

## CHAPTER V

### CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

#### 5.1 Conclusions

From the results and discussion in diagnosing the misconceptions of students in acid and base topics, two important points need to be underlined. The first point highlights the prevalence of misconceptions among students. The analysis shows that, in general, students have 33.38% of their responses categorized as misconceptions, 19.9% as scientific knowledge, 16.15% as false positives, 15.89% as false negatives, and 14.68% as lack of knowledge. This demonstrates the accuracy of the four-tier test in calculating the percentages of misconceptions held by students. Among the five levels of conceptions, students have a higher proportion of misconceptions responses compared to scientific knowledge. Furthermore, the students' misconceptions are found to be significant across all concepts related to acid and base, as indicated by the percentage of students' misconceptions being above 10%. Among the three subtopics, students exhibit a higher rate of misconceptions in the identification of acid and base solution subtopics. One possible reason for this is the lack of practical activities that bridge the gap between the concepts and real-life problems. Due to the high occurrence of misconceptions in this subtopic, several common misconceptions have been identified.

The second point that can be inferred from this research is that students have more than 45% misconception rates on questions 5, 8, and 12. These questions specifically address examples of identification of acid and base solution. There could be various reasons for this, such as unaddressed misconceptions or difficulties in understanding these specific concepts. To enhance students' scientific knowledge and eliminate misconceptions in acid and base topics, it is important to improve the lessons by addressing common misconceptions directly, incorporating hands-on activities, and promoting class discussions. These strategies will not only help students build a stronger foundation of scientific knowledge but also prevent the development of misconceptions in the first place.

## 5.2 Implications

The findings of this study have several implications that should be considered. Firstly, they underscore the need for improving school lessons and educational interventions to support students in developing a solid foundation of scientific knowledge and rectifying misconceptions specifically related to acid and base concepts. Addressing these misconceptions is crucial as it serves as a building block for students to construct accurate mental models and conceptual frameworks. By directly targeting and correcting misconceptions, educators can prevent further misconceptions from taking root and ensure that students have a more robust and accurate understanding of acid and base concepts.

Incorporating strategies that explicitly address misconceptions and provide opportunities for students to actively engage with the content can greatly enhance their scientific comprehension. These strategies may include hands-on experiments, concept mapping, and collaborative discussions that challenge and correct misconceptions.

By recognizing the significance of misconceptions and actively addressing them within educational settings, teachers can foster a more accurate understanding of acid and base concepts among students. This, in turn, will enable students to build a solid foundation of scientific knowledge and promote a more meaningful and lasting learning experience.

## 5.3 Recommendations

The findings of this research provide valuable recommendations for teachers and future researchers to enhance their instructional practices. Firstly, it is recommended that teachers identify students' pre-existing conceptions before commencing a lesson. By understanding students' misconceptions, teachers can tailor their instruction to address these specific needs and provide targeted support. However, in cases where time is limited, teachers can refer to previous research studies that have identified common misconceptions in the subject area. This allows teachers to focus on addressing those misconceptions during their lessons, reinforcing students' scientific knowledge, and actively working to prevent and eliminate misconceptions.

Furthermore, it is suggested that teachers incorporate hands-on activities into their teaching strategies. When students engage in hands-on activities, they have the opportunity to experience the concepts in a meaningful way and develop a deeper understanding of the topic. By providing concrete experiences and real-life applications, students can better grasp how the concepts work and connect them to their everyday lives.

By actively addressing misconceptions and promoting conceptual understanding, teachers can help students develop a solid foundation in scientific knowledge. Continuous reflection on teaching practices is essential for educators to identify areas of improvement and refine their instructional strategies. Staying open to ongoing professional development allows teachers to stay up-to-date with the latest pedagogical approaches and tailor their methods to meet the diverse needs of their students effectively.

Future research can build upon these recommendations by exploring the effectiveness of specific instructional interventions in tackling misconceptions and enhancing scientific understanding. Investigating the outcomes of targeted teaching strategies, hands-on activities, and other interventions will provide valuable insights into the most effective ways to promote conceptual change and support students' learning. Overall, a commitment to addressing misconceptions, fostering conceptual understanding, and continuous professional growth can lead to a more engaging and successful learning experience for students, preparing them for a deeper understanding of scientific concepts and critical thinking skills beyond the classroom.