-E oriented student worksheets
2. The chosen learning material in this research is reaction rates
3. The development model used is 4D (four D)

1.4. Scope of Problem

Considering the large number of problems that could occur in this research and the limitation of time and supporting resources, the researcher limits the problem in the research as follows.

1. The learning media developed is student worksheet
2. The learning model used is Learning Cycle 7-E
3. Material served in this student worksheet is Chemistry SMA/MA material with the main topic of reaction rates
4. The product is developed with the usage of 4D research method
5. The subject of the development research is students of class XI MIPA MAPN 4 Medan
6. Critical thinking abilities measured in this research are limited to 4 indicators, which are analyzing, synthesizing, recognizing, solving problems, and concluding

1.5. Problem Formulation

Based on the background of the problem, problem identification, scope, and limitation of the problem, the formulation of the problem in this research is as such.

1. What are the need analysis results of the student worksheets that are used in MAPN 4 Medan?
2. What is the feasibility level of the Learning Cycle 7-E oriented student worksheets based on BSNP standard criteria?

3. What is the response from the Chemistry teacher and the XI grade students majoring in Science towards the developed Learning Cycle 7-E oriented student worksheets on the reaction rate topic?
4. What are the critical thinking abilities of the students after the usage of Learning Cycle 7-E oriented student worksheets?

1.6. Research Purpose

In line with the problem formulation that has been stated, the objectives of the research are as such.

1. This research aims to obtain data and information regarding the need analysis result of student worksheets that are used in MAPN 4 Medan
2. This research aims to obtain data and information regarding the feasibility of the Learning Cycle 7-E oriented student worksheets based on BSNP standard criteria
3. This research aims to obtain data and information regarding the Chemistry teacher and the XI grade students majoring in Science response to the developed Learning Cycle 7-E oriented student worksheets on the reaction rate topic
4. This research aims to obtain data and information regarding the critical thinking abilities of the students after the usage of student worksheets oriented on Learning Cycle 7-E

1.7. Research Benefits

This research is expected to be useful for several parties, as stated as follows.

1. For Researchers

   This research could improve the knowledge, competence, and skills of the researcher in designing a learning media in the form of student worksheets oriented on Learning Cycle 7-E which can be applied afterward as prospective teachers.

2. For Teachers

   Student worksheets which are developed could become one of the learning media used in the teaching process on the reaction rate material to determine students' critical thinking abilities.

3. For Students

   Student worksheets which are developed could be used as a media source for students' independent learning on reaction rate material which can increase knowledge, and learning achievement, and train and measure their critical thinking abilities.

4. For Schools

   For schools to understand that student worksheets oriented on Learning Cycle 7-E could be used to measure students' critical thinking abilities in Chemistry class learning activity.

5. For Future Researchers

   This research could be used as study material or literature for further research.