



A Proposed Model of Community Environmental Education Program Development

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Abstract

Objective: To propose a feasible model of community environmental education program development. **Method:** The research was implemented in two phases. Phase 1 developed a structured interview form according to the researcher's model of community environmental education program development which comprised of 7 steps. This form was used to interview 3 experts who were highly experienced in developing the program. The experts' consistent opinions were used to create a rating scale questionnaire to use in gathering 19 experienced experts' opinions on the model in phase 2. Phase 2 applied the Delphi Technique to collect 19 experts' opinions by using the rating scale questionnaire created from phase 1 through 2 rounds of questionnaire. The results showed that, in general, experts had consistent opinions and were most agreed with every step of the proposed model of community environmental education program development. Therefore, it could be concluded that the proposed model was a feasible model of community environmental education program development.

This shows that the experts Most of them have a consensus that the model steps are feasible to make Project participants have learned to Community real environmental problems, causes of community environmental problems, and guidelines to prevent and solve environmental problems that people in the community can actually do. Which is the main objective of presenting all environmental education projects in the community. In addition, the implementation of this model can also be applied to other project planning, for example, it is used for agricultural career development. Allowing project participants to learn until they can bring their knowledge to a career as well.

Keywords: Program Development, Delphi technique, Community Environmental Education

Introduction

The experience was the consultant for the "SCB Challenge 2011" which was a competition project that gave young people at the tertiary level to create work for the benefit of the community which was supported by Siam Commercial Bank Public Company Limited. The concept of the project was to set up a community environmental education project for Ban Khlong Rangsit community, Lak Hok subdistrict, MueangPathum district, Pathum Thani province which had proceeded as follows:

Step 1: Compiled the data regarding the real community environmental problems. From the experience of researchers in the environmental education project in the community in Pathumthani Province from 2011 to present, it was found that the following 4 main points as follows: 1) The problem that caused disadvantage to the majority of the community. 2) The problem needed to be resolved urgently. 3) The problem that would cause other problems in the future. 4) The problem that was possible to prevent and solve by studying the environmental problems from the agencies responsible for community environmental work including government, private sectors, and community educators in order to get the real community environmental problems. The result of the study was the water pollution problem.

Step 2: Compiled the knowledge of the real community environmental problem which was water pollution in 4 main points which were: 1) The problem situation found that the severity of water pollution in Khlong Rangsit Prayoonsak (Khlong Rangsit) differs according to the seasons, 2) The cause was found to be the

drainage of water from various activities which were the wastewater from houses and markets located along Khlong Rangsit, drainage of wastewater from Klong PremPrachakorn during the rainy season into Khlong Rangsit, 3) The impact of environmental problem found that the people along the Khlong Rangsit were unable to utilize the water in the canal, and 4) the ways to prevent and solve community environmental problem was to create water pollution map to monitor water quality in Khlong Rangsit.

Step 3: Define the teaching objectives of the knowledge content in 4 issues in order to be able to create a water pollution map.

Step 4: Define the behavioral objectives according to the teaching objectives of each knowledge content was to be able to create a water pollution map in 5 months.

Step 5: Set up the activities by conducting real space surveys, group meetings, in-depth interviews, making a geo-social mapping and adding data to the map in order to be able to create water pollution map.

Step 6: Define teaching aids by using real media (real locations, sources of waste water, sewage condition in Khlong Rangsit and the map of Khlong Rangsit, LakHok subdistrict).

Step 7: Evaluate results by creating water pollution map on scheduled time.

The result of implementing all 7 steps enabled the creation of a water pollution map for Khlong Rangsit flowing through LakHok subdistrict and set the water quality surveillance points of Ban Khlong Rangsit community (Figure1).



Figure 1 Water pollution map of Khlong Rangsit flowing through LakHok subdistrict with the water quality surveillance points.(May-June)

In the year 2013, the researcher applied 7 steps of the model of the environmental education community program development as the guideline for the community environmental education project development in Ban SaladaengNua community, Chiang RakNoi subdistrict, Sam Khok district, PathumThani province. This project was funded by the National Research Council of Thailand which had proceeded as follows:

Step 1: Compiled the data of the real environmental problems of Ban SaladaengNua community which was found that the water pollution in Khlong Khok Ta Kheaw, the north of the community, was the real environmental problem of the community.

Step 2: Compiled the knowledge of the real community environmental problems, namely water pollution in 4 main points which were: 1) The situation of the problem was found that the severity of water pollution in Khlong Khok Ta Kheaw was different according to the season, 2) The cause of the problem was found to be the drainage of water from farming in the area around the Khlong Khok Ta Kheaw and the waste water from Khlong Khok Ta Kheaw after the flooding season flowed into the Chao Phraya River in front of Ban SaladaengNua community and wastewater that was drained from industrial plants located along the Khlong Khok Ta Kheaw, 3) The impact of environmental problems was found that the people of Ban SalaDaengNua community were unable to utilize the water in the Chao Phraya River after the flood season, and 4) The way to



prevent and solve the environmental problem of the community was to creating a water pollution map with water quality surveillance points in Khlong Khok Ta Kheaw.

Step 3: Define the teaching objectives of the knowledge content in 4 issues in order to create a water pollution map.

Step 4: Define the behavioral objectives according to the teaching objectives of each knowledge content to create a water pollution map in 5 months

Step 5: Set up the activities by conducting real space surveys, group meetings, in-depth interviews, making a map and adding surveillance points to the map to make a water pollution map.

Step 6: Define teaching aids by using real media (real locations, source of waste water, sewage conditions in Khlong Khok Ta Kheaw and Khlong Khok Ta Kheaw map).

Step 7: Evaluate results by mapping the water pollution in 5 months.

The result of the implementation of all 7 steps enabled the creation of a water pollution map of Khlong Khok Ta Kheaw and set the water quality surveillance points of Ban SaladaengNuea community (Wijarn & Charoenwongsa, 2014) (Figure 2).

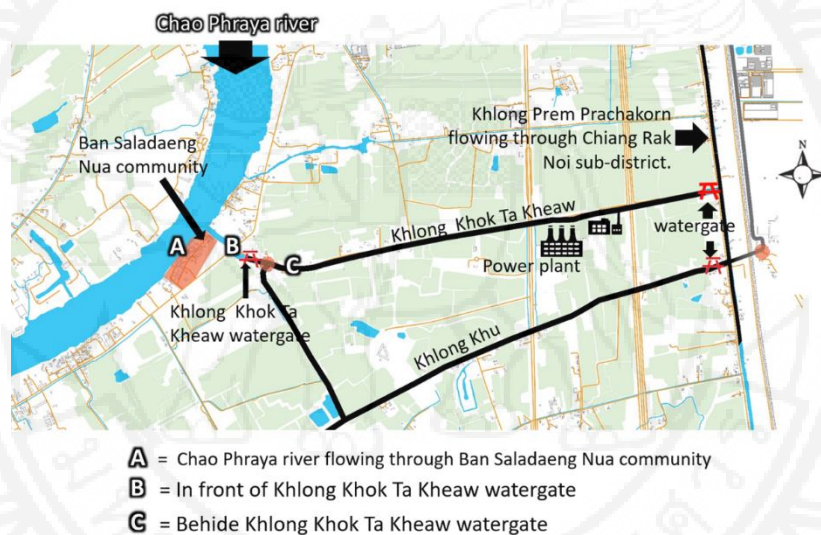


Figure 2 Water pollution map of Khlong Khok Ta Kheaw with the water quality surveillance points (September –November)

Later in the year 2014, the researcher applied 7 steps of the model developed in 2013 as the guideline for the development of community environmental education project in Ban SaladaengNuea community supported by the Metropolitan Waterworks Authority and the United Nations Development Program: UNDP. The project had proceeded as follows:

Step 1: Compiled the data regarding the real environmental problems of Ban SaladaengNuea community which was found that in addition to water pollution from the Khlong Khok Ta Khiao, it was caused by water pollution from 3 Khlongs, namely Khlong PremPrachakorn flowing through Chiang RakNoi subdistrict, Khlong Chiang RakNoi and KhlongKhu, connecting Khlong PremPrachakorn and Chao Phraya River flowing through Ban SaladaengNuea community.

Step 2: Compiled the knowledge of the real community environmental problem which was water pollution in 4 main points which were: 1) The situation of problem was found that the severity of water pollution in 3

Khlongs were different according to the seasons. 2) The cause of problem was found to be the drainage of water from farming. Drainage of flooded water was confined to the surrounding 3 Khlongs and waste water drainage after flooding season into the Chao Phraya River that flowed through Ban SaladaengNuea community. 3) The impact of environmental problems was found that the people of Baan SalaDaengNuea community were unable to utilize the water in the Chao Phraya River after the flood season because of waste water from 3 Khlongs affecting the water quality in the Chao Phraya River flowing through Ban SaladaengNuea community and 4) the way to prevent and solve community environmental problem was to map water pollution with water quality surveillance points in 3 Khlongs.

Step 3: Define the teaching objectives of the knowledge content in 4 issues in order to create a water pollution map.

Step 4: Define the behavioral objectives according to the teaching objectives of each knowledge content to create a water pollution map for 18 months.

Step 5: Set up real space surveys, group meetings, in-depth interviews, making a geo-social mapping and adding surveillance points to the map to make a water pollution map.

Step 6: Define teaching aids by using real media (locations, source of waste water, sewage conditions in Khlong PremPrachakorn flowing through Chiang RakNoi subdistrict, ChiangRakNoi and Khlong Khuin Bang Phut subdistrict and 3 maps of three Khlongs in Chiang RakNoi subdistrict and Bang Phut subdistrict)

Step 7: Evaluate results by mapping the water pollution in 18 months.

The result of the implementation all 7 steps was to be able to make a water pollution map of Khlong PremPrachakorn flowing through ChiangRakNoi subdistrict, the map of Khlong Chiang RakNoi water pollution, Khlong Khu water pollution map as well as being able to set the water quality surveillance points in 3 Khlongs that affected the water quality in the Chao Phraya River flowing through Ban SaladaengNuea community(Ban SaladaengNuea Community, 2015) (Figure 3).

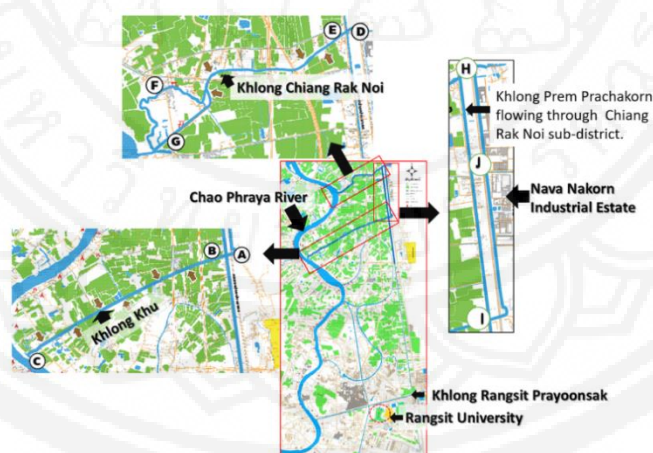


Figure 3 Water pollution map of KhlongPremPrachakornflowing through Chiang RakNoi sub-district, KhlongChiang RakNoi and KhlongKhuwith the water quality surveillance points in 3 Khlongs.

Although the 7 steps of community environmental education program development that the researcher had tried above were a successful model, the researcher needs to know experts' s opinions in relation to the researcher's model development using the Delphi technique.



The Delphi technique was a process for gathering opinions from a group of experts in making decisions about matters that was unclear by relying on the experiences, knowledge of experts in relevant fields. The opinions of the experts in the Delphi technique are applied to a wide range of management in industry, agriculture, medicine, education, etc. For example, The development of the coastal transportation system in Ah Thai by the Delphi technique (Miboon & Atikomratanakul, 2018), The development of the drug information service system for the center hospital using the Delphi technique (Udomaksorn & Kamnerd, 2009).

From the 2018 Environmental Quality Situation Report, it was found that the occurrence of environmental problems in various communities continues to occur and is difficult to manage, despite the establishment of environmental education programs in the community as a tool to prevent and solve environmental problems of Thailand continuously for at least 35 years. It shows that past environmental education projects cannot make people in the community learn about the real environmental problems of the community, the causes of the problems, and how to prevent and solve environmental problems that people in the community can actually do by themselves. Therefore, in this research, the Delphi technique was used as a tool for collecting opinions of experts.

Research objectives

To propose a feasible model of community environmental education program development.

Methods and Materials

This research was a qualitative research implemented in two phases. Phase one was to develop a structured interview form according to researcher's model of community environmental education program development for interviewing 3 highly experienced experts in planning community environmental education program for at least 10 years by asking whether they agreed or disagreed with each question including suggestion. The experts' opinions were analyzed the consistency of their opinions by using IOC method for creating a rating scale questionnaire for use in phase two. Phase two was to apply the Delphi technique to collect from 19 experienced experts opinions through two rounds of questionnaire so that the consensus among all experts could be reached. The experts were selected by purposive sampling method (9 persons from government and private higher education institutes and 10 persons from organizations with relative experience in environmental knowledge transfer). Round one, questionnaire was developed from phase one by using the rating scale questionnaire and sent to 19 experts. Round two, questionnaire was developed from the experts' answers to the round one questionnaire. The answers were calculated the median, mode, and quartile range of each question in order to create a round two questionnaire by retaining the original text and increasing the median and quartile range and the position in which each expert reviewed the first round and answered again. In answering this questionnaire, the experts would know how different their opinions were from all the experts and may change to a new answer if disagree including providing the reason for confirming the original answer that was cut from the quartile range.



Research tools

The tools for data collection from experts were: 1) the structured interview form to collect opinions from 3 experts with high experience in the development of community environmental education program towards the researcher's model in order to create a rating scale questionnaire for collecting 19 experts opinions two times.

Data collection

This research collected data in 2 phases: phase 1 was to collect 3 highly experienced expert's opinions by using the structured interview form, and phase 2 was to collect 19 experienced experts' opinions 2 times by using the rating scale questionnaire through electronic mail.

Data analysis

1. Analyze for the IOC (Item-Objective Congruence Index) according to the formula (Thawirat, 2000)

$$IOC = \frac{\sum R}{N}$$

$\sum R$ is the sum of all opinion points of all experts

N is the number of experts

An IOC value of -1 indicates inconsistent. A value of 0 means uncertain. A value of +1 means consistent.

2. The median from the rating scale questionnaire with 5 scales, weight scale score of 5 levels as follows: (Yuvanuch, 1994)

1 means that the group of experts least agree or disagree with the statement

2 means that the group of experts less agree with the statement

3 means that the group of experts moderately agree with the statement

4 means that the group of experts highly agree with the statement

5 means that the group of experts most agree with the statement

The median calculated from the answers of the expert group was interpreted according to the following criteria:

The median between 1.00-1.49 means that the group of experts least agree with the statement.

The median between 1.50-2.49 means that the group of experts less agree with the statement.

The median between 2.50-3.49 means that the group of experts moderately agree with the statement

The median between 3.50 - 4.49 means that the group of experts highly agree with the statement

The median between 4.50 - 5.00 means that the group of experts most agree with the statement

3. The difference between the median and the mode of each statement to support the harmonization of experts' opinions, any statement that has a difference between the median and the mode no more than 1.00 shows that the experts agree with that statement (Commander, 1994).

4. The difference between quartile 1 and quartile 3 is that if the quartile range of any statement is not greater than 1.50 means that the opinions of all experts are consistent, but if interquartile range is greater than 1.50 means that the opinions of all experts are inconsistent (Commander, 1994).

Results and Discussion

The research results were summarized and discussed from Table 1 as follows.

**Table 1** Opinions of the group of experts on the steps of the community environmental education program development

Steps of the program development	Opinion level	Median	Mode	Difference between Mode and median	Q3	Q1	Range between Q3-Q1	Consistency
Step 1: Gather information about the real community environmental problems regarding								
1. The criteria for determining the real community environmental problems.	Most agree	5	5	0	5	4	1	consistent
1.1 the violent problem affecting most people in the community.								
1.2 the problem that causes impact or trouble to most people in the community.	Most agree	5	5	0	5	4	1	consistent
1.3 the problem that most people in the community think "must be solved"urgently	Most agree	5	5	0	5	4	1	consistent
1.4 causes or the cause to other problems in the future	Most agree	5	5	0	5	5	0	consistent
1.4 causes or the cause to other problems in the future	Most agree	5	5	0	5	5	0	consistent
1.5 possibility to solve the problems	Very agree	4	4	0	4	3	1	consistent
2.Elements of the real community environmental problems.	Most agree	5	5	0	5	5	0	consistent
2.1 the situation of the problem								
2.2 causes of the problems	Most agree	5	5	0	5	4	1	consistent
2.3 the impact of community environmental problems on the quality of life of people in the community	Most agree	5	5	0	5	5	0	consistent
2.4 prevention and solution of existing community environmental problems	Most agree	5	5	0	5	4	1	consistent
3. Criteria for the person providing information about the real community environmental problems.	Most agree	5	5	0	5	5	0	consistent
3.1 person responsible for community environment in government and local agencies								
3.2 person in charge of community environmental work in the private sector and other organizations	Most agree	5	5	0	5	4	1	consistent

**Table 1** (Cont.)

Steps of the program development	Opinion level	Median	Mode	Difference between Mode and median	Q3	Q1	Range between Q3-Q1	Consistency
3.3 community leader	Most agree	5	5	0	5	5	0	consistent
4. Criteria for considering people in the community who will give information about the real community environmental problems	Most agree	5	5	0	5	4	1	consistent
4.1 being residents in the community for at least 10 years, which has seen continuous environmental changes in the community.								
4.2 a person who is able to transfer knowledge about the situation, cause, effect of the problem to the quality of life of people in the community, preventing and solving community environmental problems.	Most agree	5	5	0	5	4	1	consistent
4.3 a person who must use of the community environment.	Most agree	5	5	0	5	4	1	consistent
4.4 being the participant in the study / prevention and solution to the problems.	Most agree	5	5	0	5	4	1	consistent
5. Using snowball technique to select the people giving about the real community environmental problems.	Most agree	5	5	0	5	4	1	consistent
6. Prioritize the real community environmental problems by the people in the community	Most agree	5	5	0	5	4	1	consistent
Step 2 Gather the content of knowledge about the real community environmental problems regarding	Most agree							consistent
1. Criteria for considering the persons who are knowledgeable about the content of the real community environmental problems.	Most agree	5	5	0	5	5	0	consistent
1.1 having knowledge about or regarding or related to the community environmental problems.								

**Table 1 (Cont.)**

Steps of the program development	Opinion level	Median	Mode	Difference between Mode and median	Q3	Q1	Range between Q3-Q1	Consistency
1.2 having experience or participation in prevention and solution to the environmental problems of that community.	Most agree	5	5	0	5	4	1	consistent
2. How to search for the person who are knowledgeable about the content of knowledge by using snowball technique.	Most agree	5	5	0	5	4	1	consistent
3. How to gather the content of knowledge about the real community environmental problems	Most agree	5	5	0	5	4	1	consistent
3.1 interviewing the persons who are knowledgeable about the content of knowledge								
3.2 from relevant documents or reports	Most agree	5	5	0	5	4	1	consistent
Step3: Define the teaching objectives of each content of knowledge regarding 3 domains	Most agree							consistent
1. Define the teaching objectives in cognitive domain.	Most agree	5	5	0	5	5	0	consistent
2. Define the teaching objectives in psychomotor domain.	Most agree	5	5	0	5	5	0	consistent
3. Define the teaching objectives in affective domain.	Most agree	5	5	0	5	4	1	consistent
Step 4: Define the behavioral objectives from the defined teaching objectives.	Most agree	5	5	0	5	5	0	consistent
Step 5: Define the activities for the learners to perform according to the behavioral objectives.	Most agree	5	5	0	5	5	0	consistent
Step6: Teaching aids must be consistent with the activities for students to do.	Most agree	5	5	0	5	5	0	consistent
Step 7: Evaluation is based on the learner's behavioral changes according to the behavioral objectives.	Most agree	5	5	0	5	5	0	consistent

Table 1 (Cont.)

Steps of the program development	Opinion level	Median	Mode	Difference between Mode and median	Q3	Q1	Range between Q3-Q1	Consistency
The model of real community environmental education project consists of 7 steps which are	Most agree	5	5	0	5	5	0	consistent
1) Gather the information about the real community environmental problems,								
2) Gather the content of knowledge about real environmental problems,								
3) Define the teaching objectives of each content of knowledge regarding 3 domains,								
4) Define the behavioral objectives from the defined teaching objectives,								
5) Define the activities for the learners to perform according to the behavioral objectives,								
6) Teaching aids must be consistent with the activities for student to do,								
7) Evaluation is based on the learner's behavioral changes according to the behavioral objectives.								

According to the table, in general, it was found that:

1. The median was equal to 5 of all details of the steps except item 1.5 of step 1 with the median of 4 which meant that all of experts agreed with all of items of each step at the highest level except item 1.5 of step 1 which was agreed at high level.

2. The differences between the median and the mode of the details of each step were equal to 0 which was not greater than 1.00, meaning that all of experienced experts agreed with the details of each step.

3. Interquartile ranges of the details of each step were not greater than 1.50, meaning that all experienced experts' opinions regarding the details were consistent.

According to the results of the study, in general, it was found that: : all experienced experts' opinions were consistent with agreement at the highest level which meant that the community environmental education program development had to consist of the 7 steps namely; 1) Gather the information about the real community environmental problems; 2) Gather the content of knowledge about real environmental problems; 3) Define the



teaching objectives of each content of knowledge regarding 3 domains; 4) Define the behavioral objectives according to the defined teaching objectives; 5) Define the activities for the learners to perform according to the behavioral objectives; 6) Teaching aids had to be consistent with the activities for student to do; and 7) Evaluation was based on the learner's behavioral changes according to the defined behavioral objectives.

According to the model of community environmental education program development proposed above, it could be mentioned that it was different from the conventional method of developing the environmental education program, which was the training program by creating an action plan, not teaching plan. The training program stated what need to do to succeed according to the written objectives or goal, when and how to do and who were responsible. Therefore, it was impossible to assess whether the participants of the program could be able to prevent and solve community environmental problems or not. Environmental Quality Situation Report 2018 (Office of Natural Resources and Environmental Policy and Planning, 2019), indicates that the occurrence of environmental problems in communities continues to occur and is difficult to manage. It shows that past environmental education programs in the community cannot make the people in the community truly participate in the prevention and solving of environmental problems of their communities.

In contrast, the model proposed by the researcher could evaluate whether the participants' learning how to prevent and solve community environmental problems. It is based on 7 steps namely; 1) Gather information about real community environmental problems by analyzing from people related to that community problem; 2) Gather knowledge about real environmental problems, which include conditions, causes, effects and ways to prevent and solve environmental problems that the community can actually do; 3) Define the teaching objectives so that the participants could learn about the conditions, causes, effects of the problems and led to the ways to prevent and solve the problem that people in the community could actually do; 4) Define the behavioral objectives from the defined teaching objectives, to enable the participants to demonstrate behavioral prevention and solving of community environmental problems; 5 & 6) Design a learning situation and teaching aids that induced participants to learn how to prevent and solve community environmental problems in parallel with actual practice. As for the final step, the participants would be evaluated immediately upon completion of the project that could learn according to the behavioral objectives defined or not and how much? However, if any participants had not yet achieved the behavioral objectives, they could repeatedly learn on their own.

Conclusion and Suggestions

Therefore, if we were able to develop a community environmental education program that allowed the participants who were people in the community learned about real environmental problems in their communities, causes, effects and ways to prevent and solve the problems. If the people in the community could actually do, the problems would definitely decrease.

The researcher's model had been applied to set up a vocational training program in agriculture, namely, the production of ready - to - eat drowning aquaculture for the first year of vocational certificate students of SuratThani College of Agriculture and Technology by Ketkaew (2019). The results showed that all students could achieve the behavioral objective.

It could be seen that the researcher's model of program development could be applied to both the community environmental education program and the agricultural vocational training program development in various fields.



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