Turtle Awareness Program: A preliminary study on primary school students’ knowledge on turtle conservation in Malaysia.

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Abstract. Malaysia is blessed with 22 species of turtles and tortoises; including marine and freshwater turtles. Unfortunately, these species are severely threatened, eventually leading to loss of population. Thus, Turtle Awareness Programme (Turtle Camp) was initiated to spread turtle conservation awareness by providing opportunities especially for students and teachers to acquire knowledge of turtles in Malaysia and the environment beyond what is taught in school syllabus. This study aims to determine the impact of the programme on students’ knowledge about turtle conservation in 14 primary schools in Kemaman district, Terengganu, Malaysia from 2016-2019. To collect data, students’ knowledge tests using survey questionnaires were conducted before and after the programme. Majority of students (66.11%) achieved the highest score range (80-100) after the post-test. The level of knowledge acquired by students in the relevant themes (taxonomy, diversity, diet, reproduction and conservation awareness) also significantly improved after the programme. Thus, the awareness program had positively contributed in enhancing the knowledge of students on turtle conservation awareness. More depth evaluations of programme such as motivation and behavioural change and systematic educational module should be developed and tested out to ensure continuity and effectiveness of the programmes in the future.

Keywords. awareness, turtle conservation, knowledge, educational module

1. Introduction

Turtles are among the most threatened group of all vertebrates with currently 325 species described in the world. The highest species richness is found in Southeast Asia, the northern Indian subcontinent and the south eastern USA [1]. Meanwhile, there are 22 species of turtles recorded in Malaysia, comprising 4 marine turtle, 15 freshwater turtles (terrapins and softshell turtles) and 3 tortoises [2, 3]. According to International Union for the Conservation of Nature (IUCN) Red List, turtle population is at the brink of extinction as some species such as leatherback, olive Ridley, yellow-headed temple and narrow-headed softshell turtles, river and painted terrapins are classified as critically endangered, while others are considered endangered and vulnerable [4].
Unfortunately, the education syllabus in Malaysia does not highlight the plight of our turtles. Thus, the lack of awareness and knowledge of our biodiversity, specifically turtles, of their values and threats may hinder their effective conservation effort [5, 6]. Environmental education (EE) was first introduced in the 1990s as a tool, initially addressing environmental concerns through educations and emphasizing on sustainable developments [7]. Then, the concept of EE was broaden to increase the understanding of environmental values and knowledges and eventually improving attitudes and behaviours leading to creating and perhaps increasing sense of responsibility towards environment [8]. In line with target 1 of the Aichi Biodiversity to foster more people to be aware about the values of biodiversity, the Convention on Biological Diversity (CBD) had developed a Communcication, Education and Public Awareness (CEPA) toolkit in 2007. This tool demonstrated an effective communication and guidance to mainstream biodiversity and raise public awareness [9]. In fact, several studies with different approaches and contexts had been pursued to convey the message of EE to people. For examples, using different models such as insects [10], crocodile [11], dragonflies [12] and natural history exhibition of insects [13], effort had been made to enhance public knowledge and level of understanding on biodiversity; which then change their audience perceptions and awareness.

To comply with the objective of EE, this study conducted series of awareness program on turtle conservation to reach out to the younger generation, specifically elementary school students. Besides promoting the awareness, it allowed the students to acquire knowledge of turtles in Malaysia, their ecological and economic roles, threats to their survival and our actions to ensure the survival of the turtle population. Lastly, this study aims to evaluate the impact of the programme in enhancing students’ knowledge on turtle conservation.

1.1 The implementation of Turtle Awareness Programme
The Turtle Awareness Programme better known as “Turtle Camp,” was initiated by a non-government agency (NGO) called Turtle Conservation Society of Malaysia (TCS) as part of EE approach to raise awareness and instil public understanding on turtle conservation especially among young generation. They are the stewards for these turtles and the next decision makers of the future. This programme was actively conducted since 2013 to 2020 in more than 20 selected primary schools especially in Kemaman district, Terengganu, Malaysia. Mostly, the selected schools were located near rivers and beaches. Presumably, students from those schools were in close proximity to sources of turtle eggs and if not curbed, the students would likely grow up to be turtle egg collectors.

Students participated in a three hours programme during their co-curriculum day (after school period). The programmes were implemented into two modules; after school and outdoor school activities. The details are:

a. After school program (Figure 1)
   The programme was conducted in participating schools’ hall. It started with a brief lecture on turtles, their roles, threats and conservation actions currently undertaken by various agencies in the country. Then, students worked in groups of four or five to continue with three turtle-related activities and games such as Turtle Action Game, colouring (poster and turtle model), turtle origami, twister game, Ninja Turtle decoration mask, crossword solving and plastic waste management (making eco-brick). A mini exhibition on turtle was set up to give a direct experience to live terrapin and the preserved turtle specimen (i.e. egg, shell, turtle model and wet specimen). At the end of programme, each student was given a button badge and Activity Book that contains the information on turtles and some worksheets (colouring, crossword puzzle and word search) to bring home.
b. Outdoor school program (Figure 2)

About 40 participants including students and teachers from the selected schools were taken to Kemaman Sands Resort, Geliga. The activities were conducted at the nearby beach and surrounding the resort area to expose students with the outdoor learning and create an active learning in nature. The students were briefed on general information on terrapins and sea turtle, awareness on turtle conservation using the flash card and interactive briefing using poster. Then, students participated in various outdoor games such as treasure hunt, Action Game, Memory Game using Rimba card, twister, Who Am I Game, Facts about Me and Eco brick to provide a better understanding and awareness on turtle conservation. Each student received a button badge and Activity Book as tokens of appreciation for participating the program.

2. Methodology

2.1 Data collection

2.1.1 Participants Students (N = 658) aged 10 to 12 years old (standard 4 to 6) from 14 different primary schools in Kemaman district, Terengganu, Malaysia participated in this study (Figure 3). Turtle Camp was conducted during extra-curriculum time, involving three hours session for each school. The survey data were collected from 2016 to 2019.

2.1.2 Test design The effectiveness of an environmental education programme was determined based on what aspects of knowledge, attitude and skill, the participants were able to gain; and measure any changes in their knowledge and perception towards conservation after the programme [14]. In this study, the questionnaire surveys were conducted before and after their participations in the programme in order to evaluate the knowledge on turtle and conservation awareness acquired by students. The questionnaires consisted of seven open-ended and three closed-ended questions (multiple choice) with the score ranging from 0 to 10 (Table 1).
The items were developed based on the information given during the briefing/talk, games and activity book. The relevant topics were classification (taxonomy), diversity, ecological, diet/food, threats and conservation/awareness on turtles in Malaysia (sea turtle, terrapin and tortoise). All the questions, originally in Malay, had been translated to English for this paper.

**Table 1.** The post-evaluation test classified by the fields of knowledge and question types

| Item no. | Field of knowledge/ theme | Item | Question type |
|----------|---------------------------|------|--------------|
| 1.       | Taxonomy (T)              | What are differences between sea turtle, terrapin and tortoise? | Open ended |
| 2.       | Diversity (D)             | How many types of sea turtles are recorded in Malaysia? | Multiple choice |
| 3.       | Diversity (D)             | List all sea turtle’s types found in Malaysia | Open ended/listing |
| 4.       | Diversity (D)             | What is the largest sea turtle in Malaysia? | Open ended |
| 5.       | Diversity (D)             | How many types of freshwater turtles (terrapin and tortoise) are found in Malaysia? | Multiple choice |
Table 1. (Continued)

| Item no. | Field of knowledge/ theme | Item | Question type          |
|----------|---------------------------|------|------------------------|
| 6.       | Diet (DI)                 | What is the primary food/ diet for the Green Turtle? | Multiple choice |
| 7.       | Reproduction (R)          | The colour of head changes to --------- and also eyes to --------- in male river terrapin during the breeding season. | Open ended/ fill in the blank |
| 8.       | Conservation and awareness (CA) | Name two types of the most endangered terrapins in Malaysia | Open ended/naming |
| 9.       | Conservation and awareness (CA) | List three threats to terrapins and sea turtles | Open ended/listing |
| 10.      | Conservation and awareness (CA) | List three ways you can do to protect sea turtles and terrapins | Open ended/listing |

2.2 Data analysis
The pre-survey is to assess student knowledge on turtle and conservation, followed by the post-test to gauge the knowledge acquisition on subsequent experience in Turtle Camp. The number of correct answers scored by each student were graded by referring to the marking range for Malaysia primary school test as a guideline (Table 2). The final grade would describe the level of students’ attainment before and after a period of learning through the programme. The scoring rubric was also implied by [15] to interpret the level of students’ knowledge after the implementation of i-THINK program. Descriptive statistics were used to describe the percentage or proportion of answers by students for each item and test. Microsoft excel was used for statistical calculations.

Table 2. The distribution of Malaysia primary school (standard 1-6) marking system (PPSR, MOE 2016)

| Score (%) | Grade | Performance indicator |
|-----------|-------|-----------------------|
| 80-100    | A     | Excellent             |
| 65-79     | B     | Good                  |
| 50-64     | C     | Satisfactory          |
| 40-49     | D     | Weak                  |
| 0-39      | E     | Need guidance         |

3. Results and discussion

3.1 Pre and post-test knowledge achievement
A total of 658 students comprising 283 males (43.01%) and 375 females (56.99%) had completed both pre- and post-program knowledge tests. Table 3 shows that the knowledge test scores increased after the post-test, recording the majority of students (435 out of 658) achieved the highest score range (80-100). As compared to the pre-test, none of the student attained the highest score range, while, most students (555) obtained the lowest score range (0-39). However, the percentage showed a pronounced decrease (↓77.51%), with only 45 students obtained the lowest scores (0-39) after the program.

The knowledge level of students was determined based on their grades, which clustered into five categories (Table 2). Figure 4 shows the students’ grades (66.1%) were mainly distributed towards the higher grades (A), indicated their knowledge gaining at “Excellent” level after the program. This is followed by “Satisfactory” (C) and “Good” (B) categories at 13.2% and 9.1% respectively. On the other hand, only 4.7% of students obtained “Weak” level (D) and 6.8% at lowest grade E (Need Guidance).
Table 3. Pre-test and post-test knowledge achievement

| Score (%) | Pre-test % | Post-test % | % changes |
|-----------|------------|-------------|-----------|
| 80-100    | -          | 435         | 66.11 ↑   |
| 65-79     | 10         | 60          | 9.12 ↑    |
| 50-64     | 43         | 87          | 13.22 ↑   |
| 40-49     | 50         | 31          | 4.71 ↑    |
| 0-39      | 555        | 45          | 6.84 ↓    |

Figure 4. The distribution of students’ grades comparing pre and post-test scores (N=658)

3.2 Knowledge acquisition after the awareness programme

Table 4 shows the knowledge acquired by students in the relevant themes significantly improved after the programme. In comparison to pre-test, more than 80% students were familiar with the diversity of turtles in Malaysia (items 2-5) and the mating behaviour of the freshwater turtle (item 7) after the program. Prior to the programme, the number of students aware about the threats toward turtles (item 8) was the lowest (0.9%). In turn, the awareness significantly increased to 61.55% after the programme. Unlike sea turtles and tortoises, most people are not familiar with freshwater turtles especially the river and painted terrapins. After the programme, more students were able to identify the freshwater turtle (item 5) as well, enhanced from 8.2% to 80.85%.

Together with fun learning, experience outside the classroom such as hands-on activities and with additional help of handbook about turtles, this programme might attract and educate students to learn more about the turtles in Malaysia especially the terrapins. Participating in outdoor and nature related-activities might enhance students’ interest and their learning process [16]. For example, students’ participation directly in hands-on investigations and interactive learning with the subject such as ants [17] and invasive species [18] was able to motivate their learning achievement and facilitate the knowledge transfer on the presented subject.

The distribution of students’ response for each item according to the correct and wrong answers are shown in Figure 5. Approximately, 89.36% of students demonstrated excellent level of knowledge on the colour changes of river terrapin’s head and eyes during the mating season (item 7). This was followed by 88.3% of students able to name correctly one to four species of sea turtles in Malaysia (item 3). About 87.84% was able to state the species name of the largest sea turtle in the world (item 4). With regard to items 2 and 5, students chose the correct number of sea turtle (87.54%) and freshwater turtle’s types
T(80.85). Thus, the percentage of correct answers for items 2,3,4,5 and 7 are within the range of 80-90% indicating most students excelled in the related topics.

Table 4. Pre and post-test knowledge acquisition in percentage of students’ answer

| Theme | Item                                           | Percentage (%) |
|-------|-----------------------------------------------|----------------|
|       |                                               | Pre | Post |
| T     | 1. Able to classify turtles                   | 12.8| 58.97|
|       | 2. Know diversity of sea turtle              | 20.7| 87.54|
|       | 3. Able to name of sea turtle                | 16.7| 88.30|
|       | 4. Able to identify the largest sea turtle   | 19.1| 87.84|
|       | 5. Know types of freshwater turtle           | 8.2 | 80.85|
| D     | 6. Know about sea turtle’s diet              | 18.1| 74.01|
| R     | 7. Know the behaviour of freshwater turtle   | 45.7| 89.36|
| CA    | 8. Aware the threats to turtle diversity      | 0.9 | 61.55|
|       | 9. Know about the endangered species         | 21.9| 72.04|
|       | 10. Understand the concept of turtle conservation | 20.7| 69.30|

While, the knowledge achievements on turtle’s diet (DI) and conservation awareness (CA) are at good level. It shows that 74.01% of students chose options; jellyfish (A) and seagrass (C) as the Green turtle’s favourite food (item 6). In term of CA aspect, about 72.04% exhibited good response towards the turtle conservation effort (item 10). Their responses were illustrated on their written answers such as “do not collect and eat turtle eggs,” “stop plastic pollution,” “do not litter,” “reduce the use of plastics,” “participate in beach/river clean-up,” “support turtle conservation centre,” and “conduct awareness campaign.” Meanwhile, 69.3% of students were able to list the most endangered species of terrapins (item 10). Nevertheless, only 61.55% of students were aware on the threats faced by turtles (item 8), indicating the knowledge level is good. The threats were stated by students with examples such as “turtle egg collection and consumption,” “water pollution caused by trash and oil spill,” “being accidently caught and killed in fishing nets,” “destruction of nesting habitat,” “human exploitation” and “sand mining could destroy the bank for nesting.” Meanwhile, few students might not understand the meaning of threat as they tended to mention several ways to save turtle instead when answering this question.

Out of five themes, topic on taxonomy recorded the lowest percentage of correct response. Only 58.97% of students were able to distinguish between turtle groups (sea turtle, terrapin and tortoise). They pointed out the physical characteristic (legs’ shape) and habitat (sea, river and land) to differentiate the groups. Overall, majority of students (59% to 90%) were able to answer all 10 items correctly by the end of the programme, indicating their levels of knowledge on each item are considered excellent, good and satisfactory (table 2). Similar study by [19] found that the use of Science Teaching Plan (STP) model had successfully enhanced the knowledge of elementary school students about turtle conservation in their locality, Bengkulu, Indonesia by 35.2%. Apart from first-hand experiencing with live turtle specimen, students also learned about turtle identification, types of turtle and their habitat and steps to save turtles.

The tradition of turtle egg consumption is still widespread among the locals. In fact, the market demand for turtle eggs had increased with estimation of 422,000 eggs being traded in Terengganu in 2007. Some local villagers are still collecting turtle eggs as part of their income and directly supplying to the local markets, inevitably contributing to the decline in turtle population [20]. Thus, it is important to instil the knowledge on turtle protection and impact of egg consumption in students as they might share the knowledge and awareness to their families, colleagues and communities after the programme. Upon completion of the programme, they had pledged not to eat turtle eggs in the future. Ultimately, a
deeper understanding on the turtle conservation would motivate their behavioural changes and responsible actions [21].

![Figure 5](image)

**Figure 5.** The distribution of students’ answer with regards to their knowledge acquisition for each item

All in all, this study shows the positive impact of turtle awareness programme (Turtle Camp) on primary students’ knowledge acquisition on the fundamental knowledge of turtle and conservation effort especially in Malaysia. It is in line with previous studies by [22, 23, 24, 25, 26] who also found that the knowledge, positive perception and responsible behaviour of public especially students were enhanced through their involvements in any formal or informal nature education programmes and project-based learning or outdoor activities related to environment and conservation.

4. Conclusion
The Turtle Awareness Programme (Turtle Camp) had been running since 2016 to 2019 and reached out to 658 participants from 14 primary schools in Kemaman district. Data analysis from before and after the surveys showed positive increase in general knowledge among students, encouraging feedbacks from teachers as well as demands from schools to continue the effort in running the Turtle Camp. The programme’s goals are to (i) constantly improve and upgrade the educational materials, (ii) ensure inclusive and equitable quality education for all and (iii) provide a wider outreach scale and sustainable Environmental Education (EE) programmes, which align perfectly with Sustainable Development Goal 4. To ensure the continuity and effectiveness of the programmes, a systematic and versatile educational and training module and also, a depth programme evaluation would be developed and tested out with the selected schools. In such a way, the facilitators would be able to use the module as a guideline to continuously run more EE programmes in the future. Ultimately, it could facilitate the delivery of the message, awareness and also enhance the impact on the change of people action and attitude.

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