CHAPTER V
CONCLUSION, IMPLICATION, AND RECOMMENDATION

5.1 Conclusion

The implementation of engineering design process consists of eight stages, there are defining the problem, gathering information, planning, building, testing, evaluating, redesigning, and communicating. Among these stages, students actively participating in planning and building stages. Especially in the stage of building, students are excited in making water filtration device. Their enthusiasm was fueled by the results of their water filtration testing. They even immediately revised their design and built another prototype when they found that the water filtration device did not give the expected results.

The experimental class showed a notable increase in interest, with average post-test score of 72.24 compared to the control class's 65.67. Hypothesis testing revealed no initial difference in pre-test (p=0.146), but post-test analysis confirmed a significant difference of STEM-EDP (p=0.003). The N-Gain scores further supported this, showing moderate improvement in the experimental class (g=0.313) versus low improvement in the control class (g=0.013). For students' curiosity, the experimental class achieved an average score of 45.03 compared to 39.17 in the control class. Hypothesis testing showed no initial difference in curiosity levels during the pretest phase (p = 0.062), but a significant difference was observed in the post-test after implementing the STEM-EDP approach (p = 0.034). The N-Gain score of 0.383 in the experimental class, categorized as moderate, further confirms the approach's effectiveness, compared to the control class's low N-Gain score of 0.021. Furthermore, the moderate positive correlation between student interest and curiosity emphasizes the importance of addressing these variables holistically, with score results of (p) = 0.002 and (r_s) = 0.522. By creating a classroom environment that encourages both, teachers can foster sustained engagement, deeper learning, and a lifelong love of science.

These findings highlight STEM-EDP's effectiveness in increasing interest and curiosity. By linking science to real-world problem, this approach promotes environmental stewardship and prepares students for STEM-related challenges and sustainability efforts, making it a valuable addition to integrated science curricula.

5.2 Implication

This study demonstrates the transformative power of the STEM-Engineering Design Process (STEM-EDP) in fostering students' interest and curiosity, particularly through hands-on projects such as water filtration systems. STEM-EDP improves engagement, critical thinking, and environmental awareness by connecting scientific concepts to real-world challenges, preparing students for the twenty-first century. For teachers, this approach provides an innovative framework for transitioning from rote memorization to dynamic, inquiry-based learning, which makes lessons more engaging and relevant. Furthermore, incorporating STEM-EDP into science curricula supports global sustainability goals by encouraging environmental stewardship and preparing students to face emerging STEM-related challenges. These findings highlight the significance of implementing STEM-EDP as a transformative model for science education, benefiting students, educators, and society by promoting meaningful learning and sustainable solutions.

5.3 Recommendation

Future research could explore the long-term effects of the STEM-Engineering Design Process (STEM-EDP) on students' interest and curiosity; Investigating the integration of advanced technologies, such as IoT or simulations, may further enhance learning; Maximize the available time as best as possible; Validators / Expert’s judgment must be more than two, to get more objective data; and, Improve the amount of sample to get more precise data.