



Learning to think for the development of environmental ethics model for mangrove children

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Abstract

Inculcation of ethics heavily influenced by materialism may fail to arrest environmental problems. Leveraging on the thinking potential of children in their real life context, this action research was carried out with 15 children from Ko Klang mangrove community in Krabi province with the purposes to analyze their thinking patterns and innovate an alternative model for environmental ethics development. The verbalized data on their invisible thinking were collected by interviewing them as well as their teachers and parents and participant observation. The data were analyzed and coded against a schedule of 29 thinking modes and compared with the results of the test conducted to identify any trends of change in their egocentric, homocentric and ecocentric ethics. The results of the study indicated that there was a positive influence of the diversity and thoroughness of the thinking patterns for the development of ecocentric ethics, which was characterized by three main aspects of thinking about environmental situations, thinking about solving environmental problems, and thinking with environmental goals in mind. The Learn to Think for the Development of Environmental Ethics Model was innovated, comprising four steps of building confidence in self, reflecting on the value and attitudes towards the mangrove environment, planning environmental actions in the mangrove community, and reflecting on a new environmental ethical self. Recommended for further study were the sustainability of the children's environmental ethics and the capacity development of learning managers with regard to uses of questions to stimulate thinking for environmental ethics development.

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Introduction

The current environmental situation in mangrove communities necessitates serious investigations into environmental ethics of their residents. Across the world, mangroves are in deteriorating conditions due to excessive use of their resources for residential, agricultural and economic purposes (Odum, McIvor, & Smith, 1982). From 2001–2012, the world lost 9,000–25,000 hectares of mangroves annually, not to mention the enormous damage before 2001 (Strong & Minnemeyer, 2015).

In Thailand, 244,000 hectares of mangroves were found in 24 provinces (Department of Marine and Coastal Resources, 2013). From 2004–2017, Krabi, where 35,883 hectares were covered with mangroves, encountered the most serious mangrove encroachment, causing 307 hectares of mangroves to disappear (Mhaudjan, 2012). The need for mangrove resources to support the booming hospitality and tourism industries, commercial mono-cropping and sprawling residential development increased as Krabi's population rose from 450,890 in 2013 to 469,769 in 2018 (Bureau of Krabi Province, 2015). Thus, it is expedient to identify ways to improve the man-environment relationship to ensure sustainable co-existence.

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Continuous interaction with the environment resulted in humans finding a mode of living and passing their practices on to their children in social learning (Bandura, 2011). As the ways that mangrove residents treat mangroves today are heavily influenced by materialist values, the children inheriting the practices are unlikely to sustain life amid the present population pressure. To move from the traditional way of incubation, the children must be equipped with a new tool to discover how they can co-exist with the mangroves on which their life depends. The mission to equip them with a new tool is urgent because each year a large number of children, 240,000 children in 2016 alone, have had to stop their education after Grade 9 for economic reasons (National Statistical Office, 2016). Once having entered the labor market, they missed an opportunity to learn the intrinsic value of mangroves and were immediately hooked on the materialistic world. Mangrove children are more likely to continue to reside and work in their communities, raising the question whether their materialistic views could support their role as mangrove stewards. It has become important that they be encouraged to think on their own instead of casually accepting their basic instincts or the social norms.

New environmental ethics instruction must be designed to install in them a capacity to think of environmental issues for lifelong learning. This is in line with the World Commission on the Ethics of Scientific Knowledge and Technology (2009), who stressed that critical thinking was a driving force for ethics development. In order to innovate the necessary instructional model, the study posited that the children's living context must be used as their active learning environment and the relationship between their pragmatic thinking patterns and environmental ethics development could be used for innovating the thinking model that is suitable for others in other mangrove communities. For these reasons, the objectives

of this action research are twofold, i.e. (1) to analyze the thinking patterns of mangrove children who participated in a pragmatic environmental ethics development process, and (2) to synthesize an instructional model to facilitate learning to think for the development of environmental ethics for mangrove children.

Literature Review

In the search for an alternative environmental ethics development model through thinking, literature was reviewed with regard to environmental ethics, teaching methods that could create platforms for the children to decide their own environmental behavior, and an array of thinking modes. These were used to conceptualize the research framework as shown in Figure 1.

Environmental ethics is a discipline that has been much philosophized. Naess (1989) posited that humans could be nurtured by nature. Touches of natural environment would make humans realize that they were but parts of the large mystic ecological system. Leopold (2003), who previously believed in humans' capacity to manage the environment for themselves, later opined that animals, plants and nature could co-exist in interdependency. Instead of projecting one kind of environmental ethics as more proper than others, Merchant (1990) offered a framework that the three forms of man-environment relationship, i.e. egocentrism, homocentrism and ecocentrism, could simultaneously be present in a person, but their weights would change according to the person's perceptions of their learning experience. The concept of the three concurrent environmental ethics was used as the framework for environmental ethics learning assessment in the study.

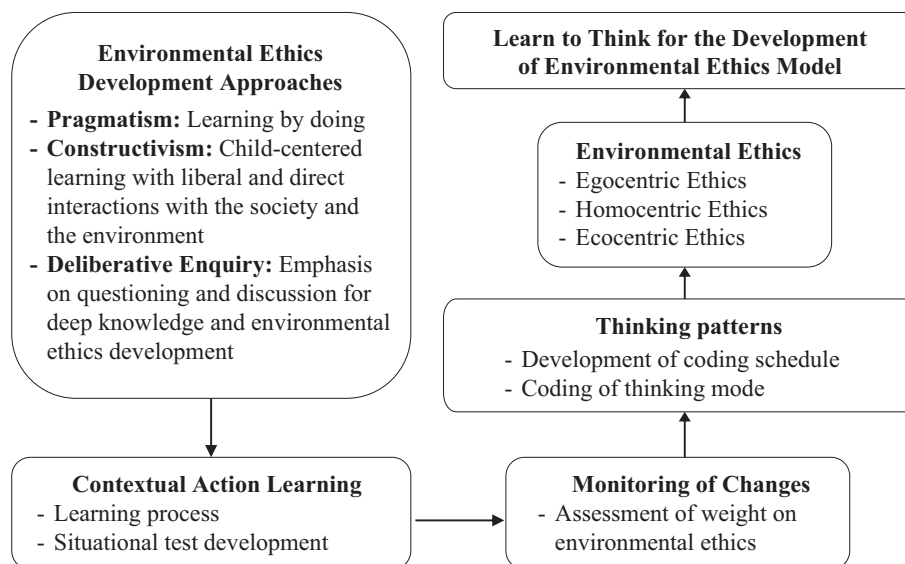


Figure 1 The research conceptual framework

To fill up the possible gaps left by environmental ethics development by means of inculcation, this study adopted John Dewey's pragmatism, which gave importance to learning by doing (Popkewitz, 2005) in their local environmental situations. It also applied social constructivism (Vigotsky, 1978), a learner-centered approach, which allowed learners to design their own learning experience based on their interests and through flexible methods to construct their knowledge and their environmental ethic standpoints. The deliberative inquiry method (Olvitt, 2013) encouraged learners with questions to think and define their values and attitudes towards themselves, others and the environment, reflecting their weights on egocentrism, homocentrism and ecocentrism. These three approaches were combined in this study according to the research by design methodology.

Reviews were conducted to identify an array of thinking modes for use in monitoring the thinking patterns of the children. Of relevance, were 29 thinking modes, including thinking to compare data sets, thinking to group details into composition, thinking to reason for clarity, thinking to apply an idea for use, thinking to predict the trend (Marzano, 2001), thinking to identify problems, thinking to find the cause of the problem, thinking to find solution to the problems, thinking to select the solution to the problem, thinking to act to solve the problem (Eberle & Stanish, 1996; Susaoraj, 2013), thinking to pin down the cause of the problem, thinking to analyze details or components, thinking to synthesize to create new things, thinking to evaluate things, thinking to decide what has to be decided (McDade, 1995), thinking to innovate an original, thinking to identify unlimited solutions within a limited time, thinking to find diverse and divergent solutions, thinking to delineate details of creation and application (Osborn, 2017), thinking to track the relations of the causes and effects, thinking to differentiate distinctions of parts, thinking of the relations from the causes to effects of a phenomenon, thinking of the Four Noble Truths, thinking of the benevolent goals to produce benefits, thinking of the pros and cons, thinking of intrinsic versus superficial values and their sustainability, thinking of setting good examples for other people based on existing knowledge and experience, thinking of the present by using the past experience for improvement and recognizing the effect of the present action on the future, and thinking of speech as how to use words for logical presentation (P. A. Payutto, 2016). This schedule served as guidelines for identifying thinking modes emerging in the study before grouping them into thinking patterns for the development of each environmental ethic trend.

Methodology

The study was conducted in the Ko Klang community of Muang district in Krabi province. The population of the Muslim sub-district increased from 1,912 people in 1993 by 82 per cent in 2017 (Department of Provincial Administration, 2017). As part of the registered Ramsar wetland, ways of life in this peninsula depended on the mangroves and local children were likely to stay after local education. Fifteen children, who went to local schools and were given consent by their parents, participated in the study. Aged from 11–15, they were in the age range that could learn about abstract reasoning (Piaget, 1964) and were capable of thinking on own, giving

logical reasoning, conveying abstract thoughts, and testing their hypotheses (Atherton, 2013).

The children participated in active learning activities called "Think for the Environment" that they designed by themselves, and that took place within their community. The group activities paved way for them to consider the socio-economic and cultural ecological conditions of their daily life and encouraged them to analyze both old and new knowledge and experience, share their opinions with peers and elders, examine environmental problems, and identify solutions for them. Data on their verbal expressions was collected and analyzed by comparing against the thinking schedule to identify their thinking modes on an individual basis.

The changes in their environmental ethics were assessed by using pre- and post-activities situational test developed based on the real life situations in the community. All test items were confirmed by experts in related fields with the item-objective congruence index (IOC) above 0.6. The test takers prioritized items of their choices, reflecting their tendencies towards egocentric, homocentric or ecocentric ethics. Their tendencies and learning patterns were juxtaposed to synthesize an instructional model that encouraged thinking for environmental ethics development.

Results

The Thinking Patterns of Mangrove Children in the Pragmatic Environmental Ethics Development Process

Based on the assessment of changes in the children's environmental ethics and the analysis of their thinking modes, three thinking patterns were identified as shown in Table 1. The first pattern resulted in decrease in egocentric ethics, and increase in homocentric ethics and ecocentric ethics. The eleven children who used this pattern employed eight thinking modes, some of which were extended with elaborated thinking modes. The eight modes that they used included (1) Thinking to categorize key components of the mangrove ecosystem, i.e. the producers, consumers and decomposers as well as the advantages and disadvantages of their presence in the ecosystem. Their thinking touched on how all life in the ecosystem would be affected if the ecosystem no longer existed. (2) Thinking of problems about deforestation and local solid waste. (3) Thinking to find causes of a large amount of solid waste in the community that was human behaviors. They extended their thinking to relate the cause with the effect of waste problems on the ecosystem and to reason that a healthy ecosystem must be kept in order for a better quality of life for themselves, the community and the environment. (4) Thinking to find solutions by asking questions and explore diverse ways to solve the solid waste problems. (5) Thinking to choose solutions after sharing ideas with friends and elders and develop a project on solving the solid waste problems. (6) Thinking to act to solve problems of solid waste in the community by going out to collect solid waste around mangrove forest areas, sorting and disposing it in trash bins. (7) Thinking of the entire problem-solving process, starting with identifying their causes and alternative solutions, choosing solutions, taking action, considering the consequences, and looking for ways to improve the situations. (8) Thinking of the target in having a healthy mangrove ecosystem.

Table 1 Thinking Patterns and Environmental Ethics Development of Mangrove Children

Environmental Ethics	Thinking Patterns
△ □ ⊕	(1) Thinking to categorize (including the extended thinking to sort out components and thinking to sort out advantages and disadvantages), (2) Thinking of problems, (3) Thinking to find causes (including the extended thinking to relate causes and effects and thinking to reason), (4) Thinking to find solutions, (5) Thinking to choose solutions, (6) Thinking to act to solve problems, (7) Thinking of the entire problem-solving process, and (8) Thinking of the target.
△ □ ⊖	(1) Thinking to categorize, (2) Thinking of problems, and (3) Thinking to find solutions.
△ □ ⊕	(1) Thinking to find causes, and (2) Thinking to categorize.

Note: △ refers to egocentric ethics, □ refers to homocentric ethics, ⊕ refers to ecocentric ethics, = refers to unchanged scores, + refers to increased scores, - refers to decreased scores

The second pattern was held by three children who showed unchanged egocentric ethics but greater homocentric ethics and lower ecocentric ethics. They used only three modes of thinking in their learning activities including (1) Thinking to categorize key components of the mangrove ecosystem, i.e. producers, consumers and decomposers but failed to provide other details of the components. (2) Thinking of problems of solid waste that created impact on themselves and the environment. (3) Thinking to find solutions how solid waste problems could be solved with no further development.

The third pattern that was used by only one child illustrated no change in environmental ethics after the learning activities. The child used only two thinking modes including (1) Thinking to find causes of the solid waste problem that was created by carelessly throwing things away. (2) Thinking to categorize components of the mangrove ecosystem, i.e. producers, consumers and decomposers without providing other details of the components.

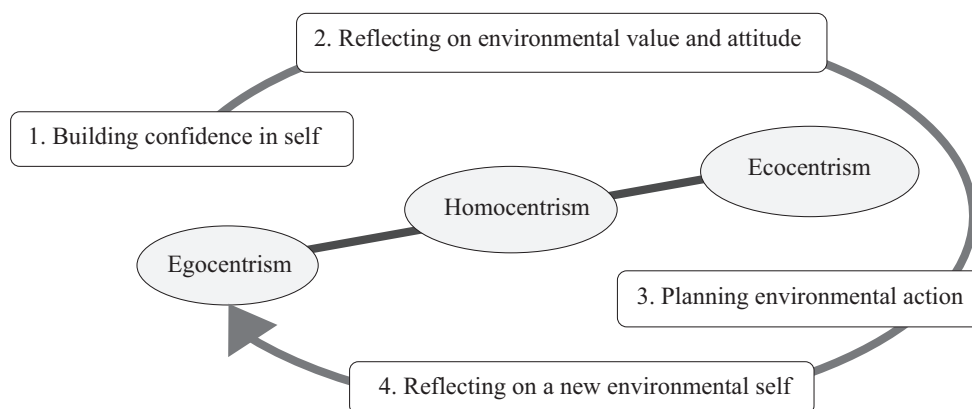
Based on the results of the analysis above, it was indicative that with the more diverse and thorough thinking patterns, the closer the children with environmental goals in mind could move to the ecocentric ethics. Enjoyable atmosphere in learning and doing new things with peers and elders, space to

express their opinions and pride in obtaining useful knowledge contributed positively to their learning results. Less diverse and thorough thinking patterns and no environmental goals could lead the children to the homocentric ethics. Fear of public speaking impeded the diversity, thoroughness and target creation. Low diversity and thoroughness of thinking patterns with no environmental goals left the child with egocentric ethics. Negligence was the major constraint of learning.

The Learn to Think for the Development of Environmental Ethics Model (LT-DEE Model)

Based on the action learning process, and resulting thinking patterns and environmental ethics development, the LT-DEE was developed as shown in Figure 2. It consisted of four major steps as follows:

Step 1 - Building confidence in self: In this step, the children were encouraged to recognize their own value and learning capacity, and their possibility to do good things. A comparative activity boosted their recognition. In the study, the activity called “Know Others and Know Ourselves” allowed the children to express their feelings after seeing

**Figure 2** The learn to think for the development of environmental ethics model (LT-DEE Model)

a miserable life of others such as a video clip about a respirator-dependent man who was unable to move any parts of his body except for his finger that he used to write books to create happiness for other people and earn money to support his family or photos of homeless children and refugees. Questions were given to encourage them to reflect on assets in their life and what they could do for themselves, others and the environment. The outcome of this step was their improved self-confidence in voicing their opinions and expressing their “self.”

Step 2 - Reflecting on environmental value and attitude: In this step, the children were encouraged to review their previous experience and knowledge about the relationships between themselves, others, and the environment and assign their values and attitudes towards them. Exchanges of simple 5W 1H questions paved ways for them to identify components in the environment. Questions like “What kind of relationship do humans have with the environment? Are they above the environment or are they part of the environment? Why is it in that way?” carried the children to consider the values of the components. Questions like “So far, what have we done to benefit ourselves, other people and the environment?” “What should we do in the future to benefit ourselves, others and the environment?” made them accept that they and their families had been exploiting the environment without doing much to care about other people or the environment. More questions like “How can we change the action that we did for ourselves but made other people unhappy or destroyed the environment into a happy-ending story?” encouraged them to shift their attitudes for a wider embrace. Outcomes from this step included the children’s ability to ask questions, their recognition that humans were part of the environment, and their ability to create connections in their thinking on the value and attitudes towards the environment.

Step 3 - Planning environmental action: In this step, the children were guided to look at environmental issues in their mangrove community. Questions to guide the discussion were: “What are environmental issues in our mangrove community? What are the causes of these issues?” The children proposed issues about themselves, others and the environment for discussions, exchange of perspectives and experiences and present their opinions. They were encouraged to plan how to learn more about the environmental issues that they were interested in. Questions like “What are the methods which can be used to learn more about these issues? Who can provide us with more knowledge about these issues?” “When and how can we visit the areas where the issues occurred?” “What are the results of our learning?” and “How shall we present the results of our learning to the community?” helped them to process their learning well. The children had opportunities to conduct field observations and interview local residents about their environmental issues and summarize their learning in a presentation to community elders. The outcomes of this step were their joint learning plan and learning tools such as interview questions and their ability to construct knowledge on their local environmental issues based on field experience and discussion with peers and elders and to summarize their views for presentation to the public.

Step 4 - Reflecting on a new environmental self: The children were provided with opportunities to reflect on their previous experience and knowledge and the new learning process. They expressed their knowledge, feelings and opinions in writing, drawing, talking, presentations and individual interviews. The outcome of this step was the evidence of their ethical development according to their learning potential. A pre- and post- situational test on environmental ethics helped identify systematically the weights the children gave to egocentric ethics, homocentric ethics and ecocentric ethics.

Discussion

The LT-DEE Model gave importance to children’s ability to construct knowledge and think in their real life context to develop environmental ethics. The model met the United Nations’ Sustainable Development Goal that quality education should equip learners for life-long learning with the ability to think, analyze, ask questions, practice, voice opinions and exchange their values, perceptions and actions on sustainable development that addressed *inter alia* local ecosystems (United Nations Educational, Scientific and Culture Organization, 2017). The study results confirmed that thinking could re-orient the children to a new environmental standpoint, shying them away from the materialistic value. The semi-opened learning process used questions to encourage the children to be aware of their own capacity to learn and solve problems instead of imitating others, who might pass materialistic value to them. The model added to Olvitt’s deliberative enquiry model (Olvitt, 2013) that relied solely on exchange of thoughts for policy-making with real life knowledge discovery and concrete action.

Key questions used in supporting the children in the study were more elaborate than those of Shapino and Takaes (2004) that consisted of “What do we have to do? What should I do? What should we do?” The key questions under the study were: (1) What am I confident in doing in order to achieve my environmental goal? (2) What value and attitudes should I have towards the environment of my mangrove community? (3) What can I do to improve the environment of my mangrove community? and (4) What is the future vision for the environment of my mangrove community? In managing the learning process, it was realized that questions were important tools in encouraging thinking. To create suitable questions, the final goal of thinking, the philosophy applied in the learning management, and the age and stage of learning of the learners must be considered.

Conclusion and Recommendation

The integrated approach of learning-by-doing, social constructivism and deliberative enquiry in real life situations could increase the possibility for mangrove children to think less for themselves and their fellow humans but more for the environment. Using questions to stimulate them to think about environmental situations, ways to solve environment problems and environmental goals promoted the diversity and thoroughness of their thinking modes. The greater the diversity

and thoroughness of thinking modes they engaged, the higher the chance they achieved less selfish environmental ethics. Recommended for further study are a study on the sustainability of the environmental ethics in the children and a study on the capacity development of environmental ethics learning managers especially in questions creation.

Conflict of Interest

There is no conflict of interest.

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