

Full Length Research Paper

A development of participation of primary school students in conservation of school environments

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Received 24 July, 2015; Accepted 24 August, 2015

This study aimed to investigate and compare knowledge, attitudes and participating behaviors of students who participated in a training session. A training manual based on the participatory process was used. The sample consisted of 30 grade 5 students and 30 grade 6 students using a voluntary sampling technique. Research instruments included 1) a training manual for participation in environmental conservation, 2) a test on knowledge about environment, 3) scale on attitudes towards participation in environmental conservation, and 4) a questionnaire about participatory behaviors in environmental conservation. The major findings revealed that the developed training manual had an effectiveness index of 0.586. The students as a whole and as classified according to sex and grade level showed gains in knowledge, attitudes and behaviors before participating in the training session. The female students indicated more knowledge as a whole and in 3 aspects: garbage and sewage disposal, water conservation, and chemical usage than the male students. The grade 6 students evidenced more knowledge in the aspect of energy conservation than the grade 5 students. But these two groups of the students did not indicate attitudes and behaviors differently. Also, the statistical interactions of sex with grade level on knowledge and behaviors were found to be significant.

Key words: Participation in environmental conservation, knowledge, attitudes, behaviors.

INTRODUCTION

Natural resources are very essential to human lives and are supporting things for promoting all prosperity of humans. Natural resources such as soil, water, air, minerals, forests, wild animals, etc, are natural heritage which influence indirectly and indirectly on human lives (Singh, 2013; Simmons, 2000). Humans rely on the environments as a basis for living and learning to improve and modify or create natural resources for accommodating their appropriate existence such as shelter, clothing and drugs. The appropriate consumption of

natural resources for living has evolves gradually by using the science processes which provides valuable knowledge for people or community to wisely use natural resources and environments (Ministry of Natural Resources and Environment, 2005). These wise usages could result in stabilities in economy, good consumption and good life quality. Otherwise, a country or a community lacks natural resources, or people lack knowledge and understanding, and are unaware of over-consumption and lack responsibility in using and maintaining the

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natural resources this will result in wasted natural resources leading to lack of natural resources, low quality of life, and inevitably competitive consumptions of limited natural resources. (Office of Natural Resources and Environmental Policy and Planning, 2008). The current situations of environment have unavoidable impacts on humans and animals and cause the world to face with intensified environmental problems which cannot be solved sustainably. (Chanakul and others, 2008; Barnett, 2003). Many countries are faced with problems with different levels of severity which impacted human life quality, depending upon increased population, economic expansion, technological advancement and deficiency of ineffective processes of environmental management (Suparat, 2010). In many instances, some environmental disasters are caused by the effects of the rapid development without environmental consideration which inevitably affects human living. In solving the environmental problems, therefore, it is a duty and responsibility of every citizen to work cooperatively for preventing future problems (Duvall and Zint, 2007).

In Thailand, the promotion and development of the quality of environments and solving environmental problems in the past, only the government agencies had a sole responsibility without participations from all valued sectors especially the public sector. The lack of public participation is due to people lack knowledge and understanding, awareness, attitudes towards self – action to environment, and a sense of responsibility in environmental conservation (Louber et al., 2001). In order to solve the problems, the people must become knowledgeable and understandable about an environmental education in all areas, as well as apply them in daily life and solving problems correctly (UNESCO, 1978) An appropriate approach is an organization of teaching and learning according to environmental education in order to develop the learners' knowledge and understanding, awareness and problem – solving skills. When they become adult citizens, they will have conscience, awareness and values and help cooperatively preserve natural resources for a long – term sustainment (Ferkany and Whyte, 2012; Sanera and Shaw, 1999). Therefore, the researcher is interested in holding a training session for promoting knowledge about environments, attitudes towards participation in environmental conservation and participatory behaviors in environmental conservation of primary school students.

Objectives

1. To study and compare knowledge, attitudes, and behaviors in environmental conservation before and after

using the training manual based on participation of the students as a whole and as classified according to sex and grade level.

2. To compare knowledge, attitudes, and behaviors in environmental conservation of the students with different sexes and grade levels.

RESEARCH METHODOLOGY

Population and sample

The sample consisted of 60 (30 each) grades 5 and 6 students, obtained using Howell formula (Howell, 2007). They voluntarily participated in the training session. These sample students were selected from a population of 320 students, attending Khueangnai (Chareonrat) School in Khueangnai District, Ubon Ratchatani province, Thailand.

Study variables

Independent variables included sex and grade level-grade 5 and grade 6. Dependent variables included knowledge about environment, attitudes towards environmental conservation, and participatory behaviors in environmental conservation.

Research instruments

The instruments are as follows: a training manual on participation in environmental conservation with assigned activities based on 5 participatory processes: problem perception, planning, implementing, profit participation, and evaluation; a multiple - choice test on knowledge about environment with 40 items, and 4 aspects: garbage and sewage disposal, water conservation, chemical usage and electricity conservation, and with difficulty values ranged between 0.24 and 0.60, item discriminating values ranged between 0.24 and 0.48, and individual and total reliabilities ranged between 0.802 and 0.862; a rating – scale questionnaire about attitudes towards participation in environmental conservation with 45 items and 4 aspects: garbage and sewage disposal, water conservation, chemical usage and electricity conservation; and with item discriminating values (item - total correlation) ranged between 0.30 and 0.72, and individual and total reliabilities ranged between 0.833 and 0.862; a rating – scale questionnaire about participatory behaviors in environmental conservation with 32 items and 4 aspects ; garbage and sewage disposal, water conservation, chemical usage, and electricity conservation ; and with item discriminating values ranged between 0.34 and 0.79, and individual and total reliabilities ranged between 0.827 and 0.868.

Data collection

The three developed instruments were administered to the sample students at the first day of the training session – as pretest scores. The training session were lasted for two days from January 11 – 12, 2014. During participation in the session, the students were doing various activities such as lecture, VDO – watching , small group

discussion, survey of school environments, and role – play. Two instruments (except for the behavior questionnaire) were administered to the students at the end of the session – as immediately posttest scores. The behavior questionnaire was administered to the students after two months of the training session (March) as delayed posttest scores. In addition, the students presented their group projects on solving school environments in the areas of garbage and sewage disposal, water conservation, chemical usage, and electricity conservation.

Data analysis

All collected data from the pretest and posttest administration were analyzed as follows: The test on knowledge of environment from pretest and posttest periods was scored and the scores were used for the calculation of an effectiveness index. The attitude questionnaire was scored as strongly agreed (5), agreed (4), uncertain (3), disagreed (2), and strongly disagreed (1). Also, a mean score from this questionnaire is interpreted as follows.

Mean interval	Meaning
4.51 – 5.00	strongly agreed
3.51 – 4.50	agreed
2.51 – 3.50	uncertain
1.51 – 2.50	disagreed
1.00 – 1.50	strongly disagreed

The behavior questionnaire was scored as always, with participation given a score of 4, frequent participation a score of 3, sometime participation a score of 2, and never participation a score of 1. Also, a mean score from this questionnaire is interpreted as follows:

Mean Interval	Meaning
3.51 – 4.00	always participation
2.51 – 3.50	frequent participation
1.51 – 2.50	sometime participation
1.00 – 1.50	never participation

The posttest scores from the instruments were analyzed to test assumptions of the Two-way MANCOVA and ANCOVA in terms of correlation of dependent variables, homogeneity of variance, homogeneity of regression slope, and homogeneity of variance - covariance matrices. The test results confirmed the assumptions at the .05 level of significance.

The scores from the instruments were tested for the difference between the pretest and the posttest measures using the paired t-test according to the whole students, sex and grade level of the students.

The posttest scores from the instruments were analyzed for testing the hypothesis stated that the students with different sexes

and grade levels had different knowledge, attitudes and behaviors using the F-test (Two-way MANCOVA and ANCOVA).

FINDINGS

The training manual had an effectiveness index of 0.586, showing that students progressed their learning at 58.6 percent. The students as a whole and as classified according to sex and grade level showed gains in knowledge, attitudes and behaviors in overall and in each aspect from before participating in the training session ($p < .001$). The female students had the whole knowledge and in 3 aspects : garbage and sewage disposal, water conservation, and chemical usage more than the male students ($p \leq .036$). However, the students with different sexes did not show different attitudes and behaviors in overall and in each aspect (Tables 1-4). The grade 6 students indicated the whole knowledge and in 3 aspects: garbage and sewage disposal, water conservation, and chemical usage ; and attitudes towards electricity conservation more than the grade 5 students. However, the two groups of the students did not evidence behaviors differently.

There were statistical interactions of sex with grade level on the whole knowledge and in the aspect of chemical usage and the whole behaviors and in the aspect of chemical usage and the aspect of electricity conservation ($p < .01$ and Tables 1-4).

DISCUSSION

This study had illustrated the positive influences of the training manual on knowledge, attitudes and behaviors of the students. Some discussions were presented in details as below.

Firstly, the students as a whole and as classified according to sex and grade level showed gains in environmental knowledge, attitudes towards environmental conservation and participatory behaviors in environmental conservation from before participating in the training session was supported by findings found that the students who participated in the training session using an environmental training manual, an activities environmental learning manual, or a camping manual had more knowledge about environmental pollution (Ratanapaiboon, 2006), waste disposal knowledge and safety food selection (Bupphapan, 2008), environmental knowledge (Prerdproa, 2009), and knowledge about electricity conservation and waste disposal (Bunprasert, 2012), than before attending the training session. This might be due to the training manual had various activities such as

Table 1. Comparison of knowledge, attitudes and participation behaviors in environmental conservation of the students with different sexes and grade levels.

Source variation	of	Test statistic	F	Hypothesis df	Error df	p	Partial Eta Squared
Pretest knowledge		Pillai's Trace	.420	3.000	51.000	.739	.024
		Wilks' Lambda	.420	3.000	51.000	.739	.024
		Hotelling's Trace	.420	3.000	51.000	.739	.024
		Roy's Largest Root	.420	3.000	51.000	.739	.024
Pretest attitude		Pillai's Trace	5.211	3.000	51.000	.003*	.235
		Wilks' Lambda	5.211	3.000	51.000	.003*	.235
		Hotelling's Trace	5.211	3.000	51.000	.003*	.235
		Roy's Largest Root	5.211	3.000	51.000	.003*	.235
Pretest behavior		Pillai's Trace	2.162	3.000	51.000	.104	.113
		Wilks' Lambda	2.162	3.000	51.000	.104	.113
		Hotelling's Trace	2.162	3.000	51.000	.104	.113
		Roy's Largest Root	2.162	3.000	51.000	.104	.113
Sex		Pillai's Trace	11.729	3.000	51.000	.001*	.408
		Wilks' Lambda	11.729	3.000	51.000	.001*	.408
		Hotelling's Trace	11.729	3.000	51.000	.001*	.408
		Roy's Largest Root	11.729	3.000	51.000	.001*	.408
Grade level		Pillai's Trace	14.434	3.000	51.000	.001*	.459
		Wilks' Lambda	14.434	3.000	51.000	.001*	.459
		Hotelling's Trace	14.434	3.000	51.000	.001*	.459
		Roy's Largest Root	14.434	3.000	51.000	.001*	.459
Interaction		Pillai's Trace	4.874	3.000	51.000	.005*	.223
		Wilks' Lambda	4.874	3.000	51.000	.005*	.223
		Hotelling's Trace	4.874	3.000	51.000	.005*	.223
		Roy's Largest Root	4.874	3.000	51.000	.005*	.223

* significant at the .05 level.

giving lecture from experts and VDO watching, brain storming during a small group discussion, and practices of doing some activities based on a participatory process. These provided activities were relevant to the principles of learning by doing of John Dewey (Ausubel, 1968), and the principles of cooperative learning of Johnson and Johnson (1991). Each student had an opportunity to learn by himself or herself, had an inter-independence with other group members, and had cooperative learning. They could learn meaningfully and understand clearly what they learned. This gained knowledge might result in having attitudes towards environmental conservation which

caused changes in participatory behaviors in environmental conservation (Wimolsak, 2005; Rickinson, 2011).

Secondly, the male students and the female students did not indicate different environmental knowledge in some aspects, attitudes and behaviors was supported by findings found that the students with different sexes did not indicate different waste disposal knowledge, food safety selection, and attitudes toward waste disposal after attending the training session (Bupphapun, 2008). This might be due to the male students and the female students who generally had some different abilities and voluntarily participated in the training session had an

Table 2. Comparison of environmental knowledge about garbage and sewage disposal, water conservation, chemical usage and electricity conservation of students with different sexes and grade levels (Two-way ANCOVA).

Learning outcome	Source of variation	SS	df	MS	F	p	Partial Eta Squared
Garbage and sewage disposal	Pretest	.219	1	.219	.314	.578	.006
	Sex	3.235	1	3.235	4.644	.036*	.078
	Grade level	6.233	1	6.233	8.947	.004*	.140
	Interaction	1.521	1	1.521	2.183	1.450	.038
Water conservation	Pretest	.045	1	.045	.072	.789	.001
	Sex	6.520	1	6.520	10.397	.002*	.159
	Grade level	7.643	1	7.643	12.189	.001*	.181
Chemical usage	Interaction	.446	1	.446	.711	.403	.013
	Pretest	.662	1	.662	1.000	.322	.018
	Sex	4.832	1	4.832	7.300	.009*	.117
	Grade level	11.887	1	11.887	17.958	.001*	.246
Electricity conservation	Interaction	3.133	1	3.133	4.734	.034*	.079
	Pretest	.922	1	.922	1.325	.255	.024
	Sex	1.788	1	1.788	2.568	.155	.045
	Grade level	.109	1	.109	.156	.694	.003
	Interaction	.120	1	.120	.172	.680	.003

*significant at the .05 level.

Table 3. Comparison of attitudes towards participation in environmental conservation in the aspects of garbage and sewage disposal, water conservation, chemical usage and electricity conservation of students with different sexes and grade levels (Two-way ANCOVA).

Learning outcome	Source of variation	SS	df	MS	F	p	Partial Eta squared
Garbage and sewage disposal	Pretest	.001	1	.001	.021	.886	.000
	Sex	.131	1	.131	3.001	.089	.052
	Grade level	.022	1	.022	.497	.484	.009
	Interaction	.067	1	.067	1.548	.219	.027
Water conservation	Pretest	.099	1	.099	2.137	.149	.037
	Sex	1.22E-05	1	1.22E-05	.000	.937	.000
	Grade level	.109	1	.109	2.243	.132	.041
Chemical usage	Interaction	4.637E-05	1	4.637E-05	.001	.975	.000
	Pretest	.013	1	.013	.329	.569	.006
	Sex	.001	1	.001	.022	.883	.000
	Grade level	.008	1	.008	.208	.650	.004
Electricity conservation	Interaction	.010	1	.010	.239	.627	.004
	Pretest	.003	1	.003	.039	.843	.001
	Sex	.189	1	.189	2.740	.104	.047
	Grade level	.565	1	.565	8.212	.006*	.130
	Interaction	.219	1	.219	3.187	.080	.055

* significant at the .05 level.

Table 4. Comparison of participatory behaviors in environmental conservation in the areas of garbage and sewage disposal, water conservation, chemical usage and electricity conservation of students with different sexes and grade levels (Two-way ANCOVA).

Learning outcome	Source of variation	SS	df	MS	F	p	Partial Eta Squared
Garbage and sewage disposal	Pretest	.002	1	.002	.058	.811	.001
	Sex	.100	1	.100	3.292	.075	.056
	Grade level	.067	1	.067	2.214	.143	.039
	Interaction	.082	1	.082	.2.717	.105	.047
Water conservation	Pretest	.117	1	.117	2.523	.118	.044
	Sex	.012	1	.012	.249	.620	.005
	Grade level	.115	1	.115	2.468	.122	.043
	Interaction	.062	1	.062	1.333	.253	.024
Chemical usage	Pretest	.061	1	.061	.794	.377	.014
	Sex	.047	1	.047	.612	.437	.011
	Grade level	.001	1	.001	.016	.901	.000
	Interaction	.415	1	.415	5.377	.024*	.089
Electricity conservation	Pretest	.001	1	.001	.014	.905	.000
	Sex	.052	1	.052	.931	.339	.017
	Grade level	.040	1	.040	.720	.400	.013
	Interaction	.631	1	.631	11.291	.001*	.170

* significant at the .05 level.

opportunity to learn by doing and cooperating each others in a group of mixed sexes. Therefore, both sexes could equally gain in knowledge, attitudes, and behaviors.

However, the finding showed that the female students indicated more overall environmental knowledge and in 3 aspects: garbage and sewage disposal, water conservation, and chemical usage than the male students. This might be due to the nature of females did not resist to change as compared with the males (Erickson and Erickson, 1984). After the female students were taught and instructed to do for conservation of the environments, they were willing to change their attitudes and behaviors more frequently than the male students.

Lastly, the grade 6 students showed more posttest environmental knowledge in overall and in 3 aspects, and attitudes towards electricity conservation more than the grade 5 students was supported by the findings found that the students learned at a higher grade level had more environmental knowledge (Ratanapaiboon, 2006), environmental knowledge and environmental attitudes than the students learned at a lower grade level (Prerdproa, 2009). This might be due to the high grade level students had more environmental knowledge structure

(Ausubel, 1968), more experiences and attitudes towards environment, and more maturity and responsibility (Ausubel, 1968) resulted from in - class learning and out-of class learning than the lower grade level students.

However, the findings showed that the grade 6 and grade 5 students did not indicate different participatory behaviors in environmental conservation was supported by the finding found that the students with different grade levels did not indicate different behaviors in environmental conservation (Ngarmsriwong, 2007). This might be due to the principle stated that the behaviors may change as an individual has awareness or attitude (Schwartz, 1974). In other words, the affective behaviors influence the performance behaviors. Since these two groups of the students after attending the training session did not show different attitudes towards environmental conservation, therefore they did not have different behaviors.

RECOMMENDATION

Environmental problems have severe impacts on human living without considerations of age, sex, occupation and

so on. Young citizens should be educated about natural resources and environments in order to be adult citizens responsible for conservation of natural resources and environment. The contents of conservation of natural resources and environments should be learned effectively at primary education level by using an appropriate teaching method or holding a training session.

Conflict of Interests

The authors have not declared any conflicts of interest.

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