

An Integrative Framework of Environmental Education for Environmental Crisis Transformation

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ABSTRACT

Though there are currently many perspectives on environmental education, they generally fail to address large gaps in linking education between natural sciences, social sciences and the humanities. As a result, recently developed environmental education management practices are inconsistent in sociocultural contexts, especially in Thailand where there are many environmental agencies and indigenous groups with their own unique worldviews. To address this issue, this mixed methodology study developed an integrative framework of environmental education based on the integral theory and worldviews of various stakeholders in Thailand. Results showed that the proposed integrative framework thoroughly addressed three holistic measures as well as five components of environmental literacy. The holistic measures consisted of *behavioral change*, *social change*, and *personal change*, whereas, the five components of environmental literacy included *competencies* (knowledge and skills in scientific and sociocultural aspects), *spiritual growth* (knowledge and skills in humanities), *participation* (norms of action), *attitudes* (proper character traits), and *awareness* (value awareness). This study not only fills gaps between various perspectives of environmental education, but also provides a shift from the reductionistic approach to a more holistic one when addressing the world's complex environmental crises, especially on personalized and localized contexts.

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INTRODUCTION

Current environmental crises including pollution, natural resource degradation, loss of biodiversity and climate change are obvious physical and biological issues. Crucially, their root causes are complicated and associated with behavioral, social

and personal problems which spark the need for a transformation away from the current dualistic view. This means a change from mechanistic, egocentric and reductionistic thought to a holistic view that is system thinking, ecocentric and more understanding of the interconnectedness of the world and the self (Canty, 2014; Naess, 2001). Environmental education [EE] that is applied to an educational process for environmental problem solving and management should develop its paradigm as well as shift from a separatist view to a more holistic view. It should also integrate natural science, social science and the humanities into an EE framework for insight in order to solve the complexities of various environmental crises.

Environmental education was developed by Western scholars in the late 1960s to apply problem solving strategies to environmental issues. At first, EE was thought of as using the environment to develop environmentally responsible behavior and literacy through awareness, attitudes, knowledge, skills, and participation (Hungerford & Volk, 1990; Lucus, 1972; United Nations Environment Program [UNEP], 1978). Two decades later, it further incorporated ideas on sustainable development. This change was inspired by Mapin and Johnson (2005) who believed that EE should evolve from empirical science and conservation to more ecopolitical and ecophilosophical focuses. As a result, during the last two decades, the conceptual framework of EE has broadened to include social, political, cultural, economic, aesthetic and spiritual

dimensions of environments (Hart et al., 1999; Palmer, 1998; Sauvé, 2005). Mapin and Johnson (2005) summarized the movement of EE into three dominant theoretical perspectives: behavioral change, social change, and personal change. Firstly, when analyzing EE from the perspective of behavioral changes, the focus is on developing scientific thinking in order to promote environmentally responsible behavior. Secondly, if viewing EE in terms of social change, the focus is on developing critical thinking for changing social values and structure in environmental justice and sustainability. Lastly, if considering personal change, this view emphasizes developing ecological consciousness and human-nature connections, and draws more from the humanities, including philosophy, aesthetics, religion, deep ecology, and bioregionalism. In considering these conceptual frameworks, researchers should work to understand and integrate these diverse EE theoretical perspectives. Furthermore, this work is important because studies focused on EE framework development are often constrained by a single purpose, rather than integrating the different perspectives for concretely holistic purposes and environmental literacy.

The framework for environmental education in Thailand has been mostly influenced by the first and more traditional framework developed from the Western worldview. However, over the past four decades, there are increasing concerns that utilizing this framework may not successfully promote conservation behavior

because it overlooks the diversity of local socio-cultural norms and various worldviews held by many communities in Thailand (Rerkpornpipat, 2010). For instance, natural science and ecology reject critical unmeasurable variables such as those perceived through the mind or which are formed by cultural values, important because these are obvious realities of one's relationship with nature in the indigenous worldview of Mekong communities living in Thailand (Jaitiang & Srisatit, 2016; Kouy, 2013; Mungthane, 2013). To solve this problem, one scholar has proposed that ecological science should be pushed to integrate oriental wisdom (Jaitiang, 2017). Alternatively, others have suggested that three dominate perspectives (scientific, critical, and philosophical thinking) should be combined into a more holistic EE purpose (Srisupan, 1996). However, these are just ideas which lack proper empirical support.

In this study, we have combined different perspectives based on the environmental worldview within Thailand's sociocultural context with integral theory to propose a more integrated framework of EE in order to help educators, practitioners, and researchers. This offers a pathway for those interested in these practices to shift toward an integration paradigm to establish a holistic and systemic EE approach that includes experiential, behavioral, cultural, and system development in order to transform the environmental crisis. In order to develop an integrated and holistic approach to environmental education, it is necessary to first elaborate the definitions

of an environmental worldview base on Thai sociocultural context, environmental literacy, and what we mean by an integral theory.

Definition of Environmental Worldviews

An environmental worldview is a frame of reference or perceptions and concepts regarding the meaning of nature and human-nature relationships. In the philosophical view, there are critical components of this worldview including ontology, epistemology, and axiology. Therefore, the worldview that we define here attempts to support five different aspects: (1) meaning and meaning-making of the nature of reality and human position in the natural world, (2) patterns of knowing and how to gain additional knowledge of nature, (3) definitions of environmental values, (4) what proper attitudes exist towards nature and environmental crisis, and (5) norms of decision-making towards nature and environmental problems (Budin, 2012; Witt, 2012). In Thai sociocultural contexts, the environmental worldview has been influenced by the eight discipline aspects: animist, dharma, aesthetic, scientific, ecological, economic, cultural and social (Sangkpanthanon, 2013; Sattayanurak, 2002). Firstly, *the animistic view* postulates a spirit-filled earth, also known as animism or "phi" - the spirit of nature in Thai culture. Secondly, *the dharma view* is a Buddhism perspective on nature as the ultimate realization of truth and the true meaning for living. Thirdly, *the aesthetic view* is

a perspective that considers the aesthetic value of nature. Fourth, *the ecological view* is a perspective on the complex systems, diversity, and intrinsic values of nature. Fifth, *the cultural view* is a perspective on nature as a life supporting-system and an important part of the value system of many communities. Sixth, *the economic view* is a perspective on nature as a resource with extrinsic value. Next, *the scientific view* is a perspective on nature as an empirical object used in order to discover rules of nature. Lastly, *the social view* is a perspective on nature as a participatory space and resource that is able to be shared.

This study explores insights into the environmental worldview in the Thai sociocultural context and defines components of environmental education via a structured interview that explored eight different aspects of individual worldviews.

Environmental Education and the Definition of Environmental Literacy

In early attempts, environmental education was defined as the educational process to promote citizen's environmentally responsible behavior via developing environmental literacy through awareness, attitudes, knowledge, and skills, as well as participation in conservation, protection, and environmental problem-solving (UNEP, 1978). During the past four decades, environmental education has undergone rapid changes, not only in terms of purpose but also in its environmental literacy aims. Mappin and Johnson (2005) had classified EE framework by purpose, content, and

practice of environmental literacy into three different perspectives: behavioral change (environmentally responsible behavior), social change (emancipation) and personal change (enlightenment). In this study, environmental literacy was redefined as: (1) *Awareness* referring to one's ability to acknowledging the value of nature and human-nature connection. (2) *Attitudes*, which are proper character traits towards nature and environmental issues. (3) *Knowledge* refers to one's understanding of the concepts of nature, human-nature relationships and environmental problems. (4) *Skills* mean the ability to understand and solve environmental issues. (5) *Participation* refers to the norms of decision-making used to address environmental problems. We classified these factors by behavioral changes, social changes, and personal changes based on Wilber's integral theory.

Integral Theory

Environmental education can be classified based on Ken Weber's integral theory. According to this theory, there are at least four irreducible perspectives (subjective, intersubjective, objective, and interobjective) that must be considered when attempting to fully understand any issue (Esbörn-Hargens, 2009). Firstly, *subjective realities* are a result of individual perspectives, such as aesthetic experiences, feelings, or those made utilizing the senses. This can be used to explore components of personal change. Secondly, *intersubjective realities* refer to the cultural or second-person perspectives such as group values,

ethics, and culture. This perspective can be used to exam the components of both social and personal change. Third, *objective realities* refer to individual behaviors which can be studied from a third-person perspective. Lastly, *interobjective realities* refer to whole eco, social or economic systems that are considered via a systemic analysis from a third-person perspective. Both behavioral and system perspectives are used to explore components of behavioral and social change. In this way, we place environmental education in an integrative framework which is relevant in individual, cultural and social contexts. Even though, there are many researches to develop the environmental education framework, this research to fill the integrative framework of environmental education in Thailand. Moreover, at the theoretical level this sheds light on environmental education in the holistic and systematic perspective.

METHODS

An exploratory sequential mixed-method research design was chosen to study an integrative framework of environmental education. Our qualitative data was first collected and analyzed, which then informed subsequent quantitative data collection (Creswell, 2012; Fetters et al., 2013). This study involved three phases. Phase one used a structured interview to understand the EE components, uncovering themes that were then used to build a survey instrument. Phase two utilized a questionnaire to test the phase one data and do a Principle Component Analysis [PCA] to identify the items

describing EE components. Phase three was an integration that happened within multiple levels of the study. This occurred first while linking data at the design level when using a sequential design, where the results from the first phase of the research were used to build the second stage of the research design. Next, an interpretation-level integration occurred connecting the qualitative and quantitative results to fully address the phenomenon for establishing the EE integrative framework.

Participants

In Phase 1, we conducted structured interviews with key informants selected through purposeful sampling, namely, on the basis of their connection to environmental work in Thailand (north, east, middle and southern regions; Hungerford & Volk, 1990; Larson et al., 2015; Stern, 2000). The number of interviews was determined based on the saturation of information (Prasithratsint, 2002). We conducted a total of 63 interviews: scholars (n=10) and university students (n=7) both in related fields of environment/ environmental education, EE high school educators (n=14), leaders of environmental clubs (n= 9), leaders of environmental NGOs (n=8), leaders of eco-communities (n=6), environmental activists (n=4) and environmental monks (n=4).

In Phase 2, to verify the EE components in the larger sample via PCA, the target population included environmental citizens in organizations, eco-communities or educational institutions involved in taking action to maintain or enhance the quality

of the natural environment (e.g. university scholars and students, EE high school educators, environmental clubs, eco-communities, and environmental NGOs). These groups were chosen because they critically influence environmental leadership and sustainability in Thailand. Therefore, we used multi-stage cluster sampling techniques (Teddlie & Yu, 2017) to define the samples. Moreover, the sample size was defined by Roscoe's formula at the 95% confidence level, and the minimum sample size required was 384 (Ngamyan, 2011). In this study we used surveys to collect data for 449 samples.

Phase 3 was used to connect the qualitative and quantitative data for developing the integrative EE framework, which was done by the researcher. Moreover, the EE framework was examined the validity with testing Index of Item-Objective Congruence: IOC (Pasunon, 2015) by five experts. The group of experts consisted of doctoral degree recipients in the fields of philosophy, cultural study, and educational evaluation; two of the doctoral degree recipients were from the field of environmental education.

Data Collection and Research Instruments

In Phase 1, qualitative data was collected from multiple resources to uncover the depth of the various components of EE. The primary qualitative data came from structured interviews covering five aspects of environmental literacy (awareness, attitudes, knowledge, skills and participation) based

on interviewing individuals in respect to eight different worldviews: animistic (X1), dharma (X2), aesthetic (X3), scientific (X4), ecological (X5), economic (X6), cultural (X7) and social (X8) (Sangkpanthanon, 2013; Sattayanurak, 2002). Interviews were designed to cover a range of topics through X1-X8 aspects; therefore, participants were asked to respond keeping in mind their previous knowledge, values, understanding and experience with the prompt:

Awareness - what parts of nature you acknowledge from an animistic (X1) perspective and what influence this has on human-nature relationship?

Attitudes - how should you behave toward nature and environmental problem solving from an animistic (X1) perspective?

Knowledge - what is the knowledge you use to understand the nature and environmental problems from the animistic (X1) perspective? where is the source of knowledge from?

Skills - how do you gain an understanding of nature from an animistic (X1) perspective, and how do you address environmental issues?

Participation - what action are you taking to maintain or enhance the quality of the natural environment, and what norms or criterion drive your decision-making or actions from an animist (X1) perspective?

During the qualitative data collection phase, we conducted 63 individual interviews. These interview data were

analyzed and defined the list of variables and themes to describe the variables of awareness, attitudes, knowledge, skills participation awareness, attitudes, knowledge, skills participation and the three EE purposes (behavioral change, social change and personal change) based on the concept of environmental education, as well as integral theory. However, to triangulate the data from the interviews, two other types of qualitative data were collected and analyzed: document collection, and non-participant observation in specific environment and context (Creswell, 2012; Heale & Forbes, 2013).

In Phase 2, the data from the qualitative phase was used to develop a survey instrument. A brief 30-item, 5-point Likert scale was created based on the list of variables that emerged during phase one interviews. It included 30-items covering five dimensions: awareness, attitudes, knowledge, skills and participation. It was designed to ask respondents to report their "Agreement level" on a scale from 1 to 5 from 1 = Strongly Disagree to 5 = Strongly Agree. In addition, the survey instrument was tested for reliability. There are different reports about the acceptable values of alpha, ranging from 0.70 to 0.95, where some recommend a threshold of 0.9 (Prasithratsint, 2002; Tavakol & Dennick, 2011). In this study, the Cronbach's Alpha was presented at 0.92. Moreover, it was also evaluated for content validity by testing IOC on five experts, where it presented an IOC of 0.99 (see survey questions in Appendix A). To gather the data, we did a hybrid data

collection approach involving both personal contact and survey distributed via mail.

The idea of triangulation had already introduced one purpose for mixed method - to integrate multiple database to understand the research problem (Creswell, 2012). In this study, triangulation was undertaken to integrate the qualitative and quantitative data for establishing the EE framework based on the environmental worldview within Thailand's sociocultural context, integral theory, and the EE concept.

Data Analysis

In Phase 1, we used the content analysis approach to sketch EE components of environmental literacy: awareness, attitudes, knowledge, skills, and participation. The qualitative data was analyzed through a multi-step process: organization of data, data immersion, construction of themes, data coding, creation of analytic memos, and interpretation of the findings (Creswell, 2012). We did content analysis and defined themes of environmental literacy into three different EE purposes: behavioral change, social change, and personal change (Table 1). In Phase 2, we used Principle Component Analysis (PCA) to test the dimensional components, choosing an oblique rotation (Promax) because the components might be related to each other. Prior to this, we made a Bartlett Sphericity test (chi-squared = 7511.858 and $p = 0.000$) and obtained the measure of sampling adequacy via Kaiser-Meyer-Olkin (KMO = 0.951), which implied that the strength of the relationship among the variables was strong. This analysis

generated five different components with eigenvalues greater than one (Table 2).

The integration phase happened at multiple levels of the study – the design level, method level, and interpretation level. It also happened in a variety of different ways - connecting, building, merging, or embedding (Berman, 2017; Fetter et al., 2013; Guetterman et al., 2015). In this study, integration occurred first while linking data at the design level when using a sequential design, where the results from the first phase of research were used to build the second stage of the research design. In order to more fully address the research question to develop the integrative EE framework, we integrated the qualitative data and quantitative data based integral theory, and the concept of environmental education (Mapin & Johnson, 2005; Rawang, 2009).

Lastly, the framework was done IOC testing by five experts, which showed the content and construct validity were presented respectively at 0.81 and 0.92.

RESULTS

Phase 1: Finding Environmental Literacy with Three Different Purposes

The content analysis revealed the EE components described in general environmental literacy and three purposes based on the environmental worldview of Thai sociocultural context (Table 1).

Additionally, it was found that environmental literacy could be described in five general themes: awareness, attitudes, knowledge, skills, and participation. Moreover, we found that environmental literacy for behavioral change mainly concerned scientific variables, while

Table 1
The components of environmental literacy with three different purposes

| Environmental literacy | Behavioral change | Social change | Personal change |
|--------------------------|--|--|---|
| 1. Awareness: | - usage values - ecological values | - cultural values | - aesthetic values - sacred values - spiritual values |
| 2. Attitudes: | - utilization - stewardship | - respect culture | - love nature - respect nature - compassion |
| 3. Knowledge: | -scientific knowledge | - systemic knowledge - local knowledge | - aesthetic knowledge - personal knowledge from deep experience* - personal knowledge from spiritual practice |
| 4. Skills: | - scientific skills - systemic thinking | - critical thinking - participation skills | - aesthetic skills - spiritual practicing skills |
| 5. Participation: | - efficiency - consequence | -community rule / ritual - multicultural | - harmony - fairness |

Note: *deep experience is a spontaneous experience that might occur during a period of independent retreat in the wild.

environmental literacy for social change focused on the sociocultural variables, and environmental literacy for personal change emphasized psychological and spiritual variables as seen in Table 1.

Category 1: Behavioral change. In Table 1, “awareness of ecological values” is a variable we defined as being a part of behavioral change. It was described by an interviewee from the ecological perspective as below:

“From [sic] ecological point of view, value of all nature [sic] things and humans are being as a small mechanical part of the nature system, and our action is not the end process, but it creates consequence to ourselves, community, region, nation and global” - university scholar

In addition, interviewees also explained the root causes of the corncob burning and smog problem in the north of Thailand by using the systemic thinking skill. It was an essential skill to insight the root causes of environmental crisis within the behavioral and social context.

“In order to understand the corncob burning and smog problem in Northern Thailand, first, we should know that corn grows as maize, which is the raw material grown to directly support animal food companies. Corn has been transformed into animal food to be

used by various livestock farms (e.g. chicken or pig farms). Subsequently, these animals become meat and are delivered to us, the customers, who buy that meat at the supermarket or eat a chicken hamburger from a fast-food restaurant. When we think systematically about this system of consumption, we see that if we consume meat, we are also the root cause of the corncob burning and smog problem in Thailand.” - EE scholar

Category 2: Social Change. Interviewees also reflected on the “awareness of cultural values” of nature, which we define as a part of social change:

“Nature is served as a cultural-supported system; water, soil, air, and mineral, these are our basic consumption for foods, cloth, house, and medicine. When we perceive the natural resource is [sic] as our living culture, we will create local knowledge and ritual to utilize resources with respect” - university scholar

Moreover, when asked, “What actions are you taking to maintain or enhance the quality of the natural environment?” interviewees who were in charge of sustainable development reflected on “participation,” which was concerned with social change for social and ecological sustainability.

“Nowadays, we have developed a participatory management style which is a collaborative environmental management system between local communities, local governments, and civil society in order to develop an environmental norm that integrates local knowledge, rituals, community rules, national law, policies, good governance concepts, community rights, and scientific knowledge.”
– leader of environmental organization

Category 3: Personal change. Other talked specifically about “awareness of spiritual values” which was included in theme of personal change. This is because interviewees described nature as a place to discover the meaning of life, and awareness of spiritual values influences personal change in living harmoniously and compassionately to all being.

“At the point of dharma perspective, human’s goal is to realize the reality of nature and meaning of life [sic]. Nature is served as a place to discovery the truth of life which is freedom. Freedom is human dignity which lead individual [sic] be self-reliance and living harmony with the nature.”- leader of environmental organization

In addition, environmental monks described the “awareness of spiritual values” in terms of the beauty of a natural place and

articulated how the beauty of nature acts as a conduit for nature appreciation and self-realization from the aesthetic perspective. This awareness was linked with the monks’ Buddhist background.

“The beauty of nature presents dharma and the three characteristics of all existence. Beauty reveals the truth, and to appreciate beauty we should also develop our minds to be free from delusion and attachment.”- environmental monk

Moreover, interviewees mentioned a way to gain deep insight into the nature and human-nature relationship (knowledge) which was associated with a personal change from separation to integration:

“A holistic perception is to think like nature and to feel like nature.”
- leader of an EE organization

Phase 2: Finding New Environmental Literacy with an Integrative Purpose

In the first phase of this study, it was revealed that the EE framework had in fact five environmental literacies, each with a single purpose: behavioral change, social change or personal change. However, in the past, EE framework often only considered a single purpose, thus causing failure in promoting environmentally responsible citizens and long-term sustainability. In phase 2, therefore, aimed to tackle these issues and integrate all purposes and environmental literacy that were identified in Phase 1 via Principal Component Analysis to study

the relationships of the variables which were defined in phase one. The eigenvalue before rotation ranges from 12.58 to 1.11. PCA defined five components where the eigenvalues were greater than one, and these factors were able to explain 62.45% of the total variance, almost half of which (41.93%) were explained by the first factor.

In this study, the five components were labeled respectively as *competencies*, *spiritual growth*, *participation*, *attitudes*, and *awareness*. To be more specific, PCA regrouped the knowledge and skills variables into two new components that are called competencies and spiritual growth (otherwise there were no changes, Table 2).

Table 2
The new five components of environmental literacy from PCA

| | Component | | | | |
|--|--------------|--------------|--------------|--------------|--------|
| | 1 | 2 | 3 | 4 | 5 |
| 1. COMPETENCIES | | | | | |
| Scientific knowledge. | 0.784 | -0.012 | 0.021 | -0.053 | 0.072 |
| Systemic knowledge. | 0.731 | -0.096 | 0.075 | 0.030 | 0.012 |
| Local knowledge | 0.777 | -0.003 | -0.062 | -0.075 | 0.144 |
| Scientific skills | 0.694 | 0.013 | 0.206 | -0.005 | -0.091 |
| Systemic thinking skill. | 0.707 | 0.089 | 0.264 | -0.066 | -0.215 |
| Critical thinking skills. | 0.431 | 0.219 | 0.323 | -0.062 | -0.124 |
| 2. SPIRITUAL GROWTH | | | | | |
| Aesthetic knowledge | 0.523 | 0.465 | -0.172 | -0.012 | 0.080 |
| Personal knowledge from deep experience | 0.556 | 0.317 | -0.160 | 0.115 | -0.005 |
| Personal knowledge from spiritual experience | 0.296 | 0.689 | -0.208 | 0.081 | 0.040 |
| Aesthetic skills | 0.064 | 0.597 | 0.159 | 0.160 | -0.143 |
| Spiritual practice skills | 0.053 | 0.379 | 0.204 | 0.052 | 0.006 |
| Participation skills | 0.266 | 0.379 | 0.153 | 0.052 | 0.006 |
| 3. PARTICIPATION | | | | | |
| Efficiency | 0.248 | -0.055 | 0.660 | -0.114 | 0.012 |
| Consequence | 0.113 | -0.146 | 0.718 | 0.079 | 0.057 |
| Community rules/rituals | -0.084 | 0.361 | 0.628 | -0.153 | 0.065 |
| Multicultural | -0.057 | -0.032 | 0.601 | 0.302 | 0.124 |
| Harmony | -0.023 | 0.082 | 0.773 | 0.023 | 0.030 |
| Fairness | -0.038 | 0.036 | 0.725 | 0.093 | 0.059 |
| 4. ATTITUDES | | | | | |
| Utilization | 0.257 | -0.164 | 0.159 | 0.545 | -0.040 |
| Stewardship | 0.249 | 0.020 | -0.056 | 0.678 | -0.068 |
| Respect nature | -0.269 | 0.225 | 0.001 | 0.893 | -0.149 |
| Respect culture | 0.275 | 0.001 | 0.001 | 0.532 | 0.007 |
| Love nature | 0.089 | -0.018 | -0.027 | 0.812 | -0.010 |
| Compassion | -0.129 | 0.092 | 0.070 | 0.812 | -0.010 |

Table 2 (continue)

| | Component | | | | |
|---------------------|--------------|--------------|--------|--------|--------------|
| | 1 | 2 | 3 | 4 | 5 |
| 5. AWARENESS | | | | | |
| Usage values | -0.163 | 0.200 | 0.072 | -0.282 | 0.749 |
| Ecological values | 0.352 | -0.166 | 0.024 | 0.124 | 0.534 |
| Cultural values | 0.301 | -0.533 | 0.129 | 0.056 | 0.565 |
| Aesthetic values | 0.104 | 0.125 | 0.016 | 0.145 | 0.610 |
| Sacred values | -0.311 | 0.739 | 0.006 | 0.063 | 0.246 |
| Spiritual values | -0.016 | 0.549 | -0.020 | 0.077 | 0.425 |

Note: Extraction method: Principal Component Analysis. Rotation method: Promax with Kaiser Normalization

Entries on bold indicate a loading of more than 0.30 on the appropriate component.

Moreover, the component correlation matrix (Table 3) shows that five components (competencies, spiritual growth, participation, attitudes and awareness) tended to correlate with each other, exhibiting a positive correlation.

Table 3

Component correlation matrix

| | 1 | 2 | 3 | 4 | 5 |
|----------------------------|------|------|------|------|------|
| 1. Competency | 1.00 | 0.62 | 0.41 | 0.68 | 0.41 |
| 2. Spiritual Growth | | 1.00 | 0.40 | 0.57 | 0.29 |
| 3. Participation | | | 1.00 | 0.47 | 0.27 |
| 4. Attitudes | | | | 1.00 | 0.47 |
| 5. Awareness | | | | | 1.00 |

Note: Extraction method: Principal Component Analysis. Rotation method: Promax with Kaiser Normalization

Phase 3: The Integrative Framework of Environmental Education

The integrative framework labels these three inseparable purposes as follows: behavioral change, social change, and personal change. It also defines five components of environmental literacy, required as a learning objective of environmental education, seen in Figure 1.

Figure 1 shows the integrative purpose of environmental education involving three perspectives – behavioral, social and

personal change. *Behavioral change* can be defined as the ability to use scientific and sociocultural understanding, thinking and decision-making in order to display environmentally responsible behavior. *Social change* is expressed as the ability to use the understanding of social structures (including social, cultural, political and economic factors), systemic thinking, critical thinking, and decision-making in order to participate in ecological and social justice. *Personal change* can be described

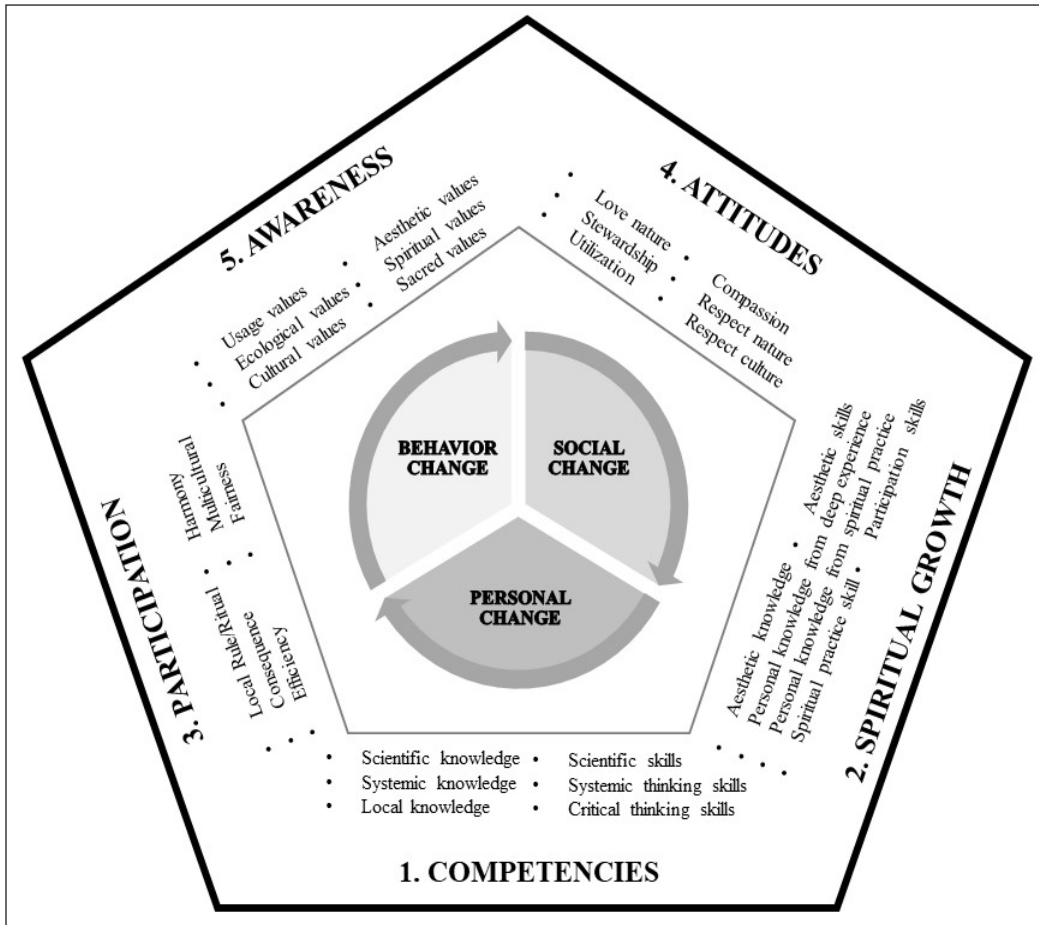


Figure 1. The integrative framework of environmental education

as the ability to develop the sense of connectedness that extends self-awareness beyond ego boundaries, instead replaced by feelings of human-nature connection, harmoniously holding a consideration of one's action with respect to nature. For this, we introduce *New Environmental Literacy* to empower people to develop the competencies and spiritual growth to participate in and shift attitudes and values towards an awareness for the proper, environmentally conscious decision-making and action.

The factors and items emerging from this analysis describe the multi-dimensional nature of environmental literacy (Figure 1). Firstly, *competencies* refer to the knowledge and skills in the scientific and sociocultural aspects that are involved in developing the ability to explore and understand nature and environmental issues based on facts and the scientific method. In this, it is also important to understand natural and environmental issues, and how these interact with social structure. Secondly, *spiritual growth* involves the

knowledge and skills in psychological and spiritual aspects that develop the human-nature relationship, self-realization, and environmental consciousness. Thirdly, *participation* refers to the ability to understand and criticize cultural norms of action when making decisions about environmental management. Fourthly, *attitudes* are the proper dispositions or character traits that people should promote in their relationships as they interact with nature and environmental issues. Lastly, *awareness* refers to acknowledging and appreciating the value of nature from a personal and cultural perspective, along with the ability to connect these values with knowledge, attitudes and participation for environmental decision-making and action.

Additionally, these findings show the simple sequence of the components - both interrelated and highly coherent. It reveals explicitly the idea that *competencies* are the priority subject, followed by *spiritual growth* to teach learners to explore and understand holistic knowledge about nature, human-nature relationships, and environmental issues. The last three components, *participation*, *attitudes*, and *awareness* involve values, norms, and affective dimensions for exploring and promoting ethical aspect of learners. Lastly, this new framework can be used to establish EE curriculum for environmental literacy and problem-solving either informally or in formal educational settings. For example, to organize environmental education in the community, educators can integrate the traditional disciplines such as local

knowledge, storytelling, ritual or spiritual experience with scientific knowledge to expand ecological understanding, human-nature relationships, and ultimately conservation.

DISCUSSION

In this study, we sought to advance the development of an integrative framework of environmental education and literacy via an integral theory that considers the sociocultural context of worldviews in Thailand. The integration of three different EE purposes together not only improves current conceptual frameworks, but also helps to ensure that environmental education is in proper alignment with the natural and sociocultural context of each region where it is taught. Moreover, it is also essential for those addressing the environmental crisis to shift from the fragmented Western worldview to an integrative paradigm.

First of all, this conceptual framework proposes the integrative purposes of (1) *behavioral change*, which emphasizes scientific thinking for promoting environmentally responsible behavior, (2) *social change*, which focuses on critical thinking for evaluating norms of decision-making and action, and (3) *personal change*, which incorporates the psychological and spiritual aspects of developing self-realization and a sense of connectedness with nature. This integration, therefore, has delivered the holistic framework of environmental education in order to develop learner's ability to explore complex environmental problems

and promote human-nature connection across disciplines. For example, one should use scientific knowledge to investigate a physical environmental issue while applying systemic and critical thinking to understand its root cause in the social context. Or, to then use policy implementation to encourage environmentally responsible behavior and new environmental action norms. This can also be applied in terms of human-nature separation, which learners can develop through considering aesthetic experience or through spiritual practices such as mindfulness training. This integrative framework is consistent with the concepts of Bonnett (2007), who suggested that environmental education should draw on two educational implications: a short-term pragmatic agenda which would focus on the cautions and scientific knowledge to monitor and help ameliorate undesirable outcomes of the impact of human behavior on nature, and a long-term agenda which should develop a sense of personal development that furthers a oneness with nature.

Additionally, the integrative framework allows for environmental education management in proper coherence with the sociocultural contexts of different regions, since it includes knowledge and values from scientific and cross-culture perspectives (including local knowledge, traditional ecological knowledge and personal knowledge) for EE curricular development. This is consistent with research which expands the field of environmental education into place-based education that aims to integrate indigenous and Western

knowledge in order to better understand communities and their land through holism, rooted in the experience of nature (Kapyrka & Dockstator, 2012; McKeon, 2012). In addition, the United Nations Educational, Scientific and Cultural Organization [UNESCO] (2017) has recently echoed the sentiment that scientific knowledge is not enough to solve the modern-day environmental crisis, but that this area study will need integrate science with local knowledge to create a strong foundation of education for sustainable development.

Environmental literacy, with its five components, can now reflect both content and value-based decisions. In term of content, competencies and spiritual growth respectively reflect the framework content of environmental education. Competency factors offer the knowledge and skills based on interpretations of nature and environmental issues through both scientific and sociocultural lenses. This finding is in alignment with early research which showed that cognitive skills, ecological knowledge, critical thinking, and understanding sociocultural contexts are essential for behavioral and social change (McKeown-Ice & Densinger, 2000; McBride et al, 2013; Nation American Association for Environmental Education [NAAEE], 2011). Spiritual growth, meanwhile, reflects the knowledge and skills based on an interpretation of nature and environment issues through self-realization and human-nature relationships in the psychological and spiritual aspects of the humanities. For example, one may use deep experience

to promote self-realization and a sense of connectedness with oneself, others and nature. Naess (2001) described this experience as a spontaneous moment in which one was allowed to realize the ecological self, which helped us to better understand the world. The spiritual growth factor, therefore, involves EE research that also utilizes the humanities, including deep ecology (Naess & Jickling, 2000), aesthetics that used to apply aesthetic experience for promoting environmental consciousness (Wang & Yu, 2018), and religion including Buddhist disciplines such as mindfulness training, or meditation for self-realization and a focus on oneness with nature (Bai & Scutt, 2009; Thathong, 2012).

In term of value-based decisions, although the first two components are specific to content, they are also interrelated with the last three components of environmental literacy: participation (norms of action), attitudes (proper character traits) and awareness (value awareness). Crucially, these also rely on how people give meaning and value to nature. For example, because nature is a complex system, individuals need to consider ecological value. This might include the intrinsic value of natural products and the holistic diversity needed to protect its intricate balances. From an ecological perspective, this is considered a norm of action in conservation. Meanwhile through a humanities lens (i.e. Buddhism), nature is dharma, the place to discover truth, the meaning of life and spiritual values. Therefore, this implies we should care for all beings in the same manner as we care

for ourselves, considering consequences of our mind, speech, and actions. In sum, environmental literacy involves both content and value-based decisions, and we need to connect them to promote environmentally responsible decision-making and action through environmental education. This conclusion is reminiscent of integrating environmental education and environmental advocacy, where environmental education needs to be connected with values and incorporation into political and ethical dialogue for changing social values and structures (Cairns, 2002; Niblett, 2012).

Lastly, the finding value from this study also offers environmental crisis transformation through EE management that help educators, practitioners and researcher to shift from fragmentation toward the integration. That is to view the environmental crisis root causes in a holistic perspective, and include experience, behavioral, cultural, and system development to the EE integrative framework for environmental problem solving. This confirms that integration is a key essential element for environmental problem solution today's, and it is consistent with the report of Bierbaum et al. (2018) which noted that lack of integration was a major of detriment to achieve sustainability, and integration approach was required to solve complex environmental problem.

CONCLUSION AND RECOMMENDATIONS

In this study, we sought to advance the development of the integrative framework of environmental education. Firstly, we

addressed the integrated purposes: behavioral change, social change and personal change. Secondly, the five components of environmental literacy: competencies, spiritual growth, participation (norms of action), attitudes (proper character traits), and awareness (value awareness). This framework has potential to systematically and holistically promoted environmental literacy, and as such has provided significant development in the understanding of nature, human-nature relationships, and decision-making to environmental sustainability and other issues. Moreover, it has also helped bridge the gap between natural science, social science and the humanities. At the same time, this integrative framework functions as a domain that links many areas of knowledge, such as local knowledge, traditional ecological knowledge, scientific knowledge, and personal knowledge from aesthetic or spiritual experiences to further the end goal of conservation, problem solving and sustainability. Moreover, the most important conclusion that can be drawn from this study is the importance of a shift from the reductionistic approach to a more holistic one when addressing the world's complex environmental crises, especially on individualized and localized contexts. Therefore, a significant application of this framework is in environmental education management, in accordance with the sociocultural contexts of each region. Lastly, the integrative framework of environmental education provides holistic purposes and environmental literacy to support sustainability in individual, local

and global spheres. Therefore, this is a useful framework for developing environmental education curriculum or programs, in both formal and informal educational settings for schools, local communities, and organizations.

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