CHAPTER V
CONCLUSION AND RECOMMENDATIONS

In this part, the researcher elaborates the conclusion drawn from the present study and some possible recommendations for conducting further related studies.

5.1 Conclusion

This study investigated and examined about using MER to enhance modeling skills, domain-specific CT skills, and view of NOST aspects in domain knowledge SSC. The main conclusion is learning sequences designed based on students and scientists conceptions such as MER able to enhance students' conceptions toward into scientists' conceptions. Besides those sequences also able to enhance students modeling skills and domain-specific CT skills. Using context application in human daily life and technology could enhance students' view of NOST aspects.

The detail conclusions based on research questions are:

1. Reconstruction of instructional materials were applied in SSC learning process based on MER. This study explored the MER as a design to support SSC learning process through scientists-students correspondence. Students were found examined and revisit their own conception and could relate concepts and human daily life application. Therefore, integrated modeling and domain specific CT skills promoted students' conceptual understanding deeply. Media and worksheets were provided to help students in learning process.
2. Implementation of an intervention based on MER promotes students' conceptual knowledge. After the intervention, the number of students who answered correctly according to the scientist conception- complete and incomplete categories- increased. Paired sample t-tests were employed and the results showed significant differences ($p < .001$) in the overall domain-knowledge (metallic crystal, alloy, covalent network, semiconductor and ionic crystal). Domain-knowledge of alloys has highest n-gain (.54, in

middle category), while metallic crystal has lowest n-gain (.42, in middle category).

3. Implementation of an intervention based on MER promotes students' modeling skills. Using model and modeling in learning SSC helps the students to develop science knowledge as well as a bridge between scientists and students conception. Paired sample t-tests were employed and results showed significant differences ($p < .001$) in the overall sub-modeling skills. Sub-modeling skill 1 (modeling a structure) and 2 (using model to explain) have n-gain in middle category (.44 and .52), meanwhile sub-modeling 3 (using model to predict) is in low category (.27).
4. Implementation of an intervention based on MER promotes students' domain-specific CT skills. Integrating domain-specific CT skills into SSC concept promote students' conceptual understanding and developing depth understanding. Paired sample t-tests were employed and the results showed significant differences ($p < .001$) in overall domain-specific CT skills (explanation, inference, interpretation, and analysis). Explanation skill has the highest n-gain (.63, in middle category), while analysis skill has the lowest n-gain (. 54, in low category).
5. Implementation of interventions based on MER promotes students' view of NOST aspects. Students' view of NOST aspects was improved from the majority in naive (N) category before intervention toward held real (R) category. The character of science and technology aspect reached 100% in R category. Meanwhile, the way acquiring scientific knowledge and theory aspects reached 12%.
6. There a relationship among students' conceptual knowledge, modeling skills and domain-specific CT skills. Positive correlation ($R = .82$ and $p < .001$) showed that good domain-specific CT skills and modeling skills helps students students to to understand the concept well. Constant contribution of domain-specific CT skills and modeling skills on domain knowledge is 67.5%.

5.2 Recommendations

This research has succeeded in developing a model of educational reconstruction to enhance students' modeling skills, domain-specific CT, and conception about NOST aspects in SSC domain knowledge. The Writer recommended some consideration for further research as follows:

1. This study used MER as the basic to design SSC learning. Considering the students' and scientists' conception is the main point of MER. However, accommodating the students' conception in large number demands the various learning designs. Therefore, the further research should provide any references that accommodate the basic concepts which are needed by the students, so they would start the learning from the same step.
2. Connecting properties and structure become the focus in SSC learning. This study prevents that students are able to construct the skill through the continuous exercise. However, students give the explanations based on cause and effect relationship without considering the body knowledge of the concept. As a result, students found the difficulties when using model to predict. Therefore, it is important for the Instructors (Lecturers and Teachers) to analyze and represent the body knowledge of concept which are belonged to students and relate to learning process.
3. Positive correlation between domain knowledge and modeling skills showed that good conceptual knowledge helps students to make a scientific model or vice versa. Considering this results, its potential in further research to develop pre-service chemistry teachers skills to manipulating or engineering chemical structure which it would not be separated from their conceptual knowledge.