

# The Effects of Environmental Education Learning Activities Using Area-Based Learning in Khok Hin Lad Community Forest in Maha Sarakham, Thailand

Likhit Junkaew<sup>1</sup>, Prayoon Wongchantra<sup>1,\*</sup> & Wutthisak Bunnaen<sup>2</sup>

<sup>1</sup>Faculty of Environment and Resource Studies, Mahasarakham University, Thailand

<sup>2</sup>Demonstration School (Secondary), Mahasarakham University, Maha Sarakham, Thailand

\*Correspondence: Faculty of Environment and Resource Studies Mahasarakham University, 44150, Thailand. Tel: 81-6000-180. E-mail: Prayoon\_nam@yahoo.co.th

Received: February 1, 2021

Accepted: April 14, 2021

Online Published: April 16, 2021

doi:10.5430/wje.v11n2p56

URL: <https://doi.org/10.5430/wje.v11n2p56>

## Abstract

The purposes of this research were to study and compare knowledge about Khok Hin Lad community forest, environmental ethics, and environmental volunteers from learning activities of undergraduate students before and after activities, to study and compare knowledge about Khok Hin Lad community forest, environmental ethics, and environmental volunteers of undergraduate students with different gender and GPAs. The sample used in the research was 99 second-year undergraduate students in Environmental Education, Faculty of Environment and Resource Studies, Mahasarakham University, which are derived from purposive sampling. The research instruments were a manual of environmental learning activities in Khok Hin Lad community forest by using area-based learning, knowledge test about Khok Hin Lad Community Forest, Environmental ethics test, and environmental volunteers test. The statistics used in the research were frequency, percentage, mean, standard deviation. And hypothesis testing using t-test, F-test (One – Way MANOVA, One – Way MANCOVA, and Univariate Test). The study found that: 1) The student's knowledge average score of Khok Hin Lad community forest, environmental ethics, and environmental volunteers after learning activities were higher than before the learning activities' statistical significance ( $p < .05$ ). 2) There was no different knowledge of Khok Hin Lad community forest, environmental ethics, and environmental volunteers between students of different gender ( $p > .05$ ). 3) There was no different knowledge of Khok Hin Lad community forest, environmental ethics, and environmental volunteers between students with different GPAs ( $p > .05$ ).

**Keywords:** learning activities, environmental education, community forest, area-based learning, environmental knowledge, environmental ethic, environmental volunteers

## 1. Introduction

### 1.1 Introduce the Problem

Khok Hin Lad community forest in Maha Sarakham province of Thailand is the original large forest which has a size of tens of thousands of acres and has different types of plants. The most common plants are large perennials such as Yang trees, Pluang, Myrolan Wood, Ingyin, Iron Wood, Freshwater mangrove, Afzelia, Gu mat, and many other perennial trees which is a habitat for a wide variety of wildlife, whole monkey, wild boar, rabbit, foxes, palm civet, squirrel, chipmunk, clouded monitor, a variety of birds, and other animals. Later in the past 30 years, the fertile Khok Hin Lad community forest has become an economic source for capitalists and is a career source for people in the communities surrounding the forest by conceding the community forest to make firewood in the brewery of Thai Ruang Co., Ltd by hiring community people to cut wood to make firewood to send to the brewery. The community was born occupation income and there was more and more to eat. Until the end of the concession agreement in the year 1992, it turned out that the forest, which was once thick and abundant, turned out to be just a grove for-est able to see through as far as the eye can see from every corner of the forest. A piece of wood larger than the arm was cut completely, leaving only a small stump and a piece of wood. Then around the year 1997, the Khok Hin Lad community forest has made concessions to take advantage of the capitalists again and it was the time that everyone

remembered and realized together when JICA company (JICA) acquired the Khok Hin Lad community forest concession to create "Demonstration Forest Reforestation Project" by plowing removing all the timber and then using economic trees to plant, such as Eucalyptus, Mangium, White Cheesewood, etc. The depressions of the community from the previous deforestation are still a stinging story of the surrounding communities who feel guilty about losing the forest. In November 1998, 1,500 villagers from 20 villages in 5 sub-districts and 2 districts gathered under the name "Khok Hin Lad Forest Conservation Committee", with Mr. Keng Yos-an as the main chairman, conduct objection movement, organize hold a seminar to raise awareness of villagers, the campaign to plant a forest with communities and many agencies, rally demanding and submitting proposals to provincial forests and the provincial governors. It was finally resolved to cancel the project in early 2000, during the joy of the villagers no one thought that getting the forest back this time would cost Mr. Thonglor Tansedee's life, a key leader who was shot dead on December 2, 2000, by the bereaved group. The community then organized a community forest restoration activity until it received the Green Globe Award in 2001 (Green Global Institute, 2001). At present, Khok Hin Lad community forest although is only 2,709 rai, it has become a source of livelihood and a power bank for the villagers in the area, build a career, generate a lot of local income each year, whole mushroom, ant egg, cockchafer, longan stink bug, siam tulip, herb and a source of learning and activities for students and the public. But there are still management problems with the problem of encroachment and exploitation by causing environmental impacts to the forests, including solid waste, area problems, regulations, forest fire, hunting, and other problems.

Researchers studied in the area to study information in the area which is divided into 2 forms including 1) study about secondary data; the researcher studied information from various media channels, including research papers, publications, online media, and studies from government agencies related to the management of Khok Hin Lad community forest and 2) study about primary data; the researcher-led a research assistant team into the area to collect data in the field, an interview with Khok Hin Lad community forestry committee, people and officials involved in the management of Khok Hin Lad community forest. The data were then analyzed, synthesized, and identified in the learning process, it was found that there were issues of interest and benefit to the conservation of Khok Hin Lad community forest which is an important issue for the conservation of Khok Hin Lad community forest in 7 issues including 1. continuing the legend of Khok Hin Lad community forest, 2. outstanding plants and trees in the Khok Hin Lad community forest, 3. mushrooms in Khok Hin Lad community forest 4. community forest management of Khok Hin Lad 5. wildlife in Khok Hin Lad community forest, 6. community forest area and Khok Hin Lad community forest map, and 7. the problem of taking solid waste in Khok Hin Lad community forest.

The effects of environmental education learning activities in Khok Hin Lad community forest using area-based learning is the study and collection of both secondary layers and primary to be an important database for designing and developing learning activities with content divided into 7 learning activities by using the learning process in the environmental education process and using area-base learning. It consists of 7 steps: step 1; define the area, step 2; survey the area, step 3; analyze the strength of the area, step 4; design the learning area, step 5; learn in the area, step 6; take off the lesson and step 7; conclusion and evaluation. The effects of environmental education learning activities in Khok Hin Lad community forest using area-base learning will be an important part in building knowledge about Khok Hin Lad community forest, environmental ethics, and environmental volunteers, this is an important basis for environmental education students that will enable environmental education students to apply knowledge about Khok Hin Lad community forest, environmental ethics, and environmental volunteers, for use in daily life and working in the conservation and restoration of natural resources and the environment in the future, and Khok Hin Lad community forest protected and restored through learning activities in the Khok Hin Lad community forest using area-based learning and to stimulate the conservation trend of Khok Hin Lad community forest for the inner people who turn their attention to the conservation of Khok Hin Lad community forests another way.

### *1.2 Research Objectives*

1. To study and compare knowledge about Khok Hin Lad community forest, environmental ethics, and environmental volunteers using environmental education learning activities in Khok Hin Lad community forest by using area-base learning of undergraduate students before and after learning activities.
2. To study and compare knowledge about Khok Hin Lad community forest, environmental ethics, and environmental volunteers from environmental education learning activities in Khok Hin Lad community forest by using area-base learning of undergraduate students with different genders.
3. To study and compare knowledge about Khok Hin Lad community forest, environmental ethics, and environmental volunteers from environmental education learning activities in Khok Hin Lad community forest by using area-base learning of undergraduate students with different GPAs.

1.3 Research Hypothesis

1. After the environmental education learning activities in the Khok Hin Lad community forest by using area-based learning, students have an average knowledge score about Khok Hin Lad community forest, environmental ethics, and environmental volunteers higher than before the activities.
2. There is different knowledge score about Khok Hin Lad community forest, ethics, and environmental volunteers between students with a different gender.
3. There is different knowledge score about Khok Hin Lad community forest, ethics and environmental volunteers between students with a different GPAs.

1.4 Research Conceptual Framework

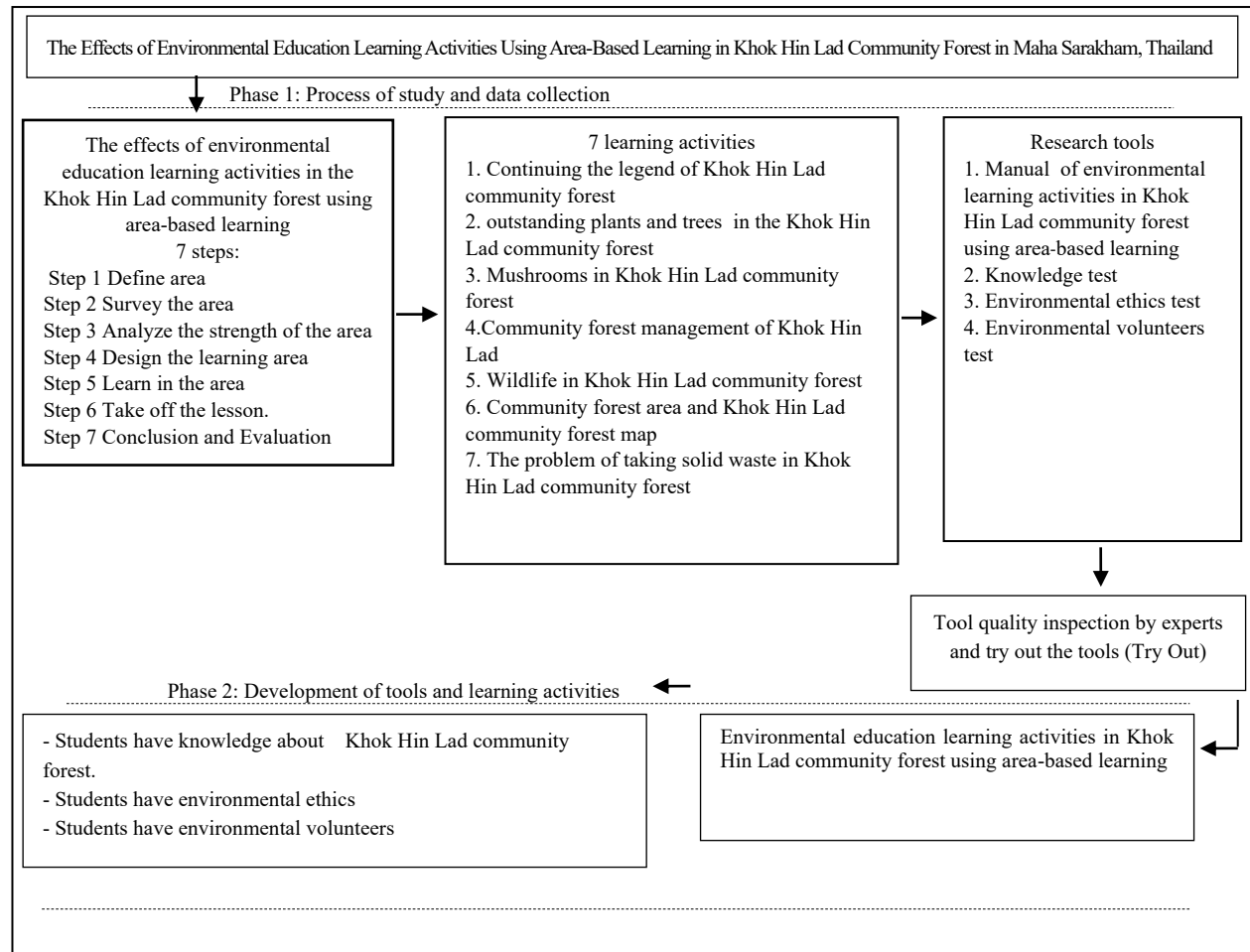


Figure 1. Research Conceptual Framework

This study is a research study using area-based learning which is divided the study into 2 phases: Phase 1; the process of collecting data from studies, documents, research textbooks, and spatial data collection, gathering of information from interviews, observations, surveys, and use of geographic technology to collect spatial data. Phase 2 is the creation and development of research tools, contains an activities manual, knowledge test about Khok Hin Lad community forest, environmental ethics test, and the environmental volunteer's test and make environmental education learning activities in Khok Hin Lad community forest by using area-based learning, it consists of learning the environment, studying by using area-based learning in 7 steps, divided into 7 learning activities, the duration of the activities is 15 weeks to students have knowlegd about Khok Hin Lad Community Forest, environmental ethics and environmental volunteers.

## 2. Research Design and Method

The development of environmental learning activity in the Khok Hin Lad community forest by using area-based learning this research was quasi-experimental research by using a one-sample group with a one-group pretest-posttest design.

### 2.1 Population and sample

2.1.1 The populations used for data collection were 376 undergraduate students, Department of Environmental Education, Faculty of Environment and Resource Studies, Mahasarakham University in Semester 2, Academic Year 2018.

2.1.2 The sample used for data collection were 99 second-year undergraduate students, Department of Environmental Education, Faculty of Environment and Resource Studies, Mahasarakham University, which was obtained by purposive sampling.

### 2.2 Studied Variables

The Independent variable was a manual of environmental learning activities in Khok Hin Lad community forest using area-based learning.

Dependent variables were knowledge of Khok Hin Lad community forest, environmental ethics, and environmental volunteers.

### 2.3 Tools Used in Organizing Activities

A handbook for learning activities on environmental studies in Khok Hin Lad community forest using area-based learning

### 2.4 Measurement and Evaluation Tools

2.4.1 Knowledge test about Khok Hin Lad Community Forest

2.4.2 Environmental ethics test for Khok Hin Lad Community Forest

2.4.3 Environmental volunteer test for the conservation of Khok Hin Lad community forest.

## 3. Data Collection

### 3.1 Phase 1: Process of Study and Data Collection

The researcher has studied the data to be a component of the effects of learning activities for Khok Hin Lad community forest using area-based learning, as follows. Secondary data: The researcher visit the area to request information on Khok Hin Lad community forest from relevant agencies and studying from documents, textbooks, research, online databases, and various media. Primary data: The researcher visited Khok Hin Lad community forest by study area in the field, in-depth interviews, and the survey and study process according to the environmental education process.

### 3.2 Phase 2: Tools and Development of Tools

The researcher used the data studied as a basis for developing tools and organizing learning activities for Khok Hin Lad community forest by using the area as a learning base. With the following processes

#### 3.2.1 Tools for organizing activities

1) Manual of environmental education learning activities in Khok Hin Lad community forest using area-based learning.

1.1) The content is divided into 7 learning activities by process of building manual, the researcher used area-based learning model as a base by studying the preliminary data, it will collect spatial data and studying documents, textbooks, and related research, for information on drafting manuals of environmental education learning activities in Khok Hin Lad community forest by using area-based learning.

1.2) Bring the outline of the created activities guide to the advisor to check and improve according to the suggestion of the advisor.

1.3) Bring the manuals of environmental education learning activities in Khok Hin Lad community forest using area-based learning offer to 5 experts.

1.4) Bring it to analysis based on the average score of 3.50 or more as a criterion. It was found that the suitability of the environmental education learning activities in Khok Hin Lad community forest manual, the mean ( $\bar{x}$ ) is 4.30, the

standard deviation (S.D.) is equal to 0.03, at the most appropriate level and the consistency value (IOC) is 0.97, it is in accordance with the applicable standards.

1.5) Improve the manual based on the evaluation results and expert recommendations. It was found that the process efficiency activities manual ( $E_1$ ) was 89.98 percent and the efficiency of the result ( $E_2$ ) accounted for 85.97 percent. The manual has an efficiency of 89.98 / 85.97 which meets the specified criteria. And has an effective index (E.I.) was 0.7317. It showed that the students have knowlegd about Khok Hin Lad community forest has increased, and students have an increase in learning progress, representing 73.17 percent.

2) The evaluation tools were knowledge test about Khok Hin Lad community forest, environmental ethics test, and environmental volunteers test with the following development steps.

2.1) Study basic information from textbooks, documents, and related research, to guide the creation of a knowledge test, environmental ethics test, and environmental volunteers test.

2.1.2) Bring information to create a knowledge test, this is 70 items of multiple choice with 4 options; A, B, C, D, choose only one correct answer. Set the correct answer criteria to give 1 point, wrong answer gives 0 points. These are 50 items of multiple choice environmental ethics test being A, B, C, D divided into 4 levels; for myself, for relatives and friends, for society and correctness and goodness and there, are 50 items of multiple choice of environ-mental volunteers with 4 options; A, B, C, D.

2.1.3) Take knowledge test about Khok Hin Lad community forest, environmental ethics test, and environmental volunteers test, let the advisors consider and improve according to the recommendations.

2.1.4) Take knowledge test about Khok Hin Lad community forest, environmental ethics test, and environmental volunteers test to have five experts consider the consistency of the test with the objective and manual. It was found that the IOC value of the knowledge test was 0.977 which is greater than 0.50 or more. The IOC value of the environmental ethics test was 0.92 which is greater than 0.50 or more and the IOC value of the environmental volunteers' test is equal to 0.97 which is greater than 0.50 or more. Showed that all tests are accurate and objective, can be used to collect information.

2.1.5) Take knowledge test about Khok Hin Lad community forest, environmental ethics test, and environmental volunteers test to try out with a second-year 100 undergraduate students of Department of Environmental Education, Faculty of Environment and Resource Studies, Mahasarakham University, registered in the course of semester 1, the academic year 2018, that is not a sample group. It was found that all of the items had a valid difficulty value, is the lowest value of 0.37 and the highest value of 0.76. There is a discriminant power between 0.397 - 0.596 and a confidence value of 0.981. Showed that all knowledge tests comply with an acceptable value greater than 0.70, can be used for data collection. Environmental ethics test every clause has individual discretionary power at the applicable level is having a discriminant power between 0.369 - 0.617 and a confidence value of 0.988. Showed that all

environmental ethics test is acceptable, which is greater than 0.70. And the environmental volunteers' test has a classifying power between 0.21 - 0.70, has a confidence factor of 0.960. Showed that all environmental volunteers test were compliant with an acceptable value greater than 0.70, can be used for data collection.

2.1.6) Improve the knowledge test about Khok Hin Lad community forest, environmental ethics test, and environ-mental volunteers test to improve, modify, make a complete, then offer an advisor for further data collection with the sample.

3) Management of environmental education learning activities in Khok Hin Lad community forest using area- based learning.

3.1) Before organizing learning activities the lecturer must prepare materials that will be used in the activities, learning activities area, safety, and hiking equipment. Meet the speaker's team to arrange a meeting and review the process of organizing learning activities to create readiness and stimulate an environment that is interesting to learn and reduces the chance of mistakes during the event.

3.2) Test before activities with a knowledge test about Khok Hin Lad community forest, environmental ethics test, and the environmental volunteers' test that the researcher created.

3.3) Environmental education learning activities in Khok Hin Lad community forest using area -based learning divided into 7 steps by integrating them according to the contents of each activity as follows.

Step 1: Define the area; procedure for using the area initially studied by the researcher, for students to study according to the learning objectives, environmental education by using area-based learning.

Step 2: Survey area; survey to identify the strengths to define patterns or focus on learning in each area.

Step 3: Analysis of the strength of the area to select points that stand out in that area, to be used to define learning boundaries by using area-base learning.

Step 4: Design the learning area; the process of designing learning issues, tools and determining the results that will arise from the learning by using area-base learning.

Step 5: Learn in the area; the process of studying and learning to collect information in a given area according to the design of each group of students.

Step 6: Take off the lesson; analyzed and the synthesized participant about the issues you are studying and what you learn from it.

Step 7: Conclusion and evaluation; summary of learning outcomes learned from environmental studies in Khok Hin Lad community forest by using area-base learning.

These 7steps processes will be used in learning activities in the Khok Hin Lad community forest in all 7 learning activities.

3.4) Establish environmental education learning activities in Khok Hin Lad community forest by using area -based learning for building knowledge about Khok Hin Lad community forest, environmental ethics, and environmental volunteers, there are a total of 7 learning activities as shown in Table 1.

3.5) Organized environmental learning activities in the Khok Hin Lad community forest by using area-based learning, according to the learning model designed by the researcher, and do test after all activities.

3.6) Testing after learning activities (posttest)by allowing students to test their knowledge about Khok Hin Lad community forest, environmental ethics test, and the environmental volunteers' test, which is the same test set as the pre-learning test.

3.7) Analyze test after learning activities (posttest) by statistical methods to test the hypothesis.

**Table 1.** Environmental Education Learning Activities in Khok Hin Lad community Forest Using Area-Based Learning

Week	Learning activities	Period (hour)
1	Describe environmental education learning activities in Khok Hin Lad community forest. using area-based learning / Pre-test	3
2-3	1. Continuing the legend of Khok Hin Lad community forest	6
4-5	2. outstanding plants and trees featured in Khok Hin Lad Community Forest	6
6-7	3. Mushroom in Khok Hin Lad Community Forest	6
7-8	4. Community forest management of Khok Hin Lad	6
9-10	5. Wildlife in Khok Hin Lad community forest	6
11-12	6. Community forest area and community forest map of Khok Hin Lad	6
13-14	7. The problem of littering in Khok Hin Lad Community Forest / Test during activities	6
15	conclusion of learning activities / Post-test	3

#### 4. Results

*4.1 The Effect of Study and Comparison Knowledge Score about Khok Hin Lad Community Forest, Environmental Ethics and Environmental Volunteers Using t-test (Paired Samples) before and after the Learning Activities (pretest-posttest) Using Area-Based Learning Found That: (as shown in table 2)*

1) The students' knowledge average score about Khok Hin Lad community forest after learning activities was higher than before learning activities statistically significant ( $p < .05$ ).

2) The students' environmental ethics average score about Khok Hin Lad community forest after learning activities was higher than before learning activities statistically significant ( $p < .05$ ).

3) The students' environmental volunteers' average score about Khok Hin Lad community forest after learning activities was higher than before learning activities statistically significant ( $p < .05$ ).

**Table 2.** The Effects of the Comparison of Knowledge Average Scores about Khok Hin Lad Community Forest, Environmental Ethics and Environmental Volunteers of Students before and after Activities Using t-test (Paired Samples)

Item	Pretest		Levels	Posttest		Levels	t	df	p
	$\bar{x}$	S.D.		$\bar{x}$	S.D.				
<b>Knowledge (N=70)</b>	32.88	1.52	Moderate	60.18	1.22	Highest	-49.824	98	.000*
<b>Environmental Ethics (N = 4)</b>	2.15	0.42	For relatives and friends	3.31	0.53	For the correctness and goodness	-41.076	98	.000*
<b>Environmental volunteers N = (5)</b>	2.37	0.21	Low	3.73	0.15	High	-56.430	98	.000*

\*Statistically significant .05, N: full score.

*4.2 The Effect of Comparing Knowledge about Khok Hin Lad community Forest Environmental Ethics and Environmental Volunteers of Students of Different Gender (As shown in table 3-4)*

There was no significant difference between the average score of the environmental knowledge, environmental ethics, and environmental volunteers of undergraduate students with different gender ( $p > .05$ ).

**Table 3.** Comparison of the Multivariate of Knowledge of Khok Hin Lad Community Forest, Environmental Ethics, and Environmental Volunteers of Students with Different Gender Using One-Way MANOVA

Test statistics	Value	Hypothesis df	Error df	F	p
Pillai's Trace	0.065	6.000	214.00	1.194	0.311
Wilks' Lambda	0.936	6.000	212.00	1.189 <sup>b</sup>	0.313
Hotelling's Trace	0.068	6.000	210.00	1.185	0.316
Roy's Largest Root	0.053	3.000	107.00	1.907 <sup>c</sup>	0.133

**Table 4.** One-way Analysis of Covariance of Knowledge, Environmental Ethics, and Environment Volunteers after Activities of Students with Different Gender by Using Pretest Scores as a Common Variable (One-Way MANCOVA)

Early variant	Dependent variable	SS	df	MS	F	p
Gender	knowledge about Khok Hin Lad community forest	43.97	1	21.98	1.24	.294
	environmental ethics	.064	1	.032	.633	.533
	environmental volunteers	.023	1	.534	2.600	.080

*4.3 The Effect of Comparison of Knowledge Score of Khok Hin Lad Community Forest, Environmental Ethics and the Environmental Volunteers of Students with Different GPAs Found That as Shown in Table 5-7*

1) There was a statistically significant difference between the average score of the knowledge of knowledge score of Khok Hin Lad community forest, environmental ethics, and environmental volunteers of undergraduate students with different GPAs ( $p < .05$ ). It showed that Univariate Test found that: there was a statistically significant difference between an average score of knowledge score of Khok Hin Lad community forest of students with different GPAs ( $p < .05$ ). There was no difference between the average score of environmental ethics and environmental volunteers of undergraduate students with different GPAs ( $p > .05$ ). (As shown in table 5-6)

2) There was a statistically significant difference between the average score of environmental knowledge of students with low GPAs, medium GPAs, and high GPAs ( $p < .05$ ) As shown in table 7.

3) There was a difference between the average score of environmental knowledge of students with medium GPAs and high GPAs the statistical significance ( $p < .05$ ) as shown in table 7.

**Table 5.** Comparison of Multiple Variances of Knowledge about Khok Hin Lad Community Forest, Environmental Ethics and Environment Volunteers of Students with Different GPAs (One-Way MANOVA)

Test statistics	Value	Hypothesis df	Error df	F	p
Pillai's Trace	0.530	6.000	190.00	11.416	.000*
Wilks' Lambda	0.481	6.000	188.00	13.869 <sup>b</sup>	.000*
Hotelling's Trace	1.059	6.000	186.00	16.420	.000*
Roy's Largest Root	1.038	3.000	95.00	32.883 <sup>c</sup>	.000*

\*Statistically significant . 05

**Table 6.** One-way Analysis of Covariance about Khok Hin Lad Community Forest, Environmental Ethics, and Environment Volunteer after Activities of Students with Different GPAs, Using Pretest Scores as a Common Variable (One-Way MANCOVA)

Early variant	Dependent variable	SS	df	MS	F	p
Grade Point	knowledge about Khok Hin Lad community forest	883.315	2	441.657	49.220	.000*
Average	environmental ethics	.071	2	.036	.702	.498
(GPAs)	environmental volunteers	.045	2	.022	877.	.419

\*Statistically significant . 05

**Table 7.** Comparison of Knowledge about Khok Hin Lad Community Forest of Students with Different GPAs in Pairs According to the Scheffe Method

GPAs	$\bar{x}$	Low	Medium	Hight
		51.80	56.52	61.95
Low	51.80	-	.008*	.000*
Medium	56.52	-	-	.000*
Hight	61.95	-	-	-

\*Statistically significant . 05

## 5. Conclusions

Results of the study and comparison of knowledge about Khok Hin Lad Community Forest, environmental ethics, and environmental volunteers from learning activities in the Khok Hin Lad community forest by using area-base learnig of undergraduate students before and after activities.

1) The results of the comparison of the knowledge average score about Khok Hin Lad Community Forest before and after the activity, it was found that when comparing the knowledge average score of Khok Hin Lad community forest before and after activities. Students have a higher average score after the activity than before. With statistical significance at the .05 level.

2) The results of comparing the environmental ethics mean scores of students before and after activities showed that when comparing the environmental ethics mean scores of students had higher post-activity environmental ethics scores than before. With statistical significance at the .05 level.

3) The results of comparing the environmental volunteers scores of the students before the activity and after the activity showed that the students had a higher mean score of the post-activity environmental volunteer than before. With statistical significance at the .05 level.

Results of the study and comparison of knowledge about Khok Hin Lad Community Forest, environmental ethics, and environmental volunteers from learning activities in Khok Hin Lad community forest by using the area as a learning base of undergraduate students with different gender found that students of different gender Knowledge of Khok Hin Lad Community Forest, environmental ethics and environmental volunteers no different.

Students with different grades have knowledge about Khok Hin Lad Community Forest. Environmental ethics and environmental volunteers were statistically different at the .05 level.

Therefore, the Univariate Test was tested for both pieces of knowledge about Khok Hin Lad community forest, and Environmental ethics it was found that the students with different academic results had statistically significant differences in knowledge of the community forest of Khok Hin Lad at the .05 level. But there is no difference



between environmental ethics and environmental volunteerism.

## 6. Discussion

### *6.1 The Results of Comparison of the Knowledge of Khok Hin Lad Community Forest, Environmental Ethics and Environmental Volunteers of The Students in Pretest and Posttest by Environmental Education Learning Activities in Khok Hin Lad Community Forest Using Area-Based Learning Found That:*

1) The students had an average score of the knowledge of Khok Hin Lad community forest in the posttest higher than the pretest. This is the result of the effects of environmental education learning activities in Khok Hin Lad community forest using area-based learning, which has gone through the manual development process by the principles and concepts of developing a manual for environmental education activities. It consists of 5 main workgroups which are analytical survey activity development project judging activities, standardization activities, control activities, and promotion activities (Junkaew, K., 2004) by using the method of compiling the theory of environmental education, to be a guideline for the efficient and effective organization of learning activities in environmental education (Wongchantra, P., 2012) and it is an activity that is meaningful to students, learners, doers, communities, nations, and the world which makes the activity people aware and pride in being able to benefit oneself and the public (Sookkasem, T., 2001). And the use of the theory of area-based learning which consists of the concept of Pimmas, S. (2018) and Tongkow, K. (2015) said that the management of spatial studies (area-based learning), must be based on the cooperation of individuals and stakeholders of all parties and levels. Along with the learning management process that focuses on student-centered, the researcher organizes the learning process only (Office of the Public Sector Development Commission and Thailand Productivity Institute, 2005) and (Kuanhawech, B., 2002). And the process of learning environmental studies in the Khok Hin Lad community forest by using area-base learning, there is also a specific system of patterns, procedures, directions, and content volumes. Each environmental education has a specific theme, content, directions, procedures, and strategies, as a result, the student has a good awareness process (Wongchantra, P., 2012) and (Junkaew, K., 2004) which consist with the study results of Wongchantra et al., (2017) found that the sample group knew average scores of green universities after learning activities more than before learning. And Boonserm, W., & Chanchalad, N., (2017) found that student knowledge about the matriculation of the forest higher after promotion than before promotion. And Ekkathat & Wongchantra, P. (2017) and Watha, U. (2017) found that students have more knowledge after the training activities more than before the training activity. And Abiolu & Oluremi Adenike (2019) found that Nigerian youths have increased their knowledge of environmental communication through appropriate media. And El Batri, B., et al., (2019) found that learning activities contribute to the increase of students' knowledge of the environment in Moroccan schools. Showed that environmental learning activities in the Khok Hin Lad community forest can develop according to the process of activity using area-based learning and integrating the learning process in environmental education. Contains a variety of transmission techniques, creating a self-learning experience, resulting in an effective activity in developing knowledge for the students who participated in the activity and resulted in students have higher post-activity knowledge than before.

2) The students had an average score of environmental ethics in the posttest higher than the pretest. This is the result of environmental education learning activities, that are specific to the creation of environmental ethics of students who participated in environmental education learning activities in the Khok Hin Lad community forest using area-based learning. The process of creating a series of activities focused on creating a paradigm of good natural resource view to happen to students with learning activities arranged for community forest areas to be like natural classrooms. Including environmental ethics concepts, living for the environment cannot be separated from ethics, social life, and community (Wongchantra, P., 2012) using an interdisciplinary learning process (Wongchantra, P., 2010) by allowing students participating in the activities to experience the environmental problems that arise in the area (Association for the Development of Environmental Quality, 2015) to create the ideal for the environment, establishing an ethical obligation thus respecting the rights and demands of individuals with equal resources (Kohlberg, L., 1981). And focus on learning that leads to the birth of gratitude, knowing the value of the environment, common interest, and the so-called natural resource conservation environmental ethics (Wongchantra, P., 2010). By learning activities on environmental studies in the Khok Hin Lad community forest using area-base learning, can learning areas be integrated into stimuli (Stimulus) for sensory stimulation (Sense Organs), to create direct experiences leading to environmental ethical changes This is in line with the concept of a learning process based on the principles of area-based learning, Bruner, J (1986) where learning by using area-based learning as a base to the worldview in the style of "Sustainable - Earth worldview" (Miller, 2000). The study results are consistent with the research results of Wongchantra, P. & Nuangchalerm, P. (2011) found that the teaching process of

environmental education using ethical cultivation can develop students' environmental ethics at a higher level than the control group. and Goralnik, L., et al., (2012) found that environmental ethics were related to the emotions and participation in caring for the environment of tertiary students. and Lisa M. R. & Cottine, C. (2018) found that the activity module resulted in 2nd-year students at the University of Oberlin there is more ethical use of pesticides. And Araujo, U. (2012) found that promotion strategies could develop environmental ethics in schools and nearby communities. Vikas, M. & Rutuja, M. S. (2017) found that the SSC model, causing children to make changes in environmental ethics after higher modeling. Showed that environmental learning activities in the Khok Hin Lad community forest, that go through the process and process of creation and development, environmental learning activities using area-based learning. It is appropriate and results in higher environmental ethics for students effectively.

3) The students had an average score of the environmental volunteers in the posttest higher than the pretest. This is the result of environmental education learning activities in the Khok Hin Lad community forest using area-based learning. It has been developed for the quality and efficiency and effectiveness of the specified criteria, using environmental education processes as a medium in management learning activities, and interpolate the process of creating environmental volunteers in all 7 activities. And it is a form of activity that students can do automatically so that they do not feel compelled to do so. A person's consciousness towards society is as a whole through caring and helping volunteers behaviors that volunteers to benefit the public (Sriborriboon, N., 2007) by interpolating into learning activities in environmental education using area-based learning, let students take responsibility for themselves and responsible for the public, empathize with the members of the group, have compassion for natural resources and the environment according to Brahma Vihara 4 (Sriborriboon, N., 2007). The process of learning from real areas, seeing real, doing real things, and getting results by yourself. Thongkaow, K. (2004) suggests that management of area-based learning must be able to respond and consistent with the potential and needs of the area which is an important guideline for national development in the future (Master Plan under the National Strategy 10 (2018 – 2037) (2018). Wongyai, W. (2011) found that students have higher post-activity volunteers than before activities which consist with the study results of Wongchantra, P., et al., (2020) found that the sample group had higher mean scores of volunteers after the training activity than before the training activity. And Johnson, M. K., et al., (2020) found teenagers who have been using the study plan have higher self-volunteers than adolescents who do not use the study plan. And Henney, S. M., et al., (2017) found that after being a real volunteer, overall I was proud and support the organization of volunteer activities. And Srijumnong, S., et al., (2015) found that students who studied using a curriculum that was developed have a public mind towards the family, school, and higher society from 4 measurements. And Kaewngam, S. & Wongchantra, P. (2018) found that the sample students had higher mean scores of volunteers after the training activity than before the training activities. And Sanphoo-nga, P. & Thitapanyo, P. (2020) found that volunteer youth has the ideology of grouping up from training. The results of the study show that environmental learning activities in the Khok Hin Lad community forest using area-based learning, which has been developed to be effective and efficient; this affects the development and change of the student's environmental volunteers in a better direction.

## *6.2 The Effect of Comparison Knowledge of Khok Hin Lad Community Forest, Environmental Ethics, and the Environmental Volunteers of Students with Different Gender Found That:*

6.2.1 The students with different gender, were not different in knowledge about Khok Hin Lad community forest which contradicts the hypothesis set. This may be the result of an environmental education learning activity in Khok Hin Lad community forest had been found that area-based learning focuses on equality and equality in learning, the focus is on developing the perceived potential of the learners together primarily. All 7 activities had been designed for all students to work together and learn together in a systematic manner which consists of the concept of Piyajan, P. (2017) said that the teaching and learning environment should be aware of the importance of all groups of people. Thongkaow, K., (2015) has suggested that area-based learning is learning that is linked to the natural resources and environment, all students learn equally, through the same activity process. Mae Fah Luang University (2014) has suggested that organizing an educational curriculum in area-based learning. It is a guideline for educational reform to developing human resources for maximum efficiency. This is consistent with the research of Sudthiboon, P., et al., (2015) found that academic achievement of male and female students studying, there is no difference in the average achievement score after study. Thammarongrat et al., (2013) found that students with different gender were no different perceptions of these three factors. Rodjapod, K. (2012) found that Mahasarakham University undergraduate students had different gender, were no different analytical capabilities. Utthawang, P., et al., (2012) found that the level of knowledge about environmental conservation among students of different genders after school is no different. The results of the study and comparison of knowledge about Khok Hin Lad community forest of students with

different gender were no different of knowledge. Showed that different gender did not affect the knowledge of the students.

6.2.2 The students with different gender, were no different in environmental ethics. Due to environmental learning activities in Khok Hin Lad community forest by using area-base learning, is an activity that has been developed to be effective according to the criteria inserting environmental ethics through organizing a 7steps field learning activity. All students will be given an equitable learning test, which upholds the equal distribution of rights and duties. Activities consist of missions and obstacles that everyone in the group must cooperate within doing the activity by Kohlberg, L. (1981) has suggested that ethics are the basis of justice, add fun and interest to the learning committee activities, where the area will be mediate, resulting in students having environmental ethics which consist with the research of et al., (2020) found that teacher candidates with different gender, were no different level of environmental ethical awareness Guricin, C.& Joy, O. S. (2020) The results of the study showed that Teacher applicants with different genders There is a no different level of environmental ethical awareness. And Keles, O., et al., (2016) found that the third year and fourth year science teacher students from 12 universities with different gender, were no different level of environmental ethics which contradicts the study results of Shounchupon, A. (2014) found that male students and female students had different results in developing environmental ethics. Karakaya, F., et al., (2017) found that science teachers of different gender were different in environmental ethics which showed that environmental learning activities in the Khok Hin Lad community forest by using area-based learning to be effective in developing environmental ethics of students participating in learning activities. The learning process follows the principles and processes of environmental education and students with different gender does not affect the level of environmental ethics.

6.2.3 The students with different gender, were no different from environmental volunteers. As a result of designing creative activities using area-base learning, can create self-study, building environmental volunteers through hands-on activities within the group, and creating situations for students to be continually absorbed in volunteers. This is consistent with the concept of Sriboriboon, N. (2007) has given the meaning of volunteers as a person's consciousness towards society. Chatpraphachai, K. (2017) said the volunteers or the public consciousness be aware, is a mind that is not still absorbed in society or the suffering of the people and wish to help. Minanon, R., et al., (2013) mentioned that the creation of a volunteer spirit of volunteers should be strengthened by cultivating awareness of the importance of volunteering. The students with different gender were no different in volunteers which is consistent with the study results of Kaewngam & Wongchantra, P. (2018) found that male and female students have skills as environmental volunteer leaders no different. Srisoonthornwohan, S. (2013) found that the students with different gender were no differences in public mental behavior overall. Wongchantra, P. et al., (2020) found that the male and female students had no differences in their environmental volunteer scores. Panetrum, S. (2016) found that when classified by gender found that there was no difference in thinking about volunteer behavior. Shows that the effects of environmental education learning activities in Khok Hin Lad community forest using area-base learning is an activity that moves in a good direction, the activities can spread the creation of environmental volunteers to all students equally and equally. All of them were experienced equal and gender did not affect the environmental volunteers of the students.

*6.3 The Results of the Study and Comparison of Knowledge about Khok Hin Lad Community Forest, Environmental Ethics, and Environmental Volunteers, from Learning Activities on Environmental Education in Khok Hin Lad Community Forest Using Area-Base Learning of Undergraduate Students with Different GPAs Found That:*

6.3.1 Students with different GPAs, were different in knowledge about Khok Hin Lad community forest. In which the effects of environmental education learning activities in Khok Hin Lad community forest, students work together as a group. Along with an exchange of learning and lesson transcription with other groups of the students is the introduction of knowledge from various academics to relate to that subject for the sake of learning (Wongchantra, P., 2012) according to with the learning processes and elements of environmental education, consisting of environmental knowledge, the process of transferring knowledge on environment, target group and achieving environmental education objectives (Wongchantra, P., 2010). The learning outcomes of students with different GPAs-affected knowledge of Khok Hin Lad community forest may be due to the personal factors of the students who are interested in learning, or skills per learning that are different. As Sopakarn, S. (2007) found that each person has different knowledge and understanding of things, it depends on the readiness condition in each situation which is consistent with the research results of Suksakit, N. (2019) found that different cumulative GPAs affects factors that affect academic achievement. Boontam, A. (2018) found that nursing students with different GPAs had different scores for understanding how others felt. and Sriplaeg, C. (2019) found that the upper group of students had higher post-learning achievement than the weak students. Konlertworapong, P., et al., (2016) found that students with

different academic achievements have different motivations for achievement. The results of the study and comparison of knowledge about Khok Hin Lad community forest using area-base learning for 7 steps, resulting in students becoming more knowledgeable about the Khok Hin Lad community forest effectively, but the educational achievement factor of students is different resulting in students having different knowledge. This is a consequence of factors that arise from individuals with different experiences, interests, cognitive abilities.

6.3.2 The students with different GPAs, were no different in environmental ethics. This is the result of environmental education learning activities in Khok Hin Lad community forest by using area-based learning, designed to allow students to create experiences from learning from real areas along with inserting environmental ethical concepts through learning activities, review of experiences for students to review themselves. It is the use of learning areas that have been integrated into a stimulus for sensory stimulation, to create direct experiences leading to environmental ethical changes. Bruner, J. (1986) using the environmental education process as an intermediary to create an interesting learning style and is a step-by-step system (Junkaew, P., 1993) to give students a perspective on environmental conservation by adhering to the principle of generosity and create a balance and sustainability for Khok Hin Lad community forest, which environmental ethics is the principle that should behave towards natural resources and the environment, so that the natural environment can live in the equilibrium of nature, the environment that is living like the wind and sustainable (Wongchantra, P., 2012) which is consistent with the research of Suwannapradit, P., et al., (2018) found that students of Sichon Kunatharnwittaya School, Thung Prang Sub-district, Sichon District, Nakhon Si Thammarat Province, with different GPAs, were no different in environmental ethics. Showed that students with different GPAs, can learn and achieve environmental ethics is no different. Learning activities can create environmental ethics equally effectively.

6.3.3 The students with different GPAs, were no different environmental volunteers. This is a result of the effects of environmental education activities that focus on area-based learning and making learners a center of learning and use the natural classroom to build knowledge and experience of environmental volunteers to protect and restore forests Kok Hin Lad community without expecting anything in return, have a public consciousness sacrifice to the public and be generous to oneself and others. A systematic learning activity plans focus on spiritual building with the sacrifice of physical strength, mental energy, and intelligence (Wongsa, S., 2006). In which all students voluntarily do environmental volunteer activities, everyone is involved in activities that achieve the goals of every activity by Wanchaithanawong, W., et al., (2008) mentioned that volunteering is an action or thing that is beneficial to others without expecting compensation and happy to help others. Showed that generosity, the sacrifice of time, material, might, and intellect for public benefit (Wongpitak, T., 2013) which is consistent with the research of Wongdachanan, R., et al., (2018) found that students with different GPAs, were known to teach and learning to promote public consciousness. Pratoomthai, B., et al., (2018) found that 1st-3rd year medical students, Faculty of Medicine Vajira Hospital, with different GPAs, were no different public mind which showed that the process of learning environmental studies in Khok Hin Lad community forest by using area-based learning is a learning process that effectively interpolates the creation of environmental volunteer for students to be not biased or focused on a particular group.

### Acknowledgments

This research was completed thanks to the great kindness and help from the field of Environmental Education, Faculty of Environment and Resource Studies Mahasarakham University Center for Research and Training in Environmental Education And thank you to the Foundation for Environmental Education for supporting research funding throughout the course.

### References

- Abiolu & Oluremi Adenike. (2019). Environmental knowledge and behavior of Nigerian youth: An assessment. *Applied Environmental Education & Communication*, 18(1), 53-67. <http://dx.doi.org/10.1080/1533015X.2018.1432431>
- Araujo, U. (2012). Promoting ethical and environmental awareness in vulnerable communities: a research action plan. *Journal of Moral Education*, 41(3), 389-397. <http://dx.doi.org/10.1080/03057240.2012.691636>
- Boonserm, W., & Chanchalad, N. (2017). Promotion of tree ordination for community forest preservation for undergraduates. *New Trends and Issues Proceedings on Humanities and Social Sciences*, 4(1), 379-384. <http://dx.doi.org/10.18844/prosoc.v4i1.2279>

- Boontam, A., Songsawangthum, M., Anan, K., Chaopipat Y., & Boaleung, T. (2018). Understanding the Feelings of Others of Nursing Students in Bachelor of Nursing Science Program Phrapokkiao College of Nursing, Chanthaburi. *Journal of Clinical Medicine Education Center Phrapokkiao Hospital*, 35(3).
- Bruner, J. (1986). *Actual minds, possible worlds*. Cambridge, MA: Harvard University Press.
- Chatpraphachai, K. (2016). *Traffic laws that are worth knowing in 2016 In California*. Retrieved 2 March 2018, from: [www.sereechai.com/index.php/2013-05-01-06.../4436-2016-01-14-19-06-56](http://www.sereechai.com/index.php/2013-05-01-06.../4436-2016-01-14-19-06-56)
- Ekkathat, T., & Wongchuntra, P. (2017). The Study of Using Environmental Education Co-operative Education Manual. *Praewakalasin Journal. Kalasin University*, 4(2), 329.
- El Batri, B., Alami, A., Zaki, M., Nafidi, Y., & Chenfour, D. (2019). Promotion of the Environmental Knowledge and Behavior through the Moroccan Syllabus of Sciences in the Middle School. *International Electronic Journal of Elementary Education*, 11(4), 371-381. <http://dx.doi.org/10.26822/iejee.2019450795>
- Environmental Quality Development Association. (2016). *ZERO WASTE Zero waste can come true, not just a dream*. Bangkok, 14.
- Goralnik, L., Millenbah, K. F., Nelson, M. P., & Thorp, L. (2012). An Environmental Pedagogy of Care: Emotion, Relationships, and Experience in Higher Education Ethics Learning. *Journal of Experiential Education*, 35(3), 412-428. <https://doi.org/10.1177/105382591203500303>
- Green Global Institute. (2001). *Khok Hin Lad Community Forest Conservation Community*. Retrieved March 2, 2018. from <https://www.greenglobeinstitute.com>
- Guricin, C., & Joy, O. S. (2020). Determination of Teacher Candidates' Awareness of Environmental Ethics. *International Journal of Contemporary Educational Research*, 7(1), 346-361. <https://doi.org/10.33200/ijcer.643329>
- Henny, S. M., Hackett, J. D., & Porreca, M. R. (2017). Involuntary Volunteers: What Happens When You Require People to "Do Good?". *Journal of Service-Learning in Higher Education*, 6(1), 1.
- Johnson, M. K., Beebe, T., M., & Jeylan T., S. M. (1998). Volunteers in Adolescence: A Process Perspective. *Journal of Research on Adolescence*, 8(3), 309-332. [https://doi.org/10.1207/s15327795jra0803\\_2](https://doi.org/10.1207/s15327795jra0803_2)
- Junkaew, K. (1993). *Environmental Education*. Bangkok: Aksorn Siam LTD., Part, 44-46.
- Junkaew, K. (2004). *Integrated environmental management* (2nd ed.). Bangkok: Kasetsart-university-press, 32-33.
- Junkaew, L., Sookngam, K., & Praimee, U. (2020). The Development of Environmental Volunteers Spirit for High School Students. *Environmental Research Journal*, 14, 19-22. <https://doi.org/10.36478/erj.2020.19.22>
- Kaongam, S., & Wongchantra, P. (2018). *Development of environmental volunteer leadership training courses*. Office of Academic Resources Mahasarakham University, 587.
- Karakaya, F., & Yilmaz, M. (2017). Environmental Ethics Awareness of Teachers. *International Electronic Journal of Environmental Education*, 7(2), 105-115.
- Keles, Özgül & Özer, Nilgün. (2016). Determination of Pre-Service Science Teachers' Level of Awareness of Environmental Ethics in Relation to Different Variables. *International Journal of Environmental and Science Education*, 11(14), 7286-7297.
- Kohlberg, L. (1981). *The Philosophy of Moral Development: Moral Stages and the Idea of Justice (Essays on Moral Development, Volume 1)*. Hardcover – July 1, 595-603.
- Konlertworapong, P., Sriprasertsuk, A., Tripong, P., & Leelakitpaisarn, Y. (2016). Study of motivation for achievement of students. *Rom-Pruek Journal*, 34(3), 35-54.
- Kuanhaweche, B. (2002). *Educational Innovation No.6*. Bangkok: Department of Educational Technology Srinakharinwirot University, 92-94.
- Lisa M. R., & Cottine, C. (2018). Biological Impact and Ethical Implications of Pesticide Use: A Short Module for Upper-Division-Undergraduate Biochemistry Courses. *Journal of Chemical Education*, 95(10), 1771-1777. <https://doi.org/10.1021/acs.jchemed.8b00379>
- Mae Fah Luang University. (2014). *Summary of the implementation of the National Curriculum Reform Program*. Thai Traditional Medical Health Sciences Program, Mae Fah Luang University, 2.
- Master Plan under the National Strategy (10) *Issues of Value and Culture Modification* (2018–2037), 8.

- Miller. (2000). *Sustainable-Earth Worldview*. Retrieved March 28, 2018 from <http://songkhlato.com>
- Minanon, R., Ninpeng, N., Wiwatkamonchai, A., & Kemathad, C. (2013). *Development of volunteer spirit-building process for students of Boromarajonani College of Nursing, Chiang Mai (Research report)*. Chiang Mai: Boromarajonani College of Nursing, Chiang Mai, 94-102.
- Nissapho, P., Nuthongkaew, K., Onnotmethee, A., Sirimethee, P., & Nontaphanee, A. (2018). The performance according to virtues of students in Sichoncunathanvithaya School, Thungprang District, Sichon District, Nakhon Si Thammarat Province. *Journal of Buddhist Sociology, Periscope*, 3(1).
- Office of the Public Sector Development Commission and Thailand Productivity Institute. (2016). *A handbook of knowledge planning: from theory to practice*. Bangkok, National Productivity Institute, 5-6.
- Ozgul, K., & Nilgun, Ozer. (2016). Determination of Pre-Service Science Teachers' Level of Awareness of Environmental Ethics concerning Different Variables. *International Journal of Environmental and Science Education*, 11(14), 7286-7297.
- Panetrum, S. (2016). Opinions on the Volunteer Behavior of Teachers' Professional Certificate Program Faculty of Education, Saint John University. *Southeast Bangkok Journal*, 2(2), 34-43.
- Pimmas, S. (2018). Strategies for managing spatial studies. *Bodhi Research Journal*, 2(2), 15-38.
- Piyajun, P. (2017). Environmental Education: The learning process through equal action. *Environmental Journal*, 21(3), 38.
- Pratoomthai, B., Thuratham, B., & Poomyoo, T. (2018). Public psychology in medical schools: comparison among medical students in the 1-3 year of the Faculty of Medicine, Vajira Hospital. *Vajira Medical Journal: Journal of Urban Medicine*, 62(4), 327.
- Qutami, N. (2005). The Relationship between Medical Students' Cognitive Method of Thinking, Their Sex Their Academic Level and the Degree of Their Creative Thinking. *International Journal of Instructional Media*, 32(3), 225.
- Rodjapod, K., Tayruekam, S., & Chomya, R. (2012). Compare analytical thinking abilities and critical thinking abilities of undergraduate students Mahasarakham University, With different gender, year, and group. *Journal of Educational Measurement Mahasarakham University*, 18(1), 24.
- Saiyos, L., & Saiyos, A. (1995). *Educational research techniques* (4th ed.). Bangkok: Sureeriyasan Publisher.
- Sanphoo-nga, P., & Thitapanyo, P. (2020). A Model of Creating Buddhist Volunteer Spirit of Youth Volunteer in the Conservation of Nong Bua Village, Changphuak Sub-District, Suvanabhumi District, Roi-Et Province. *Journal of MCU Peace Studies*, 8(3), 1072-1083.
- Senphunga, P., & Thitapanyo, M. (2020). A model for volunteering for Ban Nong Bua youth in the conservation of Dong Thale Le-Don Yai community forest. *Journal of MCU Peace Studies*, 8(3), 1072-1083.
- Shouchupon, A. (2014). Learning Outcomes in Human Life and Environmental Ethics Development of Hospitality Students in the Aviation Industry Valaya Alongkorn Rajabhat University under Royal Patronage. *Journal of Graduate Studies Valaya Alongkorn Rajabhat University*, 8(2), 37.
- Sookkasem, T. (2001). *Study of operational conditions and problems of organizing environmental education activities in a medium-high school, Under the Department of General Education Buriram Province*. Khon Kaen University, 10.
- Sopakarn, S. (2007). *Factors Relating to Knowledge and Understanding of Sub-District Administrative Organization Personnel*. Faculty of Liberal Arts. Loei Rajabhat University.
- Sopakarn, S. (2007). *Factors related to the knowledge and understanding of personnel about the Tambon Administrative Organization*. Faculty of Liberal Arts. Loei Rajabhat University, 106-107.
- Sriboriboon, N. (2007). *Developing a Causal Model of Volunteer Mind Of high school students in schools under the Office of the Basic Education Commission*. Chulalongkorn University, Bangkok, 22-23.
- Srijumnong, S., Sri-ampai, P., & Chano, J. (2015). Developing Public Mind Curriculum for Lower Secondary School Classes Using Contemplative Education Methods. *Educational Research and Reviews*, 10(16), 2387. <https://doi.org/10.5897/ERR2015.2309>

- Sriplaeg, C. (2019). Effects of Deductive Learning Method in Mobile Learning Environment on English Learning Achievement and Learning Motivation of 4 th Grade Students with Different Learning Abilities. *Journal of Education Studies*, 47(3).
- Srisoonthornwohan, S. (2013). Public mind of students at Pathumthani University. *Academic Journal Pathumthani University*, 5(1), 19-28.
- Suksakit, N. (2019). *Factors affecting academic achievement according to student opinion Vocational certificate level Commercial field of vocational schools*. This thesis follows the Master of Education program Educational Administration and Educational Leadership Program, Graduate School, Siam University, 73-74.
- Sutthiboon, P., Thamsenanupa, P., & Wongchantra, P. (2015). The Development of Environment learning Model by Natural Resources and Environment Conservative Tourism for the High School Students. *Journal of Education Mahasarakham University*, 9(3), 205.
- Sutthiboon, P., Thamsenanupap, P., & Wongchantra, P. (2015). The Development of Environment learning Model by Natural Resources and Environment Conservative Tourism for the High School Students. *Journal of Education Mahasarakham University*, 9(3), 197-208.
- Tammarongrat, P., Wattanachaiyot, M., & Kanchanathavorn, K. (2013). Factors of Learning Music after Music Students' Perception at Thaksin University Songkhla Campus. *Thaksin University Library Journal*, 3(1), 146.
- Tongkow, K. (2004). *Planning system for the development of educational administration efficiency of local administrative organizations*. Bangkok, Office of the Education Council Secretariat Ministry of Education, 34-56.
- Tongkow, K. (2015). Area-Based Educational Management: Concept, Guideline and Case Studies. *Suratthani Rajabhat Journal*, 2(2), 23-40.
- Utthawang, P., Wongchantra, P., & Neungchalerm, P. (2012). The Multiple Intelligences Integrated Learning of Environmental Education to Promote Knowledge, Attitude, and Awareness about Environmental Conservation of Chiang Mai Rajabhat University Students. *The Social Sciences*, 7(2), 308-315. <https://doi.org/10.3923/sscience.2012.308.315>
- Vanichbuncha, K. (2002). *Statistical analysis: statistics for administration and research* (6 th ed.). Dharmasarn Printing Company, 105.
- Vikas, M., & Rutuja, M. S. (2017). The Effect of SSC Model on Environmental Cognition. *Psychol Behav Sci Int J*, 2(5), 555597. <https://doi.org/10.19080/PBSIJ.2017.02.555597>
- WanChaitanawong, W., Thanasuwan, P., & Pipatthanawong, W. (2008). *Development of volunteer spirit-building process for students of Boromarajonani College of Nursing, Chiang Mai (Research report)*. Chiang Mai: Boromarajonani College of Nursing, Chiang Mai, 11.
- Wata, U. (2017). Strategies for the development of a network of villagers in community forest conservation, Maha Sarakham Province. *Chophayom Journal*, 28(2), 25.
- Wata, U. (2017). Strategy for developing a network of villagers in community forest conservation, Maha Sarakham Province. *Chophayom Journal*, 28(2).
- Wongchantra, P. (2010). *Environmental science*. Mahasarakham: Mahasarakham University Press, 357.
- Wongchantra, P. (2012). *Environmental science* (1st ed.). Faculty of Environment and Resource Studies Mahasarakham University. Mahasarakham University, 216-221.
- Wongchantra, P. (2012). *Environmental science*. Faculty of Environment and Resource Studies Mahasarakham University. Mahasarakham University.
- Wongchantra, P. (2017). The learning activities of green university for environmental education undergraduate students. *New Trends and Issues Proceedings on Humanities and Social Sciences*, 4(1), 385-391. <https://doi.org/10.18844/prosoc.v4i1.2280>
- Wongchantra, P. (2015). *Environmental ethics*. Mahasarakham: Mahasarakham University Press, 195.
- Wongchantra, P., & Nuangchalerm, P. (2011). Effects of Environmental Ethics Infusion Instruction on Knowledge and Ethics of Undergraduate Students. *Research Journal of Environmental Sciences*, 5(1), 77-81. <https://doi.org/10.3923/rjes.2011.77.81>

- Wongchantra, P., Wongchantra, K., Kaeongam, S., Ongon, S., Junkaew, L., Sookngam, K., & Praimee, U. (2020). The Development of Environmental Volunteers Spirit for High School Students. *Environmental Research Journal*, 14, 19-22. <https://doi.org/10.36478/erj.2020.19.22>
- Wongdachanan, R., Srinog, S., & Promkhun, W. (2018). Instructional management to promote public consciousness of late students Secondary Education Year 3 Donmuang Thaharnargardbumrung School, Don Mueang District, Bangkok. *Journal of Educational Review Faculty of Education in MCU*, 5(1), 89-100.
- Wongpitak, T. (2013). *Effects of Psychosocial Factors on Volunteer Spirit Behavior of Undergraduates at Srinakarinwirot University*. Master's Project, M.Ed. (Developmental Psychology). Bangkok: Graduate School, Srinakarinwirot University, 63-78.
- Wongsa, S. (2006). *The study of achievement in learning science Of Mathayomsuksa 1 students who studied in a quest for knowledge*. Master of Education Thesis, Major in Curriculum, and Instruction Mahasarakham University, 77.
- Wongyai, W. (2011). "Volunteerism". Teacher Encyclopedia honors His Majesty on the occasion of the 7 rounds of the auspicious royal ceremony on 5 December 2011. Bangkok, The Teachers Council of Thailand Secretariat, 233-237.

### Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).