CHAPTER V
CONCLUSIONS, SUGGESTIONS AND IMPLICATIONS

5.1 Conclusions

Based on the results and discussions of this research, conclusions of the objectives of this research explained as follows:

1. Students rated solubility and constant of solubility product (Ksp) and chemical equilibrium was the two most difficult of chemistry syllabus in senior high school with a moderate category.
2. Chemistry teachers rated redox and electrochemistry, solubility and constant of solubility product (Ksp) were the two most difficult of chemistry syllabus in senior high school with a moderate category.
3. Students' perception of failure factor in studying chemistry as follows: 61.69% agreed chemistry teachers were qualified, 82.57% proclaimed chemistry teachers were professional, 68.97% recognized the prevailing national curriculum (KTSP and K-13) worked properly, 58.2% students proclaimed the schools provided adequate facilities and infrastructure and 55.27% acknowledged themselves had an adequate interest and talents. 59% agreed they had high motivation in learning chemistry.
4. Teachers' perception of failure factor in studying chemistry as follows: 66.67% acknowledged themselves were qualified, 82.39% confidently acknowledged themselves were professional, 71.95% agreed the prevailing national curriculum (KTSP and K-13) worked properly, 60% proclaimed the schools provided adequate facilities and infrastructure, and 34.48% proclaimed students had an adequate interest and talents. Teachers also viewed students lacked motivation in learning chemistry. There were only 37.93% of teachers agreed.
5. Most of the chemistry teachers prefer to use symbolic level in teaching Atomic Structure, Redox reaction, Stoichiometry, Hydrocarbon compound, Chemical equilibrium, Acid and base solution, Salt hydrolysis, Buffer solution, Solubility and constant of solubility product, Redox and Electrochemistry than sub-microscopic and macroscopic. Whereas, the

macroscopic level was most favorable chosen to teach Electrolyte and non-electrolyte solution, Rate (speed) of reactions, and Colloid system. Meanwhile, the sub-microscopic level was only one time chosen to teach chemical bonding together with symbolic level. At the same time to teach Thermochemistry and Colligative properties, most of the chemistry teachers more favorable using symbolic and macroscopic.

6. The eligibility level of both content and design of IM obtained in the range of 3.82 and 3.80 of scale 4.00. This IM was eligible to be used according to experts' view.
7. Obtained t_{count} 2.175 > t_{table} 1.999 or sig. (2 tailed) .035 < .05, thus there was a difference of using IM-GI learning than DI towards students' learning outcomes in learning chemical equilibrium.

5.2 Suggestions

Based on the results and discussions of this research some suggestions addresessed as follows:

1. As listed the most difficult according to the students in senior high school, chemistry teachers should provide the exact and proper approach in teaching Ksp and Chemical equilibirum. In this case, Ksp and Chemical equilibirum involve mathematical-chemical problem solving. It also implies to the teachers since they regarded redox, electrochemistry and Ksp as the most dificult topics. Teaching redox and electrochemistry topics need a comprehensive and multi representated levels. Researcher suggests chemistry teachers apply sub-microscopic (animation-simulation) and macroscopic in teaching this topic, while chemical calculation may explained by symbolic level.
2. According to teachers' perception regarding the students' interest, talents, and motivation, teachers should be able to create 'friendly' conditions which are conducive, enjoyable, creative in order to explore the best skills of the students.
3. Chemistry teachers should select and provide suitable representation levels in teaching certain chemistry topic by means accommodate the correct

visualization and also avoid having a misconception. It ispossible to use a combination of representation levels when teaching a topic.

4. Teaching chemical equilibrium in senior high school, the researcher recommends to the chemistry teachers to apply the sub-microscopic representation in demonstrating the imitation of the natural phenomena of reversible reactions as well as in helping visualization the effect of concentration, pressure or volume and temperature toward the shift of direction of equilibrium reactions. And also using the symbolic level to practice student in solving chemical calculations.
5. Implementing this interactive multimedia, the schools need to facilitate and supportthe multimedia learning environment such as LCD projectors, slide projector, and adequate lighting.

5.3 Implications

According to the results of this research, some cases implies to the following concerns:

1. In further research, the researcher wishes this research continued in another school to look at the difference of the effectivity of this multimedia.
2. The importance of available adequate exercises particularly chemical calculations on interactive multimedia in order to practice students frequently.
3. Chemistry teachers need to analyze the components of the topics whether abstract concepts dominate or even mathematics so that teachers would be succesfully adressed the message.