CHAPTER 5

DISCUSSION

5.1. Introduction

The chapter discuss further on the results of students' level of environmental awareness, knowledge and attitude, students' reading or watching environmental programme habit and involvement in environmental activities. It also include the discussion on the significant difference between students' level of environmental awareness, knowledge and attitude, students' reading or watching environmental programme habit and involvement in environmental activities with location of school, form and gender.

5.2. The Level of Environmental Awareness on Tropical Rainforest Issues

Secondary school students showed moderate awareness (mean = 7.55) on tropical rainforest issues (maximum score of 15). The results showed that generally urban students scored higher compared to rural students. These results were further supported by the main interaction effect of locations of schools in the ANOVA test, which showed significant result when the means between both urban and rural schools were tested ($p=0.018$). As anticipated, form 4 students also scored higher mean score compared to form 1 students. Similarly, the mean scores of form 1 and form 4 students were significantly different with $p < 0.0001$. Although gender as a main factor showed no significant difference results, the two-way interaction effect of locations of schools and gender were important in determining students' level of environmental awareness on tropical rainforest

issues. Similarly, the two-way interaction effect between forms and gender was also significant. For example, the mean scores showed that among form 1 students, form 1 male students scored higher than form 1 female students while among form 4 students, form 4 female students scored higher mean score compared to form 4 male students. Gender, as a main factor is not important in determining the level of environmental awareness of the Melaka secondary school students.

The result of this study is similar to the results of a study which was conducted in Malaysia by the Economic Planning Unit (1996), which found that 90% of the students were aware of environmental issues. Similarly, results from Sundram (1999) showed that majority of the respondents (59.4%) were moderately aware about solid waste management issues. Fadzilah's (1999) study also revealed that the primary and secondary school students' had a high level of environment awareness. However, Fadzilah's results showed that primary school students possessed higher environmental awareness compared to secondary school students. Fadzilah's finding is in contrast to the findings of this study, which showed that students in the higher forms (form 4) had a higher level of environmental awareness. Fadzilah's study also showed that primary and secondary school girls possessed higher level of environmental awareness compared to boys while the results of this study showed no significant difference between male and female students' mean scores.

An analysis of the questions and answers showed that students generally were able to answer the questions. However, students found difficulty in questions relating to environmental laws due to the fact that environmental law is

not widely taught particularly at school level. Students also showed misconception on the Malaysian *ex-situ* conservation efforts, which could be attributed to students not reading the question carefully as the definition of *ex-situ* conservation was given below the question. Another confusion was also observed when students were tested on the date of the World Forestry Day. This could be because students were not aware of the various environmental events celebrated throughout the year. Students might have also got the World Forestry Day confused with the World Habitat Day, which is held on 6 October every year. Students might have also misunderstood the celebration of the Malaysian Environmental Week (MASM) which is celebrated the last week of every October as the World Forestry Day.

A misconception was clearly shown in question 10 about the selection of medicinal plants and their uses. Many Malaysians believed that 'Tongkat Ali' is an aphrodisiac. In actual fact, the root-bark of 'Tongkat Ali' is used as a post-natal tonic while a decoction of its leaves is used for washing itchiness. Eurycomalactone extract from its bark has anti-malaria properties (Wong, 2001). On the other hand, only quinine was the wrongly paired as quinine is used to treat malaria and not diarrhoea.

A fairly new concept to the students was the question on the definition of biodiversity, which showed many students were unsure of the concept. Being a relatively new concept since it was first introduced in the Earth Summit in 1992, many may not have been aware of it, particularly at school level.

5.3. The Level of Environmental Knowledge on Tropical Rainforest Issues

In general, the Melaka secondary school students had low environmental knowledge on tropical rainforest issues as its mean score was 6.90, compared to its maximum score of 15. From the mean scores computed, the results showed lower mean score compared to the mean score computed for the environmental awareness test.

Similar to the environmental awareness test result, urban district students from both forms and gender performed better than the rural district students. Female students from both districts and forms had higher environmental knowledge compared to male students. However, there was an exception where male students' mean score was higher than female students' mean score but the differences between the mean scores were small. The main effect of forms showed a strong significant difference ($p<0.0001$) while interaction effects showed no significant difference.

Brody and Koch (1989) studied the fourth, eighth and eleventh grade students' knowledge on marine sciences and natural resource issues. The results from the study showed that majority of high school students had low level of environmental knowledge on marine sciences and natural resource issues. On the average, the grand mean indicated that students at each of the grade level understood only a few marine science and natural resource concepts. Little gains were observed between the fourth and eleventh grade students. Similarly, Gambro and Switzky's (1996) study revealed that majority of the high school students also had low level of environmental knowledge. Lim's (1999) study also

revealed that the Malaysian students generally possessed low levels of environmental knowledge.`

Generally, the environmental knowledge test result showed that the students did not excel as well as in the awareness section. Among the topics, which the students found difficult, was the test on the percentage of tropical rainforest cover. Generally students knew that tropical rainforest is rich but were not sure how much. The tropical moist forest accounts for probably more than half of the earth's plant and animal species. For example, one hectare in a tropical rainforest supports 300 species of plants and 41,000 species of different insects (Abu Bakar, 1998).

In another question, students showed a distinct misconception on the cause of deforestation in Malaysia. Many students named development of transportation as the main cause of deforestation. In actual fact, history tells us that after independence in 1957, in an effort to wipe out poverty and improve social conditions among the major ethnic groups, a land development programme was carried out to ensure improved productivity of small holder. As a result of the land development project, the Federal Land Development Agency (FELDA) destroyed extensive rainforest in Peninsula Malaysia (Collins, et. al., 1991). In the 29 years since its inception in 1956, FELDA has developed a total of 660,035 hectares of agricultural land in Peninsula Malaysia (Sham Sani, 1999). Although development seems to be more aggressive now, however the area of forest cleared is much controlled and at a lower deforestation rate.

Knowledge on the mangrove ecology seems to be low among the students. Students seem to portray shallow understanding on the importance of

mangrove ecosystem because the score distribution did not show significant difference between the answer selections. This could be because lowland forest is discussed more often in the school syllabus but rarely on other types of tropical forest.

5.4. Students' Attitude towards Tropical Rainforest Issues

In general, Melaka students showed positive attitude towards tropical rainforest issues with its mean score of 46.18 out of its maximum score of 80. When comparing between districts, rural students have more positive attitude towards tropical rainforest issues compared to urban students. Ironically, although form 4 students had higher level of awareness and knowledge on tropical rainforest issues, the attitude test results showed that form 4 students had lower level of attitude compared to form 1 students. On the other hand, female students who had higher level of awareness and knowledge compared to male students also showed greater positive attitude.

Generally, students were satisfied with the percentage of the remaining forest cover available in Malaysia and a fair percentage (49.80%) of students felt that tropical rainforest issues should be taken seriously. However, the results showed positive responses when a majority of 65.49% of the students saw themselves as playing an active role in any environmental organization or clubs and many (63.53%) were also willing to donate RM 2 every week to an organization that protects and conserves the forest and wildlife.

A majority of 64.32% of the students were willing to write to the department concerned of any illegal deforestation. However, the results in Lim's

(1999) study showed that 'young people express reluctance if they had to go from house to house to solicit for public awareness in environmental conservation, or to write in to inform of a pollution problem'. Another interesting result revealed in this study was that majority (62.74%) of the students believed the responsibility to care and conserve the forest and its animals is not on the government alone but on everyone. This attitude response is similar to the results obtained by the Economic Planning Unit's (1996) study where 78% of the students and 75% of the children noted that the public play a greater role in controlling environmental pollution compared to government or public sectors. In line with that, 55.29% of the students stated that they are not too young to contribute to any forest protection and conservation activities.

It is interesting to note that although majority of the students participate actively in environmental related organizations and were supportive towards conservation efforts, but when it involved some form of sacrifices or an action which would affect the comfort of life, the percentages of students who were willing to do so were much lower. For example, only 41.18% of the secondary students were willing to buy recycled paper although recycled paper would cost more compared to the price of normal paper. Similarly, when students were tested on their response towards the use of solar energy to replace the dependency on firewood and hydroelectric power, only 34.51% were willing to change to solar energy. This is because solar energy is still a relatively new practice in Malaysia and to implement the use of solar energy is costly. Secondary school students in Melaka gave mixed responses when tested on students' willingness to reduce meat consumption. From the results, only 38.83% of the students were willing to

reduce meat and wildlife consumption although the meat products were given free.

Finally, majority of the students (83.54%) felt that environmental education is needed for all adults and children. This result is similar to the response obtained from the study conducted by Economic Planning Unit (1996), which revealed that 98% of Malaysian students regarded environmental education as important, and 95% also agreed that the subject of environment should be introduced in schools.

The Spearman rank correlation coefficient results was also interesting as it showed negative correlation coefficient between students' attitude with the level of awareness ($r = -0.85$) and knowledge ($r = -0.82$). A student may be highly aware and knowledgeable on environmental issues but it does not mean that they are willing to change their attitude and let go of life's comfort for the betterment of the environment. This was also clearly shown in the results of the attitude test of this study which showed that in questions which tested on students' response to their commitment to certain environmental issues, students were rather hesitant in commiting themselves. For example, when students were asked whether they were willing to buy recycled paper which is more expensive compared to the normal paper, only 34.67% was willing to use recycled paper. Similar patterns were observed in statements which tested on their willingness to reduce meat consumption and willingnes to change to solar energy power. Similarly, in the Economic Planning Unit (1996) study, although 90% were aware of the various environmental issues, only 22% reported some form of involvement in environmental activities. This is because environmental education is a lifelong

process. It is much easier to create and promote environmental awareness and knowledge. However, it takes much time and effort to change one's attitude and commitment towards the building of an environmental friendly community.

5.5. Environmental Awareness, Knowledge and Attitude towards Tropical Rainforest Issues by Locations of Schoool

Urban students generally scored better than rural students in the environmental awareness and knowledge tests on tropical rainforest. However, rural students seemed to show more positive attitude towards tropical rainforest issues compared to urban students.

The same significant result was observed in Fadzilah's (1999) study, which assessed environmental awareness among primary and secondary school students. Her study showed that location of school (urban-rural) played an important factor in determining students' level of awareness, knowledge, attitude, values and religious knowledge pertaining to the environment. The result showed that students from the city, coming from higher socio-economic status and with higher academic level possessed higher level of environmental knowledge and awareness.

Arcury and Christianson (1993), studied on the variation of environmental knowledge and attitude between rural and urban residents in the Kentucky River Drainage Basin. The result of the study showed, that, when there were no controlling effects of the socio-demographic factors, metropolitan and urban respondents had stronger environmental worldviews and knowledge on global environmental problems. On the other hand, when the socio-demographic factors

were controlled, the result indicated that the relationship of urban-rural residence to environmental characteristics had little importance.

It is generally expected that urban students would fair better compared to rural students. This was because urban students are generally better equipped with various facilities in schools. Even at home, they are provided with facilities such as libraries, audiovisuals, Internet services, better selection of bookshops, regular and frequent public transport services which enable them to be more mobile in attaining knowledge. With these, urban students are likely to get more information and resources and have better options and exposure as compared to students from the rural district.

Students from the urban schools are also more competitive both in terms of curriculum and co-curriculum. This is because students from urban schools generally come from moderate to high-income family. Parents are able to support their children without major financial problems. Parents have also instilled in them the importance of education to succeed in life as majority of the urban job markets are based on qualifications and skills. Therefore, there is stiff competition among urban students to improve themselves academically and to strive for the best. Unlike urban students, rural students generally come from lower income families. To some extent, students are also required to assist the family financially, leaving students limited time to study or time for leisure. Rural students face fewer challenges academically as most of their parents are involved in jobs which utilizes the available natural resources such as agriculture. These jobs are usually hereditary which students can easily depend on even if they are

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unable to get a job in the urban districts as these jobs do not depend on paper qualifications.

Although urban students have higher environmental awareness and knowledge, rural students showed better positive attitude towards tropical rainforest issues. This could be attributed to the rural surrounding which are still rich with its greenery compared to concrete jungle in the urban district. The lives of the rural district residents are also much dependent on the natural resources surrounding them such as land for agriculture, forest for forest products, sea for fishing activities and many more. Unlike rural students, urban students lives are much dependent on the urban economy which focuses on human labor, skills and qualifications rather than dependence on the natural resources. Therefore, the well-being of our natural resources is usually not their priority as compared to the rural district students because urban students finds difficulty in relating their lives with the environment.

5.6. Environmental Awareness, Knowledge, and Attitude towards Tropical Rainforest Issues by Forms

As expected, form 4 students performed far better than form 1 students in environmental awareness and knowledge section. Ironically, form 1 students showed more positive environmental attitude compared to form 4 students.

Brody and Koch's (1989) study showed that the grand mean indicated that students at each of the grade level only understood a few marine science and natural resource concepts. Little gains were observed between the fourth and eleventh grade students. Gambro and Switzky (1996) assessed the environmental

knowledge among the tenth and twelfth grade American high school students in 1987 and 1989. The results indicated that a majority (60%-70%) of the twelfth grade students were able to correctly answer the three basic environmental knowledge questions but only 41.6%-45.6% were able to answer any four of the environmental knowledge application questions. The study also revealed that there was extremely little growth of environmental knowledge from tenth to twelfth grade. Fadzilah's (1999) study revealed that primary school students possess higher environmental awareness level as compared to secondary school students.

The environmental awareness and knowledge among form 4 students were much higher compared to form 1 students. Form 4 students generally have an extra 3 years of knowledge, exposure, experience and maturity, which enabled them to understand the issue better compared to form 1 students. This is because, form 1 students had just finished the primary school education and they have just embarked into the secondary school system, which is still new and a challenging experience for them. On the other hand, form 4 students were already accustomed to the secondary school education system.

The teaching methodology between lower and upper secondary schools also differs and plays an important role in determining students environmental awareness, knowledge and attitude. Teaching lower secondary school students involves more of dissemination of information while teachers' role in the upper secondary level is less 'spoon-feeding' as it also involves students' self initiative to better equip oneself with information, critical thinking, exposure and experience.

Although students' involvement in activities is low, the percentages showed that relatively more form 4 students were involved in various environmental activity as compared to form 1 students. This is because opportunities to participate or get involved in environmental related activities are given more often to the form 4 students than form 1 students because the former are more matured and independent which enable them to participate actively and effectively. Form 4 students also face fewer restrictions from parents and they are usually given more freedom to participate in such activities.

For example, the Projek Wira Alam by the Department of Environment with the Malaysian Nature Society and supported by the Ministry of Education consists of 3 activity books which the students are required to complete before achieving the Nature Warrior (Wira Alam) title. However, the project found that the majority of the students participating in the project were upper secondary school students (Malaysian Nature Society, 2002). Although initially the activity books were designed for students to begin from the upper primary or lower secondary level, results showed that students at these ages find it difficult to conduct the activities and needed constant guidance from the teacher advisors (Malaysian Nature Society, 2002).

5.7. Environmental Awareness, Knowledge and Attitude towards Tropical Rainforest Issues by Gender

Female students generally performed better compared to male students in the environmental awareness, knowledge and attitude test. Gender, as a single factor is not a significant factor, except in determining students' level of

environmental attitude. Otherwise, two-way interaction effects such as locations of schools and gender shòwed significant difference in determining students' reading or watching environmental programme habit. The interaction effect of gender with locations of schools and also between gender with form showed significant results in determining students' environmental awareness.

Similarly, Lim's (1999) study in Malaysia showed that girls generally perform better than boys in terms of environmental issue but this does not mean that they are more committed than boys. Fadzilah (1999) also found that gender play an important role in determining students' awareness, knowledge and attitude with female students scoring higher compared to male students. In contrast, Roth and Perez (1989) in their assessment of environmental knowledge and attitudes of the twelfth grade students in the Dominican Republic found that students' responses were significantly related to students' gender with male students outscoring female students. On the other hand, in Hsu and Roth (1996) assessment on the environmental knowledge and attitudes held by community leaders in the Hualien area of Taiwan, gender was not an important indicator in determining environmental knowledge and attitude. Similarly, there was no statistical significance between gender in similar studies by Hart (1978), Ponniah (1981), Teoh (1996), and Vasudevan (1999).

The results in this study showed an interesting trend that female students had better environmental awareness, knowledge and attitude scores compared to male students. This is a positive indication that there is gender equality in pursuing education opportunities in Malaysia and that the traditional culture which elevates the status of men is dying away.

5.8.Students' Reading or Watching Environmental Programme Habit by Locations of Schools, Forms and Gender

Generally, the results showed that majority of the Melaka secondary students either 'seldom' or 'never' read environmental related materials or watch environmental programme. The results showed that more than 50% of the urban and rural students never or seldom read or watch environmental programme.

When comparing between locations of schools, rural school students read or watch environmental programme more often compared to urban students. This result indicates that in general, students in the rural district were more interested in environmental issues as environmental matters relates to them better.

In terms of forms, the results showed that form 4 students in both urban and rural districts were more interested in reading or watching environmental programmes on these issues compared to form 1 students. However, the percentage between forms showed no significant difference in the percentage scores. It is interesting to note that in general, students start getting interested in environmental issues usually at higher forms. This is because students at these ages are more matured and the curriculum syllabus in schools is more challenging with more student discussions, research and involvement of critical thinking. In comparison to the lower secondary curriculum syllabus and teaching methods, it involves mostly inputs from teachers compared to interactive learning.

Between gender, urban male students from both forms have higher percentage of students reading or watching environmental programme while in the rural district, female students seems to be reading or watching environmental programme more often compared to rural male students.

Ponniah's (1981) study on the level of environmental knowledge, understanding and attitudes of secondary students in Malaysia revealed that mass media particularly, television, radio and newspaper play an important role in disseminating environmental pollution information. Similarly, a survey by the Economic Planning Unit (1996) found that 70% of Malaysians were aware of television and radio programmes on the environment. 91% of those aware of television and radio programme claimed that the programmes had helped them in understanding the environmental issues better while 92% claimed that it changed their attitude or perception of importance of clean environment. However, reading is not a popular option as a Household Expenditure Survey (HES) conducted in 1998/1999 showed that on the average, the Malaysian household spends only RM 3.21 per month on books but spent RM 23.25 per month on toiletries (Anonymous, 2001).

5.9. Students' Involvement in Environmental Activities by Locations of Schools, Forms and Gender

When testing on students' involvement in environmental related activities such as clean-up activity and nature camps, more than 60% of the Melaka students 'seldom' or 'never' participated in these activities. However, students from the rural districts seemed to participate in these activities more often compared to urban district students. Similarly, the percentage also showed significant difference between the percentage of students actively participating in environmental activities, particularly between forms 1 and form 4 urban students.

On the other hand, the percentage difference between form 1 and form 4 in the rural district was relatively small.

The level of people participation in environmental related activities in Malaysia is still very low. In the Economic Planning Unit (1996) survey, the data showed that although Malaysians are aware of environmental issues, only 22% of Malaysian reported some form of involvement in environmental activities.

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