CHAPTER I

INTRODUCTION

1.1. Background of the Study

Education is a humanitarian process that aims to develop the potential of individuals. Human capital formation begins in childhood and continues throughout life. The modern higher education development strategy requires improving the quality of education to form an active, creative personality of a specialist capable of independent education, innovative activity, professional mobility, and competitiveness (Belokurova et al., 2021). Educational success is a complex topic that can be measured in many ways. Some factors that can be used to measure educational success include student engagement, retention, progress, satisfaction, student performance in their academic work, and their ability to apply what they have learned in real-life situations. Apart from that, technology in education can also contribute to the learning process (Moore, 2018).

Furthermore, all parties who actively participate in learning, namely students and teachers, must work together to achieve predetermined competencies, which can be measured by the readiness of students to enter higher education and their readiness to use technology in the learning process. Student success is significantly influenced by teacher quality. Teachers can facilitate positive academic and social-emotional outcomes for students through their support and collaboration with students. Teachers' expectations and sense of responsibility for students' learning can also affect student outcomes. Therefore, investing in teacher effectiveness, evaluation, well-being, and contributions is essential to student success. In the end, educational success is measured by the learning process that occurs, which can be influenced by various factors such as the quality of teaching by teachers, the use of technology, and student involvement.

Chemical material, which is quite complex, requires a good understanding to be mastered well. Because of this, how well students comprehend the principles taught by the teacher will determine how much they learn about chemistry (Yang & Shen, 2016). The effectiveness of instruction, student motivation to learn, students' innate skills or aptitudes in chemistry, and the difficulty of the subject being covered all impact how well students learn chemistry. Various reasons might contribute to suboptimal student learning results in chemistry. These factors encompass a deficient comprehension of intricate chemical ideas, insufficient student motivation to engage in the learning process, and a need for more practical experience in applying these concepts. In addition, problems in teaching methods or curricula that are less effective can affect student learning outcomes. Low learning outcomes can impact students' academic achievements and future career or educational opportunities (Sholikhun et al., 2022). Therefore, teachers and students must work together to improve student learning outcomes in chemistry.

One potential strategy for enhancing student learning outcomes in the field of chemistry involves the implementation of project-based learning initiatives. The implementation of projects can serve as a viable strategy to enhance the academic achievements of students in the field of chemistry. Project-based learning can also improve the quality of student activity processes and the quality of outcomes, including cognitive, affective, and psychomotor learning achievements (Tarigan & Latief, 2022). Projects can help students understand chemistry concepts in more depth and apply them in real situations. Projects allow students to work in teams, improve presentation skills, and develop a deeper understanding of chemistry concepts. Projects can also spark students' interest in chemistry and motivate them to study further. In addition, teachers can also provide constructive feedback and provide additional help to students in working on their projects. In this way, students can refine their skills and improve their learning outcomes in the future. Project-based learning can be valuable for improving students' chemistry learning outcomes.

Engaging in projects has been identified as a viable strategy for enhancing student learning outcomes in chemistry. By providing students with opportunities

to apply chemistry concepts in real situations, the PjBL model allows students to develop the practical, problem-solving, collaboration, and creativity skills necessary for success in work. PjBL allows students to see the interconnectedness of related concepts in real-life situations (Sahroni et al., 2022).

Even though the potential for Project Based Learning (PjBL) in improving students' skills is enormous, it still needs to be implemented in many educational institutions. The lack of implementation of PjBL in educational institutions may be caused by various things, such as a lack of resources, teacher training, and support from school administration (Sadrina et al., 2016). Another reason is that PjBL requires more intensive preparation and planning than other learning methods (Yamin et al., 2023). Teachers must design projects that fit the curriculum and ensure that assignments are appropriate to students' abilities. This process takes more time and effort than just giving individual assignments or lectures in class. Implementing PjBL requires adequate facilities and resources. To complete assignments or projects, students need access to equipment and technology that may only be available at some schools or universities. Therefore, some educational institutions may need help effectively facilitating the PjBL approach. Some teachers and administrators may need to familiarize themselves with the PjBL approach and help understand how to implement it effectively. It can hinder the implementation of PjBL in the classroom due to a lack of needed support and training. However, PjBL can effectively improve student learning outcomes in chemistry and other subjects. Therefore, it is recommended that educational institutions consider implementing PjBL to improve student learning outcomes and skills.

Project-based learning is a potential learning model for students to use to increase student activity in directly applying chemistry concepts in everyday life, which can strengthen their understanding. Project-based learning effectively creates an authentic context where students can see the relevance of chemistry concepts in everyday life, thereby increasing their learning motivation (Masbukhin et al., 2023). Projects engage students in solving real problems that require understanding chemistry concepts. They must apply their knowledge to

identify, analyze, and solve problems. PjBL activities can increase students' active participation, understanding of concepts, and acquisition of new skills, such as communication, teamwork, problem-solving, and conflict resolution (Vergara-Castañeda et al., 2021). In this research, the material used for the project is Acids and Bases.

Acid-base material requires conceptual understanding; students need help learning the material to understand the concept. Acid-base material includes acid-base properties, reactions, conjugates, pH scales, and calculations. In this material, there are also many things related to everyday life. However, students need to learn the connection between the material and everyday life; they only rely on the teaching materials provided by the teacher. It limits knowledge and makes students quickly bored during lessons.

Based on the results of an interview with the chemistry teacher at SMA Negeri 2 Percut Sei Tuan, Mrs. Niar Rehulina Perangin Angin, M.Pd., stated that class XI students still need help understanding chemistry material and quickly forget the chemistry material that has been taught. In the acid-base material, students need help understanding the concept of acids-bases, pH calculations, and their application in everyday life—the learning outcomes of chemistry students in class. The lack of good chemistry learning outcomes is caused by students' weak understanding of chemical concepts, even though, in reality, teachers have tried various learning models so that students can understand the material well. However, the learning outcomes obtained could be more optimal. Also, chemistry teachers stated that students could have been more active and enthusiastic during class, discussions, and learning. Another problem in this school is that there needs to be more learning based on the Project-Based Learning model; teachers are often the primary source of information (Teacher Centered Learning) in delivering chemistry lessons. Even so, the teacher stated that students have great potential in learning because many students have high courage, curiosity, and creativity. However, they have not been able to explore the knowledge they should get.

A learning process is good if the process can generate practical learning activities. Active student participation is a crucial factor in successful learning. Teachers can create student activity by creating a positive learning environment. Good chemistry learning results are the main requirement for successful chemistry learning. However, it must be remembered that when assessing the results, one must carefully and precisely pay attention to the process because it is in this process that students can be actively involved. Activities involved in learning can include visual, verbal, auditory, writing, drawing, metric, mental, and emotional activities. These activities are interrelated and necessary to study chemistry material. The importance of learning activities or student activeness in chemistry subjects is based on the nature of the subject itself. Most high school students consider chemistry subjects complicated to understand, so a way of dealing with them is needed so that the subject gets a high response from students. Therefore, student activity is needed to understand and master the material provided.

The current education curriculum is the Merdeka Curriculum. The Merdeka Curriculum is a new curriculum implemented in Indonesia that prioritizes active and adaptive learning by allowing educators to carry out project-based learning. The primary objective of this curriculum is to enhance student's educational experience by facilitating active engagement in the learning process and cultivating adaptability in diverse contexts. This curriculum also emphasizes soft skills and character development, allowing students to develop skills such as communication, problem-solving, and critical thinking, which are helpful in project-based learning. Projects are an essential component of the Merdeka Curriculum because they allow students to apply their knowledge and skills in real-world situations, develop critical thinking skills, and enhance their learning experience more practically and engagingly.

To increase student learning outcomes and activities, teachers should implement learning innovations that are relevant to students' conditions and the chemical material being studied. One of them is project-based learning, a learning paradigm that allows teachers to control classroom learning through project work. This course emphasizes student-centered instruction through project assignments.

Project-based learning enables students to work independently, enhance their knowledge, be more realistic, and create a product (Sastrika et al., 2013). Project-based learning (PjBL) is an instructional approach encompassing intricate assignments centered around thought-provoking inquiries and predicaments, necessitating students to engage in designing, problem-solving, decision-making, conducting investigations, and working autonomously. This method allows students to cultivate cognitive capacities, comprehension, competencies, aptitudes, and ethical virtues within their daily experiences. Project-based learning involves assigning students a project that necessitates applying their acquired knowledge to address a practical issue in the real world. These projects are usually interdisciplinary and require students to work in groups to complete them. Teachers act as facilitators, guiding and supporting students as they work on projects (Kurniasih, 2023).

1.2. Problem Identification

1. Many students think Acids and Bases material is challenging to understand.
2. The lack of student activity in chemistry learning is theoretical and less practical.
3. The use of learning models that tend to be rigid and teacher-centered.
4. There is still little use of project-based learning in chemistry learning in schools, so students' abilities to apply the concepts learned in real-world contexts still need to be improved.
5. There are still limited learning resources that are relevant and easily accessible to students in developing a more practical understanding of Acid and Base material.

1.3. Scope of Study

Based on the framework above, the scope of this research problem is as follows:

1. Low student learning outcomes in chemistry subjects.
2. Low student learning activity in chemistry subjects.

1.4. Scope of Problems

1. The research will be conducted on students of SMAN 2 Percut Sei Tuan class XI-A and XI-D, even semester of the 2023/2024 academic year.
2. The chemical material given is acid-base.
3. The learning model used is the Project Based Learning model.
4. The learning outcomes measured are learning outcomes in the cognitive domains of Bloom level C2 (understanding), C3 (applying), C4 (analyzing), C5 (integration).
5. Student learning activities measured include visual activity, oral activity, listening activity, writing activity, motor activity, mental activity, and emotional activity of students in the chemistry learning process.

1.5. Research Questions

1. Is there an influence of student learning outcomes taught using Project Based Learning on acid-base material?
2. Is there an influence in learning activities of students who are taught using Project Based Learning on acid-base material?
3. Is there a correlation between student activities and student learning outcomes?

1.6 Study Objectives

The aim of this research is:

1. To assess the disparities in student learning outcomes when employing the Project Based Learning approach in the context of acid-base material.
2. To examine the variations in student learning activities when employing the Project Based Learning approach in the context of acid-base content.
3. To determine the correlation between student activity and student learning outcomes.

1.7 Research Purposes

The benefits of this research are:

1. For researchers, the Project Based Learning learning model can provide additional knowledge and skills in creating learning sequences and increase competence as prospective teachers. Researchers can also gain direct experience in choosing a suitable model for an acid-base topic.
2. For chemistry teachers, this research can increase teachers' insight into learning models to stimulate teacher creativity and innovation in choosing the suitable learning model so that, in the end, it can improve teacher performance.
3. This research is helpful for students who have difficulty understanding chemical material, and the learning media used in this research can help improve student learning outcomes on the topic of acids and bases. Apart from that, this research can increase students' learning activities and become more active in the learning process.
4. It can be used as reference material for further research with different concepts and materials for future researchers.