

## CHAPTER V

### CONCLUSION, IMPLICATION, AND RECOMMENDATION

#### 5.1 Conclusion

Based on the results and discussions of previous chapters, the use of four-tier test has provided valuable information related to students' conception on heat topic. The first point is that in general, 56.1% of seventh grade students is at the level of lack of knowledge, 16.3% misconception, 13.3% scientific knowledge, 8.5% false positive, and 5.8% false negative. The highest conception level is lack of knowledge. This proves the truth that four-tier test was more precise in calculating the percentages of misconceptions held by students, particularly on heat topic. It can truly assess misconceptions which are free of errors and lack of knowledge. From five level of conceptions, students' have more misconceptions than scientific knowledge. Between the two subtopics, students' have the highest misconceptions and scientific knowledge on nature of heat. One of the reason is because students' still confused in defining heat.

The second point that can be concluded from this research is misconceptions that was experienced by the students are considered to be significant on all concepts of heat. It is proven by the percentage of students' misconceptions is above 10%. The most common students' misconceptions is in the nature of heat subtopic. As the misconceptions highly occurred on this subtopic, there are some common misconceptions have been detected. For instances, the mass of an object does not affect the ability to absorb heat, specific heat capacity is directly proportional with the temperature changes, and freezing is not affected by heat.

The thing that can be concluded as the third point from this research is the overall gender comparison of students on heat topic disclosed that male students have higher percentage of conception compared to female students on four levels including misconception. More misconceptions were found in male students than female students. Although there is a difference in the average percentage, it didn't show the significant difference between misconceptions of the two groups.

## **5.2 Implication**

The results of this research have several implications. It implies that the lesson at school needs to be improved to help students build scientific knowledge and eliminate misconceptions in heat topic, especially on the nature of heat subtopic. It also implies that discussing common misconceptions related to the topic is essential for students. That will help them build their scientific knowledge from what they already know. That will also prevent or counter any misconception that they might develop.

## **5.2 Recommendation**

There are some recommendations based on the results of this research that can be used as potential guides for teachers and other researchers. The first recommendation is teacher may include four-tier test in their repertoire of tools that can be used to explore their students' conceptual understanding of heat. Four-tier test can help teachers to identify aspects of the topic that require greater attention. Like other four-tier tests, it can be used to monitor gradual changes in content knowledge, explanatory knowledge, and strength of students' understanding of heat-related concepts by applying it as pre- and post-tests. Depending on the test results, the teacher either tries to remedy the problem by addressing the students' misconceptions or improves the quality of the instruction to compensate the lack of knowledge.

The second recommendation for teacher, it is essential to explore students' prerequisite concepts before learning new related concepts. The reason is because physical concepts' characteristics are interconnected. Likewise, the concept of heat is related to temperature and the laws of thermodynamics. If teachers have limited time to use diagnostic test, they can find out the common misconceptions from the previous researches. Thus, teachers may know and synchronize students' pre-conceptions before teaching a new concept. Afterwards, teacher will decide what students need to know the concepts scientifically by preparing appropriate methods to instruct heat concepts by refraining from new misconceptions. Hence, they may encourage students to confront their misconceptions and to change their understanding towards a scientific concept.

The third recommendation is for other researchers. Future research that deal with the determination of appropriate strategies that can help in modifying the misconceptions identified in this study would be worthy to undertake. The next researcher can investigate the factors that could affect students' confidence in the misconceptions that are present in their knowledge base. Researchers can also enrich the literature by correlating students' misconceptions with other variables such as scientific reasoning ability. Besides, the researchers can widen the participants of the research not only for junior high school level, but including another school levels.