

CHAPTER V

CONCLUSION, IMPLICATION, AND RECOMMENDATION

5.1 Conclusion

The implementation of ESD-based STEM learning consists of six stages, there are formulating the problem, thinking, designing, constructing, testing, redesigning, and completed with socialization to the public. The findings of the study show that the implementation of ESD-based STEM learning on the Climate Hero project has an impact on students' sustainability action and creativity.

The hypothesis test has been carried out and the result revealed that there is a significant difference between the experimental class and the control class after the learning process in their sustainability action ($p\text{-value}_{(0.032)} < \alpha_{(0.05)}$). This indicates that through working on the Climate Hero project in ESD-based STEM learning, students in the experimental class experienced an enhancement in their sustainability actions although not in each indicator. The average score of students in the experiment class increased by 0.08 to 2.71 and obtained higher average score than the control class, with a difference value of 0.07. The learning activities of ESD-based STEM learning on the Climate Hero Project stimulated students to take action especially on design and construct stage. Besides, some factors contributing to the students' sustainability action are the short implementation duration of project, students' self-efficacy, students' knowledge, students' awareness and personal value, students' daily habit, and students' environment.

For the result of students' creativity, ESD-based STEM learning on the Climate Hero project demonstrates a promising potential to develop students' creativity by generating a product that addresses climate issues. However, when comparing the average creativity results observed in this study (60%) to the previous research, the impact appears to be less significant. Some factors influencing students' creativity are students' teamwork, limited time, and students' experience in working on the technology-based project.

5.2 Implication

According to the results of the research, it can be implied that to enhance students' sustainability action related to SDGs 13 Climate Action, ESD-based

STEM learning on the Climate Hero project can be implemented in a lesson. Meanwhile, to enhance students' creativity, ESD-based STEM learning in the Climate Hero project is less recommended. To address this, it may be necessary to extend the duration of the project and carefully consider group distribution to better support creative development.

5.3 Recommendation

In the implementation of this study, the researcher realised that the implementation of ESD-based STEM learning in the Climate Hero project still needs to be improved. Some of the things highlighted by the researcher as recommendations include the time allocation in the implementation of this treatment should be pursued in sufficient duration. Secondly, students should be placed in groups with good distribution in the Climate Hero project. In addition, the author recommends conducting a pre-test of student creativity at the beginning of learning to determine the increase in student creativity. Furthermore, the concept mastery variables can also be added to measure students' understanding of climate change material after doing the project.