

**THE EVALUATION OF ENVIRONMENTAL STUDY COURSE  
MANAGEMENT OF THE NURSING SCIENCE PROGRAMME  
MINISTRY OF PUBLIC HEALTH**



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entitled

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MANAGEMENT OF THE NURSING SCIENCE PROGRAMME  
MINISTRY OF PUBLIC HEALTH**

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CHAMCHUN THEDSING: THE EVALUATION OF  
ENVIRONMENTAL STUDY COURSE MANAGEMENT OF THE NURSING  
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The purpose of this research was to evaluate the environmental study course management of the nursing science programme, offered by the nursing colleges under the jurisdiction of the Ministry of Public Health. The research methodology employed the Context-Input-Process-Product or CIPP MODEL for the evaluation of the effectiveness of the course management of nursing colleges within the four regions in the country. Four nursing colleges for each region were randomly selected for this study, and 375 nursing students were randomly selected as samples for the study. A self-reported questionnaire was developed and pre-tested in order to collect data from the nursing students. An interview questionnaire was also developed to collect data from the teachers. All data were analyzed by the computer.

Analysis of the most context evaluation revealed that environmental study course was indeed one of the important courses for nursing students. It was found that the existing course syllabus was at moderate level; therefore it should be improved.

The input evaluation revealed that the input factors were at moderate level, except for teacher factor which was at high level. Regarding the process evaluation; the study revealed that the process factors were at high level.

The product evaluation showed that the product of the course, evaluated in terms of learning achievement, i.e., the scores of most of the nursing students, were at moderate level. The post-test scores of the nursing students were significantly higher than those of the pre-test.

Hypotheses test results showed that: The post-test scores of the nursing students were higher than those of the pre-test, with a high statistical significance. The readiness of the environmental study course management was correlated with the scores of the nursing students' knowledge, at high statistical significance. The readiness of environmental study course management was correlated with the scores of the nursing students' attitude, at high statistical significance. The process of environmental study course management was correlated with the scores of the nursing students' knowledge, at high statistical significance. The process of environmental study course management was correlated with the scores of the nursing students' attitude, at high statistical significance.

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การวิจัยครั้งนี้ มีวัตถุประสงค์เพื่อประเมินผลการจัดการเรียนการสอนวิชาสิ่งแวดล้อมศึกษาในหลักสูตรพยาบาลศาสตร์ของวิทยาลัยพยาบาลสังกัดกระทรวงสาธารณสุข โดยประยุกต์ใช้รูปแบบซีพี (CIPP Model) ในการประเมินบริบท ปัจจัยนำเข้า กระบวนการจัดการเรียนการสอน และผลสัมฤทธิ์ทางการเรียนวิชาสิ่งแวดล้อมศึกษา โดยสุ่มตัวอย่างวิทยาลัยพยาบาล ภาคละ 1 วิทยาลัย กลุ่มตัวอย่างนักศึกษาพยาบาลที่ใช้ในการวิจัยทั้งสิ้น 375 คน วิธีการวิจัยกระทำโดยให้ผู้เชี่ยวชาญประเมินบริบทของวิชา การสัมภาษณ์อาจารย์ และใช้แบบสอบถามเก็บรวบรวมข้อมูลจากนักศึกษาพยาบาล วิเคราะห์ข้อมูลโดยใช้คอมพิวเตอร์ ผลการวิจัยสรุปได้ว่า

การประเมินบริบทพบว่า ควรจัดให้มีการเรียนการสอนวิชาสิ่งแวดล้อมศึกษาในหลักสูตรพยาบาลศาสตร์ของกระทรวงสาธารณสุข ส่วนเอกสารประมวลรายวิชาสิ่งแวดล้อมศึกษา มีความเหมาะสมปานกลาง จึงควรได้รับการปรับปรุงให้เหมาะสมยิ่งขึ้น สำหรับการประเมินปัจจัยนำเข้าพบว่า วิทยาลัยพยาบาลมีความพร้อมในการจัดการเรียนการสอนด้านต่างๆในระดับปานกลาง ยกเว้นด้านอาจารย์มีความพร้อมอยู่ในระดับสูง ส่วนการประเมินกระบวนการพบว่า ส่วนใหญ่วิทยาลัยพยาบาลมีกระบวนการจัดการเรียนการสอนที่เหมาะสมอยู่ในระดับสูง และการประเมินผลสัมฤทธิ์ทางการเรียนพบว่า หลังการเรียนวิชาสิ่งแวดล้อมศึกษา นักศึกษาพยาบาลมีคะแนนผลสัมฤทธิ์ทางการเรียนเพิ่มมากขึ้น แต่ส่วนใหญ่ นักศึกษาพยาบาลมีคะแนนอยู่ในระดับปานกลาง

นอกจากนี้ ผลการทดสอบสมมติฐานยังพบว่า นักศึกษาพยาบาลที่ผ่านการเรียนวิชาสิ่งแวดล้อมศึกษามีความรู้และเจตคติทางด้านสิ่งแวดล้อมสูงกว่าก่อนเรียน ความพร้อมหรือปัจจัยนำเข้า และกระบวนการจัดการเรียนการสอนวิชาสิ่งแวดล้อมศึกษามีความสัมพันธ์กับความรู้และเจตคติทางด้านสิ่งแวดล้อมของนักศึกษาพยาบาล

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## **CHAPTER I**

### **INTRODUCTION**

#### **1.1 Background of the Study**

Praboromarajchanok Institute for Health Manpower Development (PBRI), Ministry of Public Health had many educational institutes where produced health personnels. There were 35 nursing colleges and 8 public health colleges under the jurisdiction of the Ministry through out the country. The first nursing school under the Ministry was found in 1946. The principle of nursing education is aimed to produce high quality nurses. Nurses who provides health services associated with the context of society, economic, politic and technology. Therefore nursing education has continued developing all the time since it first started in Thailand.

Environmental Study Course was a subject including in the nursing science programme since the Seventh National Public Health Development Plan determined the policy to develop more quality of life especially health aspects both body and mind, in order to achieve health for all in 2000. And Thailand had been rapidly developed society and economic especially technology and materials, which affecting life. Furthermore, environmental pollution was important and critical problem which was causing health problems and affecting quality of life. The Ministry of Public Health was the main health organization developing public health services necessary to develop both environmental health and other related sciences also (The Institute of Health Manpower Development, The Educational Development Division, The Ministry of Public Health, 1994: 2).

Accordingly, the committees of the nursing science programme development set the Environmental Study Course as a mandatory subject in the Curriculum of Bachelor in Nursing Science (the revised edition) 1994, because the environment was related to health, nurses should have knowledge in environment to apply in a future career (The Institute of Health Manpower Development, The Educational Development Division, The Ministry of Public Health, 1994: 3).

In addition, Adisornsakunvong, P. (1994: 85-87) who studied “A Study on Learning and Teaching on the Environmental Education for the Diploma in Nursing Science Curricula, Ministry of Public Health B.E. 2528”, the results showed that the contents of environmental education appeared in sociology and social problem, health anthropology, basic concepts and principles of nursing I, basic concepts and principles of nursing III, community health nursing I, and community health nursing II. There was not a single subject in this curriculum. Moreover, the results found that the faculty and students showed low interesting level on environment and natural resource problems, so faculty and administrators had an idea to improve learning and teaching on the environmental education in the nursing science programme.

The course syllabus of the Environmental Study Course in the nursing science programme (Appendix C), was a course in the general education part consisted of 2 credits. The details of the course description focused on the concepts and the national environmental policy, environment affecting health, environmental quality controlling and surveillance, environmental quality analysis, environmental quality improvement, roles of individual, community and organization on environment and natural resource conservation and law of environmental health. After completing the course, the nursing students will be able to:

1. Explain the importance of the environment and changes of the environment which is affecting life both direct and in-direct impacts.
2. Tell the relationship between man and environment, and relationship among other countries in the world with the environmental problems.
3. Select the methods of the environmental problems solving in their ways of living and career.
4. Cooperate for environmental conservation and development.
5. Educate people about the environment related to health.

(The Institute of Health Manpower Development, Office of the Permanent Secretary, Ministry of Public Health, 1995: 21).

In order to manage the Environmental Study Course to achieve the curriculum goal needs supporting from various factors especially teaching materials, qualified teachers and other supplies. Each institute had different readiness of these factors, so some of them faced problems in managing the course (Chinatrakul, R., 1997: 109). In the past, many studies found that the nursing science programme had many problems including lack of teaching materials, books, journals and classroom, classroom size was inappropriate to a number of students. Lack of teachers was also a big problem and the teachers themselves had not enough time to write lesson plan and document because they had many tasks to do at the same time. Teachers also lack of community-teaching skills as well as measurement and evaluation skills. Chakreyawat, S. (1993: 143-146) studied "An evaluation of the Diploma Programme in Nursing Science Curriculum B.E. 2528, Nursing Colleges Division, the Ministry of Public Health" and found that the number of teachers regarding the professional foundation courses and profession courses were not enough. The teaching aids also

were not sufficient. These were important problems for the nursing personnel preparation.

Moreover, Adisornsakunvong, P. (1994: 77-79) studied the teachers' opinions on problems that might be found in Environmental Study Course offered in the nursing programme. It might find the problems about teachers did not have advanced knowledge related to the environment. Readiness of textbooks, journals and budgets might be the problems as well. Many teachers suggested the Environmental Study Course should be an integrated subject more than a mandatory subject. But now the environmental study course in the nursing science programme was still a mandatory subject and had been taught for five years without conducting formal evaluation the course achievement.

In summary, the researcher was interested in evaluating the Environmental Study Course management in the nursing science programme, Ministry of Public Health, including the study of context, input, process, product, as well as the problems and the limitations of course management. This study was to support the more efficient course management.

## **1.2 Research Questions**

This study, the researcher evaluated the course management using CIPP Model as the conceptual framework. The main research questions were to study the effectiveness of the Environmental Study Course management in the nursing science programme, Ministry of Public Health, and how to improved. The research questions were as follows:

1. Context evaluation: Was the Environmental Study Course

important for the nursing science programme? Was the Environmental Study Course syllabus appropriated?

2. Input or readiness of college on Environmental Study Course management including the teachers, students, teaching materials, classrooms, college surrounding, place of field trips and the budgets. How were the quantity and quality of the teachers, students, teaching materials, classrooms, college surrounding, place of field trips and the budgets? Did they correlate with the learning achievement of the nursing students?

3. Process evaluation: Did the course coordination, teaching methodology and measurement and evaluation fit? Did they correlate with the learning achievement of the nursing students?

4. Product evaluation: How high of the scores on the knowledge of the environment and nursing students' attitudes? Were the scores of pre-test different from post-test?

### **1.3 Purposes of the Study**

This research aimed to evaluate the Environmental Study Course management in the nursing science programme, Ministry of Public Health. The purposes of this study were as follows:

1. To study the context, input and process of the Environmental Study Course management in the nursing science programme, Ministry of Public Health.
2. To study the learning achievement of nursing students.
3. To explore the problems, limitations and guidance to develop more efficient Environmental Study Course management in the nursing science programme,

Ministry of Public Health.

## **1.4 Research Hypotheses**

1. The post-test scores of the nursing students' knowledge were higher than those of the pre-test.
2. The readiness of environmental study course management was correlated with the scores of the nursing students' knowledge.
3. The process of environmental study course management was correlated with the scores of the nursing students' knowledge.
4. The post-test scores of the nursing students' attitude were higher than those of the pre-test.
5. The readiness of environmental study course management was correlated with the scores of the nursing students' attitude.
6. The process of environmental study course management was correlated with the scores of the nursing students' attitude.

## **1.5 Scopes of the Study**

1. This study aimed to evaluate the Environmental Study Course management in the nursing science programme, Ministry of Public Health, especially in summer session, academic year 1998.
2. The learning achievement was studied especially both cognitive and affective domains, except psychomotor domain.

## **1.6 Basic Assumptions**

1. This study involved only the data of the nursing students who were

learning the Environmental Study Course in the nursing science programme, Ministry of Public Health during the summer session in the academic year 1998.

2. In this study, it assumed that the sampled subjects honestly provide answers on each item in the questionnaires and interview which were used as the research instruments.

### 1.7 Definition of Terms

**Evaluation** = The process of collection and analysis of all information, was to check the achievement of the curriculum and its goals. Did programme achieve the goals of the curriculum? This study used CIPP Model as the conceptual framework.

**Environmental Study Course management** = The system that consisted of many factors which support environmental study course management including context, input, process, and product.

**Teacher** = Person who worked at nursing college under the jurisdiction of the Praboromarajchanok Institute, Ministry of Public Health, took action as course coordinators and/or lecturers, including lecturers from other institutions who taught the Environmental Study Course in the nursing science programme, Ministry of Public Health during the summer session in the academic year 1998.

**Nursing students** = Person who was studying in the first year and learning Environmental Study Course in the nursing science programme, Ministry of Public Health during the summer session in the academic year 1998.

**Readiness of college in environmental study course management** = The college prepared many resources for the efficient environmental study course management as follows: readiness of teachers, readiness of students, readiness of

teaching materials, readiness of classrooms, college surrounding, place of field trips and the readiness of budgets.

**Learning achievement** = Success level of studying the Environmental Study Course focused on cognitive and affective domains.

### **1.8 Significance of the Study**

This research was to examine the context, input, process, product and problems of the Environmental Study Course management in nursing college under Ministry of Public Health. These findings were the basic data for developing more efficient course management, and to be used as the guide for Praboromarajchanok Institute, Ministry of Public Health to develop more efficient course management in the colleges.

### **1.9 Limitation of the Study**

This study did not cover the data from the nursing colleges in the northern region because there were no colleges in the region offered this course during the summer session in the academic year 1998.

## CHAPTER II

### LITERATURE REVIEW

This chapter can be divided into three major parts that reviewed the concepts of curriculum evaluation, environmental education and related studies.

#### **2.1 The Concepts of Curriculum Evaluation**

##### **2.1.1 Definition of Evaluation**

Evaluation is an essential tool in every field of education as well as in the area of environmental education because it can investigate any attribute that the evaluators wish to. Therefore, results of an evaluation could identify especially the accomplishment or effectiveness of the course, and the achievement of the students. Kevin McGinley (1983: 89), the author of **The ESP classroom: some notes on evaluation in ESP**, identified that evaluation should be an integral part of any educational approach. At the very least, educators are concerned whether or not the basic objectives have been attained, and consequently, whether the course can be described as effective or successful.

Taylor, R. (1950. In Bursri, T., 1988: 287) identified that the process of curriculum evaluation was to check the curriculum and learning goals. These goals mean the learner's behavior change, so curriculum means the process of checking that how learner's behavior change.

Cronbach (1963. In Kaemane, T., 1997: 135) identified the curriculum evaluation was the collection and the analysis of all information for decision making

on curriculum and programme.

Stufflebeam, D. L. (1971. In Bursri, T., 1988: 288) identified that curriculum evaluation was the process of collection and analysis all information to be recommended for decision making.

Based on this definition, the researcher attempts to match this concept with the present study in which this study tries to collect and to analyze the information. Did programme achieve the goals? Thereby making judging efficiency and effectiveness possible.

### **2.1.2 Purpose of Curriculum Evaluation**

Actually, evaluation expresses its purposes in its meaning. Although evaluation has various meanings in different situations, they are the same in that an evaluation is done for making a decision or a judgment. Generally, curriculum evaluation has three objectives as follows: (Kaemane, T., 1997: 134)

2.1.2.1 To investigate the efficient of the curriculum and the effectiveness of the goals achievement.

2.1.2.2 To make judgment on the appropriateness of the curriculum design, management and learning activities.

2.1.2.3 To measure the learner's achievement.

The viewpoint of the researcher is that an evaluation has its own purpose depending on the evaluator. However, the purpose reviewed above offered some practical possibilities for all evaluators to keep in mind when conducting an evaluation.

### **2.1.3 Dimensions of Curriculum Evaluation**

According to the discussion on the evaluation of an educational

curriculum, there are many approaches. These approaches are known by evaluation theorists as a “dimensions of curriculum evaluation”. There are three fundamental dimensions which the patterns of curriculum evaluation center on including formative and summative evaluation, process and product evaluation, using, quantitative and qualitative approaches.

#### 2.1.3.1 Formative and summative evaluations.

Formative evaluation and summative evaluation are distinguished by referring to the position of programme evaluation. Formative evaluation takes place and produces information that is fed back during the development of a programme and its curriculum. The objective of formative evaluation is to improve the target course by using the information gathered. For summative evaluation, it is done, on the other hand, after the curriculum has been completed. Its results provide information in order to determine whether the course was effective and successful.

#### 2.1.3.2 Product and process evaluations.

The distinction between product evaluation and process evaluation is based on the way the information might be considered. Product evaluation can be defined as any evaluation which is focused on whether the goals or product of the programme were achieved. On the other hand, process evaluation emphasizes more or what is going on in a programme or process that helps to reach the goals or product (James Brown, 1989: 251).

#### 2.1.3.3 Quantitative and qualitative evaluations.

Quantitative and qualitative approaches in course evaluation concern the methods used to deal with the data collected of a programme evaluation. If the

data is quantitative, it will be gathered by using the analysis of numbers and statistical techniques. The instruments used in quantitative approach are test results or scores, and ranking of questionnaires and interviews. In contrast, qualitative data is not concerned with numbers and statistics. The data in this approach is gathered by observation which include, for example, classroom observations, diary entives made by administrators, teachers or students, and records of meetings or discussions.

#### **2.1.4 Frameworks of Curriculum Evaluation**

In the field of nursing education, there is a popular evaluation model called CIPP model. James Popham (1975: 33), the author of **Educational Evaluation** published by Prentice-Hall Inc., reviews the CIPP model that was originated by Danial Stufflebeam and Egon guba in 1971. This decision making model aims to evaluate mainly for aspects of a programme: context, input, process, and, product, so this is why the model is called CIPP. The context evaluation aims mainly at evaluating the appropriateness of the existing programme in a social setting in terms of its aims, goals, objectives, educational policy and philosophy, social needs, their significance, etc. Second, input evaluation is to provide information for determining how to utilize resources to meet the programme goals. This can be done by identifying and assessing 1) relevant capabilities of the responsible agency, 2) strategies for achieving programme goals, and 3) designs for implementing a selected strategy. Third, process evaluation provides information for programme decisions. It shows the content which context and input evaluations have been performed adequately- the more adequate the context and input evaluations are, the more certain it is that the programme will work well and the less critical the process evaluation will need to be. Finally, product evaluation measures and interprets the attainment of the programme. The general

methods used include devising operational definitions of objectives, measuring criteria associated with the objectives, comparing these measurements with predetermined absolute or relative standards, and making rational interpretations of the outcome using the recorded context, input, and process information.

In summary, the researcher selected CIPP model to apply in this study because this model could evaluate holistic system and to be useful for the administrators making decision to improve more efficient course management.

## **2.2 Concepts of Environmental Education**

### **2.1 Definition of Environmental Education**

Rattanathusnee, T. (1992: 171) mentioned that the environmental education is a process of education to educate people to concern environmental problems due to have responsibility and participation in problem solving. To educate knowledge about the environment, the relationship between man and environment to protect this problem and to develop both high environmental quality and high quality of life.

Chankao, K. (1993: 71) identified that the environmental education is a well-systematic process of knowledge provision, emphasizing the use of educational technology to educate people knowledge about environment to remain high environmental quality.

Srisupan, W. (1993: 75) identified that environmental education is a studying process to make person knowing about nature, their roles and other components. Its goal is to people can live related with nature and they are happy in their local, country and the world.

Veeravatnanond, V. & Sripanpong, B. (1996: 15-16) mentioned that environmental education is a studying process emphasis on physical and social environment, both concrete and un-concrete factors that change environment and the impact on human being. Its goal is to make people good attitudes, behavior and values to preserve and to develop the environmental quality and the quality of life.

Stapp & Cox (1981: 7) identified that environmental education is a process with the objective of developing the world population to be aware of all environmentally-related problems. And it is aimed to educate people knowledge, attitudes and skills to protect and to solve environmental problems both individual and others.

Luckx, et. al. (1982: 7-18) explained that environmental education is the studying process with the aim to develop population about:

1. Knowledge about the relationship between living things and physical environment.
2. Aware of the environmental problems and search guideline to solve them.
3. Motivating them to have a good behavior in environmental responsibility to make high quality of life.

In summary, environmental education is the purposeful process of education to promote people environmental knowledge. Its goal is to provide people with knowledge, awareness, attitudes, values and participation in environmental problem solving to create environmental quality and quality of life.

## **2.2 The Objectives of Environmental Education**

The Belgrade Charter recommended the objectives of environmental

education are to make people achieve (UNESCO, 1976. In Veeravatnanond, V. & Sripanpong, B., 1996: 27-28) as follows:

1. Awareness: to concern in environmental problems.
2. Knowledge: to understand the environment and their roles to solve environmental problems.
3. Attitudes: to have social value that connect with environment and to motivate people participating in environmental protection and improvement.
4. Skills: to have skills in environmental problem solving.
5. Evaluation ability: to be able to evaluate the policy of environment; assess the project that effect on ecology, politic, economic, society, ethics and education.
6. Participation: to develop their responsibility in environmental problem solving.

In addition, from the intergovernmental conference on environmental education at Tbilisi recommended the objectives of environmental education (Eamsiri, A.,1978: 131) as follows:

1. Awareness: to help social groups and individuals acquire an awareness of and sensitivity to the total environment and its allied problems.
2. Knowledge: to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of the environment and its associate problems.
3. Attitudes: to help social groups and individuals acquire a set of values and feelings of concern for the environment, and the motivation for actively participating in environmental improvement and protection.

4. **Skills:** to help social groups and individuals acquire the skills for identifying and solving environmental problems.

5. **Participation:** to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems.

### **2.3 The Guiding Principles of Environmental Education**

The guiding principles of environmental education was recommended in the Belgrade Charter from the international environmental education workshop at Belgrade, 1975 (UNESCO, 1976. In Veeravatnanond, V. & Sripanpong, B., 1996: 27-29) as follows:

1. Environmental education is to study the environment as holistic view both natural resources and human-made including ecology, politic, economic, technology, society, logic, culture and aesthetics.
2. Environmental education should be a lifelong process both formal and informal education.
3. Environmental education should be interdisciplinary approach.
4. Environmental education should be active participation in environmental problem protection and problem solving oriented.
5. Environmental education should be think globally but act locally.
6. Environmental education should be present- future oriented.
7. Environmental education should consider development, growth of all developments and their impact to the environment.

8. Environmental education should promote people to realize a worth of the environment and necessity to cooperate in protection and solving the environmental problems including the national, regional and international levels.

The international environmental education workshop at Belgrade was the first environmental education workshop of the world so the eight principles were guideline for every country using suitable to the state of each country.

Moreover, the concepts of environmental education curriculum development summarized that environmental education curriculum is to educate people knowledge to be awareness, thinking, analysis and participation in environmental problem solving. The content is interdisciplinary approach; associate to ages, intelligence, economic, life-style or real experience of the learner. The basic concepts consist of ecosystem, energy, pollution, economic and technology, value and population concepts (Veeravatnanond, V. & Sripanpong, B., 1996: 29).

In addition, the intergovernmental conference of environmental education at Tbilisi, October, 1997, added more clearly Principles (Eamsiri, A.,1978: 131-133). Environmental education should:

1. Consider the environment in its totality- natural and built, technological and social (economic, political, technological, cultural- historical, moral, aesthetic).
2. Be a continuous lifelong process, beginning at pre-school level and continuing through all formal and non- formal stages.
3. Be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective.
4. Examine major environmental issues from local, national,

regional and international points of view so that students receive insights into environmental conditions in other geographical areas.

5. Focus on current and potential environmental situations, while taking into account the historical perspective.

6. Promote the value and necessity of local, national and international co- operation in the prevention and solution of environmental problems.

7. Explicitly consider environmental aspects in plans for development and growth.

8. Enable learners to have a role in planning their learning experience and provide an opportunity for making decisions and accepting their consequences.

9. Relate environmental sensitivity, knowledge, problem-solving skills and values clarification to every age, but with special emphasis on environmental sensitivity to the learner's own community in early years.

10. Help learners discover the symptoms and real causes of environmental problems.

11. Emphasize the complexity of environmental problems and thus the need to develop critical thinking and problem- solving skills.

12. Utilize diverse learning environments and a broad array of educational approaches to teaching/ learning about and from the environment with due stress on practical activities and first- hand experience.

Srisupan, W. (1993: 75) mentioned that the basic principles of environmental education management should consisted of:

1. Realizing in the importance of learner: Learner should

concern with their roles on environmental problem solving in their local and their society. The education has to allow learner realizing in their values, knowing about their local and society. They should concern in the impact of the environment which affecting them.

2. Realizing in the importance of social experience due to the learner would be able to analyze their social problems. The teacher should give the learner an opportunity to research new idea or new technique to solve their social problems.

3. The content is interdisciplinary approach. Student would be able to integrate environmental education and related science to explain the system of relationship of every factor, able to understand about environmental problem and approach this problem.

4. Realizing in the importance of culture and human-ethics to promote person to be positive attitudes and appropriate behavior in ecosystem of the world.

From above, environmental education is an interdisciplinary approach that the learner has active participation and direct experiences for useful in the future.

#### **2.4 Strategies of Teaching of Environmental Education**

Strategies of teaching of environmental education would achieve the goals, have to consider (Veeravatnanond, V. & Sripanpong, B., 1996: 111) as follows:

1. Goal: The goals of environmental education want the student to have positive attitudes toward environment and behavior in promotion and improvement environmental quality. From this, teaching strategies of environmental education should be the method that students have active participation for example:

discussion, decision making, observation and analysis, etc.

2. **Content:** Strategies of teaching of environmental education should be suitable with the content for example: teaching about “ecosystem”, teacher might use transparency, slide presentation, field-study, simulation or games, etc.

3. **Learner:** Strategies of teaching of environmental education should be suitable with the learner because the learners are different from each other.

4. **Teacher:** Teacher would choose the strategy suitable to his ability.

Veeravatnanond, V. & Sripanpong, B. (1996: 111-113) recommended that the present popular teaching strategies of environmental education as follows:

1. **Outdoor education:** This is the learning by experience for example: field-study, studying in a market, studying in a forest near their college or field trips.

2. **Cinema or video:** This makes students are very interested in the lesson.

3. **Slide presentation:** This is the strategy of teaching saver than field trip.

4. **Transparency:** This is a popular method because it is cheap, easy making and safe time.

5. **Simulation and Games:** Simulation is to suppose student in a situation and each learner discusses or students make decision about something.

Games look like a simulation but it is a competition for example: students enter a competition for collecting garbage in their college, a competition for answering the questions, etc.

6. **Inviting special lecturer:** Inviting special lecturer who specialized in some content, lectures or discusses, students are more interested in environmental problems.
7. **Laboratory:** This is a better method for students to find problems.
8. **Interview:** Sometime inviting special lecturer is not comfortable so the students must go to interview the specialist by themselves.
9. **Special activities:** The college or the club of environmental conservation might set special activities about the environment for students. And students always perceive the environmental news.
10. **Paper report:** This method students can search and present an update information about the environment. They can work individual or group.
11. **Debate:** This method divides students into two groups for example: one group is “promote using nuclear” and the other is “fight against to using nuclear”, then each group must search many data promoting their ideas.
12. **Role-playing:** Learner plays a role of person who is in a story for example: a student plays as a doctor and the other one is a patient, then they talk about air pollution causing some diseases.
13. **Using opportunity:** Sometime changing of attitudes toward environment has to wait suitable opportunity for teaching.

In summary, good teaching strategies of environmental education should use many methods and learner is active participation. Students have knowledge, attitudes and skills about the environment.

Moreover, Schwarb (1983: 8-12) presented the research result on “The

Effective Teaching of Environmental Education”, such teaching environmental education is active learner participation for preserving environmental quality. The teaching should use many following methods:

1. Outdoor education is to give students a direct-experience.
2. Role-playing and simulation train students to be decision-making skill.
3. Problem solving trains students to have problem solving skill.
4. Value clarification trains students to develop their values on preserving environmental quality.
5. Lecture is to explain the basic theories.
6. Discussion trains students to participate in brain storming and to present their opinions.

In summary, teaching of environmental education has to make students able to be thinking, doing and solving problems for achievement of the environmental education objectives. And the course content should be the current problems of the environment.

## **2.5 Measurement and Evaluation of Environmental Education**

Evaluation of Environmental Education wants to know about:

(Veeravatnanond, V. & Sripanpong, B., 1996: 127)

1. To evaluate how the learning achieve.
2. To examine how the teaching achieve the goals.
3. To evaluate teachers' course management.
4. To provide data about the progress of the learners and use

them for improving the curriculum.

Measurement and evaluation of environmental education has the same principle of general education evaluation. It should be distinguished into three main elements of curriculum, which are purposes or objectives, methodology or learning experience, and measurement and evaluation. These elements can be shown in a dynamic model, which each element depends on each other (Sukhothai Thammathirat Open University, 1987: 819).

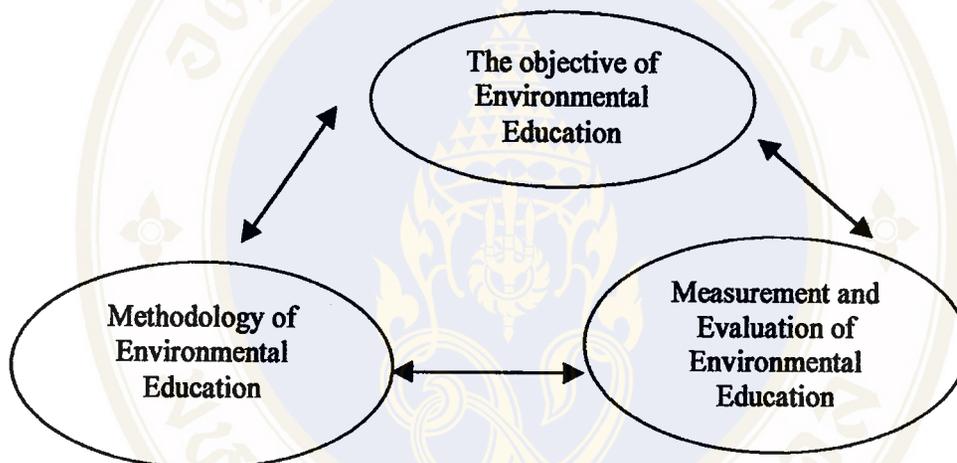


Figure 1 Dynamic Model of Elements in Environmental Education Evaluation.

From above, the measurement and evaluation of environmental education has to consider the objectives of environmental education which are three domains such as cognitive domain, affective domain and psychomotor domain (Sukhothai Thammathirat Open University, 1987: 820).

The guidelines of measurement and evaluation consisted of various behaviors (Sukhothai Thammathirat Open University, 1987: 820-821) as follows:

1. Cognitive domain: This domain has many methods to measure knowledge, for example: observation, questioning and examination. Test construction has to measure properly for each level including knowledge,

comprehension, application, analysis, synthesis and evaluation ability.

2. Affective domain: This domain is the opinions, attitudes and values of learners toward the environment. It is very important but difficult to measure it. The methods of evaluation are such as observation, interview and questionnaire. The questionnaire is rating scale questionnaire or essay. Moreover, Veeravatnanond, V. & Sripanpong, B. (1996: 129-131) recommended the methods of evaluation the attitudes and values toward environment as follows:

2.1 Likert scale: It is the most popular questionnaire. There are rated 3, 5, 7, 9 or 11 scales. Furthermore, evaluation of attitude and behavior can evaluate at the same time and use the same scales. The example of evaluation attitude toward environmental problem by 5 rating scales as follows:

The example questions about environmental problem are as follows:

Directions: Please, write the letter in the blanket in front of these sentences as your opinions:

SA = Strongly agree

A = Agree

U = Uncertain

D = Disagree

SD = Strongly disagree

..... 1. High technology helps population alive in the world.

..... 2. Pollution problem can't solve besides controlling population growth.

..... 3. There are many pollution problems because human does not concern in environment.

2.2 Semantic Differential Technique: This questionnaire is constructed as the environmental issue and the learner answers by providing the position of their opinions, believes or values on those things. For example:

The river and the canal in Bangkok

Clean ..... Dirty  
 Can throw garbage ..... Shouldn't throw garbage  
 Beautiful ..... Not beautiful  
 Can drain waste water ..... Shouldn't drain waste water  
 Should dump for construct the street ..... Shouldn't dump construct the street

2.3 Magnitude estimate scale: This is a questionnaire to measure attitude toward the concepts of the environment. The learner provides the scores for each story; total scores are 1, 10, 100, 500 or 1,000 scores. The sum of their scores was shown their attitudes. For example:

	Total 500 scores
Air without pollution	.....
40% of forest in Thailand	.....
Wildlife conservation	.....

3. Psychomotor domain: The methods of evaluation are such as observation from practices, observation from participation in doing activities as cleaning their college, developing their college or community and solving problem about garbage in college. The evaluation may use questionnaire for observation behavior by checking their works as neatness, beauty or quickness in working.

### 2.3 Related Studies

For this study, the researcher reviewed the studies related to environmental study course management, curriculum evaluation and nursing curriculum as follows:

Paemayon, T. (1985: 90-95) who studied "Evaluation on the Course: Natural Resource and Environment Conservation in 1978 Curriculum Course Syllabus", the results found that:

The instructional objectives set by teachers were less coincided with the course syllabus's objectives. It was concentrated on factual contents more than attitudes and practice.

The contents of the course were reasonably coincided with the course syllabus in the curriculum, community environment, but according to the students' opinions, were less useful in daily life.

The learning activities in classroom were not coincided with the teacher's handbook, curriculum implementation. The teaching methods were mostly lecture, discussion and paper reports. There were, however, some uses of mass media and school environment in classroom teaching, but lack of teaching by problem-solving method.

The teachers' evaluation procedure was coincided with principles of evaluation, but it still emphasized more on factual contents than values, attitudes, and practices.

Teachers' problems were: they wanted to be trained in the course contents and learning activities, the need of teaching aids, such as learning kits, books, and other environmental documents.

Soontara, P. (1988: 156-159) who studied “An Evaluation of the Graduate Programme in Hospital Administration, Mahidol University; year 1987”, the results showed that:

**Context evaluation:** The objectives of the curriculum were in good educational objective and relevant to the objective of the Faculty of Medicine, Ramathibodi Hospital. Most of the contents within the curriculum were suitable and relevant. Only small parts, not significant, should be improved and added.

**Input evaluation:** Qualification of participants were suitable with the curriculum except some participants should have more experience in the field of hospital administration before come to the programme. The organizers of the programme were competent out needs more personnel especially educational trained person. There were enough essential equipment needed for learning and teaching, but library services should be improved. There were good planning and organizing for learning and teaching throughout the programme.

**Process evaluation:** The whole process of learning and teaching throughout the programme were well-planned.

**Product evaluation:** Participants who graduated from this programme were capable in the field of hospital administration and health service research.

Even though there were some parts of the curriculum should be improved and added, but as the whole, this curriculum was satisfied by both participants and lecturer and also served the objectives very well.

Tangyuwaraeng, A. (1991: 126-132) who studied “State and Problem of using Curriculum of Nursing Science programme B.E. 2528 in Nursing Colleges, Nursing College Division, the Ministry of Public Health”, found that the problems of

using curriculum were such as teachers had not enough time to complete lesson plan and handout because they had many tasks; teachers, materials and classrooms were not enough; and their size were not suitable to a lot of students; teachers lacked of community teaching skill; and there was not a standard criteria of evaluation.

Chakreyawat, S. (1993: 139-144) who studied “An Evaluation of the Diploma Programme in Nursing Science Curriculum B.E. 2528, Nursing College Division, the Ministry of Public Health”, the research findings showed that:

Context evaluation indicated that the curriculum objectives were clearly stated, practicable, corresponding to social needs and highly concentrated in professional nursing. The curriculum structure was appropriated, corresponding to the students’ needs, and they were found to be useful and necessary for career implementation. The instructional and evaluation activities were corresponding to the curriculum objectives.

Input evaluation showed that the number of instructors regarding the foundation courses and professional courses, in related to the number of courses offered, were lowly appropriated. Instructional aids were lowly sufficient but of high quality and great convenience.

Process evaluation, the operation instruction and evaluation process was highly appropriated.

Product evaluation, the graduates had both general and specific qualifications as mentioned in the objectives of the curriculum.

Popattanachai, U. (1994: 49-145) who studied “An Evaluation of Nursing Administration Course in Diploma Programme in Nursing Science Curriculum of Suratthani Nursing college by CIPP Model”, the findings revealed that:

The context factor (i.e., purposive, structure and content), the input factor (i.e., instructors, nursing students and instructional aids) and the process (i.e., management, operation instruction and evaluation process) were moderately appropriated. The product of the course, which was evaluated in term of learning achievement, all the students passed the minimum requirement. The work capability of the graduates nursing administration and public health was moderately appropriated.

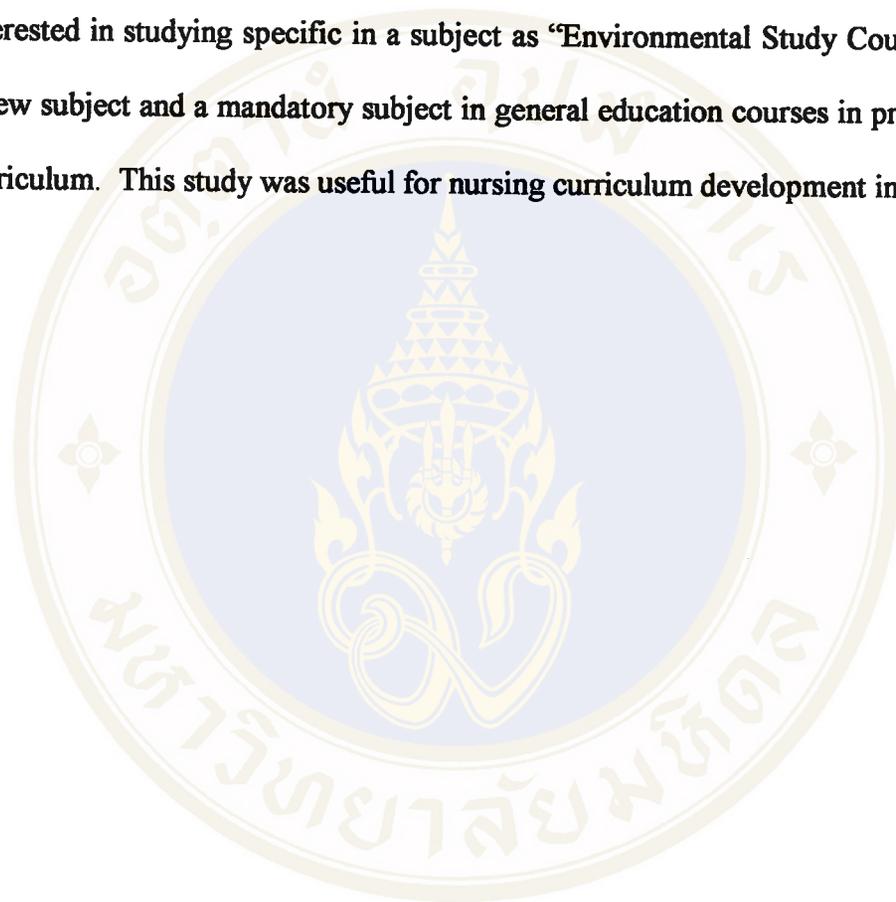
The correlation between context factor and input factor was shown to be non-significantly related but the input factor were shown to be significantly related to the process. The process and the learning achievement were shown to be non-significantly related also, but there were significant relation to the work capability in nursing administration and public health of the graduates.

Problems and obstacles in the organizing of the important learning and teaching were: (1) No appropriateness of the course content of some items; (2) Not enough time for practice teaching; (3) No appropriateness of the classroom and practice building; (4) No readiness of instructors; (5) Lack of the learning motivation creating of instructors; (6) Not enough textbooks and documents for learning and teaching; (7) No readiness of audio-visual equipment for teaching.

The research suggested that the college administrators and the responsible persons for the Nursing Course should cooperate to improve the content, the learning and practice location, seeking of texts and documents for teaching, audio-visual equipment, the readiness of instructors and the coordination with the practice location for supervision.

Conclusion, the related studies showed that a curriculum evaluation both

nursing education and environmental education was not different and these findings were useful for development more efficient curriculum. From this reason, the researcher realized in the importance of curriculum evaluation. Furthermore, there was a little of research about each subject in nursing curriculum so the researcher was interested in studying specific in a subject as “Environmental Study Course” that was a new subject and a mandatory subject in general education courses in present nursing curriculum. This study was useful for nursing curriculum development in the future.



## CHATER III

### RESEARCH METHODOLOGY

This study was a course management evaluation, aimed to evaluate the Environmental Study Course management using CIPP Model as the conceptual framework. Methodologies consisted of context evaluation by experts. The data were collected from nursing students by questionnaires and from teachers by structured interview questionnaires to evaluate context, input and process of environmental study course management. This chapter presents six topics of methodology as follows: the conceptual framework, the research design, the population and sampling, the research instruments, the data collection and the data analysis.

#### 3.1 Conceptual Framework of the Study

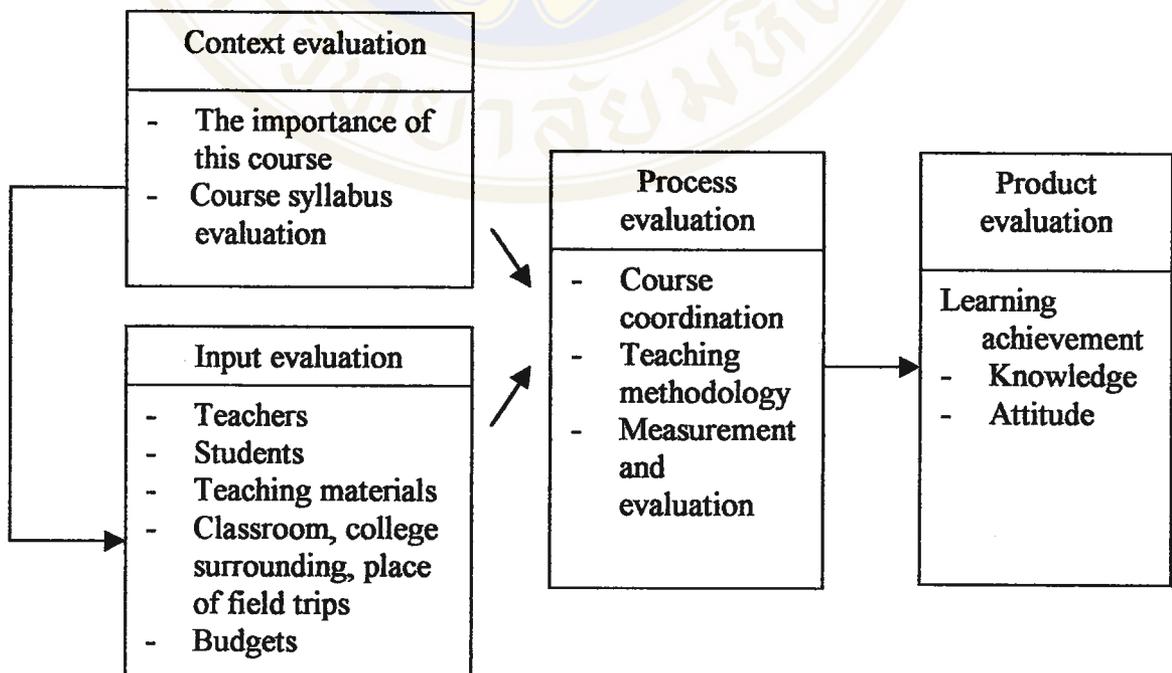


Figure 2 Conceptual Framework of the study

### 3.2 Research Design

For this study, the researcher used one group pre-test post-test design, as shown in Table 1.

Table 1 One group pre-test post-test research design

Group	Test		
	Pre-test	Learning and teaching	Post-test
Experimental group	0	x	0

### 3.3 Population and Sampling

#### 3.3.1 Population

There were three groups of participants in this study including the experts, the nursing students and the teachers.

1. Experts: The criteria for selection of the experts was that they must specialized in environmental education and/or nursing education, with at least a master's degree. They also should have working experiences regarding environmental education and/or nursing education for at least five years.

2. Nursing students: There were 565 first year nursing students studying the environmental study course at nursing colleges under the jurisdiction of the Ministry of Public Health during the summer session in the academic year 1998. (Table 2).

3. Teachers: There were 7 course coordinators and 20 teachers of 7 nursing colleges which offered environmental study course during the summer session in the academic year 1998.

Table 2 Number of nursing students studying environmental study course in the nursing colleges under the jurisdiction of the Ministry of Public Health

Regions	Boromrajachonani Nursing Colleges	Number of Nursing Students
Central	Saraburi	87
	Ratchaburi	60
Eastern	Chonburi	110
North eastern	Udonthani	119
	Nakhonpanom	81
Southern	Trang	59
	Narathiwat	49
	<b>Total</b>	<b>565 Students</b>



### 3.3.2 Sampling Technique

By using the purposive random sampling technique, four nursing colleges from each region were selected as case study and sample groups. The selection criterion was that the nursing colleges selected must be offered the environmental study course during the summer session in the academic year 1998. Because the researcher had not enough time for collecting data from all of the nursing colleges. Therefore, the researcher selected four nursing colleges for each region as sample groups including Boromrajachonani Nursing College at Saraburi, Chonburi, Udonthani and Trang provinces; the rest three nursing colleges were not selected. However, four nursing colleges were good representatives for this study.

#### 3.3.2.1 Sample size

The sample size consisted of 5 experts on environmental study, 375 nursing students, 4 course coordinators and 4 teachers from four nursing colleges for each region where were randomly selected for this study as following:

A) The purposive sampling used to select 5 experts on environmental study from Praboromarajchanok Institute, nursing colleges and universities.

B) Nursing students' sample: The researcher selected all of the first year nursing students (375 students) from four nursing colleges for each region.

C) Teachers' sample: The researcher interviewed 4 course coordinators and 4 teachers for each college.

#### 3.3.2.2 Sampling techniques

In this study, the sampling techniques employed were as follows:

A) Experts' sampling: Purposive random sampling was employed to select 5 experts.

B) Students' sampling: Purposive random sampling was employed to select four nursing colleges for each region that offered environmental study course during summer session in academic year 1998. Then, the researcher selected all of the first year nursing students from four nursing colleges for each region. There were 375 students, shown in Table 3.

C) Teachers' sampling: Purposive random sampling was employed in this study.

**Table 3** Number of the sampled nursing students studying environmental study course in the nursing colleges under the jurisdiction of the Ministry of Public Health

Regions	Boromrajachonani Nursing Colleges	Number of Nursing Students
Central	Saraburi	87
Eastern	Chonburi	110
North eastern	Udonrthani	119
Southern	Trang	59
	<b>Total</b>	<b>375 Students</b>

### **3.4 Research Instruments**

#### **3.4.1 Characteristics of the Questionnaires and the Interview**

Questionnaires were developed and employed for data collection.

There were three questionnaires as follows:

1. Course syllabus evaluation questionnaire for the experts to evaluate the context of the environmental study course. The researcher wrote this tool and evaluated it by five experts. It consisted of two parts: (Appendix A)

Part I: Background or personal data of the experts

Part II: Course syllabus evaluation

2. Questionnaire for the nursing students consisted of four following parts: (Appendix A)

Part I: Background data of the nursing students' samples.

Part II: Environmental knowledge test was multiple choices, four choices, only one choice was the best answer.

Part III: Environmental attitude test was developed by using Likert scale.

To score the level of their attitudes, the rating scales for this part was on the continuum of 1 to 5 as follows:

	<u>Positive</u>	<u>Negative</u>
Strongly agree	5 scores	1 score
Agree	4 scores	2 scores
Uncertain	3 scores	3 scores
Disagree	2 scores	4 scores
Strongly disagree	1 score	5 scores

Part IV: The opinions on environmental study course management questionnaire was to collect data after course that consisted of two sections as follows:

Section I: Input evaluation questionnaire (i.e.: The teachers, students, teaching materials, classroom, college surrounding, place of field trips and the budgets) was the 5-rating scales and the opinions on problems and recommendations were open-ended questions.

To score the level of their opinions, the rating scales for this part was on the continuum of 1 to 5 as follows:

Highest level	5 scores
High level	4 scores
Moderate level	3 scores

Low level 2 scores

Lowest level 1 score

Section II: Process evaluation questionnaire (i.e.: Course coordination, teaching methodology, and measurement and evaluation) was five rating scales and the opinions on problems and recommendations were open-ended questions.

To score the level of their opinions, the rating scales for this part was on the continuum of 1 to 5 as follows:

Highest level 5 scores

High level 4 scores

Moderate level 3 scores

Low level 2 scores

Lowest level 1 score

3. An interview for the teachers was the information about context, input and process of environmental study course management. It was open-ended questions that consisted of 4 parts as follows: (Appendix A)

Part I: Characteristics of the teachers.

Part II: Context evaluation.

Part III: Input evaluation (i.e.: The teachers, students, teaching materials, classroom, college surrounding, place of field trips and the budgets)

Part IV: Process evaluation (i.e.: Course coordination, teaching methodology, and measurement and evaluation).

### **3.4.2 Construction and Development of the Questionnaires**

The process of construction and development of the questionnaire were as follows:

1. Environmental study course syllabus questionnaire for the experts

1.1 studied the documents and literatures related to the curriculum evaluation and environmental education.

1.2 studied the environmental study course syllabus in-depth in order to know the details of items as course objectives, course contents, etc.

1.3 constructed a draft questionnaire focusing on the purposes of the study and the research questions.

1.4 modified the questionnaire based on the suggestions of the thesis supervisory committee. The content validity was inspected by the researcher advisors, and was reconfirmed by three environmental education specialists.

1.5 revised the questionnaire

2. Questionnaire for the nursing students

2.1 studied the documents and literatures related to the curriculum evaluation and environmental education.

2.2 studied the environmental study course syllabus in-depth in order to know the details.

2.3 constructed a draft questionnaire. The questionnaire was used to collect data about environmental knowledge, environmental attitude and the opinions of the nursing students on the course management. The environmental

knowledge test and the environmental attitude test covered course objectives that was whether each lesson in the course had been necessary to learn and to use in a future career or not. The questionnaire about the opinions based on CIPP Model.

2.4 modified the questionnaire based on the suggestions of the thesis supervisory committee.

2.5 The content validity was inspected by the researcher advisors, and was reconfirmed by five environmental education specialists. The content validity of the questionnaire was reconfirmed by the results of the pilot study.

2.6 Pre-tested the questionnaire with 45 first year nursing students at Boromrajachonani Nursing College Ratchaburi, who were not sample groups to test the reliability.

2.7 for finding the difficulty of the environmental knowledge test and the discrimination power, the researcher chose 40 (from 52) question items with the difficulty between 0.2-0.8 and with the discrimination power from 0.2 up. Then, calculated the reliability of the items using Kuder-Richardson's Formula 20. The reliability was 0.73.

- calculated the difficulty of the environmental knowledge test by using the formula showed below: (Thaweeratt, P., and 1997: 128)

$$P = \frac{R}{N}$$

When P = Difficulty for each item

R = The number of the students who answered correctly in each item

N = All of the samples

The acceptable difficulty coefficient index in this study was at 0.2 to 0.8. Forty (40) items were difficulty. (Appendix B)

- for finding the discrimination power, first checked and scored, arranged the score ascending means, then divided into two groups with 25 % proportion, high group and low group, next each group computed the number of the samples who answered correctly in the same item, finally replaced with the formula of proportion of difference between high and low groups (Thaweeratt, P., 1997: 130).

$$r = \frac{R_u - R_e}{N/2}$$

When  $r$  = Discrimination power for each item

$R_u$  = The number of the students who answered correctly in the high group

$R_e$  = The number of the students who answered correctly in the low group

$N$  = All of the samples

The acceptable discrimination power index in this study was set at 0.2 up.

- To analyze its reliability, the researcher used Kuder-Richardson's Formula 20 (Thaweeratt, P., 1997: 123). The reliability of the questionnaires was 0.73, which considered as appropriate for data collection. The formula showed that:

$$R_{tt} = \frac{n}{n-1} \left\{ 1 - \frac{\sum pq}{S_t^2} \right\}$$

When  $r_{tt}$  = Reliability

$n$  = The number of the items

$p$  = Proportion of the correct-answered students for each item

$q$  = Proportion of the incorrect-answered students for each item =  $1 - p$

$S_t^2$  = The variation of the score

2.8 Environmental attitude test and the opinions questionnaire.

- The reliability coefficients for the attitude test and opinions questionnaire were computed by using the most commonly used available package computer programme “Statistical Package for the Social Sciences (SPSS/PC)” reliability subprogram or the Cronbach Alpha Model (Cronbach, In Thaweeratt, P., 1997: 125). The formula showed that:

$$\alpha = \frac{n}{n-1} \left\{ 1 - \frac{\sum S_i^2}{S_t^2} \right\}$$

When  $\alpha$  =  $\alpha$  co-efficient

$n$  = The number of items

$S_i^2$  = The score of variance for each item

$S_t^2$  = The score of variance for all items

The acceptable reliability co-efficient of the environmental attitude scale was 0.76, and the reliability co-efficient of the opinion questionnaire, section i was 0.85, section ii was 0.81.

### 3. The interviewing questionnaire

3.1 studied the documents and literature related to the curriculum evaluation and environmental education.

3.2 constructed a draft questionnaire focusing on the purposes of the study, the research questions and CIPP Model.

3.3 modified the questionnaire based on the suggestions of the thesis supervisory committee.

3.4 The content validity was inspected by the researcher advisors, and was reconfirmed by two environmental education specialists.

3.5 revised the questionnaire.

### 3.5 Data Collection

In order to collect the data, the researcher first collected the information from the group of specialists. The researcher contacted them by telephone in advance to introduce herself and gave information about the study. Then the researcher went to meet them at their working places or with an introductory letter from the Dean of the Faculty of Social Sciences and Humanities, Mahidol University, requesting cooperation in giving information for this study.

Next, the researcher collected the data from the group of nursing students, the researcher sent the letter from the Dean of the Faculty of Social Science and Humanities, Mahidol University, to the Director of Praboromarajchanok Institute, Ministry of Public Health, requesting cooperation in data collection for this study in four nursing colleges. Then the researcher contacted each college by telephone in advance to introduce herself and gave information about the study, went to each

college with an introductory letter from the Dean of the Faculty of Social Sciences and Humanities, Mahidol University, permitted from the college director and requested the teacher's cooperation in giving each student the questionnaire in the classroom. The researcher, then, pre-tested the environmental knowledge test and attitude test with 375 nursing students.

After 9 weeks pre-test, the researcher conducted post-test, together with gathering the nursing students' opinions.

Finally, in order to gather the data from the teachers, the researcher interviewed the course coordinators and the teachers. The interview was conducted in the same procedure as the first one. Each interview took approximately, 30 to 60 minutes.

In collection of the data, 375 completed questionnaires were collected during the pre-test, and 358 questionnaires from the post-test. The number of the questionnaires slightly decreased because 12 nursing students were absent and 5 nursing students dropped out.

### **3.6 Data Analysis**

The descriptive statistics were employed in this study including Percentage, Arithmetic Mean and Standard Deviation. The statistical tests employed in this study included Paired t-test and Chi-square test. Moreover, content analysis was employed for the data from interview teachers and from the experts.

## **CHAPTER IV**

### **RESULTS**

The purpose of this study was to evaluate the Environmental Study Course management of the Nursing Science Programme offered at the nursing colleges of Ministry of Public Health. The samples of Nursing College were drawn from 4 colleges namely: Boromrajachonani Nursing College Saraburi, Chonburi, Udonthani, and Trang. The results of this study was divided into 4 parts as follows:

#### **Part I Results from the experts**

##### **1.1 Characteristics of the experts**

##### **1.2 Context evaluation of the course by the experts**

#### **Part II Results from the nursing students**

##### **2.1 Characteristics of nursing students' sample**

##### **2.2 Input evaluation by the nursing students**

##### **2.3 Process evaluation by the nursing students**

##### **2.4 Product evaluation by the nursing students**

##### **2.5 Problems and recommendations by the nursing students**

#### **Part III Results of hypotheses testing**

3.1 The post-test scores of the nursing students' knowledge were higher than those of the pre-test.

3.2 The readiness of the Environmental Study Course management was correlated with the scores of nursing students' knowledge.

3.3 The readiness of environmental study course management was

correlated with the scores of nursing students' attitude.

3.4 The post-test scores of the nursing students' attitude were higher than those of the pre-test.

3.5 The process of the Environmental Study Course management was correlated with scores of the nursing students' knowledge.

3.6 The process of the Environmental Study Course management was correlated with the scores of nursing students' attitude.

#### **Part IV Results from the teachers**

4.1 Characteristic of the teachers

4.2 Input evaluation by the teachers

4.3 Process evaluation by the teachers

4.4 Product evaluation by the teachers

4.5 Problems and recommendations by the teachers

### **Part 1 The Results from the Experts**

#### **1.1 The Characteristics of the Experts**

1.1.1 Sex: All of the experts were female.

1.1.2 Age: Three (3) of the experts were aged between 44-54, two (2) of the experts were aged between 33-43.

1.1.3 Office: Three (3) of the experts worked at the Nursing College, one expert at university, one expert Praboromarajchanok Institute, Ministry of Public Health.

1.1.4 Position: Two (2) of the experts were administrators, two (2) of the experts were professional nurses, and one expert was associate professor.

1.1.5 Education: Four (4) of the experts held master degrees and one expert Ph.D.

1.1.6 Experience in environmental education and/or nursing education: All of the experts had experience in environmental education and/or nursing education.

1.1.7 Present job: Two (2) of the experts were administrators, one expert taught environmental study course in a nursing college, one expert taught environmental study course at university and one expert was studying for doctoral degree in environmental education.

Table 4 Number of the experts classified by the characteristics

(N= 5)

The characteristics	Number of the experts
1. Sex	
Male	0
Female	5
2. Age	
33 – 43 years old	2
44 – 54 years old	3
3. Office	
Nursing College	3
University	1
Praboromarajchanok Institute	1
4. Position	
Administrator	2
Professional nurse	2
Associate professor	1
5. Education	
Master degree	4
Doctoral degree	1
6. Experience in environmental education and/ or nursing education	
Have	5
Not at all	0
7. Present job	
Taught environment at university	1
Studying Ph.D. in environmental education	1
Taught environment in nursing college	1
Administrators in nursing education	2

## **1.2 Context Evaluation by the Experts**

Context evaluation by the experts, the researcher determined the topics to be evaluated including the evaluation of the importance of the Environmental Study Course and the evaluation of Environmental Study Course syllabus. The results of the analysis were shown in Table 5-6.

1.2.1 The evaluation of the importance of the Environmental Study Course.

1.2.1.1 Nursing students should learn environmental study course in the nursing science programme: All of the experts agreed that this subject was important for nursing students to learn to be a leader in taking care of the environment and health.

1.2.1.2 This should be a mandatory subject: All of the experts agreed that this course should be a mandatory subject because this was a general basic subject for all to concern the environmental values and necessary to manage the environment for quality of life of individual, community, local, country and the world. From this reason, the nursing students should be learnt about management the environment to be the basic knowledge of community health nursing.

Moreover, one expert suggested to add the environmental study course to be a selected subject in nursing science programme with 3 credits and its course description was as follows: study of the environmental system, analyze the factors, relations and adaptations of organism in varied ecological system, environmental quality analysis, role of human in varied ecological system and method of utilizing natural resource and sustainable yield.

1.2.1.3 The suitable credit: Three (3) of the experts agreed that

this course should be offered 2 credits because the students had studied it in a high school already and they learnt this course in curriculum to be a part of teaching about only environmental management in the patient departments.

However, two (2) of the experts agreed that this course should be 3 credits because this course had many contents and various activities both indoor and outdoor education.

1.2.1.4 Characteristics of learning and teaching: Three (3) of the experts suggested to study only theory because the nursing students learnt this subject for only basic of community health nursing subject, did not study for specialist in the environment. And if it emphasized both theory and practice, there was not enough time. However, in studying theory teacher could also set practice as studying, discussions and management the environment in real situation.

However, two (2) of the experts suggested that the students should be studied in both theory and practice because the students should be able to touch with the real experience. One expert agreed that it should be add one credit for practice but one expert agreed that it should be have at least one activity as outdoor education or environmental education practice, need not to increase the credit.

Moreover, one expert suggested that if the environmental study course was set in this curriculum, it should emphasize both theory and practice because this course students must study about ecosystem and role of human in real situation so students should survey community and environment in those area. By this reason, this course should be add 1 credit for practice which made the total credit of this subject become 3 credits.

**Table 5** Number of the experts classified by the opinions on the importance of the Environmental Study Course

Topics	Number of the experts		Total
	Agree/ Appropriate	Disagree/ Inappropriate	
1. Nursing students should learn the Environmental Study Course in the nursing Science programme.	5	0	5
2. This course should be a mandatory subject.	5	0	5
3. This course should be offer 2 credits.	3	2	5
4. This course should be study only theory.	3	2	5

### 1.2.2 Environmental Study Course syllabus evaluation

As a whole, the experts evaluated the relevance of every topic in this course syllabus, the findings showed that: Three (3) of the experts evaluated that every topic was relevant at moderate level and suggested that every topic should be more relevance with professional nursing and more contents about current problems such as Dioxin, global warming, El ni no, studying about environmental pollution rather than natural resources conservation and considering what topics may be duplicated to other subjects in this curriculum. Two (2) of the experts agreed that every topic was relevant at high level.

1.2.2.1 The course title: Four (4) of the experts agreed that this title was incorrect, should be change to new title like that: Two (2) of the experts

agreed to change to be “ Environmental Education” while adding the content of environmental education process. The other wanted to change to be “ Environmental Management”, and one expert agreed to change to be “Nursing and Environment” while adding more content about nursing. But another one agreed that the title should be the same.

1.2.2.2 The course description: All of the experts agreed that the course description was completed and appropriated for professional nursing already. Clear: Four (4) of the experts agreed that it was clear but the other one agreed that it was unclear and she suggested to improve “Environmental quality analysis” to be “Determining the environmental quality standard”.

#### 1.2.2.3 The course objectives:

A) Correct, Clear, Covered the contents and stated with the course description: All of the experts agreed that the course objectives were stated with the course description. Four (4) of the experts agreed that they were correct, clear and covered the contents. However, one expert disagreed with them and she suggested focusing on the role of nurses and the awareness in environmental issues.

B) The objectives had the suitable scope to the professional nursing: Three (3) of the experts agreed that they were suitable to the professional nursing, but two (2) of the experts agreed that they were still lacked of thinking, analyzing and problem solving. And they should focus on the policy, law, and the protection of the environmental quality.

C) The course objectives were stated with the curriculum objectives: Four (4) of the experts agreed that they were stated with the curriculum objectives. One expert disagreed and suggested to add the creative

thinking and approaching people.

D) The course objectives were stated with the current problems: All of the experts agreed that they were stated with the current problems.

#### 1.2.2.4 The course contents:

A) The course contents were relevant to the course objectives: Four (4) of the experts agreed that they were relevant to the course objectives. One expert disagreed and suggested to add the content about the environment and nursing.

B) The course contents were suitable arrangement and clear language: All of the experts agreed that the language was clear. Arrangement of the contents: Three (3) of the experts agreed that they were suitable arrangement but two (2) of the experts disagreed and suggested to add the determination of the environmental quality standard. And if they added the content about nursing, they should be improve new arrangement.

C) As a whole, the experts suggested to improve the course contents as follows:

- Should cut the environmental quality analysis and Chapter II, should consider to cut some contents that duplicated other subjects as “water” duplicated to Biochemistry subject.

- Should add the roles of nurses on the environment; the determination of the environmental quality standard; and the process of making people consciousness.

- Should change some details concerning the patients' problems as the pollution substance and problem solving.

- Others: the experts agreed that these course contents should not be change anymore but teachers should teach the update contents all the times.

#### 1.2.2.5 The number of study hour:

A) The number of study hour was suitable with the contents: Three (3) of the experts agreed that the study hour was not suitable with the contents. The suggestions about this showed that: There should increase time for every chapter, Chapter III added more 2 hours if adding some contents like nursing and environment; making people consciousness and public participation in environmental problem solving. It should decrease study hour in chapter II in the part that content duplicated to another subject. However, two (2) of the experts agreed that it was suitable with the contents.

B) The number of study hour was suitable with the teaching methodology: Three (3) of the experts agreed that it was not suitable with the teaching methodology. The suggestions showed that: Two (2) of the experts agreed to add times in chapter III especially adding for surveying and solving the environmental problems in the community, one expert suggested that chapter III should decrease study hour from 12 hours to 8 hours and added in chapter I from 6 to 8 hours. However, one expert agreed that it was suitable with the teaching methodology. One expert did not know what methodology that teacher taught so she could not evaluate it.

1.2.2.6 Teaching methodologies: They covered the objectives and the contents: Four (4) of the experts agreed that they covered the objectives and the contents. Only one expert disagreed and suggested to decrease lecture while adding seminar, small-group learning, studying from real things and in real situations

as camps and problems analysis in their colleges or their communities.

#### 1.2.2.7 Teaching materials:

A) Teaching materials were relevant to the course: Four (4) of the experts agreed that they were relevant to the course but one expert disagreed and suggested to add real things and real situations.

B) Teaching materials were enough and modern: Three (3) of the experts agreed that they were enough but one expert disagreed. The experts evaluated that they were modern and not modern equally. Half of the experts evaluated that they were not modern and suggested to delete transparency and water quality analysis equipment.

C) Teaching materials were easy to find, buy and make by the teachers or the colleges: All of the experts agreed that the teachers could buy, find or make them easily. Three (3) of the experts agreed that the college could buy, find or make them easily, but only one expert mentioned that the college did not prepare the water quality analysis equipment.

#### 1.2.2.8 Measurement and evaluation:

A) Measurement and evaluation was relevant to the objectives, content and the teaching methodology: Three (3) of the experts agreed that it was relevant to the objectives, content and the teaching methodology. Two (2) of the experts suggested to add the observation of students' behavior such as throwing garbage, saving energy; and adding the evaluation of doing environmental activities.

B) Measurement and evaluation covered including cognitive, affective and psychomotor domains: The experts evaluated it covered and did not cover equally. They suggested to add evaluation of psychomotor domain such

as the observation of nursing students' behavior, for example: throwing garbage, saving energy; and adding the evaluation of doing environmental activities.

#### 1.2.2.9 Textbooks:

A) Textbooks providing for the students were relevant to the course: Three (3) of the experts agreed that they were relevant to the course but two (2) of the experts disagreed. Both two groups suggested to add some textbooks for example: Environmental Education of Chunkao, K., Environmental Acts, Public Participation and the Environmental Education for making people the environmental awareness.

B) Textbooks were enough and modern: Four (4) of the experts agreed that they were enough but one expert mentioned that they were not enough and suggested to add some more textbooks about environmental acts such as: Enhancement and Conservation of National Environmental Quality Act B.E.2535, Factorial Act, Public Health Act; the update books edited in the year 1997 and over were such as State of the Thai environment 1997, Green World Foundation, etc. Modernity: Three (3) of the experts evaluated they were modern but two (2) of the experts evaluated they were not modern and suggested to add some environmental journals such as: environmental health journal, pollution control department journal and the environmental research journal, etc.

C) All of the experts agreed that the college could purchase the textbooks that specify in course syllabus and the experts recommended.

Table 6 Number of the experts classified by the opinions on the environmental study course syllabus evaluation.

Topics	Numbers of the experts		Total
	Agree/ Appropriate	Disagree/ Inappropriate	
1. Course title	1	4	5
2. Course description			
2.1 Clear	4	1	5
2.2 Complete	5	0	5
2.3 Appropriate scope	5	0	5
3. Course objectives			
3.1 Correct	4	1	5
3.2 Clear	4	1	5
3.3 Covered the contents	4	1	5
3.4 Were stated with the course description	5	0	5
3.5 Appropriate scope	3	2	5
3.6 Were stated with the curriculum objectives	4	1	5
3.7 Were stated with the current problems	5	0	5
4. Course contents			
4.1 Were relevant to the objectives	4	1	5
4.2 Appropriate arrangement	3	2	5
4.3 Clear language	5	0	5
5. Study hour			
5.1 Was suitable with the contents	2	3	5
5.2 Was suitable with the teaching methodology	1	3	4*
6. Teaching methodology covered the objectives and the contents	4	1	5
7. Teaching materials			
7.1 Were relevant to the course	4	1	5
7.2 Enough	3	1	4**
7.3 Modern	2	2	4**
7.4 Teachers could buy, find or make them easily	4	0	4**
7.5 College could buy, find or make them easily	3	1	4**

Table 6 (Continued)

Topics	Number of the experts		Total
	Agree/ Appropriate	Disagree/ Inappropriate	
8. Measurement and evaluation			
8.1 Were relevant to the objectives, contents and the teaching methodology	3	2	5
8.2 Covered including cognitive, affective and psychomotor domains	2	2	4***
9. Textbooks			
9.1 Were relevant to the course	3	2	5
9.2 Enough	1	4	5
9.3 Modern	2	3	5
9.4 College could buy or find them	5	0	5

\* One expert could not evaluate this item because she did not know what real methodology that teacher taught.

\*\* One expert did not evaluate these items.

\*\*\* One expert did not evaluate this item because she did not know what content that teacher evaluate.

## Part 2 The Results from the Nursing Students

### 2.1 The Characteristics of Nursing Students' Sample

The first part of the questionnaire for the nursing students required them to identify their background and general characteristics. The respondents were

asked to provide their sex, age, grade point average, scholarship, the interest in studying nursing, the reason to choose nursing, experience in doing environmental activities, perception of the environmental information and the environmental training courses or camps.

The sample was the first year nursing students who were studying the Environmental Study Course in summer session the academic year 1998 in Boromrajachonani Nursing College Saraburi, Chonburi, Udonrthani and Trang province, were 375 subjects.

The obtained data were analyzed by frequency distribution and percentage. The results were presented in Table 7.

2.1.1 Sex: Most of the samples of nursing students were female (89.1%) more than male (10.9%).

2.1.2 Age: Most of the samples of nursing students were aged between 17-19 (81.1 %), the others were aged between 20-23 (18.4%) and 24-27 (0.5%).

2.1.3 GPA: Most of the samples of nursing students were GPA in the first semester, the academic year 1998, 2.51-3.00 (38.7 %). The others were GPA 2.01- 2.50 (28.0%), 3.01- 3.50 (16.3%), 1.01- 2.00 (10.9%), and 3.51- 4.00 (6.1%).

2.1.4 Scholarship: Most of the samples of nursing students received scholarship from the Provincial Public Health Office (69.1 %). The others received scholarship from the hospital (25.1%), from the Praboromarajchanok Institute (5.3%) and from the nursing college (0.5%).

2.1.5 The interest in studying nursing: Most of the samples of nursing students were interested in studying nursing at moderate level (48.8 %). The others were at high level (31.2%), low level (12.8%), and not interest at all 7.2%.

2.1.6 The reason to choose nursing: Most of the samples of nursing students chose nursing because it was easy to find a job (79.2 %). The other reasons were parents needs (65.3%), had scholarships all courses (14.5%), liked it very much (30.4%), unable to enter in the other institutes (19.2%), and would liked to help the other people (4.3%).

2.1.7 Experience in doing the environmental activities: Most of the samples of nursing students had experience in doing the environmental activities (99.5 %).

2.1.8 The environmental activities which nursing students used to do: Most of the samples of nursing students used to cleaning or collecting garbage (93.3 %) and growing trees or reforestation (87.2 %). The other environmental activities were such as being a leader or a member of the club of environmental conservation (23.2%), marine conservation (22.1%) and wildlife conservation (2.1%).

2.1.9 The perception of environmental information: Most of the samples of nursing students used to perceive the environmental information (96.3 %).

2.1.10 Used to take training courses or camps about the environment: Most of the samples of nursing students never went to camps or took any courses about the environment (75.2 %).

Table 7 Number and percentage of the nursing students classified by the characteristics.

(N= 375 100 %)

The characteristics	Number of the nursing students	Percentage (%)
<b>1. Institution</b>		
Boromrajachonani Nursing College, Chonburi	110	29.3
Boromrajachonani Nursing College, Trang	59	15.7
Boromrajachonani Nursing College, Saraburi	87	23.2
Boromrajachonani Nursing College, Udonrthani	119	31.7
<b>2. Sex</b>		
Male	41	10.9
Female	334	89.1
<b>3. Age</b>		
17-19 Years	304	81.1
20-23 Years	69	18.4
24-27 Years	2	0.5
<b>4. GPA (in the first semester, the academic year 1998)</b>		
1.01-2.00	41	10.9
2.01-2.50	105	28.0
2.51-3.00	145	38.7
3.01-3.50	61	16.3
3.51-4.00	23	6.1
<b>5. Scholarship</b>		
Hospital	94	25.1
The Provincial Public Health Office	259	69.1
Nursing College	2	0.5
Praboromarajchanok Institute	20	5.3
<b>6. The interest in studying nursing</b>		
Not at all	27	7.2
Low	48	12.8
Moderate	183	48.8
High	117	31.2
<b>7. The reason to choose nursing</b>		
Liked it very much	114	30.4
Unable to enter in the other institutes	72	19.2
Was easy to find a job	297	79.2
Parents needs	245	65.3
Had scholarships all course	152	40.5
Would like to help the other people	16	4.3
<b>8. Experience in doing the environmental activities</b>		
No	2	0.5
Yes	373	99.5

Table 7 (Continued)

(N= 375 100.0 %)

The characteristics	Number of the nursing students	Percentage (%)
<b>9. The environmental activities which they used to do</b>		
Cleaning/collecting garbage	350	93.3
Growing trees or reforestation	327	87.2
Water or marine conservation	83	22.1
Wildlife conservation	8	2.1
Being a leader or a member of the club of environmental conservation	87	23.2
<b>10. Perception of the environmental information</b>		
No	14	3.7
Yes	361	96.3
<b>11. Went to camps or took training courses about the environment</b>		
No	282	75.2
Yes	93	24.8

**2.2 Input Evaluation** or the readiness of college in course management such as the teachers, students, teacher materials, classroom, college surrounding, places of field trips and the budgets (Table 8).

As reported in Table 8, the readiness of teachers found that it was at high level except the number of them was at moderate level.

The readiness of students found that it was at moderate level in these items: Students were interested in knowing the course description and the course objectives (mean=3.42), students were interested in knowing news about the environment (mean=3.35), students had basic knowledge about the environment before studying it (mean=3.17) and students used to do environmental activities (mean=3.16). The readiness of students was at high level as follows: Students were

active participation in doing environmental activities (mean=3.82) and students paid attention in learning (mean=3.78).

The readiness of teaching materials found that every factor of this readiness was at moderate level.

The readiness of classrooms, college surrounding and places of field trips found that they were at moderate level as follows: adequate classroom, appropriate classroom and classroom surrounding. The factor was at high level as college surrounding. The factor was at low level such as adequate and appropriate of place of field trips.

The readiness of budgets found that it was at moderate level except supporting budgets from other agencies for doing environmental activities was at the lowest level.

Table 8 Percentage and mean of the nursing students classified by the opinions on the input evaluation.

(N=358 100.0 %)

Evaluation list	Level of readiness					$\bar{X}$	S.D.
	Highest	High	Moderate	Low	Lowest		
<b>Teachers</b>							
1. Number of teachers	8.9	34.6	41.9	12.3	2.2	3.36	0.89
2. Teachers' qualifications were appropriated to the content.	24.0	61.7	12.6	1.7	0.0	4.08	0.65
3. Teachers had knowledge, abilities and experiences in environmental education.	31.3	53.4	13.4	1.7	0.3	4.14	0.72
4. Teachers paid attention in the course.	24.3	52.5	19.8	2.8	0.6	3.97	0.78
5. Teachers had good teaching skills.	12.0	46.1	38.0	2.8	1.1	3.65	0.77
6. Teachers lectured modern knowledge.	21.2	48.6	27.4	1.7	1.1	3.87	0.80

Table 8 (Continued)

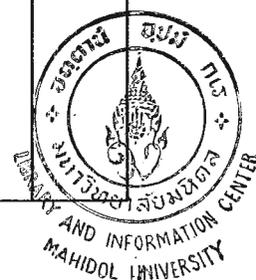
(N=358 100%)

Evaluation list	Level of readiness						— X	S.D.
	Highest	High	Moderate	Low	Lowest			
<b>Teachers (cont.)</b>								
7. Teachers were accuracy in course content.	15.4	56.7	25.4	1.7	0.8	3.84	0.73	
8. Teachers were good models in the environment.	24.0	48.6	24.0	2.2	1.1	3.92	0.82	
<b>Students</b>								
1. Students had basic knowledge about the environment before studying it.	1.1	20.9	1.8	5.9	0.3	3.17	0.54	
2. Students paid attention in learning.	14.8	50.0	33.2	2.0	0.0	3.78	0.71	
3. Students were interested in knowing course objectives and course description before studying it.	5.9	38.0	48.6	7.5	0.0	3.42	0.72	
4. Students used to do environmental activities.	4.7	28.5	48.3	15.1	3.4	3.16	0.86	
5. Students were interested in knowing news about the environment.	6.1	33.2	50.0	10.6	0.0	3.35	0.75	
6. Students were active participation in doing environmental activities.	18.2	49.2	29.6	3.1	0.0	3.82	0.76	
<b>Teaching Materials</b>								
1. Adequate materials (textbooks, v.d.o., cinema, slide, teachers)	8.4	31.0	36.6	21.5	2.5	3.21	0.96	
2. Modernity of materials (textbooks, v.d.o, film, slide)	10.6	30.4	41.9	15.4	1.7	3.33	0.92	
3. Quality of materials (textbooks, v.d.o, film, slide)	7.0	31.6	47.5	12.6	1.4	3.30	0.83	
4. Convenience in using the materials.	3.9	34.6	45.5	14.2	1.7	3.25	0.81	
<b>Classroom, College Surrounding and Place of Field Trips</b>								
1. Adequate classroom.	10.6	36.6	38.8	13.7	0.3	3.44	0.87	

Table 8 (Continued)

(N= 358 100%)

Evaluation list	Level of readiness						S.D.
	Highest	High	Moderate	Low	Lowest	$\bar{X}$	
<b>Classrooms, College Surrounding and Place of field trips (Cont.)</b>							
2. Adequate place of field-trips	5.9	22.3	48.0	20.9	2.8	3.08	0.88
3. Appropriate classroom.	2.5	9.5	23.2	14.2	50.6	1.99	1.16
4. Appropriate place of field-trips	3.6	12.3	20.9	12.3	50.8	2.06	1.24
5. Classroom surrounding							
- Cleanliness	3.4	27.4	60.9	7.5	0.8	3.25	0.68
- Neatness	3.6	26.0	58.7	11.2	0.6	3.21	0.70
- Air ventilation	8.7	30.7	45.0	12.3	3.4	3.29	0.91
6. College surrounding (building, canteen, bathroom, dormitory)							
- Cleanliness	16.2	55.6	27.1	1.1	0.0	3.87	0.68
- Nature	22.1	45.0	27.7	4.7	0.6	3.83	0.84
- Water disposal	18.4	49.4	30.4	1.4	0.3	3.84	0.74
- Solid waste disposal	18.4	49.4	29.9	2.0	0.3	3.84	0.75
<b>Budgets</b>							
1. Received budgets from college for environmental activities.	3.1	19.8	42.7	21.8	12.6	2.79	1.00
2. Received budgets from other organizations for environmental activities.	0.0	0.0	0.0	0.0	100.0	1.00	0.00
3. Received other support (trees or grass) from other organizations for environmental activities.	5.0	21.2	30.7	34.1	8.9	2.79	1.04
4. Administrator supported budgets for buying the teaching materials for the environmental study course.	4.5	23.7	41.6	24.3	5.9	2.97	0.95



2.3 Process evaluation (Table 9) were as follows: Course coordination,

teaching methodology and, measurement and evaluation.

From Table 9, Most of the factors of course coordination were at high level including: The arrangements of the exams schedule, exams room and exams inspector (mean=3.89); planed the programme of study properly (mean=3.57); and paid attention to set learning time (mean=3.50). The factors of course coordination were at moderate level as follows: The teaching following the schedule set before (mean=3.33); and the management of the schedule in order to allow students have time for self-study (mean=2.96).

Teaching methodology evaluation founded that it was at high level and moderate level equally. The factors at high level were as follows: Teaching methodology encouraged student to love and care environments (mean=3.90); teachers told learning objectives (mean=3.87); teachers allowed students to ask questions (mean=3.87); teaching methodology encouraged students' thinking skills (mean=3.71); teaching methodology was associated to the course objectives (mean=3.66); and learning and teaching process encouraged students to solve the environment and health problems (mean=3.59). The factors at moderate level were including: Teaching methodology was appropriated to the course contents (mean=3.47); teaching methodology was appropriated to the class time (mean=3.41); teachers used teaching materials appropriately and efficiency (mean=3.41); teachers allowed students to participate in teaching methodology (mean=3.24); teachers allowed students to present the environment projects (mean=3.15); and teachers allowed students to self-study (mean=3.11).

Measurement and evaluation founded that: The factors at high level were as follows: Measurement and evaluation following course objectives (mean=3.72); criteria were clear and exact (mean=3.11); the evaluation covered

course contents (mean=3.65); the method of measurement and evaluation was appropriate (mean=3.65); and teachers told criteria and methods of evaluation to student in advance (mean=3.57). The factors at moderate level were including: Measurement and evaluation were including cognitive, affective and psychomotor domains (mean=3.49); teachers told students the evaluation results (mean=3.39); students were active participation in evaluation (mean=3.28); and had formative evaluation in response to students' achievement (mean=3.20).

Table 9 Percentage and mean of the nursing students classified by the opinions on the process evaluation

(N=358 100%)

Evaluation list	Level of appropriateness					$\bar{X}$	S.D.
	Highest	High	Moderate	Low	Lowest		
<b>Course Coordination</b>							
1. Planed the programme of study properly.	5.9	47.1	45.3	1.7	0.0	3.57	0.63
2. Paid attention to set learning time.	6.7	44.5	41.2	7.6	0.0	3.50	0.73
3. The teaching following the schedule set before.	5.6	37.4	42.5	13.1	1.4	3.33	0.82
4. The management of the schedule in order to allow students to have time for self-study.	3.1	21.8	45.8	26.3	3.1	2.96	0.85
5. The arrangements of the exams schedule, exams room and inspector.	21.5	49.7	24.9	3.6	0.3	3.89	0.79
<b>Teaching Methodology</b>							
1. Teachers told learning objectives.	12.8	63.1	22.9	0.8	0.3	3.87	0.63
2. Teaching methodology was associated to the course objectives.	11.5	49.4	33.0	5.6	0.6	3.66	0.78
3. Teaching methodology was associated to the class time.	7.0	39.1	41.9	11.5	0.6	3.41	0.80
4. Teachers allowed students to participate in teaching methodology.	7.0	31.3	43.3	15.9	2.5	3.24	0.89

Table 9 (Continued)

(N= 358 100%)

Evaluation list	Level of appropriateness						— X	S.D.
	Highest	High	Moderate	Low	Lowest			
<b>Teaching Methodology (Cont.)</b>								
5. Teachers allowed students to present environment projects.	10.9	26.5	33.5	24.6	4.5	3.15	1.05	
6. Teachers allowed students to ask questions.	20.1	50.0	26.8	2.8	0.3	3.87	0.77	
7. Teachers used instructional materials appropriately and efficiency.	9.8	33.8	45.3	9.8	1.4	3.41	0.85	
8. Teaching methodology was appropriated to the course contents.	7.8	40.5	43.6	7.3	0.8	3.47	0.78	
9. Teachers allowed students to self-study.	5.0	26.0	46.1	20.7	2.2	3.11	0.86	
10. Learning and teaching process encouraged students to solve the environment and health problems.	10.9	45.8	36.0	6.1	1.1	3.59	0.81	
11. Teaching methodology encouraged students' thinking skills.	14.0	49.7	30.2	5.6	0.6	3.71	0.80	
12. Teaching methodology encouraged student to love and care the environments.	24.0	46.9	25.4	2.5	1.1	3.90	0.83	
<b>Measurement and Evaluation</b>								
1. Measurement and evaluation following the course objectives.	8.9	55.0	34.9	0.8	0.3	3.72	0.65	
2. Criteria were clear and exact.	7.8	52.0	38.3	1.7	0.3	3.65	0.66	
3. Teachers told criteria and methods of evaluation to student in advance.	13.1	41.9	34.1	10.1	0.8	3.56	0.87	
4. Students participated in evaluation.	8.9	29.3	45.5	13.4	2.8	3.28	0.91	
5. The evaluation covered course contents.	10.3	47.8	38.8	3.1	0.0	3.65	0.70	

Table 9 (Continued)

(N= 358 100%)

Evaluation list	Level of appropriateness						
	Highest	High	Moderate	Low	Lowest	$\bar{X}$	S.D.
<b>Measurement and Evaluation (Cont.)</b>							
6. To have formative evaluation in response to students' achievement.	5.3	29.3	47.2	16.5	1.7	3.20	0.84
7. Teachers gave students the evaluation results.	12.3	12.3	37.2	12.8	3.6	3.39	0.98
8. Measurement and evaluation was including cognitive, affective and psychomotor domains.	10.1	10.1	40.5	7.5	1.7	3.49	0.84
9. The method of measurement and evaluation was appropriate.	11.2	11.2	37.7	7.5	0.6	3.57	0.81

## 2.4 Product Evaluation by the Nursing Students

Product evaluation or learning achievement of the nursing students was evaluated by examination of knowledge and attitude toward environment before and after studying this subject.

The researcher used 40 questions about the environmental knowledge and 24 questions about the environmental attitudes. The number of students who took the examination was 100% in pre-test and 95.5% in post-test.

### 2.4.1 The knowledge about the environment (Table 10)

From data analysis about nursing students' environmental knowledge, pre-post test, found that:

the importance of the environment to human? Pre-test correct answer was 81.3%; incorrect answer was 18.7%, but post-test more correct answer was 86.6%, incorrect answer was 13.4%. What is the most important cause which makes unbalance of nature? Pre-test correct answer was 64.3%; incorrect answer was 35.7%, but post-test more correct answer was 80.7%, incorrect answer was 19.3%. What is not a method to reduce Greenhouse Effect? Pre-test correct answer was 72.8%; incorrect answer was 27.2%, but post-test more correct answer was 78.2%, incorrect answer was 21.8%.

What is not impact of El Ni No? Pre-test correct answer was 30.9%; incorrect answer was 69.1%, but post-test more correct answer was 32.5%, incorrect answer was 67.5%. What is the most extensive activity affecting environmental change? Pre-test correct answer was 28.0%; incorrect answer was 72.0%, but post-test more correct answer was 43.6%, incorrect answer was 56.4%. What happens if people lack knowledge and are unaware of the natural resources values? Pre-test correct answer was 80.3%; incorrect answer was 19.7%, but post-test more correct answer was 87.7%, incorrect answer was 12.3%.

What does policy of the environment conservation lead to a peaceful society? Pre-test correct answer was 38.7%; incorrect answer was 61.3%, but post-test more correct answer was 48.1%, incorrect answer was 51.9%. What does a new strategy in the Eighth National Socio-Economic Development Plan mean? Pre-test correct answer was 25.6%; incorrect answer was 74.4%, but post-test more correct answer was 37.7%, incorrect answer was 62.3%.

#### Chapter 2 "Environmental Quality Control and Surveillance":

Knowledge about water: What is the most source of water pollution? Pre-test correct

answer was 30.7%; incorrect answer was 69.3%, but post-test more correct answer was 49.2%, incorrect answer was 50.8%. What does student advise people to save water? Pre-test correct answer was 82.7%; incorrect answer was 17.3%, but post-test more correct answer was 89.4%, incorrect answer was 10.6%. What is the activity for saving water? Pre-test correct answer was 80.3%; incorrect answer was 19.7%, but post-test more correct answer was 95.3%, incorrect answer was 4.7%.

Knowledge about air: What does air pollution mean? Pre-test correct answer was 57.1%; incorrect answer was 42.9%, but post-test more correct answer was 75.7%, incorrect answer was 24.3%. What does student advise people to reduced air pollution? Pre-test correct answer was 38.7%; incorrect answer was 61.3%, but post-test more correct answer was 42.5%, incorrect answer was 57.5%. What is CFC impact? Pre-test correct answer was 69.6%; incorrect answer was 30.4%, but post-test more correct answer was 71.5%, incorrect answer was 28.5%.

Knowledge about noise pollution: What kind of industrial factory makes the noisiest problem? Pre-test correct answer was 30.7%; incorrect answer was 69.3%, but post-test more correct answer was 37.7%, incorrect answer was 62.3%. What is incorrect about the danger of noise pollution? Pre-test correct answer was 33.1%; incorrect answer was 66.9%, but post-test more correct answer was 39.4%, incorrect answer was 60.6%. What is the easy and safe method to control and prevent noise pollution? Pre-test correct answer was 50.4%; incorrect answer was 49.6%, but post-test more correct answer was 57.6%, incorrect answer was 42.4%.

Knowledge about solid waste: What is the waste hazardous? Pre-test correct answer was 60.3%; incorrect answer was 39.7%, but post-test more

correct answer was 76.0%, incorrect answer was 24.0%. What is the most efficient method to dispose of infectious solid waste? Pre-test correct answer was 59.2%; incorrect answer was 40.8%, but post-test more correct answer was 76.9%, incorrect answer was 23.1%. Where does student discard cotton wool and gauze after wound dressing? Pre-test correct answer was 65.6%; incorrect answer was 34.4%, but post-test more correct answer was 89.4%, incorrect answer was 10.6%. What does the environmental quality surveillance mean? Pre-test correct answer was 67.7%; incorrect answer was 32.3%, but post-test more correct answer was 64.5%, incorrect answer was 35.5%.

Knowledge about pesticide: What is the best correct answer about pesticide? Pre-test correct answer was 85.9%; incorrect answer was 14.4%, but post-test more correct answer was 94.1%, incorrect answer was 5.9%. What does student advise people if their body is contaminated with the pesticide? Pre-test correct answer was 79.2%; incorrect answer was 20.8%, but post-test more correct answer was 80.0%, incorrect answer was 20.0%. Does student think that the marine in the Gulf of Thailand remains the pesticide? Pre-test correct answer was 67.7%; incorrect answer was 32.3%, but post-test more correct answer was 88.8%, incorrect answer was 11.2%.

Chapter 3 "Roles of individual, community and organizations on the environment and natural resources conservation ": What is correct about the natural resources management? Pre-test correct answer was 82.4%; incorrect answer was 17.6%, but post-test more correct answer was 88.3%, incorrect answer was 11.7%. Who has duty on environmental and natural resource conservation? Pre-test correct answer was 46.1%; incorrect answer was 53.9%, but post-test more correct

answer was 55.3%, incorrect answer was 44.7%. What is the objective of environmental and natural resource conservation? Pre-test correct answer was 60.0%; incorrect answer was 40.0%, but post-test correct answer was decrease 56.1%, more incorrect answer was 43.9%. What is not a principle of environmental and natural resource management? Pre-test correct answer was 71.2%; incorrect answer was 28.8%, but post-test more correct answer was 82.7%, incorrect answer was 17.3%. What concept should be used in management of the exhausting natural resource? Pre-test correct answer was 62.4%; incorrect answer was 37.6%, but post-test correct answer was decrease 50.3%, more incorrect answer was 49.7%.

What concept should be used in management of the renewable natural resource? Pre-test correct answer was 38.1%; incorrect answer was 61.9%, but post-test more correct answer was 44.2%, incorrect answer was 55.8%. These are guidance to manage environmental problems, which one is incorrect? Pre-test correct answer was 25.1%; incorrect answer was 74.9%, but post-test more correct answer was 49.4%, incorrect answer was 50.6%. What activity can student disseminate environment and natural resources conservation? Pre-test correct answer was 32.0%; incorrect answer was 68.0%, but post-test more correct answer was 64.5%, incorrect answer was 35.5%. What is the most dissemination of the environment and natural resources conservation? Pre-test correct answer was 82.1%; incorrect answer was 17.9%, but post-test more correct answer was 88.3%, incorrect answer was 11.7%.

What is correct about environmental education? Pre-test correct answer was 32.0%; incorrect answer was 68.0%, but post-test more correct answer was 38.2%, incorrect answer was 61.8%. What is not rights and function of people to protect the environment? Pre-test correct answer was 71.2%; incorrect

answer was 28.8%, but post-test more correct answer was 77.3%, incorrect answer was 22.7%. What is the role of people on prevention the pollution? Pre-test correct answer was 21.9%; incorrect answer was 78.1%, but post-test more correct answer was 33.0%, incorrect answer was 67.0%. What is the role of non-government organizations on prevention the pollution? Pre-test correct answer was 24.8%; incorrect answer was 75.2%, but post-test more correct answer was 43.6%, incorrect answer was 56.4%.

What is the most important goal of environmental laws? Pre-test correct answer was 14.7%; incorrect answer was 85.3%, but post-test more correct answer was 18.7%, incorrect answer was 81.3%. What does student do if student saw that a distillery discard the alcoholic production at the roadside of the village and they released foul smelling gases interrupted villagers? Pre-test correct answer was 55.5%; incorrect answer was 44.5%, but post-test more correct answer was 67.3%, incorrect answer was 32.7%. What is the characteristic of a responsibility according to the theory of an absolute fault responsibility in the Enhancement and Conservation of National Environmental Quality Act B.E. 2535? Pre-test correct answer was 26.9%; incorrect answer was 73.1%, but post-test more correct answer was 32.5%, incorrect answer was 67.5%.

As a whole, post-test nursing students answered more correct almost questions except three questions such as: What does the environmental quality surveillance mean? What is the objective of environment and natural resource conservation? And what concept should be used in management of exhausting natural resources? Therefore teachers should be taught these topics more clearly.

Table 10 The comparison of the environmental knowledge scores of the pre-test and the post-test among of the sampled nursing students.

Questions	Percentage of the sampled nursing students			
	Pre-test (%)		Post-test (%)	
	Correct	Incorrect	Correct	Incorrect
1. What is the importance of the environment to human?	81.3	18.7	86.6	13.4
2. What is the most important cause which makes unbalance of nature?	64.3	35.7	80.7	19.3
3. What is not a method to reduced greenhouse effect?	72.8	27.2	78.2	21.8
4. What is not the impact of El Ni No phenomenon?	30.9	69.1	32.5	67.5
5. What is the most extensive activity affecting the environmental change?	28.0	72.0	43.6	56.4
6. What does happen if people lack knowledge and are unaware of natural resources values?	80.3	19.7	87.7	12.3
7. What is the efficient policy?	38.7	61.3	48.1	51.9
8. What does a new strategy in the Eighth National Socio-Economic Development Plan mean?	25.6	74.4	37.7	62.3
9. What is the most source of water pollution?	30.7	69.3	49.2	50.8
10. What does student advise people to save water?	82.7	17.3	89.4	10.6
11. What is the activity for saving water?	80.3	19.7	95.3	4.7
12. What does air pollution mean?	57.1	42.9	75.7	24.3
13. What does student advise people to reduce air pollution?	38.7	61.3	42.5	57.5
14. What is CFC impact?	69.6	30.4	71.5	28.5
15. What kind of industrial factory making the noisiest problem?	30.7	69.3	37.7	62.3

Table 10 (Continued)

Questions	Percentage of the sampled nursing students			
	Pre-test (%)		Post- test (%)	
	Correct	Incorrect	Correct	Incorrect
16. What is incorrect about the danger of noise pollution?	33.1	66.9	39.4	60.6
17. What is the easy and safe method to control and prevent noise pollution?	50.4	49.6	57.6	42.4
18. What is the waste hazardous?	60.3	39.7	76.0	24.0
19. What is the most efficient method to dispose of infectious solid waste?	59.2	40.8	76.9	23.1
20. Where does student discard cotton wool and gauze after wound dressing?	65.6	34.4	89.4	10.6
21. What does the environmental quality surveillance mean?	67.7	32.3	64.5	35.5
22. What is the best correct answer about pesticide?	85.9	14.1	94.1	5.9
23. What does student advise people if their body is contaminated with pesticide?	79.2	20.8	80.0	20.0
24. Does student think that the marine in the Gulf of Thailand remains the pesticide?	67.7	32.3	88.8	11.2
25. What is correct about natural resources management?	82.4	17.6	88.3	11.7
26. Who has duty on environment and natural resources conservation?	46.1	53.9	55.3	44.7
27. What is the objective of environment and natural resources conservation?	60.0	40.0	56.1	43.9
28. What is not a principle of environment and natural resources management?	71.2	28.8	82.7	17.3
29. What concept should be used in management of the exhausting natural resource?	62.4	37.6	50.3	49.7
30. What concept should be used in management of the renewable natural resource?	38.1	61.9	44.2	55.8

Table 10 (Continued)

Questions	Percentage of the sampled nursing students			
	Pre-test (%)		Post- test (%)	
	Correct	Incorrect	Correct	Incorrect
31. These are guidance of management environmental problems, what is incorrect?	25.1	74.9	49.4	50.6
32. What activity can student disseminate the natural resources conservation?	32.0	68.0	64.5	35.5
33. What is the most dissemination of the environment and natural resources conservation?	82.1	17.9	88.3	11.7
34. What is correct about environmental education?	32.0	68.0	38.2	61.8
35. What is not rights and function of people to protect the environment?	71.2	28.8	77.3	22.7
36. What is the role of people in pollution prevention?	21.9	78.1	33.0	67.0
37. What is the role of non-government organizations in pollution prevention?	24.8	75.2	43.6	56.4
38. What is the most important goal of environmental laws?	14.7	85.3	18.7	81.3
39. What does student do if student saw that a distillery discard the alcoholic production at the roadside of the village and they released foul smelling gases interrupted villagers?	55.5	44.5	67.3	32.7
40. What is the characteristic of a responsibility according to the theory of an absolute fault responsibility in the Enhancement and Conservation of National Environmental Quality Act B.E. 2535?	26.9	73.1	32.5	67.5

#### 2.4.2 Attitude toward the environment (Table 11)

From data analysis about nursing students' environmental attitudes, pre-post test, found that:

Environmental is important for human life: pre-test nursing students answered strongly agree 99.2% and agree 0.8%; post-test all of the nursing students answered strongly agree (100.0%).

Problem solving is the responsibility of countries where are sources of environmental pollution: pre-test the most of nursing students answered disagree 36.0%, agree 22.7%, strongly disagree 17.0%, uncertain 13.1% and strongly agree 11.2%; post-test most of the nursing students answered more strongly disagree 52.3%, disagree 36.0% and uncertain 11.7%.

Man is the cause of environmental problems: pre-test most of the nursing students answered strongly agree 81.0%, agree 17.9%, uncertain 0.8% and strongly disagree 0.3%; post-test most of the nursing students answered more strongly agree 82.1% and agree 17.9%.

Water pollution comes from only people who settle home on the river sides: pre-test most of the nursing students answered disagree 61.3%, strongly disagree 22.4%, uncertain 9.1%, agree 6.4% and strongly agree 0.8%; post-test most of the nursing students answered more disagree 62.3%, more strongly agree 30.2%, and uncertain 7.5%.

People who use tap water, don't conserve the water resources: pre-test most of the nursing students answered strongly disagree 74.6%, disagree 22.1%, uncertain 1.1%, agree 1.1% and strongly agree 1.1%; post-test most of the nursing students answered strongly disagree 74.4% and disagree 25.6%.

Air pollution finds specific in Bangkok: pre-test most of the nursing students answered disagree 58.4%, strongly disagree 32.0%, uncertain 6.9%, agree 1.9% and strongly agree 0.8%; post-test most of the nursing students answered disagree 57.3%, more strongly disagree 32.7%, uncertain 6.9%, agree 1.7% and strongly agree 1.4%.

Air pollution can cause the respiratory tract infection, everyone must solve this problem: pre-test most of the nursing students answered strongly agree 76.3%, agree 22.1% and strongly disagree 1.6%; post-test most of the nursing students answered more strongly agree 81.3% and agree 18.7%.

Noise pollution is interrupted concentration, but no effect on health: pre-test most of the nursing students answered strongly disagree 56.8%, disagree 37.3%, strongly agree 3.0%, uncertain 2.4% and agree 0.5%; post-test most of the nursing students answered more strongly disagree 64.5%, disagree 34.3% and uncertain 1.2%.

Noise pollution prevention is the function of everybody: pre-test most of the nursing students answered strongly agree 68.7%, agree 23.2%, uncertain 4.3%, disagree 2.7%. and strongly disagree 1.1%; post-test most of the nursing students answered more strongly agree 73.2%, agree 18.2%, uncertain 5.3%, disagree 2.5%.and strongly disagree 0.8%.

Waste disposal is the only function of municipal officials: pre-test most of the nursing students answered strongly disagree 48.0%, disagree 46.1%, uncertain 2.7%, agree 1.9% and strongly agree 1.3%; post-test most of the nursing students answered more strongly disagree 53.1%, disagree 44.1% and uncertain 2.8%.

In present, there are many patients from the environment, must

solve the environmental problems: pre-test most of the nursing students answered strongly agree 65.3%, agree 32.3%, disagree 1.1%, strongly disagree 0.8% and uncertain 0.5%; post-test most of the nursing students answered more strongly agree 69.2%, agree 27.1%, uncertain 1.7%, disagree 1.2% and strongly disagree 0.8%.

People should use chemical fertilizer for more productivity: pre-test most of the nursing students answered disagree 49.1%, uncertain 31.2%, strongly disagree 10.7%, agree 8.8% and strongly agree 0.3%; post-test most of the nursing students answered disagree 47.5%, uncertain 26.5%, more strongly disagree 16.0%, agree 9.5% and strongly agree 0.5%.

In present, in Thailand, environmental pollution is not the crisis problems, are not necessary to solve them: pre-test most of the nursing students answered strongly disagree 54.6%, disagree 36.5%, uncertain 3.2%, agree 2.9% and strongly agree 2.8%; post-test most of the nursing students answered more strongly disagree 59.6%, disagree 34.3%, agree 2.2%, strongly agree 2.2% and uncertain 1.7%.

Natural resources conservation will remain inheritance for posterity: pre-test most of the nursing students answered strongly agree 54.7%, agree 42.4%, strongly agree 1.3%, uncertain 1.1% and strongly disagree 0.5%; post-test most of the nursing students answered more strongly agree 64.8%, agree 33.2%, uncertain 1.2% and strongly disagree 0.8%.

Simple life-style is one method of environmental and natural resources conservation: pre-test most of the nursing students answered agree 50.9%, uncertain 32.3%, strongly agree 12.3% and disagree 4.5%; post-test most of the nursing students answered strongly agree 27.6%, agree 46.5%, uncertain 21.4% and disagree 4.5%.

Everyone should participate in preserving the environmental and natural resources: pre-test most of the nursing students answered strongly agree 92.5%, agree 6.7%, uncertain 0.5%, and strongly disagree 0.3%; post-test most of the nursing students answered strongly agree 92.2%, agree 7.5% and uncertain 0.3%.

Environmental education can educate from the kindergarten to the university: pre-test most of the nursing students answered strongly agree 57.3%, agree 39.2%, disagree 2.4% and uncertain 1.1%; post-test most of the nursing students answered more strongly agree 65.4%, agree 30.7%, uncertain 3.4% and disagree 0.5%.

Nurses able to be leaders in environmental problem solving: pre-test most of the nursing students answered agree 61.1%, strongly agree 26.7%, uncertain 10.1% and disagree 2.1%; post-test most of the nursing students answered more strongly agree 31.8%, agree 6.4%, uncertain 9.8% and disagree 2.0%.

Environmental law is the best tool to solve environmental problems: pre-test most of the nursing students answered uncertain 44.3%, agree 32.8%, disagree 14.7%, strongly agree 7.5% and strongly disagree 0.7%; in the same post-test most of the nursing students answered uncertain 41.9%, agree 32.4%, disagree 14.8%, strongly agree 9.5% and strongly disagree 1.4%.

Environmental problems are important so environmental education should be set in the national education plan: pre-test most of the nursing students answered agree 56.8%, strongly agree 37.6%, uncertain 3.5%, disagree 1.3% and strongly disagree 0.8%; post-test most of the nursing students answered strongly agree 54.8%, agree 43.2%, uncertain 1.7% and strongly disagree 0.3%.

Environmental conservation is the obstacle in developing the countries: pre-test most of the nursing students answered not disagree 43.5%, strongly

disagree 37.0%, uncertain 10.4%, agree 5.6% and strongly agree 3.5%; post-test most of the nursing students answered disagree 40.5%, strongly disagree 33.8%, uncertain 12.9%, agree 8.1% and strongly agree 4.7%.

Should train and educate people to aware of the environmental values: pre-test most of the nursing students answered strongly agree 78.4%, agree 21.3% and uncertain 0.3%; post-test most of the nursing students answered strongly agree 79.9%, agree 19.8% and uncertain 0.3%.

Public relation is one method of promotion the environment and natural resources conservation: pre-test most of the nursing students answered agree 59.7%, strongly agree 37.1%, uncertain 2.7% and disagree 0.5%; post-test most of the nursing students answered strongly agree 45.8%, agree 50.9%, uncertain 3.0% and disagree 0.5%.

The best natural resources conservation is no use any natural resources at all: pre-test most of the nursing students answered disagree 57.9%, strongly disagree 22.9%, uncertain 14.9%, agree 2.4% and strongly agree 1.9%; post-test most of the nursing students answered disagree 62.3%, strongly disagree 21.5%, uncertain 10.1%, agree 3.4% and strongly agree 2.7%.

As a whole, both pre-test and post-test nursing students' environmental attitudes found that nursing students answered "strongly agree" or "agree" almost positive questions and answered "strongly disagree" or "disagree" in negative questions; except the attitudes toward utilizing environmental laws to solve environmental problems, most of the nursing students answered "uncertain". In summary, the post-test scores of attitudes of nursing students were higher than those of the pre-test.

Table 11 The comparison of the environmental attitude scores of the pre-test and the post-test among of the sampled nursing students.(Percentage and Mode)

Environmental attitudes	Environmental attitude scores											
	Pre-test						Post-test					
	5	4	3	2	1	Mode	5	4	3	2	1	Mode
1. Environment is important for human life.	99.2	0.8	0.0	0.0	0.0	5	100.0	0.0	0.0	0.0	0.0	5
2. Problem solving is the responsibility of countries where are sources of environmental problems.	17.0	36.0	13.1	22.7	11.2	4	52.3	36.0	11.7	0.0	0.0.	5
3. Human is the cause of environmental problems.	81.0	17.9	0.8	0.0	0.3	5	82.1	17.9	0.0	0.0	0.0	5
4. Water pollution come from only people who settles home on the riversides.	22.4	61.3	9.1	6.4	0.8	4	30.2	62.3	7.5	0.0	0.0	4
5. People, who use tap water, don't conserve the water resources.	74.6	22.1	1.1	1.1	1.1	5	74.4	25.6	0.0	0.0	0.0	5
6. Air pollution finds specific in Bangkok.	32.0	58.4	6.9	1.9	0.8	4	32.7	57.3	6.9	1.7	1.4	4
7. Air pollution can cause the respiratory tract infection; everyone must solve this problem.	76.3	22.1	0.0	0.0	1.6	5	81.3	18.7	0.0	0.0	0.0	5

Table 11 (Continued)

Environmental attitudes	Environmental attitude scores											
	Pre-test						Post-test					
	5	4	3	2	1	Mode	5	4	3	2	1	Mode
8. Noise pollution is interrupted concentration but no effect on health.	56.8	37.3	2.4	0.5	3.0	5	64.5	34.3	1.2	0.0	0.0	5
9. Noise pollution prevention is function of everybody.	68.7	23.2	4.3	2.7	1.1	5	73.2	18.2	5.3	2.5	0.8	5
10. Waste disposal is the only function of municipal officials.	48.0	46.1	2.7	1.9	1.3	5	53.1	44.1	2.8	0.0	0.0	5
11. In present, there are many patients from the environment, must solve environmental problems.	65.3	32.3	0.5	1.1	0.8	5	69.2	27.1	1.7	1.2	0.8	5
12. People should use chemical fertilizer for more productivity.	10.7	49.0	31.2	8.8	0.3	4	16.0	47.5	26.5	9.5	0.5	4
13. In present, in Thailand, environmental pollution is not the crisis problems, are not necessary to solve them.	54.6	36.5	3.2	2.9	2.8	5	59.6	34.3	1.7	2.2	2.2	5

Table 11 (Continued)

Environmental attitudes	Environmental attitude scores											
	Pre-test						Post-test					
	5	4	3	2	1	Mode	5	4	3	2	1	Mode
14. Natural resources conservation will remain inheritance for posterity.	54.7	42.4	1.1	1.3	0.5	5	64.8	33.2	1.2	0.0	0.8	5
15. Simple life-style is one method of natural resources conservation.	12.3	50.9	32.3	4.5	0.0	4	27.6	46.5	21.4	4.5	0.0	4
16. Everyone should participate in preserving natural resources.	92.5	6.7	0.5	0.0	0.3	5	92.2	7.5	0.3	0.0	0.0	5
17. Environmental education can educate from kindergarten to university.	57.3	39.2	1.1	2.4	0.0	5	65.4	30.7	3.4	0.5	0.0	5
18. Nurses able to be leaders in environmental problem solving.	26.7	61.1	10.1	2.1	0.0	4	31.8	56.4	9.8	2.0	0.0	4
19. Environment law is the best tool to solve environmental problems.	0.7	14.7	44.3	32.8	7.5	3	1.4	14.8	41.9	32.4	9.5	3
20. Environmental problems are important so environmental education should set in the national education plan.	37.6	56.8	3.5	1.3	0.8	4	54.8	43.2	1.7	0.0	0.3	5

Table 11 (Continued)

Environmental attitudes	Environmental attitude scores											
	Pre-test						Post-test					
	5	4	3	2	1	Mode	5	4	3	2	1	Mode
21. Environmental conservation is the obstacle in developing the countries.	37.0	43.5	10.4	5.6	3.5	4	33.8	40.5	12.9	8.1	4.7	4
22. Should train and educate people to aware of the environmental values.	78.4	21.3	0.3	0.0	0.0	5	79.9	19.8	0.0	0.3	0.0	5
23. Public relation is one method of promotion the natural resources conservation.	37.1	59.7	2.7	0.5	0.0	4	45.8	50.9	3.0	0.3	0.0	4
24. The best natural resources conservation is no using any natural resources at all.	22.9	57.9	14.9	2.4	1.9	4	21.5	62.3	10.1	3.4	2.7	4

Note: To score the level of environmental attitudes, the rating scales for this part was on the continuum of 1 to 5 as follows:

	<u>Positive</u>	<u>Negative</u>
Strongly agree	5 scores	1 score
Agree	4 scores	2 scores
Uncertain	3 scores	3 scores
Disagree	2 scores	4 scores
Strongly disagree	1 score	5 scores

## **2.5 Problems and Recommendations of Environmental Study Course Management by the Nursing Students**

### **2.5.1 Input factors.**

#### **2.5.1.1 Teachers.**

##### **Problems.**

- Teachers lacked of teaching skills.
- Teachers did not teach an update knowledge.
- Teachers came late.
- Many teachers did not co-operate with each other so there were problems about dividing topics. Teachers taught the same contents and the teaching was not continuous.

- Lacked of teachers.
- Teachers were guest speakers from other agencies so there were problems about difficult to co-operate, gag of interaction between teachers and students, and students were shied to ask questions.

##### **Recommendations.**

- Teachers should improve teaching technique for example: preparing before teaching, interesting presentation, clear explanation, showed some examples, strengthen teaching and speaking more slowly.

- The college should consider and screen good guest speakers and there was a teacher of nursing college in team teaching also.

- Teachers should provide an update knowledge.

- Guest speakers should have time following the study hour; should make class in learning time and punctuality.

- Teachers should co-operate with each other to divide topics clearly and did not teach the same contents.

- Increasing more teachers.

#### 2.5.1.2 Students.

##### Problems.

- Students lacked of basic knowledge about the environment.

- Students lacked of perception and interesting in environmental information.

- Students wrote slowly and did not understand what teacher taught.

- Students did not intend in class because the teachers taught only lecture, there were no other learning and teaching activities .

- Students studied hard and practiced in patient departments so they were tired, bored, stress and restless. They were sleepy in class and had not enough time to search more environmental knowledge.

- There were a lot of students so everyone did not participate in teaching activities.

##### Recommendations.

- Students should pay attention in class, ask more questions and do more self-study.

- Students should be always interested in environmental information from varied media.

- Teachers should divide students into small group

including theory class, outdoor education and field trips.

- There were various teaching activities so that the students were not bored and sleepy.

#### 2.5.1.3 Teaching materials.

##### Problems.

- Lacked of teaching materials.
- Teaching materials were not update.
- Teaching materials were low quality such as small letter, picture and sound were not clear.

##### Recommendations.

- Increasing various, update and amount of teaching materials. The teaching materials which students needs were videos, textbooks, journals, films, slide presentations and handout.

- Improvement quality of teaching materials.
- There should have video player in classroom and in dormitory for students watching in free time.

- Teachers should give handout for each topic so that the students could study before and after class.

#### 2.5.1.4 Classroom, college surrounding and place of field trips.

##### Problems.

- Small classroom was not suitable for a lot of students and for doing activities.

- Classroom surrounding did not help the teaching and learning atmosphere as it was feel hot, dirty, untidy and loudly.

- The place of field-trips was not enough and not diversity.

**Recommendations.**

- Should learn in a large room or a meeting room.
- There should be outdoor education to change the learning and teaching atmosphere; students were not bored.
- Improvement classroom surrounding to help the teaching and learning atmosphere.
- Improvement college surrounding to nature with growing trees and providing many chairs under trees and building areas.
- Increasing the places for field-trips.

**2.5.1.5 Budgets.**

**Problems.**

- College had not much money for field-trips and for buying teaching materials.
- There were no sponsor from other agencies.
- The budget for field-trip was paid lately, students must pay in advance.

**Recommendations.**

- Increasing budget for field-trip and for buying teaching materials.
- Asking for a sponsor from other agencies.
- Teacher should plan the field-trip project in advance in order to get money more quickly or spare other money for this; students should not

pay in advance.

### 2.5.2 Process factor.

#### 2.5.2.1 Course coordination.

##### Problems.

- Learning and teaching did not follow the schedule so guest speakers had to make class.

- There were no time for students to self-study.

- This course offered in summer session, it was a short time and was not enough time for doing activities.

- Setting class in the afternoon, students were sleepy and not concentrated because they were fatigue from learning half a day in the morning.

- Studying in a long time, students were bored.

##### Recommendations.

- Learning and teaching should follow the schedule, if changing should inform students in advance.

- Extending more learning time.

- Management time for students to self-study.

- Should learn 1-2 subjects in a day, did not learn many consecutive hours and should study this course in the morning.

- Management time for field-trips.

#### 2.5.2.2 Teaching methodology.

##### Problems.

- Not varied, most of them was the lecture; there were

not outdoor education or field trips.

- There were many contents.
- Teachers used unsuitable visual aids for example:

small letter, unclear.

- Teachers used only transparency, not varied materials.
- There was not enough time for doing activities and for

field trips.

- There were not enough time for watching video in

class.

- Students were not active participation in learning and

teaching activities.

#### Recommendations.

- Theory partner should have various activities such as: discussion, problem solving, self-study, games or walk rally.

- Should set practice partner more than theory partner as field-trips, studying at real place, camping, doing environmental activities or projects because the practice made students to be awareness and consciousness in environment better than the theory.

- Teachers should use various visual aids as video, slide presentations, films or handout.

- Teachers should allow students to be active participation, discussion, presentation, environmental problem solving in their local and doing activities or projects of environmental conservation .

- Teachers should stimulate students, more close up for

increasing the learning and teaching atmosphere.

- Increasing time for field-trips.
- Should write transparency with bigger letters or printing-letter; and change it more slowly.

- Increasing time for watching video and slide in class time or watching it in free time.

- Teachers should manage teaching time, how many times for lecture, watching video or for other activities.

#### 2.5.2.3 Measurement and evaluation.

##### Problems.

- The criteria were not clear.
- The measurement was evaluated knowledge level more than analysis level and evaluated only theory so it couldn't evaluate attitudes and practices at all.

- Teachers told the examination results very late.

- Students were not active participation in evaluation.

- There was a few time of examination.

##### Recommendations.

- Should evaluate practice more than theory, focused on the analysis and synthesis skills.

- Should have formative evaluation.

- Should have clear criteria and method of evaluation.

- Should inform the evaluation results more quickly.

- Should allow students to participate in evaluation.

### Part 3 The Results of Hypotheses Testing

3.1 The post-test scores of the nursing students' knowledge were higher than those of the pre-test. (Table 12)

The researcher analyzed the scores of the nursing students' environmental knowledge found that: pre-test Mean = 20.75, standard deviation (S.D) = 3.20; post-test Mean = 23.01, standard deviation (S.D) = 3.67.

The different of Mean of pre-test and post-test was 2.26, the result of comparison the different of statistic tested by Paired t-test 11.59, significance level = .000. This showed that the post-test scores of the nursing students' knowledge were higher than those of the pre-test.

Table 12 The results of the knowledge scores pre-test and post-test of the nursing students.

Test	Number (N)	Mean	Standard deviation (S.D.)	P
Pre-test	358	20.75	3.20	.000***
Post-test	358	23.01	3.67	t = 11.59

\*\*\*P < .000

3.2 The readiness of environmental study course management was correlated with the scores of the nursing students' knowledge. (Table 13)

From Table 13, 89.9% of all students had medium knowledge about the environment and 10.1% had high knowledge. For the medium readiness college, 96.7% of all students had medium knowledge and 3.3% had high knowledge. The high readiness college, 67.5% of all students had medium knowledge and 32.5% had high knowledge. By using the assumption of chi-square test was 60.34, degree of

freedom was 1 and significance level was .000. This showed that the readiness of environmental study course management was correlated with the scores of the nursing students' knowledge.

Table 13 The relationships between the readiness of the college in environmental study course management and the scores of environmental knowledge.

The readiness of the college	The scores of environmental knowledge		Total
	Medium	High	
Medium	266 (96.7)	9 (3.3)	275 (100.0)
High	56 (67.5)	27 (32.5)	83 (100.0)
Total	322 (89.9)	36 (10.1)	358 (100.0)

Chi- Square = 60.34

Degree of Freedom = 1

Significance = .000

3.3 The process of environmental study course management was correlated with the scores of the nursing students' knowledge. (Table 14)

From Table 14, the relationships between the process of environmental study course management and the score of environmental knowledge found that: The process of environmental study course management was correlated with the scores of the nursing students' knowledge.

Table 14 The relationships between the process of environmental study course management and the scores of environmental knowledge.

The process	The scores of environmental knowledge		Total
	Medium	High	
Medium	266 (96.7)	9 (3.3)	275 (100.0)
High	56 (67.5)	27 (32.5)	83 (100.0)
Total	322 (89.9)	36 (10.1)	358 (100.0)

Chi- Square = 60.34

Degree of Freedom = 1

Significance = .000

3.4 The post-test scores of the nursing students' attitude were higher than those of the pre-test. (Table 15)

The researcher analyzed the scores of the nursing students' environmental attitude found that: pre-test Mean = 102.54, standard deviation (S.D) = 5.65; post-test Mean = 103.66, standard deviation (S.D) = 6.09.

The different of Mean of pre-test and post-test was 1.12, the result of comparison the different of statistic tested by Paired t-test 3.50, in significance .001 level. This showed that the post-test scores of the nursing students' attitude were higher than those of the pre-test.

Table 15 The results of the pre-test and post-test scores of the nursing students' attitude.

Test	Number (N)	Mean	Standard deviation (S.D.)	P
Pre-test	358	102.54	5.65	.001***
Post-test	358	103.66	6.09	t = 3.50

\*\*\*P < .001

3.5 The readiness of environmental study course management was correlated with the scores of the nursing students' attitude. (Table 16)

From Table 16, 64.2% of all students had medium attitude about environment, 19.6% had low attitude and 16.2% had high attitude. For the medium readiness college, 65.8% of all students had medium attitude, 21.5% had low attitude and 12.7% had high attitude. The high readiness college, 59.0% of all students had medium attitude, 13.3% had low attitude and 27.7% had high attitude, more than the medium readiness college.

By using the assumption of chi-square test was 11.49, degree of freedom was 2 and significance level was .003. This showed that the readiness of

environmental study course management was correlated with the scores of the nursing students' attitude.

**Table 16** The relationships between the readiness of the college in environmental study course management and the scores of environmental attitude.

The readiness of the college	The scores of environmental attitude			Total
	Low	Medium	High	
Medium	59 (21.5)	181 (65.8)	35 (12.7)	275 (100.0)
High	11 (13.3)	49 (59.0)	23 (27.7)	83 (100.0)
Total	70 (19.6)	230 (64.2)	58 (16.2)	358 (100.0)

Chi- Square = 11.49

Degree of Freedom = 2

Significance = .003

3.6 The process of environmental study course management was correlated with the scores of the nursing students' attitude. (Table 17)

From Table 17, the relationships between the process of environmental study course management and the scores of environmental attitude found that: the process of environmental study course management was correlated with the scores of the nursing students' attitude.

**Table 17** The relationships between the process of environmental study course management and the scores of environmental attitude.

The process	The scales of environmental attitude			Total
	Low	Medium	High	
Medium	59 (21.5)	181 (65.8)	35 (12.7)	275 (100.0)
High	11 (13.3)	49 (59.0)	23 (27.7)	83 (100.0)
Total	70 (19.6)	230 (64.2)	58 (16.2)	358 (100.0)

Chi- Square = 11.49

Degree of Freedom = 2

Significance = .003

## **Part 4 The Results from the Teachers**

### **4.1 The Characteristics of the Teachers (Table 18)**

4.1.1 Institute: Boromrajachonani, Nursing College, Chonburi, Trang, Saraburi, and Udonthani were two (2) of the teachers from each college.

4.1.2 Sex: There were female equal to male.

4.1.3 Ages: Five (5) of the teachers were aged between 25-32, two (2) of the teachers were aged between 41-48 and one teacher was aged between 33-40.

4.1.4 The responsibility: Four (4) of the teachers were teachers, three (3) of the teachers were course coordinators and one teacher was both a teacher and a course coordinator.

4.1.5 Office: Four (4) of the teachers were working at nursing college, two (2) of the teachers were working at the Provincial Public Health Office, one teacher was working at Sirindhorn Public Health College, and the last one was working in the hospital.

4.1.6 Position: Three (3) of the teachers were the professional nurses, two (2) of the teachers were the teachers, one teacher was the specialist in public health, one teacher was the public health officer, and one teacher was the specialist in sanitation.

4.1.7 Education: Six (6) of the teachers graduated master degree, two (2) of the teachers graduated bachelor degree.

4.1.8 Major: Three (3) of the teachers graduated in nursing, three (3) of the teachers graduated in environment, one teacher graduated in social development, and another one graduated in social science and humanities.

4.1.9 Experience in taking training courses about the environment:

Five (5) of the teachers had this experience but three (3) of the teachers had not at all.

4.1.10 Experience in teaching about the environment: Four (4) of the

teachers used to teach 1-5 years and one teacher taught 6-10 years.

4.1.11 Experience in environmental study course coordination in

nursing college: Two (2) of the teachers had experience 4 years, one teacher had 2 years and one teacher had 1 year.

4.1.12 Experience in teaching the environmental study course in

nursing college: Two (2) of the teachers had 3 years, two (2) of the teachers had 2 years experience and one teacher had 4 years.

4.1.13 The number of teaching class: Each teacher had the hours of

teaching differently as 8,10,12,16, and the most was 30 hours.

Table 18 Number of the teachers classified by the characteristics

The characteristics	Numbers of the teachers
<b>1. Institution (N=8)</b>	
Boromrajachonani Nursing College, Chonburi	2
Boromrajachonani Nursing College, Trang	2
Boromrajachonani Nursing College, Saraburi	2
Boromrajachonani Nursing College, Udornthani	2
Total	8
<b>2. Sex (N=8)</b>	
Male	4
Female	4
Total	8
<b>3. Age (N=8)</b>	
25-32 Years	5
33-40 years	1
41-48 years	2
Total	8

Table 18 (Continued)

The characteristics	Numbers of the teachers
<b>4. The responsibility (N=8)</b>	
Course coordinator	3
Teacher	4
Both a Course coordinator and a Teacher	1
<b>5. Office (N=8)</b>	
Nursing college	4
Sirindhorn Public Health College	1
Provincial Public Health Office	2
Hospital	1
Total	8
<b>6. Position (N=8)</b>	
Teacher	2
Professional nurse	3
Specialist in Public health	1
Community public health officer	1
Specialist in Sanitation	1
Total	8
<b>7. Education (N=8)</b>	
Bachelor Degree	2
Master Degree	6
Total	8
<b>8. Major (N=8)</b>	
Nursing	3
Environment	3
Social development	1
Social and humanities	1
Total	8
<b>9. Experience in taking training courses about the environment (N=8)</b>	
Yes	5
None	3
Total	8
<b>10. Experience in teaching about the environment (N=5)</b>	
1-5 years	4
6-10 years	1
Total	5
<b>11. Experience in environmental study course coordination in nursing college (N=4)</b>	
1 year	1
2 years	1
4 years	2
Total	4

Table 18 (Continued)

The characteristics	Numbers of the teachers
12. Experience in teaching the environmental study course in nursing college (N=5)	
2 years	2
3 years	2
4 years	1
Total	5
13. The number of teaching class (N=5)	
8 hours	1
10 hours	1
12 hours	1
16 hours	1
30 hours	1
Total	5

#### 4.2 Context Evaluation by the Teachers (Table 19)

Context evaluation by interviews teachers, the researcher determined the topics to evaluate including the evaluation of the importance of environmental study course and the evaluation of course objectives, course contents and study hour. The results of analyzed were shown in Table 19.

##### 4.2.1 The importance of environmental study course.

4.2.1.1 Nursing students should study the environmental study course in the nursing science programme: All of the teachers agreed that nursing students should study this course because it was the basic subject that everyone had to know especially they could apply to solve the health problem of people. Moreover, it made they were aware of the environment.

4.2.1.2 This should be a mandatory subject: All of the teachers agreed that this course should be a mandatory subject because the policy of Thai government provided setting the environmental education all levels, all schools for all

students having the basic knowledge and being aware of the environmental values. From this reason, nursing students should study it because the environment was affected health. And if this course was a selected subject, nursing students might not select because they might think that it was not directly related to the professional nursing.

4.2.1.3 Suitable credits: Five (5) of the teachers agreed that 2 credits were enough because it was suitable with contents and teaching methodologies. And in nursing curriculum, the content about environment was integrated in other subjects as community health nursing subject. Moreover, students used to study in secondary school.

However, three (3) of the teachers agreed that 2 credits were not enough because the environmental study course was important, related to both individual and their career so they should realize in its importance as well as other subjects. And if added more credits, nursing students would pay more interest and also realize in its importance. Moreover, there was a long time for students to aware of the environment. If added more credits, teachers would have enough time to set outdoor education or field trips. From these reasons, three (3) of the teachers suggested that this course should be 3 credits; and two (2) of the teachers suggested to add 1 credit for practice also.

#### 4.2.2 The evaluation of environmental study course syllabus.

##### 4.2.2.1 The course objectives:

A) The course objectives were stated with the curriculum objectives: All of the teachers agreed that they were stated with the curriculum objectives. The curriculum objective provided that nursing students had to

know about the relationship between man and environment for solving health problems of population. The teachers mentioned that after studying this course, nursing students would be able to apply knowledge in a career.

B) The course objectives were stated with the current problems: Seven (7) of the teachers agreed that they were stated with the current problems, one teacher agreed that this should be improve to be update.

4.2.2.2 The course contents: Seven (7) of the teachers agreed that they were still not suitable because they were not covered the content related to the professional nursing; not update; the topics were not clear; in Chapter 2 duplicated to the topic of sanitation in the community health nursing subject; and the contents were not related to the course title. One teacher agreed that these contents were suitable already because this course was offered in the first year; not difficult; focused on the knowledge, memory and application level; not analysis level.

Moreover, they wanted to emphasize at health and professional nursing; add content about environmental quality improvement, environmental education process, education for people to be awareness and ethics on the environment, the roles of nurses on environment and natural resource management, state of current environment, local environment and community life-style, forest, wildlife, marine; and wanted to improve the Chapter as follows:

Chapter 1 General knowledge about the environment.

Chapter 2 The roles of nurses on the environmental quality surveillance and improvement.

Chapter 3 Management of environment and natural resource

## 4.2.2.3 Study hour:

A) The number of study hour was suitable with the course contents: Six (6) of the teachers agreed that it was suitable. Two (2) of the teachers agreed that it was not suitable. The suggestions about this were showed that: One teacher suggested to add more time in Chapter 2, another teacher agreed that should decrease time from 12 hours to 10 hours in chapter 2 and should increase time in chapter 3 from 12 to 14 hours.

B) The number of study hour was suitable with teaching methodology: Five (5) of the teachers agreed that it was not enough because teachers could set only lectures, could not set other methodologies such as outdoor education or field-trips. They suggested adding more time for practice 1 credit or not should have at least one practice activity as outdoor education or field trips.

Table 19 Number of the teachers classified by the opinions on the context of the environmental study course

Topics	Number of the teachers		Total
	Agree/ Appropriate	Disagree/ Inappropriate	
1. Nursing students should study environmental study course in nursing science programme.	8	0	8
2. This course should be a mandatory subject.	8	0	8
3. This course should be 2 credits.	5	3	8
4. Course objectives were stated with curriculum objectives.	8	0	8
5. Course objectives were stated with current problems.	7	1	8
6. Course content.	1	7	8
7. The number of study hour was suitable with the contents.	6	2	8
8. The number of study hour was suitable with teaching methodology.	3	5	8

### 4.3 Input Evaluation by the Teachers

As a whole, two (2) of the teachers evaluated that Boromrajachonani, Nursing College, Chonburi had readiness at high level, two (2) of the teachers evaluated that Boromrajachonani, Nursing College, Trang had no readiness at all. One teacher evaluated that Boromrajachonani, Nursing College, Udonnathani had readiness at moderate level and another evaluated that it was at high level. One teacher evaluated that Boromrajachonani, Nursing College, Saraburi had readiness at moderate level and another evaluated that it was at low level. (Table 20)

Table 20 Number of the teachers classified by the opinions on the level of the readiness of the colleges.

Boromrajachonani, Nursing College	Number of the teachers				Total
	None	Low	Moderate	High	
Chonburi	0	0	0	2	2
Trang	2	0	0	0	2
Saraburi	0	1	1	0	2
Udonnathani	0	0	1	1	2
Total	2	1	1	3	8

The details about input evaluation including the teachers, students, teaching materials, classroom, college surrounding, place of field trips and the budgets showed that:

#### 4.3.1 Teachers

4.3.1.1 Number of teachers: Generally every college had at least one teacher to be environmental study course coordinator who was in general education department or in community health nursing department; but there were

difference in number of teachers in each college (Table 21). Two colleges had six teachers, one college had two teachers and another had only one teacher. The evaluation about adequate of teacher found that: Three colleges had enough teachers, only one college was not enough. However, that college planned to invite two guest speakers in the next academic year.

Table 21 Number of the teachers in the sampled nursing colleges

Boromrajachonani, Nursing College	Numbers of the teachers
Chonburi	6
Trang	1
Saraburi	6
Udonthani	2
<b>Total</b>	<b>15</b>

4.3.1.2 Education of teachers: 15 teachers graduated master degree and 12 of them graduated in environment major, and each in economic, social science and humanity, and public policy. (Table 22)

Table 22 Number of the teachers classified by the major education

Major education	Numbers of the teachers
Environment	12
Economic	1
Social science and humanity	1
Public Policy	1
<b>Total</b>	<b>15</b>

#### 4.3.2 Students

Students evaluation, the researcher provided to evaluate in these topics: Basic knowledge of students before studying this course, intention of students in studying this course, participation in environmental activities, and number of the students; these results found that:

4.3.2.1 Basic knowledge of students before studying the environmental study course: Five (5) of the teachers evaluated that the students had basic knowledge about environment at low level because Chapter 2 and Chapter 3 were more difficult contents, especially environmental laws students had not at all. Moreover, they were the first year students so they still lacked of the concept of the environment. However, two (2) of the teachers evaluated that they had basic knowledge at moderate level, and only one teacher evaluated that the students had basic knowledge at high level.

4.3.1.4 Intention of students in studying environmental study course: Four (4) of the teachers found that students were interested in asking any questions and were active participating in environmental activities so they evaluated that students had much intention in studying this course because it was not a serious subject and was a good atmosphere class. Three (3) of the teachers found that students asked less questions and were not interested in environmental information so they evaluated that students had medium intention in studying this course because it was not serious and not difficult subject. Only one teacher evaluated that they had low intention in studying because nursing curriculum students must study many subjects so they had to pay more attention in nursing subjects than general basic subjects.

4.3.1.5 Participation in environmental activities: Five (5) of the teachers evaluated that 100% of students were interested in participation in environmental activities. Two (2) of the teachers evaluated that students were interested in participation in environmental activities at moderate level. One teacher evaluated that the students were interested in participation in environmental activities at low level because they studied very hard, not enough time to do it.

4.3.1.6 Number of students: Six (6) of the teachers evaluated that there were too many students. Four (4) of the teachers suggested to have 50 students per class, two (2) of the teachers suggested to have 50-70 students per class. However, two (2) of the teachers evaluated that there were suitable number of students.

Table 23 Number of the teachers classified by their opinions on the readiness of the students

Topics	Level of readiness				Total
	None	Low	Moderate	High	
1. Basic knowledge of students before studying this course.	0	5	2	1	8
2. Intention of students in studying this course.	0	1	3	4	8
3. Participation in environmental activities.	0	1	2	5	8
4. Number of the students	0	6	0	2	8
Total	0	13	7	11	24

#### 4.3.2 Teaching materials (Table 24)

The visual aids which teachers used as follows: Transparency, slide presentation, video, folder, handout, picture, real place and water quality analysis equipment. These teaching materials, nursing college did not prepare, guest speakers had to take them by themselves. These results showed that:

4.3.2.1 The quantity of teaching materials: Six (6) of the teachers evaluated that the teaching materials were not enough for searching but two (2) of the teachers evaluated that they were enough for searching.

4.3.2.2 The quality of teaching materials: Five (5) of the teachers evaluated that they had high quality, two (2) of the teachers evaluated that they had low quality and one teacher evaluated that they had medium quality.

4.3.2.3 The update of teaching materials: Five (5) of the teachers evaluated that they were updated but three (3) of the teachers evaluated that they were not updated.

4.3.2.4 The textbooks, journals and research books in the library: Five (5) of the teachers evaluated that they were not enough for searching and were not updated. Three (3) of the teachers evaluated that they were enough for searching and were updated already. However, they were only in Thai language, none of English.

4.3.2.5 Teaching materials which teachers needs: Should increase the number of journals both Thai and English, research, V.D.O, slide, textbooks and CAI.

**Table 24** Number of the teachers classified by their opinions on the readiness of teaching materials.

Topics	Level of readiness			Total
	Enough/ High	Medium	Not enough/ Low	
1. The quantity of teaching materials.	2	0	6	8
2. The quality of teaching materials.	5	1	2	8
3. The update of teaching materials.	5	0	3	8
4. The textbooks, journals and research books in the library.	5	0	3	8

#### 4.3.3 Classroom, college surrounding and place of field trips.

4.3.3.1 Classroom: All of the teachers evaluated that it was enough but it was a small size, not suitable for a lot of students.

4.3.3.2 The classroom surrounding: Seven (7) of the teachers evaluated that it was good surrounding but one teacher evaluated that it was not good.

4.3.3.3 The college surrounding: Seven (7) of the teachers evaluated that it was good surrounding but one teacher evaluated that it was not good.

4.3.3.4 Place of field-trips and outdoor education: Only Boromrajachonani, Nursing College, Chonburi had field-trip, the teachers evaluated that they were suitable for studying. Moreover, Boromrajachonani, Nursing College, Saraburi had outdoor education at Pa Sak River where teachers evaluated that it was suitable for studying.

#### 4.3.4 Budgets

4.3.4.1 Budgets for field-trips: Most of colleges did not receive

budget for field trips. Only Boromrajachonani, Nursing College, Chonburi received the budget but still not enough.

4.3.4.2 Budgets for buying teaching materials: Two (2) colleges teachers did not request to buy them. Only one college where the director supported well but another the director supported a little money.

4.3.4.3 Budgets from other organizations: Every college never received the money from other organizations except the materials, lecturer and trees.

#### **4.4 The Process Evaluation**

##### **4.4.1 Course coordination**

4.4.1.1 Planed the programme of study: Every college had at least one teacher, course coordinator, who managed everything and co-operated between students and guest speakers. This course offered during summer session, there were 3 hours class per week, totally 9 weeks. This was a short term effected to both students and teachers like that: Teachers had to teach in hurry; students had not enough time to study; and evaluated in the short time also.

4.4.1.2 The management of the schedule in order to allow students to have time for self-study: Every college did not set time for student to self-study because there was not enough time, but students could self-study in the period of meeting their advisors and the period of library, this time was about 2-3 hours per week.

4.4.1.3 Inviting guest speakers: Three (3) colleges invited guest speakers from outside 100%. Only Boromrajachonani, Nursing College, Chonburi where a teacher joined in team teaching also.

#### 4.4.2 Teaching methodology

Each college had different teaching methodology, (Table 25). The methodologies every college used were as follows: Lecture, discussion, paper report and presentation, and self-study. Two (2) colleges used outdoor education. Moreover, some colleges were lab in water quality analysis, the project of controlling and get rid of mosquito, and field trips. Exhibition was not using in any colleges at all.

Table 25 Number of the colleges classified by the teaching methodology

Teaching Methodology	Number of the colleges		Total
	Have	None	
1. Lecture	4	0	4
2. Discussion	4	0	4
3. Paper report and presentation	4	0	4
4. Project	1	3	4
5. Field-trip	1	3	4
6. Outdoor education	2	2	4
7. Lab	1	3	4
8. Self-study	4	0	4
9. Exhibition	0	0	0

##### 4.4.2.1 Participation of students in teaching methodology:

Three (3) colleges allowed students to participate in methodology in selection where place of field trips. Only one college did not allow students.

##### 4.4.2.2 Teachers allowed students to present the environment

project: Three (3) colleges did not allow students because the teacher agreed that they were the first year students, low experience, not enough time, and they had to practice in the patient departments. Only one college allowed students.

#### 4.4.3 Measurement and evaluation

4.4.3.1 The methods of measurement and evaluation: Every college used the examination, three (3) colleges also used the paper report and presentation, and one college used project and presentation also. Discussion and exhibition that provided in course syllabus did not use at all (Table 26).

Table 26 Number of the colleges classified by the methods of measurement and evaluation.

The methods of measurement and evaluation	Use	Not use	Total
1. Examination	4	0	4
2. Paper report and presentation	3	1	4
3. Project and presentation	1	3	4
4. Discussion	0	0	0
5. Exhibition	0	0	0

4.4.3.2 The criteria of scoring: The scoring was followed the methods of measurement and evaluation like that the examination 60%-95% and 5%-40% from paper report, project, and presentation, (Table 27).

Table 27 Number of the colleges classified by the criteria of scoring

The methods of measurement and evaluation	The criteria of scoring			
	Cholburi	Trang	Saraburi	Udonthani
1. Examination	60.0	80.0	90.0	95.0
2. Paper report and presentation	40.0	20.0	0.0	5.0
3. Project and presentation	0.0	0.0	10.0	0.0
Total	100.0	100.0	100.0	100.0

#### 4.4.3.3 Grading: Every college used the same grading system.

There were 8 levels of grading by changing to normalized T-score following the provision of the evaluation of Praboromarajchanok Institute, Ministry of Public Health and used the grading programme computer.

4.4.3.4 The covering of the objectives of measurement and evaluation, (Table 28): Most of colleges covered only two domains as cognitive domain and affective domain. Only one college that covered including three domains as cognitive domain, affective domain and psychomotor domain. Evaluation of cognitive domain used examination; affective domain used observation in class without scoring. And psychomotor domain evaluation used project with 10% of all scores.

Table 28 Number of the colleges classified by the covering of the objectives of measurement and evaluation

The objectives of the measurement and evaluation	Numbers of the college		Total
	Use	Not use	
1. Cognitive domain	4	0	4
2. Affective domain	4	0	4
3. Psychomotor domain	1	3	4

4.4.3.5 Allowed students to evaluate themselves: Two (2) colleges allowed students to evaluate themselves for development without scoring. The others did not allow them to evaluate themselves because the teacher agreed that there was not enough time.

## **4.5 Problems and Recommendations in Environmental Study Course Management by the Teachers**

### **4.5.1 Input factors**

#### **4.5.1.1 Teachers**

##### **Problems.**

- Lacked of teachers and no nursing teachers who graduated in the environment major taught this course. Most of teachers were the specialist in sanitation so nursing students did not perceive knowledge about the environment related to professional nursing when they graduated they couldn't apply in a career.

##### **Recommendations**

- Increasing more teachers and should have a teacher at nursing college also.

#### **4.5.1.2 Students**

##### **Problem.**

- Too many students.

##### **Recommendation**

- Decreasing number of students to 50 students per class.

#### **4.5.1.3 Teaching materials**

##### **Problem**

- Lacked of teaching materials.

##### **Recommendation**

- Increasing more teaching materials.

#### 4.5.1.4 Classroom, college surrounding and place of field trips

##### Problem

- The college surrounding did not help in learning and teaching this course, not nature and not clean.

##### Recommendation

- Improvement the college surrounding by having a garden for relaxant.

#### 4.5.1.5 Budgets

##### Problem

- Lacked of budgets for field trips and outdoor education.

##### Recommendation

- Should manage the suitable budgets for field trips and outdoor education.

#### 4.5.2 Process factors

##### 4.5.2.1 Course coordination

##### Problems

- Course coordinator had not enough time to attend the class so she did not know the real students' problems.

- Guest speakers had lived far from the nursing college so they came late.

- Guest speakers had their own jobs so they had not enough time to teach this course and did not follow the schedule.

#### Recommendations

- Guest speakers should be active participation in course management.
- Should have a teacher from the nursing college in team teaching.
- Should manage time for students to self-study.

#### 4.5.2.2 Teaching methodology

##### Problems

- There was not enough time to set lab or field trips.
- Teachers couldn't set up the field trips because the nursing college had no budget.

##### Recommendations

- Should set up the field trips for students had direct experience.
- Guest speakers and teachers in nursing college should join with each other in planning the lesson plan and the evaluation.
- Should study about the local environment and local wisdom because the environmental problems in each area were different.

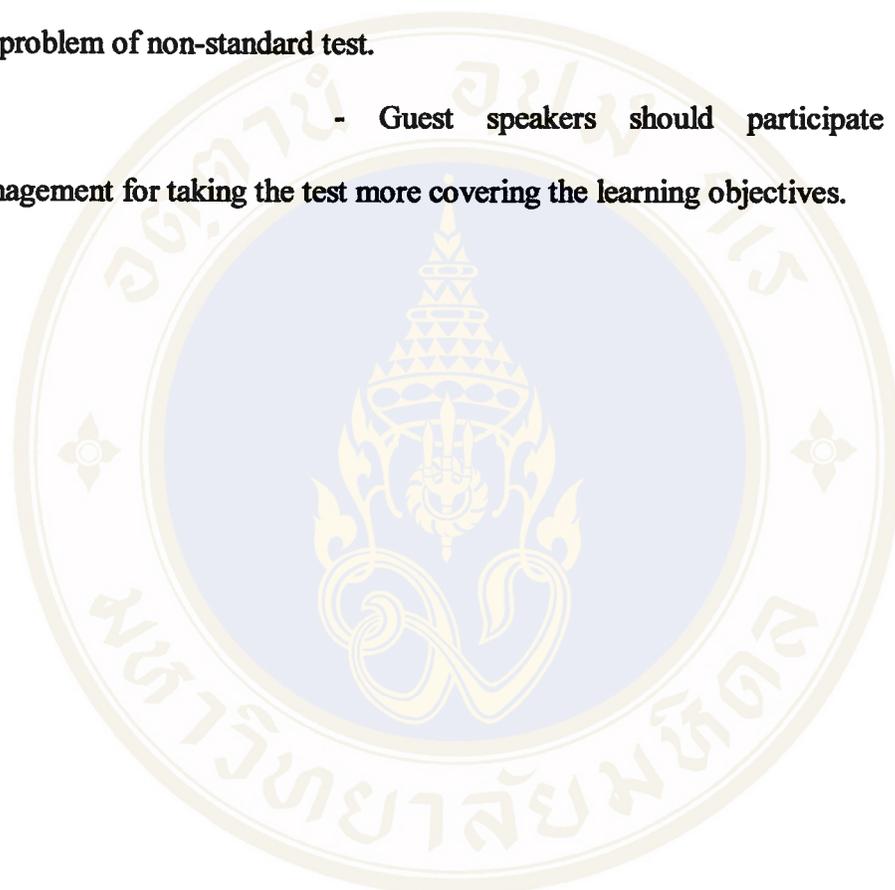
#### 4.5.2.3 Measurement and evaluation

##### Problems

- Guest speakers had not enough time to take some tests.
- The test by guest speakers was not up to standard because most of it was only knowledge level.

**Recommendations**

- Should give guest speakers enough time for taking the test.
- Should use the system of the bank of tests for solving the problem of non-standard test.
- Guest speakers should participate in course management for taking the test more covering the learning objectives.



## **CHAPTER V**

### **DISCUSSION**

The results of the evaluation of environmental study course management of the nursing science programme, Ministry of Public Health had some interesting issues that should be discussed as follows:

1. **Context evaluation**
  - 1.1 **Evaluation of the importance of environmental study course**
  - 1.2 **Evaluation of the environmental study course syllabus**
2. **Input evaluation**
  - 2.1 **Teachers**
  - 2.2 **Students**
  - 2.3 **Teaching materials**
  - 2.4 **Classrooms, college surrounding and place of field trips**
  - 2.5 **Budgets**
3. **Process evaluation**
  - 3.1 **Course coordination**
  - 3.2 **Teaching methodology**
  - 3.3 **Measurement and evaluation**
4. **Product evaluation**
5. **Hypotheses testing**

## **1. Context Evaluation**

For context evaluation, researcher determined the topics in this discussion as follows: Evaluation of the importance of environmental study course in the nursing science programme and evaluation of the environmental study course syllabus by the following details listed below:

### **1.1 Evaluation of the Importance of Environmental Study Course**

1.1.1 From the research result, it was found that both experts and teachers agreed that the environmental study course was important for nursing students to study and should be incorporated in the nursing science programme. This coincided with the findings of the research work by Adisornsakunvong, P. (1994: 85-87), which found that the majority of the teachers and students had ideas about environmental study that enabled them to solve the problems in many cases. This was also the reason why teachers and administrators proposed to organize a programme of study about the environmental study in the nursing science programme. To provide the students with knowledge, awareness, and participation in the responsibility of protection and preservation the environment. Nursing students could apply this knowledge for using in daily life and in nursing career for solving health problems because the environmental problems also had effects to health.

1.1.2 Regarding the characteristics of the learning and teaching of the environmental study course; analysis of data revealed that both experts and teachers agreed that this course should be a mandatory subject with 2 credits and taught only in theory while the teaching methodology was added practice also, according to research by Suntarotoak, S. (1972: 70) which was found that teachers and students in the Rajabhat Institute Chandrakasem agreed that the environmental science subject was a

mandatory subject in their programme because it was quite useful and appropriate. But from the research of Adisornsakunvong, P. (1994: 85-87), found that teachers and administrators of the Nursing Colleges Division agreed that it should be inserted in others related subject because the existing curriculum, the number of credits taken by students were enough and if this subject was a mandatory subject, there could be some problems. However, they agreed that this subject, if included, had to be taken for 2 credits.

In addition, students needed to practice also because if not then they might solve the environmental problems and they did not need any credits.

The number of study hour in the curriculum, the experts and teachers agreed that the estimated time was not appropriate so that it should be improve to suit with the contents and teaching methodology time required for the practice.

## **1.2 Evaluations of the Environmental Study Course Syllabus**

The experts evaluated that every topic of the course syllabus was relevant in a moderate level and the experts suggested to add more topics in order to made it more suitable to the nursing career; For example, dioxin substance, global warming, El Ni No phenomenon. Emphasized on the topic about pollution more than that one about the natural resource conservation and considered to decrease some contents those duplicated to other subjects in the nursing science programme. Rattanathusnee, T. (1989: 57) mentioned that the highest goal of environmental curriculum was to expect a higher quality in human life; ability to choose the best way to continue with a happy life by means of a behavior in which natural resource conservation was considered important.

For this reason the environmental curriculum should be plan and the contents determined to suit with the actual society and be able to solve environmental problems. The curriculum would be done well if it suits the goals and objectives and suits with the state of each institution, local and country. Therefore, a complete process of research was done. Information had to be approached and analyzed as well.

1.2.1 Course title: The majority of the experts agreed that it was incorrect but they had different opinions about the change of this course title so that it had to be observed carefully.

1.2.2 Course description: All of the experts agreed that the Environmental Study Course description was suitable and had relevance to the nursing career and the majority agreed that its course description was clear. One expert mentioned that the course description was not clear yet and she suggested an adaptation “the environmental quality analysis” be “determination of the environmental quality standard”. Moreover, the course description was not clear yet due to the course description determined “the environmental quality analysis” but it could not meet the course objectives and the teaching methodology should not develop in labs so that the course description should be develop clearer.

1.2.3 Course objectives: The experts agreed that these course objectives were correct, clear, covered course contents and appropriate to the nursing career. Both teachers and experts agreed that the course objectives were stated with the curriculum objectives and the current problems. These were good quality of course objectives. They also were suitable to the basic of education, actual society and the learner needs. They encouraged quality of learner and helped preserving of

value, culture and traditions. They were also clear and flexible (Uthranont, S., 1985: 222-223). However, the objectives of environmental education were to help people and society to be aware, knowledgeable, attitudes, skills, evaluation ability and participation (UNESCO, 1976. In Veeravatnanond, V. & Sripanpong, B., 1996: 27-28). From this reason, the researcher agreed that this course objectives were not complete yet in the part of awareness and attitudes so that these objectives should be added.

Moreover, researcher agreed that these objectives were not stated with the course description, they were not complete yet in the part of environmental quality control and surveillance, and environmental quality analysis that should be improved.

1.2.4 Course Contents: The experts agreed that the language was clear, they were suitable to the course objectives and were in an appropriate arrangement, except that if the contents change, the arrangement of the course should be change also. Almost all of the teachers agreed that the contents were not appropriate yet and they should be change to emphasize the topics about health and relationships between the environment and nursing career. For example consciousness about the environmental problems; apart from that also was suggested to give additional contents to the determination of environmental quality standard. Considered all the natural resources.

Chapter 1 General knowledge about the environment.

Chapter 2 Roles of nurse in the environmental quality  
preservation and surveillance.

Chapter 3 Environment and natural resources management.

It implied that the contents about the environment plan were contained in Chapter 3, topic “Law of environmental health” changed to “Environmental laws”

When determining the contents of the environmental education it was difficult to determine them certainly. Each country had to determine them according to the country’s necessities but contents should be emphasize including concepts, skills and practice (UNESCO, 1980:7). Stapp (1981: 59-62) mentioned that environmental education should teach to emphasize in students’ thinking about five concepts which were: ecology, population, economy and technology, environmental decision making and environmental ethics.

1.2.5 Teaching methodology: Almost all of the experts agreed that the teaching methodology was suitable to course objectives and course contents but they suggested to cut some lectures and to plan more methodologies in the seminars, small groups teaching, experimental learning such as: camps and analysis the environment in communities or schools. Schwarb (1983: 8 – 12) studied about a quality teaching methodology of environmental education, the results found that environmental education teaching must allow students to participate in the treatment of environment. There must use a lot of teaching methodologies which were concluded as follows:

- Outdoor education for students would have direct experience.
- Role-play and situations teaching were to allow students to present their opinions and practice in making decisions.
- Problem solving teaching was to enable students to decide and solve problems.

- Value-clarification teaching was to train students developing their values in environmental quality preservation and conservation.
- Lecture was to explain the theory.
- Discussion was to enable students for brain storming and present their opinions.

1.2.6 Teaching materials: The experts agreed that they were suitable to the course, enough and easy to be acquirable by teachers and colleges. Modernity was considered because the experts evaluated that they were in the modern and not in modern equally. Moreover, the experts suggested to add the real-things and the real situation. The experts suggested to cut transparency and water quality analysis equipment but the researcher agreed that these were necessary and important for teaching so they remained.

1.2.7 Textbooks: The majority of the experts agreed that the textbooks were in accordance with the course but still were not enough and not updated, there should add the books "Environmental Education by Chunkao, K.", the related acts, public participation, consciousness of environment, the new books that were edited after year 1997 and other environmental journals. The experts agreed that these books and the books written in the course syllabus could buy or search by the colleges.

1.2.8 Measurement and evaluation: More than a half of the experts agreed that it was in accordance with the course objectives, course contents and teaching methodology while the covering of cognitive domain, affective domain and psychomotor domain were evaluated by the experts found that they were covered and not covered equally and they suggested to add more psychomotor domain evaluation.

The measurement and evaluation of environmental education were considered from the objectives of environmental education, there were three domains including cognitive domain, affective domain and psychomotor domain so that must evaluate all three domains. It could not evaluate only one domain (Sukhothai Thammathirat Open University, 1987: 820).

## **2. Input Evaluation**

Input Evaluation or Readiness of the College in Environmental Study Course management including: the teachers, students, teaching materials, classroom, college surrounding, place of field trips and the budgets did the analysis in this area. The results of the evaluation led to discuss about each of the following points:

2.1 Teachers were found that all of factors were at high level as follows: Teachers' qualifications were appropriate to the contents, teachers had knowledge, abilities and experiences in environmental education, teachers paid attention in course, teachers had skills in fluent teaching, accuracy in course content, lectured modern knowledge and be good model in the environment. These were important factors that affected to make more efficient teaching as the research result of Wotruba and Wright (Wotruba and Wright, 1975: 653-661) found that the factors affected to make more efficient teaching were for instance had a broad and accurate knowledge about the environment point and was able to explain it clearly, active, helped to make good relationships among the students group, encouraged students' thinking by examples, helped students to be confidence, to be lively in teaching, help students both inside and outside, and evaluated fairly.

However, the number of teachers that was evaluated by students found

that it was at moderate level. From interviews teachers found that most of the nursing colleges had not nursing teachers to teach environmental study course. There was one college from four colleges that inadequate teachers according to the research result of Adisornsakunvong, P. (1994: 78) found that if the environmental study course was a new subject in the nursing science programme, most problems were found as lacking of teachers who had knowledge and ability about the environment. Moreover from the report results of the nursing colleges supervision (Nursing Colleges Division, 1990: 7) found that the first important problem of nursing colleges administration was lack of teachers.

In addition, it was according to the research result of Chakreyawat, S. (1993:114) which was found that the number of teachers in general basic division was not appropriate to the course opened. Although many colleges tried to solve this problem by inviting guest speakers from other agencies but some colleges there were still this problem. Therefore, the course coordinator in a hurry solved this problem. Furthermore, the result found that the inviting of guest speakers from other agencies had some problems such as the lecturers lived far away from the colleges and it was difficult to get there, they came late in class, they had other extra works so that their time did not switch with the schedule. To invite many teachers without cooperation sometimes the teachers taught the same contents or did not teach continue each others, so the guest speakers and the course coordinators should cooperate in doing a learning plan and solve this problem also. In addition, the nursing colleges should give an opportunity to nursing teachers who were interested in the environment to train in the environment or the environmental education programme in order to help in teaching this course, it made teaching more efficient. According to the research

result of Adisornsakunvong, P. (1994: 81), from the suggestions about the teachers, the teachers agreed that both teachers and administrators should go to seminars, train or conference about the environment in order to increase their knowledge. Because it maybe get few benefits if invited guest speakers from outside.

2.2 Students: The majority of the students factors were at moderate level as follows: They had basic knowledge about the environment before studying it, they were interested in knowing the course description and objectives before studying it; and they were interested also in knowing news about environment and they used to do environmental activities before. However, from interviews teachers, found that students had a little basic knowledge about environment maybe because the contents in chapter 2 and 3 were over difficult to understand especially the environmental laws. Moreover, most of the students only learnt in class, did not used to get training or camping in environment before, therefore students were lacked of environmental concepts.

The factors that teachers and students evaluated that they were at high level as students were active participation in doing environmental activities and studying the course. This was in accordance with Chakreyawat, S. (1993: 114), the research result about students factor found that the interest in learning, skill to learn in nursing curriculum and their attitude toward learning and teaching in nursing curriculum were at high appropriate level. Students were an important part of teaching system so they were paid attention from teachers since start to end of studying. In other word, in the step of objectives setting teachers must know basic knowledge of learner and consider that how students change behavior, does it change to accord with course objectives or not. The time teachers had given students was

also important for the study since it was used to determine the appropriate objectives, contents and groups of learners related to knowledge and ability. Teachers knew that what group wanted to help specially. Accordingly, Veeravatnanond, V. & Sripanpong, B. (1996: 111) mentioned that environmental education teaching achieved the objectives if the teachers thought students were important to choose teaching approach.

Moreover, teachers and students evaluated that there were too many students in a class so that they could not properly use the teaching methodology and the teachers were also unable to take care of them, therefore number of the students should be decrease.

2.3 Teaching materials: All of the teaching materials factors were appropriate at a moderate level and from the interviews teachers found additional information. The nursing colleges had not enough teaching materials and the guest speakers had to look for it by themselves accordingly with the research result of Adisornsakunvong, P. (1994: 118-125), found that the principal barrier was the lack of documents and textbooks about this course.

According to the research result of Chakreyawat, S. (1993: 118-125), found that equipment was not enough; this should be change soon because the equipment was an important instrument of teaching for teachers to make more efficient teaching. Moreover, Chinatrakul, R. (1997: 114) mentioned that teachers should use visual aids in the environmental education teaching because visual aids helped students achieved the goals faster and more efficient. They helped students to get direct experience and learn better than the others. From this reason, the colleges should search more teaching materials that related to the students or teachers needs.

2.4 Classroom, college surrounding and place of field trips: Most of the factors of them were appropriate at a moderate level as follows: quantity of classrooms, their appropriateness and their environment. The environment in the college was at high level. The factors were at low level as adequacy and appropriateness of outside. According to the research result of Popattanachai, U. (1994: 82-83), the places were at moderate appropriate level as follows: meeting room was not adequate and appropriate, classroom was hot and the place of training was not appropriate. Moreover, Chakreyawat, S. (1993: 118-125) found that the place of learning or training were not adequate, demonstrate room, visual room and meeting room were little quality and meeting room was not easy to use it so it should be improve in a hurry because environment of college was influent to learning and teaching of this course. Good surrounding was a good model for students, their parents and for communities to use in management their home or communities (Chinatrakul, R., 1997: 117, 120).

However, outdoor education or field trips were important experience for students for the study of environmental education to solve the real problems so should set more methodology like this.

2.5 Budgets: All factors of the budgets were at moderate level except there were a sponsor from other agencies was at the lowest level. From the interviews teachers found that the colleges supported the budgets for the environmental activities and helped only a little buying the materials required. According to the research result of Adisornsakunvong, P. (1994: 78) found that if the nursing college set the environmental study course in the nursing science programme as a mandatory subject or a select subject, there were some problems of course management, the first

problem was lacking teachers and the next one was lacking budgets. However, the environmental study course management had to be outdoor education for students had the direct experience. From this reason, the colleges' administrators should encourage and support some budgets for this activity.

The colleges should receive sponsors from other agencies both government and non government sectors as a resting-place or a lecturer for promoting good relationship and good co-operation in education for helping more efficient course management.

According to Chotekunshorn, T. & Nongmak, J. (1994: 322,387-389) mentioned that the personals, money or materials in the colleges were limited especially the normal budgets from the government which was not enough so that they had to ask for sponsors like private companies or from the community, the economic assistance required to develop those activities that were very important for the environmental study course management.

### **3. Process Evaluation**

It was an analysis about course coordination, teaching methodology and, measurement and evaluation. The results of the process evaluation led to discuss about the following points:

3.1 Course coordination: Most of the factors of course coordination were at high level including; The arrangements of the exams schedule, exams room and exams inspector; planned the programme of study properly and paid attention to set study hour. According to the research result of Chakreyawat, S. (1993: 126-128) found that the process evaluation was at high appropriate level especially setting the

educational plan was correct to criteria of curriculum using; and led to the result of course management evaluation as feedback for improvement the course management. Moreover, all colleges had a teacher who was a course coordinator to manage and co-operate with guest speakers and students so that course management was efficient.

Moreover the factors of course coordination were at moderate level as follows: The teaching following the schedule set before and the management of the schedule in order to allow students to have time for self-study. The teaching did not follow the schedule set in advance so the teachers must make-class. From this result, the course coordinator should co-operate with the teachers to come on time to class and consider the appropriate time for learning and teaching so that the time would be enough to develop the knowledge and learn a lot.

The next one, the schedule was not enough time for students to self-study. From the interviews teachers found that the environmental study course was set 3 hours per week during summer session in the total 9 weeks which was a short time and teachers had to hurry up to teach the course so students did not have time to learn by themselves.

However, the college set the time to go to library and meet their advisors so the students could use this time to self-study.

However, in the schedule management there must be a consideration of course nature to help students were not stress or more tired; there was not the impact of a subject effect to other subjects like the practice subject should match its theory and there were not more two subjects in a day; managed the time for students to self-study; set the subject of theory and calculation in the morning rather than in the

afternoon; and consideration of the convenience of teachers to teach (Wonganutararote, P., 1992: 187).

3.2 The teaching methodology: They were found the appropriateness was at high level and moderate level equally. The factors were at high level including: The teaching methodology encouraged students to love and care the environment; teachers told learning objectives; teachers allowed students to ask questions; the teaching methodology encouraged students' thinking skills; the teaching methodology was associated to the course objectives; learning and teaching process encouraged students to solve environment and health problems. According to the research result of Chakreyawat, S. (1993: 129-133) found that all of the teaching methodologies were at high appropriate level such as: preparation of contents; teaching technique; and teachers allowed students to ask questions.

The teaching methodologies were at moderate level as follows: The teaching methodologies were appropriated to the course contents; the teaching methodologies were associated to the study hour; teachers used materials appropriately; teachers allowed students to participate in the teaching methodologies; teachers allowed students to present the environment projects; and teachers allowed students to self-study. This result conflict to the research result of Chakreyawat, S. (1993: 129-133) found that all of the teaching methodologies were at high appropriate level as follows: The teaching methodologies were associated to the study hour; students were active participation in learning and teaching activities; teachers allowed students to self-study; and teachers used materials appropriately.

From the interviews teachers found that the teaching methodologies that all colleges used were lectures, discussions, students' paper reports and

presentations, and self-study. Half of the samples of colleges set outdoor education. Moreover, the result found that some colleges set lab of water quality analysis, do the project to control and eradicate mosquito, and field trips.

However, Chinatrakul, R. (1997: 94) mentioned that learning achievement depends on the process of teachers' teaching, teachers must try to find methods to produce students to think by themselves, to be active and can solve problems. Teachers should provide the scientific method. And this course should emphasize both theory and practice according to the research result of Adisornsakunvong, P. (1994: 81) found that the suggestion about teaching methodology, teachers agreed that this course should teach both theory and practice like that situation, seminar and exhibition with modern materials. Moreover, they should take students to field trips, camps and participate in the environment projects of NGOs both indoor and outdoor for direct-experience and students could solve the problems by themselves. Therefore, all colleges should set teaching methodology both theory and practice that related to the principles of environmental education.

3.3 The measurement and evaluation: Some of those results were at high level and others were at moderate level. The results that were at high level as follows: measurement and evaluation followed the course objectives; criteria were clear and exact; evaluation covered the course contents; the method of measurement and evaluation was appropriate; teachers told criteria and methods of evaluation to student in advance. According to Chakreyawat, S. (1993: 130-133) found that all factors of measurement and evaluation were at high appropriate level as follows: measurement and evaluation followed the course objectives; scoring; criteria; evaluation covered the course contents and objectives; and tools of evaluation.

The results that were at moderate level as follows: Measurement and evaluation were including cognitive, affective and psychomotor domains. Teachers told students the evaluation results; students were active participation in evaluation; had formative evaluation to response students' achievement.

From interviews teachers found that all of the colleges used examination, paper and presentation for measurement and evaluation. There was only one college used a project and presentation. While discussion and exhibition were not used by any college. Moreover, the measurement and evaluation that colleges used did not cover three domains namely cognitive domain, affective domain and psychomotor domain. Most of the measurement and evaluation covered two domains namely cognitive domain and affective domain. There was only one college covered including three domains. However it needed to be evaluated often to improve the ability of students as shown before, during and after class which would evaluated in knowledge, skills and attitudes (Chinatrakul, R., 1997: 95). The measurement and evaluation of the environmental education should considered including three domains like cognitive, affective and psychomotor domains, and should be evaluated often to improve the ability of students (Sukhothai Thammathirat Open University, 1987: 820).

#### 4. Product evaluation

The product of the course which were evaluated in terms of learning achievement, the post-test scores of the nursing students were higher than those of the pre-test, but the scores of most of the nursing students were at moderate level and sometimes the nursing students answered wrong in the post-test. Because they



studied during summer session that was a short time so they were not enough time to learn and self-study. Moreover the nursing students also had to practice in patient wards at the same time so they were stressed, fatigued and sleepy in class. They were not enough time for rest and self-study. They were the first year nursing students so they could not adjust themselves.

Moreover most of teaching methodologies that teachers used was the lecture while teachers were detailed course contents by only themselves so that it effected to learning achievement of nursing students. From this result it was feedback that how many students achieved the objectives of environmental study course so should improve and develop the environmental study course management more efficiency.

## **5. Hypotheses**

5.1 The post-test scores of the nursing students' knowledge were higher than those of the pre-test.

5.2 The readiness of the environmental study course management was correlated with the scores of the nursing students' knowledge.

5.3 The process of the environmental study course management was correlated with the scores of the nursing students' knowledge.

5.4 The post-test scores of the nursing students' attitude were higher than those of the pre-test.

5.5 The readiness of the environmental study course management was correlated with the scores of the nursing students' attitude.

5.6 The process of environmental study course management was

correlated with the scores of the nursing students' attitude.

Hypothesis 1: The post-test scores of the nursing students' knowledge were higher than those of the pre-test and hypothesis 4: The post-test scores of the nursing students' attitude were higher than those of the pre-test. From the study it was found that the post-test scores of the knowledge and attitude of the nursing students were higher than those of the pre-test, with a high statistical significance. According to Nunthee, S. (1994:110) found that students had higher scores after integrating the environmental study course "The forest resources" in the first year secondary school. This result showed that the environmental study course management was added in the nursing science programme, nursing students had higher environmental knowledge and attitude.

Hypothesis 2: The readiness of the environmental study course management was correlated with the scores of the nursing students' knowledge and hypothesis 5: The readiness of the environmental study course management was correlated with the scores of the nursing students' attitude. From the study it was found that the readiness of the environmental study course management was correlated with the knowledge and attitude of the nursing students, with a high statistical significance. According to Chinatrakul, R. (1998:109) mentioned that in order to achieve the curriculum goals there were many factors needed for course management such as teaching materials, equipment, and enough teachers including the support from every organization. From this reason every college should improve the readiness of course management more appropriately.

Hypothesis 3: The process of the environmental study course management was correlated with the scores of the nursing students' knowledge and

hypothesis 6: The process of the environmental study course management was correlated with the scores of the nursing students' attitude. From this study it was found that the process of the environmental study course management was correlated with the environmental knowledge and attitude of the nursing students, with a high statistical significance. According to Chinatrakul, R. (1998:109) mentioned that the success of curriculum depends on the process of learning and teaching that makes students enthusiastic in learning, thinking, doing and solving problems. Teachers should provide the scientific method. And this course should emphasize both theory and practice. From this reason every college should improve the process of course management more efficiency for good product.

## CHAPTER VI

### CONCLUSIONS AND RECOMMENDATIONS

The purpose of this research was to evaluate the Environmental Study Course management of the Nursing Science Programme based on the CIPP model. The samples for the study comprised 5 experts, 8 teachers, and 375 first year nursing students in Boromrajachonani Nursing College at Chonburi, Trang, Saraburi and Udonthani provinces.

Methods consisted of context evaluation by experts, data were collected from nursing students by questionnaire and structured interviews with teachers to evaluate context, input, and processes of the Environmental Study Course. The researcher constructed the questionnaire for nursing students and pre-tested it for the 45 first year nursing students in Boromrajachonani Nursing College, Ratchaburi province. Data were also collected by the researcher. The statistical methods employed in this study were percentage, mean, standard deviation, paired t-test, Chi-square and content analysis.

#### 6.1 Conclusions

##### 6.1.1 Characteristics of Samples

6.1.1.1 Characteristics of the experts: All of the experts were female. Most of them were between 44-54 years of age and worked at nursing colleges. They held master degrees and had experience in environmental education and/or nursing education. Their present jobs were as follows: Two experts were administrators, one expert taught environmental study course in a nursing college, one expert taught

environmental study course at university and the other was studying for doctoral degree in environmental education.

6.1.1.2 Characteristics of nursing students' sample: Most of them were female and were between 17-19 years of age. They were G.P.A 2.51-3.50; received scholarships from provincial public health department. They were interested in studying nursing at moderate level and chose nursing because it was easy to find a job as a nurse. Most of them had experience in doing environmental activities before taking the Environmental Study Course. Most of them never went to camps or took any courses about the environment.

6.1.1.3 Characteristics of teachers' sample: There was a balance between male and female. Most of them were between 25-32 years of age. The sample comprised 4 teachers, 3 course coordinators, with the exception of one who was both a teacher and a course coordinator. Four were teachers in nursing colleges, four were lecturers from other health organizations. Most of them were registered nurses. There was a balance in their educational background in nursing and in environment fields. Most of them went to take courses on the environment. Most of them had experience in teaching and lecturing about the environment for 1-5 years and 1 teacher had experience in teaching the environmental study course in highest nursing colleges for 4 years. 2 course coordinators had experience in coordination the environmental study course in highest nursing colleges for 4 years.

## **6.1.2 Context Evaluation**

6.1.2.1 The importance of the Environmental Study Course: Both experts and teachers agreed that this subject was important for nursing students to learn and should be a mandatory course in nursing science programme with 2 credits

emphasizing only on theory and practice.

6.1.2.2 Course syllabus evaluation: The experts evaluated that every topic of the course syllabus was relevant in a moderate level such as: incorrect subject title, unclear course description, course objectives were not stated with the course description, the content was not appropriate, textbooks or other materials were not enough and/or modern.

### **6.1.3 Input Evaluation**

6.1.3.1 Readiness of teachers: Teachers were special teachers from other agencies. The students evaluated that the teachers were at high level except the number of them was at moderate level. From the interview teachers found that most colleges had enough teachers, there was only one college that did not have enough teachers. Not all every college had nursing teachers taught so they suggested that they should have nursing teachers in the teaching team also.

6.1.3.2 Readiness of students: The students evaluated that they were at moderate level. However, the high readiness was their intend to study and participate in environmental activities. There were too many students so teachers suggested that there should be 50 students in a class.

6.1.3.3 Readiness of teaching materials: The teaching materials that teachers used in teaching such as transparency, slide presentations, videos, poster, overhead, pictures, etc. Students evaluated that the teaching materials were in a moderate level but the teachers evaluated that the teaching materials were updated and of high quality except for the number which was not enough.

6.1.3.4 Readiness of classrooms, college surrounding and place of field trips: Students evaluated that they were at moderate level. For the low levels

like the places of field trips or outdoor education were not suitable and enough. However, teachers evaluated that the places of field trips were good and suitable.

6.1.3.5 Readiness of budgets: Students evaluated that readiness of budgets was at a moderate level except for the budget from other organizations that was the lowest. From interviewed teachers it was found that most of the colleges did not receive any support from other organizations. Most colleges did not receive budgets for field trips. However, there was only one college that received funds for field trips but it was not enough.

#### **6.1.4 Process Evaluation**

6.1.4.1 The course coordination: Students evaluated that the most of factors of course coordination were at high level such as; the arrangements of the exams schedule, exams room and exams inspector; plan the programme of study properly and pay attention to set learning time. Moreover the appropriateness of the course coordination which was in a moderate level was the teaching following the schedule set before and the management of the schedule in order to allow students to have time for self-study. From interviews teachers it was shown that each college had a course coordinator who managed and coordinated between teachers and students. Moreover, the management of the schedule in order to allow students to have time for self-study, there was not enough time because from the interviews it was found that the environmental study course was set for 3 hours per week during summer session for a of 9 weeks which was a short time and teachers had to hurry through teaching the course so students did not have time for self-study.

However, the college had set some free time for students to use the library and to meet their advisors which time could also be used for self-study. 3 of

4 colleges invited special teachers from outside, 100 %. There was one college that had nursing teacher engaged in team teaching.

6.1.4.2 The teaching methodology: Every college had teaching methodology comprising discussions, lectures, allowing students to do report and make action to present the class, and self-study. Half of them participated in teaching methodology like outdoor education. Moreover, some colleges also had teaching methodology such as water quality analysis, mosquitoes' eradication, and field trips. Students evaluated these teaching methodologies at high level and moderate level equally.

Interviewed teachers showed that most of the colleges allowed students to participate in course management but they did not allow them to present the environment projects; the reason was they were only first year students and lack in experienced, they learnt it in summer session only so they were not enough time, and they must practice in the patient wards. There was only one college that allowed them to present the environment project.

6.1.4.3 The measurement and evaluation: Some of those results were appropriate at a high level and others were at a moderate level. The results of high level were measurement and evaluation following course objectives; criteria were clear and exact. The evaluation covered course contents; the method of measurement and evaluation was appropriate. Teachers told criteria and methods of evaluation to student in advance.

The results that were in a moderate level were: Measurement and evaluation including cognitive, affective and psychomotor domains. Teachers gave evaluation results to students; Students participated in evaluation; to have formative

evaluation in response to students' achievement.

From interviewed teachers it was shown that every college used examinations, reports, projects and presentations to grade the students. While discussions and exhibitions were not used by any college. The highest score was 60-95 % gained by the examinations only and the rest 5-40 % was gained from assignments such as reports, projects and presentations. Moreover, the measurement and evaluation used by colleges did not cover three domains like cognitive, affective and psychomotor. Most of the measurements and evaluations covered two domains only, namely, cognitive and affective. There was only one college which covered all three domains. All colleges were to grade, 8 level, T score, used the computer for grading. Moreover, half of them allowed students to evaluate themselves, to improve themselves, not the score. The others did not allow students to evaluate themselves because there was not enough time and students were not interested.

#### **6.1.5 Product Evaluation**

The product of the course was evaluated in terms of learning achievement. The post-test scores of the nursing students were higher than those of the pre-test, but the scores of the most nursing students were at moderate level.

#### **6.1.6 Hypotheses Testing**

6.1.6.1 The scores of knowledge for post-test were higher than those of the pre-test, with a high statistical significance.

6.1.6.2 The readiness of the Environmental Study Course management was correlated with the environmental knowledge, with a high statistical significance.

6.1.6.3 The process of the Environmental Study Course management was correlated with the environmental knowledge, with a high statistical significance.

6.1.6.4 The scores of attitude post-test were higher than those of the pre-test, with a high statistical significance.

6.1.6.5 The readiness of the Environmental Study Course management was correlated with the environmental attitude, with a high statistical significance.

6.1.6.6 The process of the Environmental Study Course management was correlated with the environmental attitude, with a high statistical significance.

## **6.2 Recommendations from This Study**

- Studies showed that the Environmental Study Course syllabus in nursing science programme was suitable at moderate level; therefore it needs to be improved.
- Studies showed that every college invited lecturers from other health organizations without nursing teachers and the observation of course coordinator. This also affected follow up problems. Because of, special teachers were not in good relationship with students; they came late; did not teach on schedule; only lectured; and test was based more on memory. So the course coordinator had to evaluate the teaching of the invited teachers more than usual by observing them in class, discuss about problems in teaching, or special teachers to participate more in teaching planning.
- Studies showed that the learning achievement of students was at moderate level and some items in post-test showed that the students had lower scores than for the pre-test. So the teachers should encourage students to pay more attention in studying, and be willing to find more information about environment on an on-going basis.

Moreover, the study found that teachers used teacher-centered approach

such as lectures so a student centered teaching method should be developed.

- Studies found that knowledge and attitude about environment were associated to the readiness and process of the Environmental Study Course. Therefore every college should be improved the input factor and suit the teaching process.

### **6.3 Recommendations for Further Research Studies**

- Data collection should be based on classroom observation rather than expert opinion, interview and questionnaire.
- It should evaluate about environmental study course management in nursing science programme by using different evaluation method.
- It should be evaluate environmental study course management in other nursing colleges it belonging to The Thai Red Cross Association or The Ministry of Defense.

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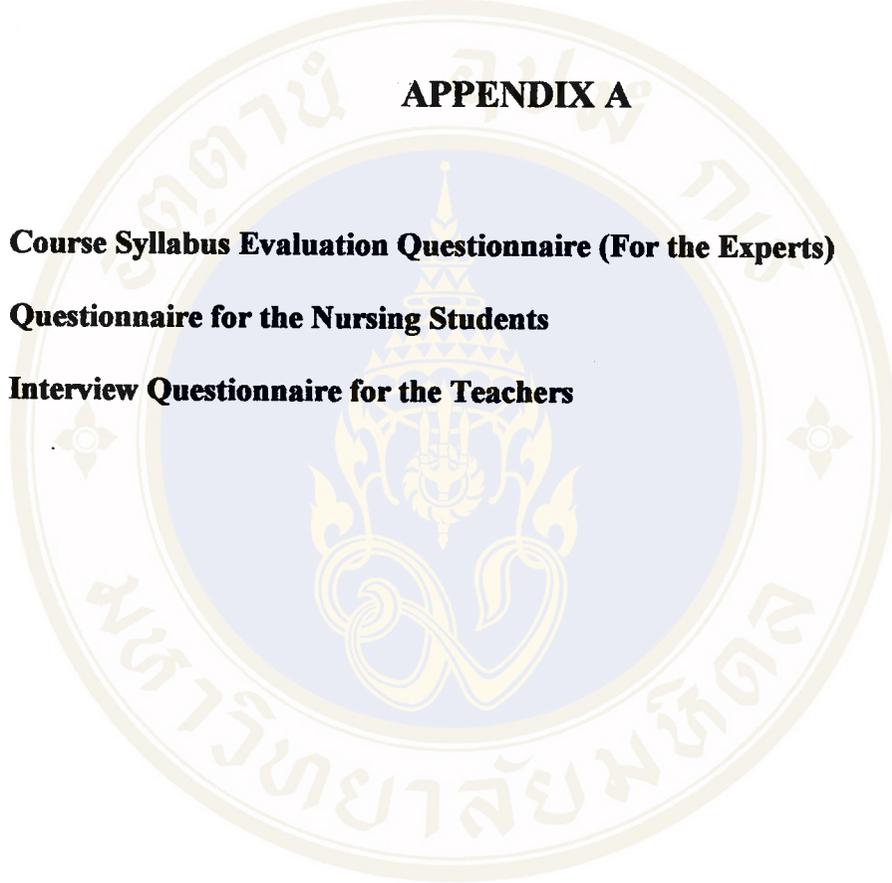
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The background features a large, faint watermark of the Mahidol University logo. It is a circular emblem with a central figure, likely a deity or royal figure, surrounded by Thai script. The text 'มหาวิทยาลัยมหิดล' (Mahidol University) is visible at the bottom of the circle.

**APPENDIX A**

- **Course Syllabus Evaluation Questionnaire (For the Experts)**
- **Questionnaire for the Nursing Students**
- **Interview Questionnaire for the Teachers**

## Course Syllabus Evaluation Questionnaire

(For the Experts)

### Part I Characteristics of the Experts

1. Name.....
2. Age.....years
3. Sex           ( ) Male                           ( ) Female
4. Office .....
- .....
- .....
5. Position .....
- .....
- .....
6. Education.....
- .....
- .....
7. Experience in environmental education and/or nursing education.....
- .....
- .....
8. Present Job.....
- .....
- .....
- .....

**Part II Environmental Study Course Syllabus Evaluation**

1. Would do you agree to learn the Environmental Study Course in the nursing science programme? And why?

- ( ) Yes, because.....
- ( ) No, because.....

2. This course title was “Environmental Study”, is it correct? And what title do you change?

- ( ) Correct
  - ( ) Incorrect
- It should be change.....

3. Environmental Study Course was a mandatory subject, is it appropriate? Why?

- ( ) Appropriate, because.....
  - ( ) Inappropriate, because.....
- And it should be offer.....

4. Credits: 2 (2-0-0)

4.1 Environmental Study Course had 2 credits, is it appropriate? Why?

- ( ) Appropriate, because .....
  - ( ) Inappropriate, because .....
- It should be have..... credits

4.2 This course set theory 2 hours/week/semester, but no lab and practice. Would do you think it should add lab and practice? Why?

- ( ) Only theory, because.....
- ( ) Theory and practice, because.....

How do you set practice?

- ( ) Add practice credits, but total 2 credits.

Add practice credits, add credits, total.....credits.

Do not add practice credits, but teaching methodology should set the environmental education practice or outdoor education at least 1 time.

Others (Please specify).....

Theory and lab, because.....

How do you set it? .....

Theory, lab and practice, because.....

How do you set it? .....

5. The course description is:

Clear  Unclear

How did you improve it?.....

Complete  Uncompleted

How did you improve it?.....

The scope of this course is  Inappropriate

appropriated for nursing. How did you improve it?.....

6. The course objectives:

6.1 Are they correct, clear, complete and state with the course description? What items do you improve?

Correct  Incorrect

What items do you improve?.....

Clear  Unclear

What items do you improve?.....

Complete  Uncompleted

What items do you improve?.....

- State with the course description       Not state

What items do you improve?.....

6.2 Do the course objectives have an appropriate scope for nursing? How do you improve them?

- Appropriate       Inappropriate

What items do you improve?.....

6.3 Are the course objectives state with the curriculum objectives? How do you improve them?

- Yes.       No.

What items do you improve?.....

6.4 Are the course objectives state with the current problems? How do you improve them?

- Yes.       No.

What items do you improve?.....

7. The course contents:

7.1 Are the course contents relevant to the course objectives? How do you improve them?

- Yes.       No.

How do you improve them?.....

7.2 Is the arrangement of course contents appropriate? Is the language clear? And how do you improve them?

- Appropriate arrangement       Inappropriate arrangement

How do you improve them?.....

- Clear language
- Unclear language

How do you improve them?.....

7.3 How do you improve the course contents appropriate for nursing?

What contents do you delete?.....

What contents do you change?.....

What contents do you add?.....

8. Is study hour in this course syllabus suitable with the course contents? How do you improve it?

- Suitable
- Not suitable

What chapter do you agree to decrease study hour ?.....

What chapter do you agree to increase study hour? .....

9. Is study hour in this course syllabus suitable with the teaching methodology?

How do you improve it?

- Suitable
- Not suitable

What chapter do you agree to decrease study hour? .....

What chapter do you agree to increase study hour? .....

10. Does the teaching methodology cover course contents and course objectives?

How do you improve it?

- Yes.
- No.

What teaching methodology do you delete?.....

What teaching methodology do you add?.....

11. Teaching materials:

11.1 Are teaching materials relevant to the course? How do you improve them?

- Yes.
- No.

What teaching materials do you delete?.....

What teaching materials do you add?.....

11.2 Are teaching materials enough and modern? How do you improve them?

- Enough
- Not enough

What teaching materials do you add?.....

- Modern
- Not modern

What teaching materials do you delete?.....

What teaching materials do you add?.....

11.3 Do you think the college or the teachers can buy, find or make them easily?

- Teachers can buy, find or make them easily
- Teachers can buy, find or make them difficulty

What teaching materials do you delete?.....

What teaching materials do you add?.....

- College can buy, find or make them easily
- College can buy, find or make them difficulty

What teaching materials do you delete? .....

What teaching materials do you add?.....

12. The measurement and evaluation:

12.1 Is the measurement and evaluation relevant to the teaching methodology, course contents and course objectives? How do you improve it?

- Yes.
- No.

How do you improve it?.....

12.2 Does the measurement and evaluation cover including cognitive, affective and psychomotor domains? How do you improve it?

Yes.  No.

How do you improve it?.....

13. Textbooks:

13.1 Are textbooks relevant to this course? How do you improve them?

Yes.  No.

What textbooks do you delete?.....

What textbooks do you add?.....

13.2 Are textbooks enough and modern? How do you improve them?

Enough  Not enough

What textbooks do you add?.....

Modern  Not modern

What textbooks do you delete?.....

What textbooks do you add?.....

13.3 Can the colleges or the teachers buy or find the textbooks that you recommend?

Yes.  No.

14. Considering the previous 13 items, how would you rate that every topic of the environmental study course syllabus is relevant? How do you improve them?

Irrelevant  Relevant  
 High  
 Moderate  
 Low

How do you improve this course syllabus? (Please explain).....

.....

.....

## Questionnaire for the Nursing Students

---

**Directions:** This questionnaire is categorized into 4 main parts:

**Part I:** Characteristics of the nursing students

**Part II:** Environmental knowledge test

**Part III:** Environmental attitude test

**Part IV:** Opinions on the environmental study course management

Please answer this questionnaire on the basis of your own experience and judgment and complete every item. Please put a check (/) in the box or fill words or sentences in the blank space of each item. Your responses will be very useful to this study to develop the environmental study course management more efficient.

Thank you all

Researcher



9. Have you ever heard the news or information of environment?

No.             Yes.

10. Have you ever taken training courses or camps about the environment?

No.             Yes.

## Part II Environmental Knowledge Test

**Directions:** Please mark (X) on the best choice.

1. Which of the following is important of the environment to human being?
  - A. It is an origin of human-lives.
  - B. It is the basic factor in living.
  - C. It is a fair property of human.
  - D. It makes relationship among human firmly.
2. Which is the most important cause that makes unbalance of nature?
  - A. Population increasing.
  - B. Reducing forest in Thailand.
  - C. Violation the environmental laws.
  - D. Drainage wasted water and air pollution from industry.
3. Which is not a method to reduce greenhouse effect?
  - A. Reduce the use of hair spray.
  - B. Reduce the use of nitrogen fertilizer.
  - C. Fire the forest for reforestation.
  - D. Use solar energy and wind power.
4. Which is not impact of El Ni No phenomenon?
  - A. The water animals move to new habitat.

- B. The Australian coast was drought.
  - C. The South American coast was monsoon and flood.
  - D. The South East Asia was monsoon and flood.
5. Which is the most extensive activity that affects the environmental change?
- A. Building a large dam.
  - B. Cultivating a mobile plantation in water resources areas.
  - C. Building a large industrial factory.
  - D. Forest destruction in the National Reserved Forest.
6. What happens if people lack knowledge and are unaware of natural resources values?
- A. Environmental pollution
  - B. Lack of natural resources
  - C. Environmental laws
  - D. There are violent social problems.
7. Which policy of environment conservation leads to peaceful society?
- A. Sustainable policy
  - B. ISO 9002 standard policy
  - C. ISO 14000 standard policy
  - D. Integrated-agriculture policy .
8. The Eighth National Socio-Economic Development Plan used a new strategy to manage environment and natural resources. What does a new strategy mean?
- A. Sustainable development
  - B. Public participation
  - C. Appropriate technology

D. Man-centered development

9. Which source causes the most problem of water pollution?
- A. Domestic
  - B. Hospital
  - C. Industry
  - D. Farmland
10. What does student advise people to save water if there are water shortages?
- A. Turn on valve for drop of water into a container in a bedtime.
  - B. Turn on valve while brushing one's teeth.
  - C. Use the calyx of the water lily to pour water in stead of rubber tube.
  - D. Turn on tap water all the time while taking a shower.
11. Which is the activity for saving water?
- A. Washing a car, should fill water into a container and use clothes moisten, then mop a car.
  - B. Washing clothes, should wash by your hands without soaking before washing them.
  - C. Taking a bath, should take a bath in a bathtub saver than take a bath by a bowl.
  - D. Washing vegetables, first you should soak them and then wash them from a valve directly.
12. What does air pollution mean?
- A. Poisonous air.
  - B. There is much foreign body in the air that is danger.
  - C. Air consists of high quantity of gases and dust.
  - D. There are over-limited of carbon dioxide in the air.

13. What does student advise people to reduce air pollution?
- A. Reduce the use of foam, to rectify smog in the atmosphere.
  - B. Growing trees, ozone gases in the atmosphere will increase.
  - C. Install the catalytic converter in their cars, exhaust gases will decrease.
  - D. Use benzene in stead of diesel, carbon dioxide will decrease.
14. Which is the CFC impact?
- A. React to CO<sub>2</sub>, heat power will increase.
  - B. React to CO<sub>2</sub> and fume, smog will increase.
  - C. React to molecule of ozone, make ozone depletion.
  - D. React to nitrogen oxide, ozone will increase.
15. Which kind of industrial factory makes the noisiest problem?
- A. A textile factory.
  - B. A spinning factory.
  - C. A smithy factory.
  - D. Every factory makes noise pollution equally.
16. Which is incorrect about the danger of noise pollution?
- A. A crash noise can cause more dangerous than a continuo noise.
  - B. Noise pollution interrupts concentration and also affects to blood pressure.
  - C. Two persons hear equal noise at the same time, will become the same hearing problems.
  - D. High frequency sound is more dangerous than low frequency sound.
17. Which is the easy and safe method for controlling and prevention noise pollution?

- A. Building room with thick mirror to prevent sound wave.
  - B. Growing evergreen trees.
  - C. Using safeguard to prevent noise pollution while working.
  - D. Building concrete wall parallels the road where is traffic jam.
18. Which is the waste hazardous?
- A. Glass, metal
  - B. Foams, a piece of glass.
  - C. Plastic, a color tins.
  - D. Fluorescent light bulb, dry cell.
19. Which is the most efficient method to dispose of infectious solid waste?
- A. Classify infectious solid waste from other solid waste strictly.
  - B. Classify infectious solid waste from other solid waste and discard into the black bag.
  - C. Collect a lot of infectious solid waste to dispose of them together, for safe time.
  - D. Collect a lot of infectious solid waste and other solid waste to dispose of them together, for safe fuel.
20. Where does student discard cotton wool and gauze after wound dressing?
- A. Rubbish can.
  - B. Black bag.
  - C. Red bag.
  - D. Wound dressing set.
21. What does the environmental quality surveillance mean?
- A. Study EIA before implementing the project.

- B. Analyze the samples when there are environmental problems.
  - C. Analyze the environmental quality changes all the times.
  - D. Analyze the environmental quality changes that may find after implementing the project.
22. Which is the best correct answer?
- A. Insecticide is danger to insects and human.
  - B. Insecticide is danger to insects and various animals.
  - C. Pesticide is danger to every pest.
  - D. Pesticide is danger to every living thing.
23. What does student advise people if their body is contaminated with the pesticide?
- A. Clean with permanganate of potassium suddenly.
  - B. Take him to the hospital suddenly.
  - C. Wash with water suddenly.
  - D. Wash with soap and water suddenly.
24. Does student think that the marine in the Gulf of Thailand remains the pesticide?
- A. No, because the Gulf of Thailand is not the rice crop area.
  - B. Yes, because the wind blows pesticide into the sea.
  - C. No, because marine water is very salty so that it can destroy pesticide's poison.
  - D. Yes, because the various rivers flow into the sea, they also bring the pesticide into the sea.
25. Which is correct about natural resources management?
- A. Natural resources management is a part of conservation.
  - B. Natural resources will lose, if there are not appropriate management.
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- C. Natural resources management should use the principle of the resource using needs.
- D. Management is efficient implementation that consists of finding, preserving, improving and reserving.
26. Who has duty on environment and natural resource conservation?
- A. Private sector.
  - B. Only government.
  - C. Everyone.
  - D. Every sector joins with each other.
27. Which is the objective of environment and natural resource conservation?
- A. To be a stability of ecology.
  - B. To be a balance between producer and consumer.
  - C. To prevent pollution.
  - D. To be a balance between population and natural resources.
28. Which is not a principle of environment and natural resource management?
- A. Safe use of natural resource.
  - B. Wise use of natural resource.
  - C. Preserve and remain the natural resource.
  - D. Search a method to improve the damaged environment.
29. What concept should be used in management of the exhausting natural resources?
- A. Get rid of the contaminated things.
  - B. Save them.
  - C. Use only the increment resources.
  - D. Determine the environmental laws to control in using them.

30. Which concept should be used for managing the renewable natural resources?
- A. Must use only the increment resources.
  - B. The environmental laws have strict violations.
  - C. Control and prevent contaminated things.
  - D. Use quality technology to take them for using.
31. These are guidance of management the environmental problems, which one is incorrect?
- A. Polluter Pays Principle (PPP).
  - B. Set environmental education for all levels and all sectors.
  - C. The Ministry of Public Health determines and uses the environmental laws.
  - D. Environmental problem solving should focus on prevention and public participation.
32. Which activity can student disseminates the environment and natural resources conservation?
- A. Go to the environmental camps that the college set.
  - B. Set the clubs of environment and natural resources conservation.
  - C. Application a member of environmental journal.
  - D. Participate in every environmental activities that the college set.
33. Which is the most dissemination of the environment and natural resources conservation?
- A. Distribute the folders entitled "Problems of lacking of environment and natural resources".
  - B. Broadcast entitled "The method of environment and natural resources

conservation”.

C. Hold a training course entitled “Public participation in environmental problems solving”.

D. Write the essay in newspaper entitled “Awareness of Thais people in environment and natural resources conservation”.

34. Which is correct about environmental education?

A. Environmental education can educate only youth group.

B. Environmental education can educate only formal education.

C. Environmental education is the permanent tool to solve environmental problems.

D. The highest goal of environmental education is to people are aware of environmental values.

35. Which is not rights and function of people to protect the environment?

A. Information perception.

B. Public participation.

C. Providing the environmental laws.

D. Pay money for pollution treatment according to polluter pays principle.

36. Which is the role of people on prevention the pollution?

A. Aware of environmental problems.

B. Do not violate the environmental laws.

C. Reduce the waste from consumption.

D. Research new method to prevent pollution.

37. Which is the role of non-government organizations on prevention pollution?

A. Declare people to save electricity.

- B. Fight against the Thai-Burma gases pipeline project.
  - C. Study the environmental impact assessment (EIA).
  - D. Admit to register non-government organizations of environmental conservation.
38. Which is the most important goal of environmental laws?
- A. Control the degradation of natural resources.
  - B. Control drainage waste products from various industrial factories.
  - C. Encourage and help to develop for better quality of life of population.
  - D. Encourage people to participate in environmental conservation.
39. What does student do if student saw that a distillery discarded the alcoholic production at the roadside of the village and they released foul smelling gases interrupted villagers?
- A. Reports to the Department of Industrial Works to fine that factory.
  - B. Advise villagers to report to the Department of Pollution Control.
  - C. Asks for permission from the leader of the villagers to check its wasted treatment plants.
  - D. Tell the district officials to check it's wasted treatment plants.
40. Which is the characteristic of a responsibility according to the theory of an absolute fault responsibility in the Enhancement and Conservation of National Environmental Quality Act B.E. 2535?
- A. Only a criminal violation.
  - B. There is not an exception of a violation.
  - C. There is not intention to violate, must pays fines for violation.
  - D. Put in force only the degradation of the environment and natural resources.

**Part III: Environmental Attitude Scale**

**Direction:** Please mark / in the only one column on the basis of your own judgment for each question.

Environmental Attitudes	Strongly Agree	Agree	Un certain	Disagree	Strongly disagree
1. The environment is important for human life.	.....	.....	.....	.....	.....
2. Problem solving is the responsibility of countries where are sources of environmental pollution.	.....	.....	.....	.....	.....
3. Man is the cause of environmental problems.	.....	.....	.....	.....	.....
4. Water pollution come from only people who settles home on the riversides.	.....	.....	.....	.....	.....
5. People, who use tap water, don't conserve the water resources.	.....	.....	.....	.....	.....
6. Air pollution finds specific in Bangkok.	.....	.....	.....	.....	.....
7. Air pollution can cause the respiratory tract infection; everyone must solve this problem.	.....	.....	.....	.....	.....
8. Noise pollution is interrupted the concentration but no effect on health.	.....	.....	.....	.....	.....
9. Noise pollution prevention is the function of everybody.	.....	.....	.....	.....	.....
10. Waste disposal is the only function of municipal officials.	.....	.....	.....	.....	.....

Environmental Attitudes	Strongly agree	Agree	Un certain	Disagree	Strongly disagree
11. In present, there are many patients from the environment, must solve the environmental problems.	.....	.....	.....	.....	.....
12. People should use chemical fertilizer for more productivity.	.....	.....	.....	.....	.....
13. In present, in Thailand, environmental pollution is not the crisis problems, are not necessary to solve them.	.....	.....	.....	.....	.....
14. Natural resources conservation will remain inheritance for posterity.	.....	.....	.....	.....	.....
15. Simple life-style is one method of environment and natural resources conservation.	.....	.....	.....	.....	.....
16. Everyone should participate in preserving environment and natural resources.	.....	.....	.....	.....	.....
17. Environmental education can educate from kindergarten to university.	.....	.....	.....	.....	.....
18. Nurses able to be leaders in environmental problem solving.	.....	.....	.....	.....	.....
19. Environmental law is the best tool to solve the environmental problems.	.....	.....	.....	.....	.....
20. Environmental problems are important so environmental education should be set in the national educational plan.	.....	.....	.....	.....	.....
21. Environmental conservation is the obstacle in developing the countries.	.....	.....	.....	.....	.....

Environmental Attitudes	Strongly agree	Agree	Un certain	Disagree	Strongly disagree
22. Should train and educate people to aware of the environmental values.	.....	.....	.....	.....	.....
23. Public relation is one method of promotion the environment and natural resources conservation.	.....	.....	.....	.....	.....
24. The best natural resources conservation is no use any natural resources at all.	.....	.....	.....	.....	.....

#### **Part IV Opinion on the Environmental Study Course Management**

**4.1 Input evaluation or readiness of college in environmental study course management consist of 5 following sections:**

Section I Readiness of teachers

Section II Readiness of students

Section III Readiness of teaching materials

Section IV Readiness of classroom, college surrounding and place of field trips

Section V Readiness of budgets

#### **Section I Readiness of Teachers**

**Directions:** Please evaluate the readiness of teachers each question. You are asked to rate the readiness of teachers on the relative degree or applies this readiness- highest, high, moderate, low, lowest.

Items	Level of Readiness				
	Highest	High	Moderate	Low	Lowest
1. Number of the teachers.	.....	.....	.....	.....	.....
2. Teachers' qualifications were appropriate to the content.	.....	.....	.....	.....	.....
3. Teachers had knowledge, abilities and experiences in environmental education.	.....	.....	.....	.....	.....
4. Teachers paid attention in course.	.....	.....	.....	.....	.....
5. Teachers had good teaching skills.	.....	.....	.....	.....	.....
6. Teachers lectured modern knowledge.	.....	.....	.....	.....	.....
7. Teachers were accurate in content.	.....	.....	.....	.....	.....
8. Teachers were good model in the Environment	.....	.....	.....	.....	.....

Comments:

Problems and obstacles caused by the teachers.....

.....

.....

Recommendations .....

.....

.....

.....

.....

**Section II Readiness of students**

**Directions:** Please evaluate the readiness of students each question. You are asked to rate the readiness of students on the relative degree or applies this readiness- highest, high, moderate, low, lowest.

Items	Level of Readiness				
	Highest	High	Moderate	Low	Lowest
1. Students had basic knowledge about the environment before studying this course.	.....	.....	.....	.....	.....
2. Students paid attention in learning.	.....	.....	.....	.....	.....
3. Students were interested in knowing course objectives and course description before studying it.	.....	.....	.....	.....	.....
4. Students used to do environmental activities.	.....	.....	.....	.....	.....
5. Students were interested in knowing news about the environment.	.....	.....	.....	.....	.....
6. Students were active participation in doing environmental activities.	.....	.....	.....	.....	.....

Comments:

Problems and obstacles caused by the students.....  
 .....

Recommendations.....  
 .....

**Section III Readiness of teaching materials**

**Directions:** Please evaluate the readiness of teaching materials each question.

You are asked to rate the readiness of teaching materials on the relative degree or applies this readiness- highest, high, moderate, low, lowest.

Items	Level of Readiness				
	Highest	High	Moderate	Low	Lowest
1. Teaching materials were enough. (textbooks, videos, films, slide, teachers)	.....	.....	.....	.....	.....
2. Teaching materials were updated. (textbooks, videos, films, slide)	.....	.....	.....	.....	.....
3. Teaching materials were high quality. (textbooks, videos, films, slide)	.....	.....	.....	.....	.....
4. Convenience in using the teaching materials.	.....	.....	.....	.....	.....

What teaching materials did you want any more?.....

.....  
.....

Problems and obstacles in using the teaching materials.....

.....  
.....

Recommendations.....

.....  
.....

**Section IV Readiness of classroom, college surrounding and place of field trips**

**Directions:** Please evaluate this readiness each question. You are asked to rate this readiness on the relative degree or applies this readiness- highest, high, moderate, low, lowest.

Items	Level of Readiness				
	Highest	High	Moderate	Low	Lowest
1. Classrooms were enough.	.....	.....	.....	.....	.....
2. The places of field trips were enough.	.....	.....	.....	.....	.....
3. Classrooms were appropriate.	.....	.....	.....	.....	.....
4. The places of field trips were appropriate.	.....	.....	.....	.....	.....
5. Classroom surrounding					
- Cleanliness	.....	.....	.....	.....	.....
- Neatness	.....	.....	.....	.....	.....
- air ventilation	.....	.....	.....	.....	.....
6. College surrounding (building, canteen, bathroom, Dormitory)					
- Cleanliness	.....	.....	.....	.....	.....
- Nature	.....	.....	.....	.....	.....
- water disposal	.....	.....	.....	.....	.....
- solid waste disposal	.....	.....	.....	.....	.....

Comments:

Problems and obstacles about classroom, college surrounding and place of field trips

.....

.....

Recommendations.....

.....

**Section V Readiness of budgets**

**Directions:** Please evaluate the readiness of budgets each question. You are asked to rate the readiness of budgets on the relative degree or applies this readiness- highest, high, moderate, low, lowest.

Items	Level of Readiness				
	Highest	High	Moderate	Low	Lowest
1. Received budgets from college for environmental activities.	.....	.....	.....	.....	.....
2. Received budgets from other organizations for environmental activities.	.....	.....	.....	.....	.....
3. Received materials (i.e.: trees or grass) from other organizations for environmental activities.	.....	.....	.....	.....	.....
4. Administrator supported budgets for buying teaching materials.	.....	.....	.....	.....	.....

Comments:

Problems and obstacles about budgets.....

.....

.....

Recommendations.....

.....

.....

.....

**4.2 Process evaluation** consisted of 3 sections as follows:

Section I The course coordination

Section II The teaching methodology

Section III The measurement and evaluation

**Section I The course coordination**

**Directions:** Please evaluate the course coordination each question. You are asked to rate the course coordination on the relative degree or applies this appropriateness- highest, high, moderate, low, lowest.

Items	Level of Appropriateness				
	Highest	High	Moderate	Low	Lowest
1. Planed the programme of study properly.	.....	.....	.....	.....	.....
2. Paid attention to set learning time.	.....	.....	.....	.....	.....
3. The teaching followed the schedule set before.	.....	.....	.....	.....	.....
4. The management of the schedule in order to allow students to have time for self-study.	.....	.....	.....	.....	.....
5. The arrangements of the exams schedule, exams room and exams Inspector.	.....	.....	.....	.....	.....

Comments:

Problems and obstacles were caused by the course coordination.....

Recommendations.....

**Section II The teaching methodology**

**Directions:** Please evaluate the teaching methodology each question. You are asked to rate the teaching methodology on the relative degree or applies this appropriateness- highest, high, moderate, low, lowest.

Items	Level of appropriateness				
	Highest	High	Moderate	Low	Lowest
1. Teachers told learning objectives.	.....	.....	.....	.....	.....
2. The teaching methodology was associate to the course objectives.	.....	.....	.....	.....	.....
3. The teaching methodology was associate to the study hour.	.....	.....	.....	.....	.....
4. Teachers allowed students to participate in teaching methodology.	.....	.....	.....	.....	.....
5. Teachers allowed students to present the environment projects.	.....	.....	.....	.....	.....
6. Teachers allowed students to ask questions.	.....	.....	.....	.....	.....
7. Teachers used materials properly and effectively (kind of materials and duration)	.....	.....	.....	.....	.....
8. The teaching methodology was appropriated to the course contents.	.....	.....	.....	.....	.....
9. Teachers allowed students to self-study.	.....	.....	.....	.....	.....
10. The teaching methodology encouraged students to solve the environment and health problems.	.....	.....	.....	.....	.....
11. The teaching methodology encouraged students' thinking skills.	.....	.....	.....	.....	.....
12. The teaching methodology encouraged students to love and care the environment.	.....	.....	.....	.....	.....

Comments:

Problems and obstacles caused by learning and teaching activities .....

.....

Recommendations.....

**Section III The measurement and evaluation**

**Directions:** Please evaluate the measurement and evaluation each question. You are asked to rate the measurement and evaluation on the relative degree or applies this appropriateness- highest, high, moderate, low, lowest.

Items	Level of appropriateness				
	Highest	High	Moderate	Low	Lowest
1. Measurement and evaluation followed the course objectives.	.....	.....	.....	.....	.....
2. Criteria were clear and exact.	.....	.....	.....	.....	.....
3. Teachers told criteria and methods of evaluation to students in advance.	.....	.....	.....	.....	.....
4. Students participated in evaluation.	.....	.....	.....	.....	.....
5. The evaluation covered course contents.	.....	.....	.....	.....	.....
6. To have formative evaluation in response to students' achievement.	.....	.....	.....	.....	.....
7. Teachers gave evaluation results to students.	.....	.....	.....	.....	.....
8. Measurement and evaluation including cognitive, affective and psychomotor domains.	.....	.....	.....	.....	.....
9. The method of measurement and evaluation was appropriate.	.....	.....	.....	.....	.....

Comments:

Problems and obstacles were caused by the measurement and evaluation .....

.....  
 .....  
 .....

Recommendations.....

.....  
 .....  
 .....

## Interview Questionnaire

### (For the Teachers)

**Directions:** Interview questionnaire consist of 4 parts as follows:

Part I: Characteristics of the teachers

Part II: Context evaluation

Part III: Input evaluation

Part IV: Process evaluation

Place of interview.....Date.....Time .....

#### Part I: Characteristics of the Teachers

1. Name.....Surname.....
2. Boromrajachonani, College of Nursing, .....
3. Age.....years
4. Sex                   ( ) Male                   ( ) Female
5. Office .....
6. Position .....
7. Education

( ) Bachelor degree .....

Field .....

Institution .....

Graduated year .....

( ) Master degree.....

Field .....

Institution .....

Graduated year .....

( ) Doctoral degree .....

Field .....

Institution .....

Graduated year .....

8. Experience in taking the environment or environmental education training

- ( ) Curriculum title.....  
 Duration .....  
 Place .....
- ( ) Curriculum title .....  
 Duration .....  
 Place .....
- ( ) Curriculum title .....  
 Duration .....  
 Place .....
- ( ) Curriculum title .....  
 Duration .....  
 Place .....

9. Experience in teaching and lecturing about the environment .....years

10. Experience in teaching the environmental study course or coordination this course  
 in Nursing Science programme .....years

11. Duration that you must taught .....hours

12. What topics did you teach? .....

**Part II: Context Evaluation**

1. Would you agree to learn the Environmental Study Course in the nursing science  
 programme? And why?

- ( ) Yes, because.....
- ( ) No, because.....

2. Environmental Study Course was a mandatory subject, was it appropriate? Why?

- ( ) Appropriate, because.....
- ( ) Inappropriate, because.....

And how did you set it?.....

3. Environmental Study Course had 2 credits, was it appropriate? Why?

- ( ) Appropriate, because .....

Inappropriate, because .....  
It should be ..... credits

4. Were the course objectives state with the curriculum objectives? How should you improve them?

Yes.  No.

What items should you improve?.....

4. Were the course objectives state with the current problems? How should you improve them?

Yes.  No.

What items should you improve?.....

6. Were the course contents appropriate? And how should you improve them?

Yes.  No.

How should you improve them?.....

How should you improve the course contents appropriate for nursing?

What contents should you delete?.....

What contents should you change?.....

What contents should you add?.....

7. Was the study hour in this course syllabus appropriate with the teaching methodology and the contents? How should you improve it?

Yes.  No.

What chapter did you agree to decrease the study hour?.....

What chapter did you agree to increase the study hour?.....

**Part III: Input Evaluation**

1. As a whole, did you think your college had the readiness of the Environmental Study Course management? How much?

Not at all

Have

Low

Moderate

High

*Specific:*

## 1.1 Readiness of teachers

- Number of teachers who were course coordinators.....persons.
- Number of teachers who were lecturers ..... persons, and were they enough? .....

List	Position/Office	Education/ Training course	Experience in working about the environment	The topics that he/she taught
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				

1.2 Readiness of students

- How much did you feel the students had basic knowledge about the environment before studying this course?

- Not at all
- Have
- Low
- Moderate
- High

- How much did you feel the students were interested in this course?

- Not at all, because .....
- Were interested in this course
- Low, because.....
- Moderate, because.....
- High, because.....

- How much did you feel the students were interested in doing the environmental activities?

- Not at all, because .....
- Were interested in doing the environmental activities
- Low, because.....
- Moderate, because.....
- High, because.....

- The number of students in your class was:

- Too large, because .....
- Too small, because .....

The appropriate number of students in a class should be.....students.

1.3 Readiness of teaching materials

- What teaching materials did you use in teaching?.....
- Were teaching materials enough?.....

- How would you rate quality of teaching materials used in this course?  
.....
- Were teaching materials update?.....
- In library, were textbooks, journal, environmental research in Thais and English enough?.....
- What teaching materials did you need any more?.....

**1.4 Readiness of classroom, college surrounding and place of field trips**

- Were classrooms enough?.....
- How would you rate classroom surrounding? (Cleanliness, Neatness, Air ventilation) .....
- How would you rate college surrounding? Were they useful for learning this subject matter? (cleanliness, nature, water disposal, solid waste disposal).....
- Where did you go to field trips?.....
- How suitable were the places where you go to field trips? .....

**1.5 Readiness of budgets**

- Did you receive budgets for environmental activities or outdoor education from your college?  
( ) No, because.....  
( ) Yes, amount.....bath.
- Were the budgets enough?.....
- How did you manage the budgets?.....
- Did your administrator support the budgets for buying the materials of this course?.....

- Did you receive budgets or materials from other organizations? .....

1.6 What were problems and obstacles of the readiness of your college in Environmental Study Course management? (Please explain)

- Not at all
- There were problems and obstacles:

- Teachers.....
- Students .....
- Teaching materials.....
- Classroom, college surrounding and place of field trips.....
- Budgets.....

And how did you improve them?

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....
- 6.....

**Part IV: Process Evaluation**

1. Course coordination:

- How did you plan the programme of study?.....
- Did the teaching follow the course outline?
  - Yes, because.....
  - No, because.....
- Did schedule have any time for students to self study?
  - Yes, because.....
  - No, because.....
- Did your college invite guest speakers from other organizations? What was a proportion?.....

- What were the problems and obstacles about course coordination? And how did you improve them?.....

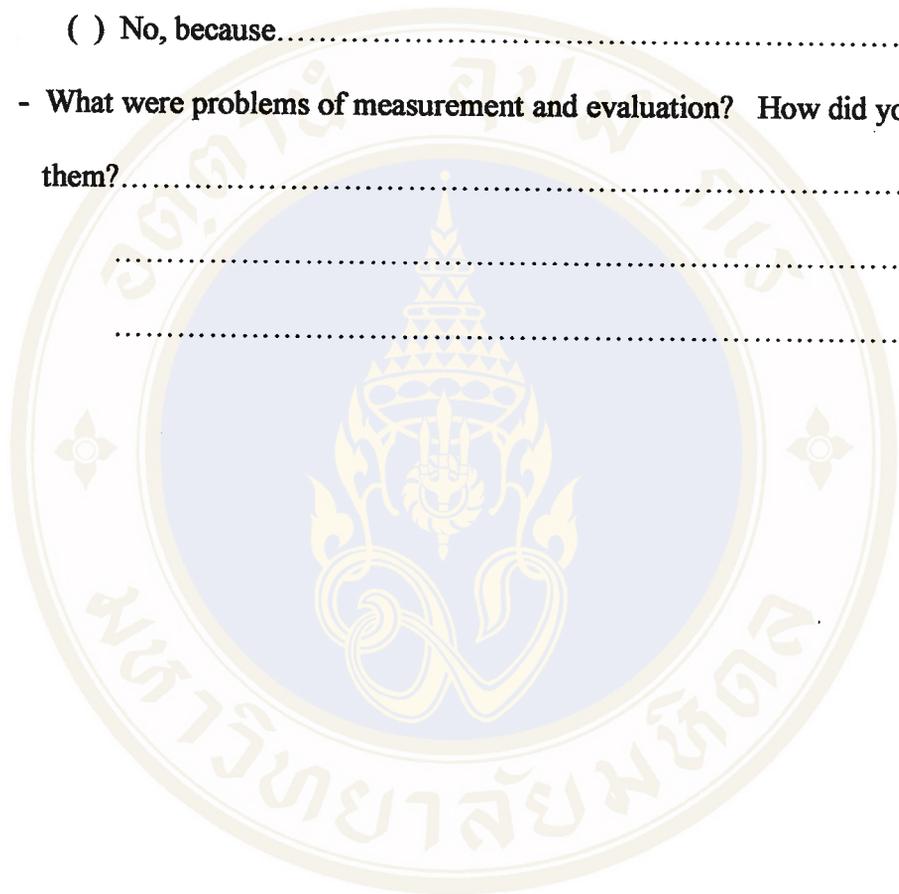
## 2. Teaching methodology:

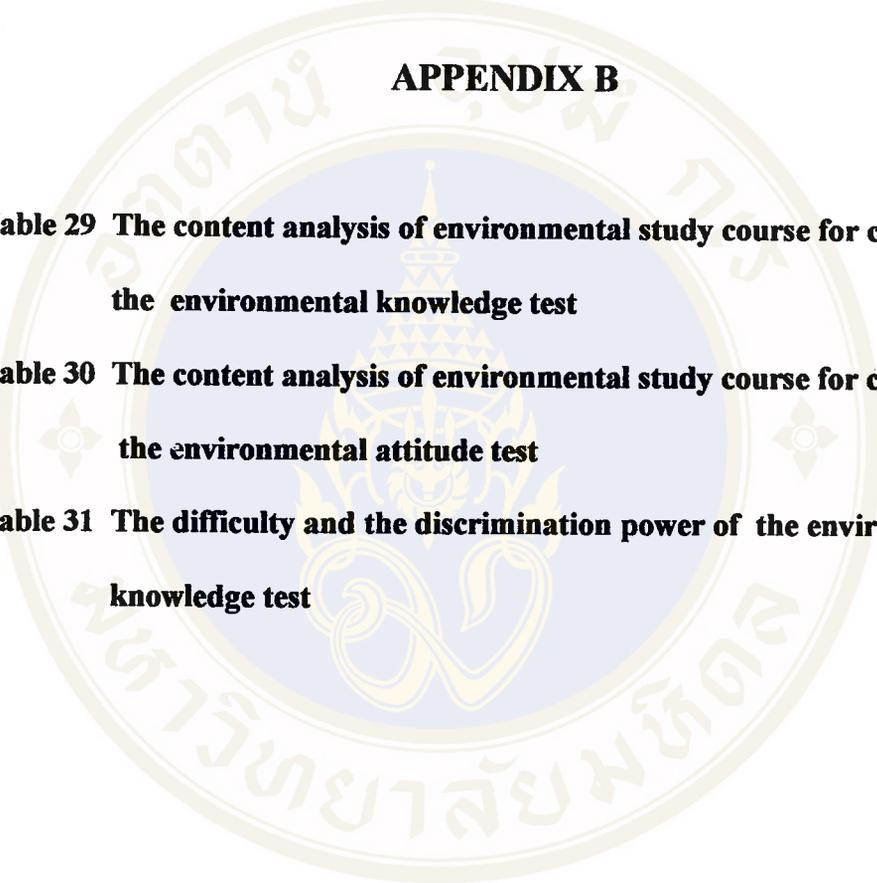
- What teaching methodologies did you teach for this course? (Please explain)
  - ( ) Lecture.....
  - ( ) Discussion.....
  - ( ) Paper report.....
  - ( ) Self study.....
  - ( ) Field trip.....
  - ( ) Problem based learning.....
  - ( ) Others (Specify).....
- Did students participate in teaching methodology?
  - ( ) Yes. (Please explain) .....
  - ( ) No, because.....
- Did you allow students to present the environment projects?
  - ( ) Yes. (Please explain) .....
  - ( ) No, because.....
- What were problems of teaching methodology? How should you improve them?.....

## 3. The measurement and evaluation:

- What methods of measurement and evaluation did you use for this course?  
(Please explain)
  - ( ) Examinations.....
  - ( ) Paper reports and presentations.....
  - ( ) Others (Specify).....
- What domains did the measurement and evaluation cover?
  - ( ) Cognitive domain.....
  - ( ) Affective domain.....
  - ( ) Psychomotor domain.....

- What are criteria of grading?.....
- How is grading system?.....
- Did students participate to evaluate themselves?
  - ( ) Yes. (Please explain) .....
  - ( ) No, because.....
- What were problems of measurement and evaluation? How did you improve them?.....  
.....  
.....





**APPENDIX B**

- **Table 29 The content analysis of environmental study course for construction the environmental knowledge test**
- **Table 30 The content analysis of environmental study course for construction the environmental attitude test**
- **Table 31 The difficulty and the discrimination power of the environmental knowledge test**

Table 29 The content analysis of environmental study course for construction the environmental knowledge test

Contents	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation	Total
<b>Chapter 1: Plan and Policy of the Environment</b>							
1.1 Concepts and the importance of the environment	1						1
1.2 Balance of the environment	1						1
1.3 State of the Thai and global environment	1	1					2
1.4 Relationship between the environment and way of life						1	1
1.5 Factors affecting environmental debasement				1			1
1.6 National plan and policy about the environment	2						2
<b>Chapter 2: Environmental Quality control And Surveillance</b>		1	1	1		1	4
2.1 Water							
2.2 Air		1	1	1			3
2.3 Noise		1	1	1			3
2.4 Solid waste		1	1	1			3
2.5 Pesticide		1	1	1			3

Table 29 (Continued)

Contents	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation	Total
<b>Chapter 3: Roles of individual, community and organization on natural resources and environment conservation</b>							
3.1 Concepts of natural resources and environment conservation	2						2
3.2 Principles of the utilization and management the natural resources and environment		2					2
3.3 Practices of natural resources and environment conservation			2			1	3
3.4 Dissemination of the concepts and practices of natural resources and environment conservation				1	1	1	3
3.5 Roles of individual, community and organization on natural resources conservation and developent the environment				2	1		3
3.6 Law of environmental health		1	2				3
<b>Total</b>	<b>7</b>	<b>9</b>	<b>7</b>	<b>9</b>	<b>2</b>	<b>4</b>	<b>40</b>

**Table 30 The content analysis of environmental study course for construction the environmental attitude test**

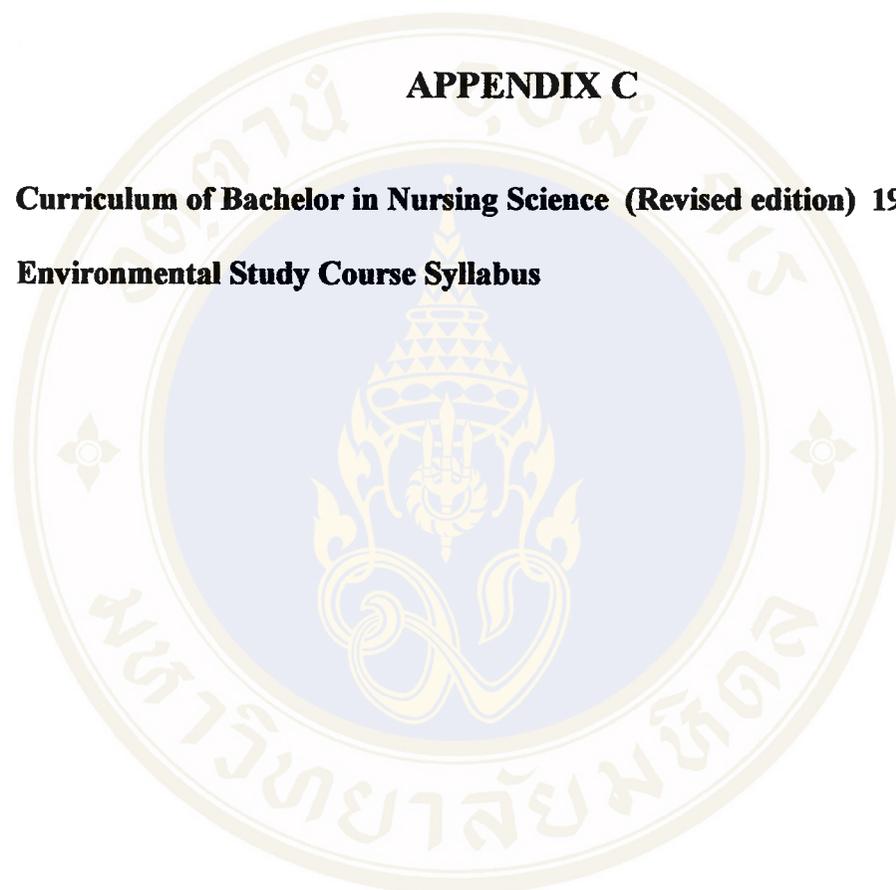
Contents	Attitude		Total of items	Percentage
	Positive	Negative		
Chapter 1:  Plan and Policy about the environment	3	3	6	25.0
Chapter 2:  Environmental quality control and surveillance	3	6	9	37.5
Chapter 3:  Roles of individual, community and organization on natural resources and environment conservation	7	2	9	37.5
<b>Total</b>	<b>13</b>	<b>11</b>	<b>24</b>	<b>100.0</b>

Table 30 The difficulty and the discrimination power of the environmental knowledge test

Items	Difficulty (P)	Discrimination power (r)
1	.71	.25
2	.75	.34
3	.71	.25
4	.38	.41
5	.50	.50
6	.54	.21
7	.21	.50
8	.21	.21
9	.46	.42
10	.67	.33
11	.72	.21
12	.50	.50
13	.50	.22
14	.79	.42
15	.30	.43
16	.33	.25
17	.54	.28
18	.75	.26
19	.54	.42
20	.71	.42
21	.67	.67
22	.77	.25
23	.79	.25
24	.72	.21
25	.73	.21
26	.50	.66
27	.63	.20
28	.73	.21
29	.75	.26
30	.33	.33
31	.33	.25
32	.37	.29
33	.79	.25
34	.41	.83
35	.58	.33
36	.25	.26
37	.29	.28
38	.27	.40
39	.54	.25
40	.33	.25

## APPENDIX C

- **Curriculum of Bachelor in Nursing Science (Revised edition) 1994**
- **Environmental Study Course Syllabus**



## **Curriculum of Bachelor in Nursing Science (Revised edition)1994**

### **Principle and Justification:**

The ultimate goal of the Ministry of Public Health is to promote community self-reliance in health care with the collaboration and support of health personnel. Within the framework of this goal, the community members must be actively involved in their own health care, to enable them to achieve a quality of life. Therefore, the Ministry of Public Health is responsible for the preparation of health personnel of the health team. Such there are enough quantity and quality personnel.

Praboromarajchanok Institute is responsible for the preparation of health personnel of the health teams by the production and development the personnel both at the basic and continues levels. As such, its mandate is the preparation of nursing personnel who are the important personnel of the health team. Praboromarajchanok Institute had taken the educational management with system approach for the training of the nursing personnel both at the professional and the technical levels. Nurses who are practiced in the areas of health promotion, disease prevention and in curative and rehabilitative care. Such practice includes the utilization of community resources and technology appropriate for the condition and circumstances in the community.

To This end, Praboromarajchanok Institute had taken the necessary steps to reorient nurse education programme, as the existing Curriculum of Diploma Programme in Nursing Science has been in use since 1985, it is now deemed appropriate to undertaken a curricular reform in cognizance of the new trends which based on the same curriculum that is community oriented that nurses will be able to

utilize the effective nursing care to meet health needs of individuals, families and communities with their full participation and develop quality of life of population.

**Philosophy:**

Praboromarajchanok Institute, Office of the Permanent Secretary, Ministry of Public Health believes that its primary responsibility is the preparation of nurses who are technically competent, and who possess desirable moral and ethical values for effective practice at all levels of care to meet the needs for nursing service in a constantly changing Thai society.

Man is seen as a biopsychosocial being in constant interaction with the environment, using coping/ adaptive mechanisms to maintain a dynamic state of equilibrium throughout the health-illness continuum. The practice of professional nursing is focused on assisting man to cope with and adjust within the environment where he/ she is functioning, to achieve a level of health which is compatible with a productive life in society.

Health is a dynamic state of well being in which the individual is able to function in an integrated way to develop his/her potential to the extent that he/she is capable to carry on basic life activities and live a satisfying, creative and full life in the community.

Nursing is an essential social service to society, and forms part of any effective health care system. Such service utilizes the nursing process in all aspects of nursing care. Nursing is the application of selected scientific concepts, theories and principles in the provision of nursing care that promotes the health of all individuals. It's primary goal is to assist individuals, families and communities throughout the life

cycle, in developing self-reliance towards the attainment of a level of health and a quality of life that will enable people to participate effectively in the community in which they live.

Nursing is practiced in a variety of settings, at all levels of health care, and requires social, intellectual and technical skills. Nursing is the utilization of principles, theories of nursing science and related science and nursing process in developing self-reliance towards the attainment of the national goal of HFA. Preparation for such practice is best carried out in a teaching-learning atmosphere that provides opportunities for the development of a critical, inquiring mind, sound decision making, leadership skills and the responsibility of continuing learning for continued personal and professional growth.

Learning is an active, continuous and sequential process and takes place more readily, when the learner actively experiences the behavior to be learned and is guided and supported by the teacher and the environment. The graduate will be able to function with knowledge, competency and positive attitudes, embed with the moral and ethical values in living and in nursing practice, continuing personnel developing to the promotion of professional standard and maintenance of good civic in society.

**Educational Goals:**

After the successful completion of the programme, the graduate will be able to function with beginning competency in the practice of professional nursing, at all levels of health care for individuals, families and communities. The graduate will be able to:

1. Respect the value of professional nursing and human rights of all individuals, families and communities and demonstrate this at all times.

2. Utilize the concepts, principles, nursing theories, nursing process and other relevant sciences in providing nursing care to meet health needs and the environment of individuals, families and communities with their full participation, in the promotion of health, prevention of illness, curative and in the rehabilitation or restoration to health of the ill/sick.
3. Demonstrate the qualities of professional competence in critical thinking, and decision making with clinical knowledge for solving the health problems of individuals, families and communities.
4. Operate independently or collaboratively with other health workers in the health team and with the personnel from other related organizations and coordinating service requirements at all levels of health care.
5. Initiate to improve modern nursing service and administration appropriate to high technology and science.
6. Participate actively in research activities and/or apply research findings in the continuous improvement of nursing.
7. Posses professional moral and ethical values in nursing practice and in living.
8. Apply principles of teaching, management and supervising nursing personnel.
9. Accept responsibility of continuing learning for continued personal and professional growth.
10. Support the principles of Constitutional Monarchy of the Thai people and demonstrate a sense of social and civic responsibility.

## Environmental Study Course Syllabus

**Title:** Environmental Study

**Code:** H. 123

**Credits:** 2 (2-0-0)

**Course Description:**

Study of the concepts and the national environmental policies, environment affecting health, environmental quality control and surveillance, environmental quality analysis, environmental quality improvement, roles of individual, community and organization on natural resources and environment conservation and law of environmental health.

**Objectives:** After completing the course, the nursing students will be able to:

1. Explain the importance of the environment and changes of the environment which is affecting life both direct and indirect impacts.
2. Tell the relationship between man and environment and relationship among other countries in the world with the environmental problems.
3. Select the methods of the environmental problem solving in their ways of living and career.
4. Cooperate for environmental conservation and development.
5. Educate people about the environment related to health.

**Contents:**

Chapter 1 Plan and policy about the environment 6 hours

Concepts and the importance of the environment

Balance of the environment

State of the Thai and global environment

Relationship between the environment and way of living

Factors affecting environmental debasement

National environmental plans and policies

**Chapter 2 Environmental quality control and surveillance 12 hours**

Water

Air

Noise

Solid waste

Pesticide

Environmental quality improvement

**Chapter 3 Roles of individual, community and organization on natural resources and environment conservation 12 hours**

Concepts of natural resources and environment conservation

Principles of natural resources and environment utilization and management

Practices of natural resources and environment conservation

Dissemination of concepts and practice in natural resources and environment conservation

Roles of individual, community and organization in conservation of natural resources and development the environment

Law of environmental health

**Teaching Methodologies:**

1. Lectures
2. Discussions
3. Self-study
4. Reports
5. Field trips
6. Exhibitions

**Teaching Materials:**

1. Transparency
2. Videos, Films, Slide presentations
3. Water quality equipment
4. Textbooks

**Measurement and Evaluations:**

1. Examinations
2. Discussions
3. Paper reports and presentations
4. Exhibitions

**Textbooks:**

Ruengpanit, N. **Natural Resources and Environment Conservation.** Handbook in training and teaching, Project of textbooks for natural resources and environment conservation Vol. 1. Faculty of Forestry, Kasetsart University, 1990.

Nutalai, P. et. al. (Eds.). **Paper presented at the seminar on “Natural Resources and Environment Conservation in Thailand”.** Bangkok: October-November, 1992.

Suchamnong, P. **Social and Environmental Problems**. Bangkok: Odiestore, 1990.

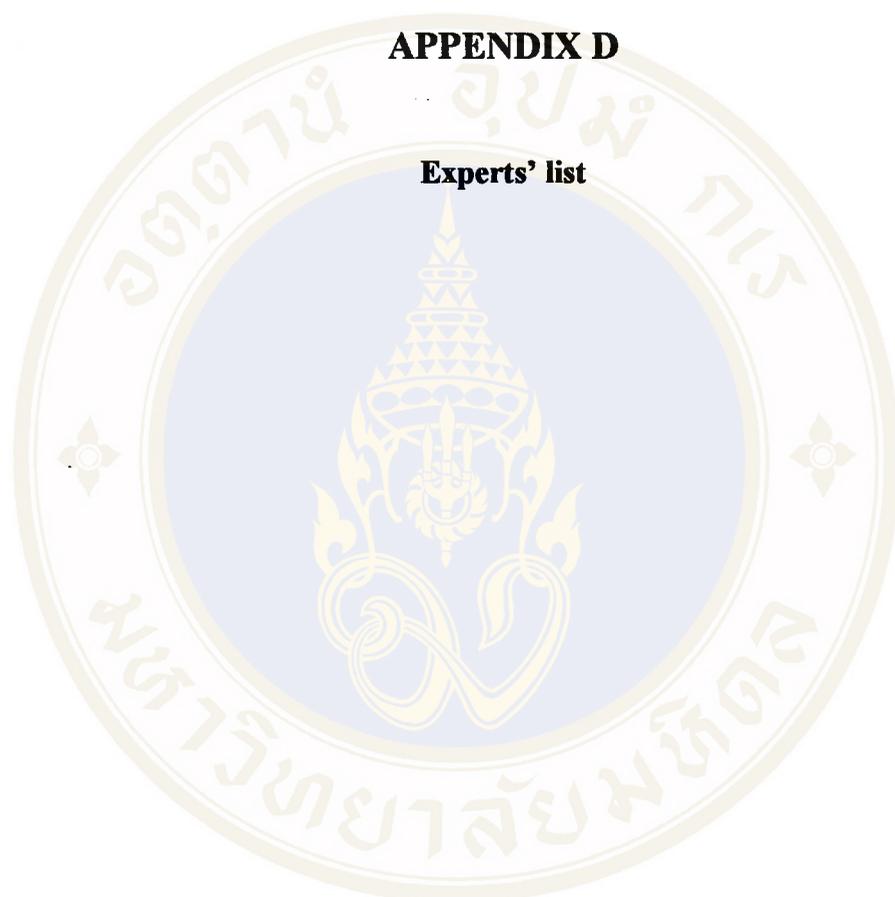
The Institute of Research for Environmental Status. **Paper report of the Meeting Cooperation between the Government and Private Sectors: Development and Environmental Preservation**. The United Nations Environment Programme, 1987.

Siam Association. **Natural Resources Conservation in Thailand concerning Socio-Economic Development**. In Santisook, T., Samitinond, T. and Warren Y Brockelman (Eds.). The Nature Division, Siam Association, 1985.

The Office of Training, National Institute of Development Administration. **The Environmental Analysis for Development**. In Sangchai, S. (Eds.). Bangkok: Training National Institute of Development Administration Press, 1990.

**APPENDIX D**

**Experts' list**



### **Experts' List**

1. **Assoc.Prof.Dr. Piyathida Tridech** Faculty of Public Health, Mahidol University
2. **Dr. Tassanee Nontasorn** Faculty of Public Health, Mahidol University
3. **Assoc.Prof. Waraporn Srisupan** Faculty of Social Sciences and Humanities,  
Mahidol University
4. **Lect. Wasin Plumcharoen** Faculty of Social Sciences and Humanities,  
Mahidol University
5. **Dr.Pailin Nukulki** Educational Development Division,  
Praboromarajchanok Institute, Ministry of  
Public Health
6. **Lect. Subha Yoo-yurn** Srimahasarakham Nursing College
7. **Lect. Samrit Kounpon** Srimahasarakham Nursing College
8. **Lect. Konkanok Lattanond** Boromrajachonani Nursing College, Bangkok
9. **Lect. Theranun Wannasiri** Boromrajachonani Nursing College,  
Ratchaburi

**BIOGRAPHY**

<b>NAME</b>	Miss Chamchun Thedsing
<b>DATE OF BIRTH</b>	21 April 1969
<b>PLACE OF BIRTH</b>	Roi-et, Thailand
<b>INSTITUTIONS ATTENDED</b>	Srimahasarakham Nursing College, 1989- 1992 : Diploma in Nursing Science Mahidol University, 1997-1999 : Master of Education (Environmental Education)
<b>FELLOWSHIP/RESEARCH GRANT</b>	Supported in part by the Thesis Grant, Graduate Studies of Mahidol University Alumni Association
<b>POSITION &amp; OFFICE</b>	1993- Present, Srimahasarakham Nursing College, Mahasarakham Province, Thailand Position : Professional Nurse (Lecturer)