

CHAPTER V

CONCLUSION, IMPLICATION AND RECOMMENDATION

5.1 Conclusion

Based on the results of the study and data analysis aforementioned, it was obviously concluded that:

1. There were significant effects of learning techniques on students' critical thinking skills at MAN 1 Tanjung Pura ($F = 87.082$; $P = 0.000$).
2. There were significant effects of science-related attitudes on students' critical thinking skills at MAN 1 Tanjung Pura ($F = 2.493$; $P = 0.040$).
3. There were interactions between learning techniques and science-related attitudes on students' critical thinking skills at MAN 1 Tanjung Pura ($F = 2.037$; $P = 0.000$).
4. There were significant effects of learning techniques on students' problem solving skills at MAN 1 Tanjung Pura ($F = 94.214$; $P = 0.000$).
5. There were significant effects of science-related attitudes on students' problem solving skills at MAN 1 Tanjung Pura ($F = 3.397$; $P = 0.031$).
6. There were interactions between learning techniques and science-related attitudes on students' problem solving skills at MAN 1 Tanjung Pura ($F = 2.915$; $P = 0.000$).

5.2 Implication

The results of the study implied that visual mapping is one of the other learning techniques which focuses on student-centered instruction. A variety of educational mapping aids have been developed that enable the visual display of information, concepts and relations between ideas. These mapping aids take a

variety of names including, such as concept mapping, mind mapping and argument mapping. The potential of these mapping aids for educational purposes is only now starting to be realised.

The over-riding aim of all mapping aids is similar. If students can represent or manipulate a complex set of relationships in a diagram, they are more likely to understand those relationships, remember them, and be able to analyze their component parts. This, in turn, promotes deep and not “surface” approaches to learning (Biggs, 1987; Entwistle, 1981; Marton *et al.*, 1976a, 1976b; Ramsden, 1992). Secondly, visual maps are also much easier to follow than verbal or written descriptions (Larkin *et al.*, 1987; Mayer *et al.*, 1990). Thirdly, visual maps utilise the often under-utilised parts of the brain associated with visual imagery. This enables more processing power to be used, hence leads to a greater capacity for learning. Finally, the work involved in map-making requires more active engagement on the part of the learners, and this too leads to greater learning (Twardy, 2004).

Newhouse (1990) emphasizes that science-related attitude is a very important factor in influencing human behavior. Attitude is affected by personal opinion, and these opinions can be formed through personal life experiences and education. Studies concerning the science learning environment show that there is a relationship between this environment and students’ attitude toward science (Rich *et al.*, 1997; Aldridge *et al.*, 2000; den Brok *et al.*, 2004; Rakici, 2004; Puacharearn *et al.*, 2004; Wahyudi *et al.*, 2004; Telli *et al.*, 2006).

5.3 Recommendation

Based on the results aforementioned, here were the recommendation suggested as follows:

1. Lecturers/Researchers

- a. Considering that the learning process are still applying less effective and meaningful learning approaches, it is highly recommended that the teachers should apply the visual mapping that can stimulate students' critical thinking and problem solving skills as well.
- b. The results of this study can be used as a reference for similar studies with materials, such as human locomotor system or other biology materials.
- c. As competent teachers, it is extremely good to encourage students to increase their science-related attitudes, so that they have a great sense to accomplish their own problems in daily lives.
- d. Suggesting to other subsequent researchers to be able develop the results of this study to be beneficial and useful as the source of information on the educational purposes, especially to those, including biology teachers who employ the teaching processes in the use of visual mapping.

2. Students

- a. Students need to improve their understanding related to biology concepts.
- b. Students need to increase their self-critical thinking and problem solving skills through visual mapping.