

CHAPTER I

INTRODUCTION

1.1 Background of the Study

Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have the skills needed by themselves and society (BP et al., 2022). National education in Indonesia has been designated as one of the national development sectors to make the nation's life more intelligent. Having a vision of realizing the education system as a strong and authoritative social institution to empower all Indonesian citizens to become quality human beings, so that they are able and proactive to respond to the challenges of the ever-changing times (Situmorang *et al.*, 2018).

Current developments in science and technology encourage the implementation of the Indonesian National Qualifications Framework Curriculum (KKNI) in higher education which aims to develop student potential optimally. The implementation of the Indonesian National Qualifications Framework (KKNI) as the basis for competency standards has shifted the teaching and learning paradigm to adopt a competency-based curriculum at Universitas Negeri Medan. The current curriculum needs to implement various learning strategies to equip students with knowledge appropriate to the subjects they learn (Sutiani *et al.*, 2017).

Therefore, innovative learning materials are needed that are relevant and easy to understand by students in accordance with the demands of the applicable curriculum. Good learning materials must be able to present subject matter that is in accordance with curriculum demands, developments in science and technology, and able to connect learning to achieve predetermined competencies. Innovative teaching materials are learning resources that can be better adapted to student needs. Flexibility to analyze and consider various factors, including student qualities such as intellectual, emotional and spiritual capacities, as well as learning barriers (Sutiani *et al.*, 2017).

Teaching materials are all materials, whether in the form of information, tools or texts that are arranged systematically, and display a complete figure of competencies that will be mastered by students and used in the learning process

with the aim of planning and reviewing learning implementation (Prastowo in FH, 2021). Furthermore, innovative teaching materials should provide opportunities for the development of students' character so that they are competent in developing their knowledge capacity independently through high-level thinking skills such as critical thinking, creativity and decision making, as well as problem solving (Temel, 2014; BE *et al.*, 2019) .

Critical thinking is considered to help in solving problems and making decisions, while problem solving is a process where individuals try to overcome the problems they face to achieve goals. This is related to how we think, not what we think (Sutiani *et al.*, 2017). One of the potentials that must be developed and formed in higher education is critical thinking. Critical thinking is an organized mental process and plays a role in the decision-making process to solve problems. Critical thinking includes analysis and interpretation of data in scientific discovery activities (Suparni, 2016).

Analytical chemistry, as a chemical discipline, is concerned with the qualitative and quantitative characterization of chemicals. This is very important in almost every part of our lives because chemicals are present in everything we use (Dasgupta *et al.*, 2013). This course is very interesting and demanding because it can be a method for developing critical thinking skills that integrate theory and practice, as well as knowledge and abilities in using instruments for analytical purposes (Juliandiani *et al.*, 2020).

To improve the teaching and learning process in chemistry courses, variations in learning methods and models can be used. One learning innovation is the use of a project-based learning model. Project-based learning is learning that requires a long period of time, focusing on student activities to be able to understand a concept or principle by carrying out in-depth investigations into a problem and finding relevant solutions and implementing them in project work, so that students experience a meaningful learning process by building his own knowledge. The project-based learning method allows students to be able to work independently or in groups to produce project results that originate from everyday life problems (Nurfitriyanti, 2016).

Several previous studies on new chemistry teaching materials found that these teaching materials had beneficial effects. One of them is a research paper entitled "Innovative Chemistry Learning Materials with Projects and Multimedia to Develop Students' Thinking Skills in Teaching Anion Analysis" by Juliandiani *et al.* (2020) shows that the development of innovative chemistry teaching materials can improve students' critical thinking skills, analytical chemistry skills and knowledge. Another research conducted by Rizki *et al.* (2020) shows that the development of innovative learning materials can increase creativity in laboratory experiments, encourage students to study freely, create a more enjoyable learning environment, and ultimately improve student performance in knowledge and psychomotor elements.

Based on the facts and problems above, the authors are interested in conducting research with the title **“The Development of Innovative Learning Resource with Project to Improve Student Critical Thinking Skills on The Teaching of Redox Titration”**

1.2 Problem Identification

Based on the background of the problems described above, the identification of the problems in this study, are as follows:

1. Students have problems understanding lessons, especially in college students are required to study independently.
2. The learning process has not utilized teaching materials and learning models more optimally.
3. The implementation of practicum activities in the laboratory is still not maximally carried out by students.
4. The need for students to use innovative teaching materials to improve critical thinking skills.

1.3 Scope of Study

To focus the problem, the research scope of the problem under the research is limited to:

1. Design a project on the subject of Redox Reaction in accordance with applicable curriculum requirements.
2. The learning model that is integrated in this teaching material is a project-based learning model.
3. The media used in this development is a learning module which is reviewed and revised by the chemistry lecturer until standard teaching materials are obtained.
4. This study only develops Chemistry learning modules for Bilingual Chemistry 2020 students.

1.4 Research Questions

Based on the background that has been stated previously, the problem formulations in this study are:

1. What is the strategy that will be carried out to develop innovative learning material for teaching of Redox Titration?
2. What are the mini-projects that can be developed to be integrated in the Redox Titration teaching material to make the Analytical Chemistry teaching easily learn?
3. What is the strategy that will be carried out to standardize innovative teaching materials in order to meet the eligibility criteria for teaching materials according to SNPT standards?
4. How effective is the project based innovative learning material in building critical thinking skill of students in studying Redox Titration?
5. How effective is the project based innovative learning material in improving student learning outcomes on Redox Titration?

1.5 Study Objectives

Based on the formulation of the problem above, the objectives of this study are as follow:

1. To develop an innovative project-based teaching materials for the teaching of Redox Titration.
2. To compile and develop mini projects that can be developed to be integrated in the for teaching of Redox Titration teaching material to make the Analytical Chemistry teaching easily to learn.
3. To standardize innovative teaching materials in order to meet the eligibility criteria for teaching materials according to SNPT standards.
4. To build critical thinking skill of students through using innovative project-based teaching materials in studying Redox Titration.
5. To improve student learning outcomes that are taught by using an innovative project-based teaching materials in teaching Redox Titration.

1.6 Research Purpose

The results of project-based learning innovations in Redox Titration material are expected to be useful:

1. For students, this innovative learning resource is expected to help students understand and increase their interest in studying the material of Redox Titration.
2. For lecturers, this innovative learning resource is expected to help lecturers in teaching Redox Titration material.
3. For researchers, as a valuable experience in innovating project-based learning materials that can be used by students in higher education.
4. For other researchers, as input for making innovative teaching materials with projects in the teaching of Redox Titration material.