The Context, Status and Challenges of Environmental Education in Formal Education in Taiwan

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Abstract

Like many countries, Taiwan’s concern with environmental education started in the 1980s. During that period, economic and industrial development had brought Taiwan a crisis in the form of serious environmental pollution.

In Taiwan, promoting environmental education started from the social environmental education sector by the non-formal education system, followed eventually by the formal education system of schools. Two public government organizations, the Environmental Protection Administration and the Ministry of Education, worked mutually through these processes making achievements along the way.

After the Grade 1-9 Curriculum Reform in 2001, Taiwan’s formal curriculum for environmental education in schools was included as a “major issue” in the National Curriculum. The national curriculum also developed competence indicators/benchmarks for environmental education at different learning stages. From elementary to junior high school, most of the schools brought the competence indicators into their school-based curricula, putting them into the overall school curriculum plans, and assimilated environmental education contents into various traditional disciplines for teaching.

Keywords: formal environmental education, national curriculum, environmental education project

I. Overview of Environmental Education in Taiwan

The movement of environmental protection in Taiwan society can be traced back to the 1970s, when rapid economic and industrial development had caused severe environmental pollution. The earliest term related to environmental education appeared as “environmental hazards education” or “pollution education” in 1980s (Huang, 1980; Lin, 1981). Since then, many a dispute and conflict about the environmental hazards happened increasingly, and the “environmental protection education” was then used in academic fields (Hsiao, 1986). Almost at the same time, the first national park was established in Taiwan in 1983, responsible for the work of natural conservation. Consequently, the term of “conservation education” accompanied with “environmental education” was formally presented (Yang, 1985; Chou, 1988). In 1987, the Environmental Protection Administration (EPA) was established in Taiwan and its Department of Comprehensive Planning which later embarked on promoting the education of environmental protection was founded within the institution as well. The promotion activities emphasized on the content of environmental pollution, targeting environmental education activities engaged by all citizens nationwide. In other words, environmental education was first presented to the public through the government system (Executive Yuan, 2015).

With respect to environmental education within the formal education system, there are now more than 4,000 schools in Taiwan organized systematically by the Ministry of Education (MOE) to promote Environmental Education (EE). That is because a special mission unit was organized in 1990 under the MOE for the performance of EE in schools called “MOE Environmental Protection Unit” (Wang, 1999). Since then, the unit has played a critical role in promoting EE in schools in Taiwan throughout the following 26 years and has made considerable impacts.

Moreover, Taiwan’s National Environmental Education Act was then passed in 2010. According to the act, the faculty and staff as well as students of every advanced vocational school and at high school level and below are required to receive at least four hours of EE training per year. Accordingly, EE training was administrated from school students to school faculty and staff. In addition to learning important environmental issues through subjects infused within school curricula, students were encouraged to participate in non-formal and informal learning activities. The former refers to taking part in organized educational programs outside of schools such as doing recycling...
projects, participating in flea markets, or attending environment related competitions. The latter refers to learning with no specific learner and trainer at no particular place. For example, students might be going to an environmental learning center for outdoor learning. However, sometimes it gets blurred between these two types of learning. Table 1 displays the important policies and promotion process of EE in schools in Taiwan.

<table>
<thead>
<tr>
<th>Year</th>
<th>Important policy or promotion task</th>
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<tbody>
<tr>
<td>1987</td>
<td>Environmental Protection Administration (EPA) was established in Taiwan.</td>
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<td>1990</td>
<td>MOE established the “Environmental Protection Unit” to promote EE at school.</td>
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<tr>
<td>1992</td>
<td>MOE approved “The Program of MOE Reinforcing the Promotion of EE.”</td>
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<td>1996</td>
<td>MOE and EPA promoted collectively “The Program of Reinforcing the Execution of EE at School.”</td>
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<tr>
<td>1998</td>
<td>MOE promoted “Green School Partnership Network Program.”</td>
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<td>2001</td>
<td>MOE announced “Grade 1-9 EE Curriculum Guidelines”. Since then, “Environmental Education” has been officially included in school curricula for Grade 1-9 students.</td>
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<tr>
<td>2002</td>
<td>MOE initiated “The Program of Partial Reform to Sustainable Campuses,” promoting EE via construction in the campus.</td>
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<tr>
<td>2004</td>
<td>MOE carried out “The Program of Three-year Reinforcing EE at School”</td>
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<td>2005</td>
<td>MOE founded EE guidance group in every County Education Bureau, facilitating to promote EE in every County.</td>
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<td>2008</td>
<td>MOE amended the regulations of “Grade 1-9 EE Curriculum” in response to the “UN Decade of Education for Sustainable Development,” emphasizing on the concept of sustainable development.</td>
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<tr>
<td>2010</td>
<td>Taiwan Legislative Yuan passed the Environmental Education Act as a law, making it mandatory for elementary and junior high schools to hire an “environmental education employee” to be in charge of the program as well as the implementation of EE at school.</td>
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<tr>
<td>2015</td>
<td>Taiwan’s education reformed. MOE announced “12-year Compulsory Education Curriculum Guidelines” which regulate every discipline to incorporate EE for students from Grade 1-12. The regulations will come into force starting from 2018.</td>
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II. The School Curriculum of Environmental Education

Right after the establishment of the EPA in 1987, the Environmental Protection Unit of MOE was formed in 1990. Thus, the work for the development and promotion of Taiwan’s environmental education was set and divided into two systems. While the EPA was responsible for non-formal environmental education, the MOE pushed forward the environmental education in the formal (schools) system. As there was also a curriculum reform of the school system during this period, the study and the development of curriculum on environmental education began flourishing. There are two important keynotes to be mentioned. One is a study on “the guiding principles of environmental education” which was carried out by the National Science Council (Wang, 1999), the other study is on “the framework of environmental education for Grade 1-9 curriculum guidelines” which was conducted by MOE (MOE, 2001). Draft of the framework for Taiwan’s environmental education was a result of the efforts from curriculum experts, educators, and school teachers. The framework was set in 2001 based on the Tbilisi Declaration in 1977 for environmental education goals and later on was defined by five objectives for the implementation of environmental education. The version of the 2001 framework was revised in 2008 after a few years of implementation.

In 2001, the MOE of Taiwan modified the framework of “Grade 1-9 EE Curriculum Guidelines” after to the United Nations Intergovernmental Conference on EE in Tbilisi in 1977 and along with the term of “sustainability” from Earth Summit in 1992. The ultimate objectives of EE in Taiwan are therefore outlined as sustainable development, concerns for the future generations, recognition of limited resources and providing assistance to underprivileged groups. The Grade 1-9 Curriculum Guidelines includes EE as a major issue and integrates it into different teaching fields for implementation. The course objectives include related knowledge on sustainable development and issues like global warming and climate change, to cultivate students to become aware and recognize environmental issues and to practice in daily life what they have learnt. The five objectives of the EE curriculum in the formal education system of Taiwan are listed as: Environmental Awareness and Sensitivity, Environmental Knowledge, Environmental values and Attitudes, Environmental Action Skills, and Environmental Action Experiences (MOE, 2008).

The curriculum objectives focus on students that receive nine years of compulsory education. The idea is to raise their environmental awareness and sensitivity through interdisciplinary teaching activities, enrich their environmental knowledge, cultivate their environmental values and equip them with skills to solve local environmental problems. Furthermore, students are expected to become citizens with environmental literacy when confronting with either their current or future lives as well as issues related to sustainable development.

Since the implementation of EE curriculum adopts interdisciplinary infusion method rather than carrying it out as
an independent subject, before a semester starts, schools would hold meetings with teachers to discuss about how to incorporate EE into the curriculum of every discipline/subject. In correspondence to the goals and concepts, teachers would design the teaching materials based on different students’ cognition development so as to properly infuse environmental education. Before terms begin, schools have to submit their curriculum plans for a whole school year to district educational administrators for review.

In 2015, MOE set out to extend the Compulsory Education from 9 years to 12 years. The new education reform has thus established “12-year Compulsory Education Curriculum Guidelines,” and EE has then been infused into the curriculum as “Grade 1-12 EE Curriculum Guidelines.” (MOE, 2015) The reform requires every discipline to take into account the objectives of environmental education and the five aspects of learning themes in its curriculum guidelines, namely “environmental ethics”, “sustainable development”, “climate change”, “disaster prevention and response” and “resource circulation.” The target learners are students from Grade 1-12. These curricula are expected to come into effect starting from 2018. In addition to the formal curricula, the ensuing National Environmental Education Act came into force in Taiwan in 2011. It has then become compulsory for every school staff and student from elementary to senior high school to receive at least four hours of EE course every year. On account of this regulation, the implementation of EE at school has become more diversified. Apart from the way of infusing EE curriculum into every discipline, there are more learning activities that have sprouted from the concept of school-based curriculum, including various environmental protection related competitions, exhibitions, family activities or field trips to certified environmental learning centers and so on.

III. The Implementation of Environmental Education at Schools

While EE curriculum has been implemented through incorporating into various disciplines, several EE programs initiated by the MOE have also some critical influences in terms of the implementation as following:

1. Green School Partnership Network Program

Green School Partnership Network Program has been promoted in Taiwan since 1998. The program puts emphasis on four aspects which are: the necessity of drawing attention to environmental policy in school management, pollution reduction in school campus and eco-greening, environmental curriculum material and student environmental life. Moreover, the program highlights the sharing of EE activities with partner schools. Until 2016, schools at all levels have shared approximately 74,000 various EE activities on the platform with the hope of transforming schools into ecological paradigm (MOE, 2016a).

2. Sustainable Campus Program

In 2002, the MOE proposed the "Sustainable Campus Program" with the aim of promoting the unique features of where schools located for their local natural resources, history and humanities, encouraging schools to create sustainable campus, developing plans for EE lessons as well as teaching materials. Schools are expected to turn into places for EE learning and as community bases for carrying out energy-saving and carbon reduction. Since 2002, at least every year there are 60 schools in Taiwan received grants from this program. Until now, more than 1,000 schools have participated in this program. Elementary schools in particular are rather beneficial in promoting EE within schools (MOE, 2016b).

3. Energy Education School Project

From 2009 onward, the MOE has promoted Energy Education School Project and planned to enhance students’ technology-related knowledge and literacy of energy-saving and carbon reduction at different school levels from elementary and secondary school to university. The objective lies in creating high-quality workforce that integrate both knowledge and action in the field of energy. Every year 5 to 20 schools of different levels would form a network responsible for promoting and performing tasks of local or regional energy education. Schools of all levels become fully engaged not only in administrative support but also in energy-related teaching (MOE, 2016c).

4. Disaster Prevention and Climate Change Adaptation Program

As Taiwan is an island with a sensitive environment, issues that related to disaster prevention and protection as well
as climate change are all crucial for students in Taiwan. The MOE embarked on the Disaster Prevention Experimental Program in 2002 and incorporated issues related to climate change adaptation into the focal tasks of schools as part of EE. Until 2015, 300 schools have set up disaster preventing campuses. The MOE also operates 22 county counseling groups, reinforcing the execution of every local education task related to disaster prevention as well as approving the capabilities of and providing training to the seed teachers (MOE, 2016d).

Apart from the above policy making, the MOE lead the planning of the “12-year compulsory education curriculum guidelines for environmental education” (MOE, 2015). With regard to themes of climate change and disaster prevention, students at different stages have to learn in school curriculum from 2018, as shown on Table 2 and Table 3.

### IV. Teacher Training (Workshop) for Environmental Education

A set of institutions have been established in Taiwan for teacher education to train school teachers within the formal education system. Basically the preservice training requires elementary school teachers to complete 40 course credits for the teacher education program; and junior high school teachers to complete 26 course credits. In addition to the required courses, “Environmental Education” has always been listed as one of the many elective courses. However, as EE is neither formed as a stand-alone subject in Taiwan, nor is it a subject for the entrance examination, only a few preservice teachers have taken it as an elective. Consequently, despite the fact that beginner teachers might not have any problems regarding the competencies of “delivering rudimentary education,” they tend to lack experiences to “delivering content of EE”, such as knowledge of ecology, concepts relate to environmental issues, evaluation capacities, evaluation skills and methods. Nonetheless, in Taiwan elementary and secondary school teachers are highly encouraged to receive in-service training. At present, several prominent EE graduate schools offer professional training programs, including the ones in Taiwan Normal University, Taichung University of Education, University of Taipei and Dong Hwa University. The schools employing these teachers can grant every teacher two half-days per week to receive professional trainings in EE graduate schools.

Moreover, it is obligatory for elementary and junior high school teachers in Taiwan to attend at least 180 hours every year of training activities. All elementary schools set every Wednesday afternoon to be the time for all teachers to attend training activities. There are 20 weeks per semester and four hours every Wednesday afternoon for each school to plan a variety of activities such as EE training for teachers. Teachers can then choose at free will to participate in campus or off-campus training activities (workshops) according to their needs or interests. The off-campus training activities may be organized by other schools, the regional environmental learning centers, the MOE, the EPA and municipal environmental education counseling groups, etc. These activities provide teachers with professional training opportunities in the field of EE.

Additionally, a very special mechanism has been created to facilitate the promotion of EE in elementary and
secondary schools. As previously mentioned, the MOE helped to establish EE counseling groups in the offices of education for every county government since 2005. Every county (city) has different focal points for promotion. Though members of the groups are organized based on different policies, the operation modes and functions remain the same. The group members are from diverse sources, for instance, the members of the “EE Counseling Group” of the Bureau of Education in Taipei City consist of an inspector from Bureau of Education, a faculty advisor, a part-time counselor, a counseling director that is positioned part-time by an elementary school principal, and 14 counselors that are as well senior teachers in elementary schools. The group provides each school in Taipei City with guidance and assistance to promote EE as well as teacher in-service training.

V. The Predicaments and Challenges of Implementing Environmental Education Curricula at School

EE appears to be prominent in the school curricula. However, in reality EE faces various difficulties while being merged into other learning areas as a formal curriculum (Kao and Chang, 2016). According to numerous empirical studies, when EE is being incorporated into the “Grade 1-9 Curriculum,” it has encountered barriers in terms of learning time, learners’ prior experience, curriculum content, teachers’ competencies, instructional assessment, textbook editing, administrative support and attitudes towards EE curriculum. Details are stated as follows:

1. **Learning time:** Compact courses in various disciplines leave no time for integrating EE. Other issues continue to proliferate, leading to the increase of teaching load and resentment from teachers.

2. **Curriculum content:** EE adopts curriculum infusion approach and is devoid of curriculum planning; piecemeal learning makes it difficult to manifest EE itself.

3. **Teachers’ competencies:** Appropriate understanding of the connotation of EE is still lacking. Moreover, the professional knowledge and abilities of teachers to integrate EE in different disciplines appear to be insufficient.

4. **Instructional assessment:** It is not easy to evaluate the teaching effectiveness of curriculum incorporation, which also applies to EE.

5. **Textbook editing:** Teachers in Taiwan heavily rely on using textbooks when teaching. Whether the editors of the textbooks would infuse key contents into each discipline of formal curriculum directly affects the promotion of EE.

6. **Attitudes towards EE curriculum:** This depends if teachers and schools value and give weight to the EE curriculum. More often than not, EE is considered to be a minor that is dispensable as it is not a subject for entrance examination.

With the implementation of Taiwan’s new curriculum reform in formal education in 2018, EE will also face issues and challenges. However, with the experience garnered over the past twenty years of carrying out the “Grade 1-9 Curriculum,” both the education policy makers and the schools are well prepared to meet future challenges.

VI. Conclusion

Environmental education has emerged and become rooted in Taiwan since the 1980s. In the formal education system, there have been a set of strategies and institutional systems promoting EE at school. It can be observed that diverse environmental issues have also been incorporated into activities in elementary and junior high schools.

However, the implementation of EE curricula still faces multiple difficulties due to a variety of subjective and objective factors during on-site teaching. What can we learn and how can we improve the EE amidst Taiwan’s education reform and the current predicament of curriculum incorporation? And how can we develop appropriate curriculum in the future?

As conclusion, first there is one belief that we must acknowledge. Namely, EE is itself an attitude and a profession of which barriers in between different disciplines must be overcome. This is crucial in order to successfully promote EE interdisciplinary at school. Secondly, administrative units as well as curriculum leaders must agree on the fact that EE activities are essential educational content. Third, local governments and schools should create their own unique content that helps to shape EE itself into an element of life.

Profiles of the authors

Trai-Shar Kao has dedicated to Taiwan’s environmental education for more than three decades. Previously, she worked for the Environment Protection Administration in the public sector, when she promoted several
considerable environmental education projects nationwide, and helped setting up environmental education centers in universities. Now being a professor at the Teacher College, University of Taipei, she puts her focus on the formal environmental education by teaching pre-service teachers subjects of environmental education. For many years, she was invited to be a consultant for environmental education’s policy-making either by the Environment Protection Administration or by the Ministry of Education. She was also elected as the chairperson of Chinese Society of Environmental Education from 2011 to 2012, when she made efforts with some non-government organizations for the advancement of the environmental education.

Hui-fen Kao was once involved in developing teaching materials for environmental education for schools at the initial stage of the development of Taiwan’s environmental education. Later on she worked in a science museum as a researcher/educator to promote science education in the informal setting. She is now responsible for planning tasks for student groups’ to visit the museum. Also, she helps school teachers to make best use of exhibits (objects) as teaching materials to develop their after school programs. The exhibit areas of “Taiwan’s Ecology” and “Life on Earth” in the science museum are explored for implementing the environment related program.

Yi-Jen Tsai has five years of legal training in Taiwan, Beijing, and Netherlands, specialized in legal and urban issues. She conducted the Architecture and Living Environment Seminar while she was a teaching assistant in a graduate school. She also acted as a secretary and legal consultant in the institute of Chinese Association of Urban Management. Being interested in making sustainable urban development policies and regulations, she is now pursuing a master degree in urban and regional planning for built environment.

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