Development of an Environmental Education Model for Global Warming Alleviation

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Abstract: The Intergovernmental Panel on Climate Change (IPCC) predicted that if the process of greenhouse gases has continuously accumulated in the atmosphere, the resulting shifts in the composition of atmosphere will lead to change in the functioning of the world's climate system. The human activities are the main cause of the global warming. The human behavior is influenced by psychological traits and states. The purpose of this research was to study the influences of demographic characteristics, psychological traits and states and environmental education affecting to create the inspiration of having public mind for environmentally conservative behavior that could lead to develop an environmental education model for global warming alleviation. The populations were undergraduate students of academic year, 2010 of Mahasarakham University. The simple random sampling was employed to select the sample of 455 students from 33,682 students. The questionnaire was used as instrument for data collecting. Pearson correlation and Path analysis were used for data analysis. The results revealed that psychological traits in terms of goal of life showed the highest directly affected to inspiration in aspects of role model with 0.432 and it also showed the highest directly affected to the consumption behavior for global warming alleviation with 0.568 while role model showed directly affected to the consumption behavior for global warming alleviation with 0.555. Moreover, psychological states in terms of religion belief showed the highest directly affected to inspiration in aspects of role model with 0.529 and it also highest directly affected to impressive environment with 0.527. Additionally, psychological traits in terms of goal of life illustrated the highest directly affected to inspiration in aspects of impressive environment with 0.527 and psychological states in terms of religion belief illustrated the highest directly affected to inspiration in aspects of impressive environment with 0.562 while impressive environment showed directly affected to the consumption behavior for global warming alleviation with 0.629. Considering on environmental education, environmental attitude showed the highest directly affected to inspiration in aspects of role model with 0.574 and it showed also directly affected to inspiration in aspects of impressive environment with 0.637 and directly affected to the consumption behavior for global warming alleviation with 0.656.

Key words: Development, process, consumption behavior, human behavior, climate system, Thailand

INTRODUCTION

The Intergovernmental Panel on Climate Change (IPCC) predicted that if the process of greenhouse gases has continuously accumulated in the atmosphere, the resulting shifts in the composition of atmosphere will lead to change in the functioning of the world's climate system. The human activities are the main cause of the global warming (Confalonieri *et al.*, 2007). The environmental information from different sources about the cause of environmental problem and decreasing of natural resources includes global level, national level, city level, community level and household.

The environmental problem can not absolutely separate from individual level. The main of cause is revealed that the people have enough knowledge and understanding and lack of consciousness, awareness and attitude to practice proper behavior including to realize that they take very important parts to take responsibility for conservation of natural resources and environment (Thiengkamol, 2011). Generally, it is widely accepted that the sustainable society, economics, education and environment, therefore it needs to develop the quality of people before to consider to other aspects of development. Therefore, the human is the origin of development in all aspects then they will be impacted by the results of those development. The human is accepted to be a centered development of all aspects in society (Punthumnavin, 2008). Until presented, considering the major aim of development of Thailand, since the 8th National Economic and Social Development Plan paid an important function on promotion of economic development but it still emphasized on the issue of human resource development and competency building for all

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age of Thai citizen in order to decrease problem and obstacle of livelihood. Additionally, it included urban and rural development by introducing the principle of self-sufficiency economy to integrate in the 9th National Economic and Social Development Plan. Until, the 10th National Economic and Social Development Plan, it included the principle of participation of every sectors in Thai society and aimed to set Thai citizen as center of development in order to accomplish a sustainable economic and society based on the moral and ethics for living and conservation of natural resources and environment. These assisted to develop the quality of life of Thai people in various aspects that was consistent to principle of sustainable development in accordance to concept of conference of environment and development of United Nation since, 1992.

In Agenda 21 of global action plan mentioned that sustainable development is development which meets the needs of the presented without compromising the ability of future generations to meet their own needs (Office of National Economic and Social Development Plan, 2010; Watkinson, 2009; WCED, 1987; Volker, 2007; Thiengkamol, 2011).

In order to meet a sustainable development, it can be done through the environmental education process through all channels whether informal, formal, non-formal, life long education system, more over it included the mass media and internet but it needs to stress in the way of attitude changing and continuous implementation to develop permanent behavior of natural resources and environmental conservation (Thiengkamol, 2011).

Environmental education process will be able to train people to practice until they gain more knowledge and understanding, raise awareness, build consciousness, adjust attitude to be positive, take responsibility, make a proper and clear decision to participate and practice to conserve the natural resources and environment with public mind to devote themselves for public including having concept to distribute their knowledge, understanding, awareness and positive attitude to their families member and others to conserve the natural resources and environment as them (Elliot, 1995; Thiengkamol, 2011).

The intention of psychologists tried to understand on human behavior and then they had researched on the methods gathering through a large number of theories and models but they had the main focus on explanation how individual perceived and evaluated the stimulant before making decision to express his behavior. To study on human behavior, it is emphasized on the stage of perception and evaluation on stimulants and intervention factors that occurred from the stimulants that must occur before the behavior expression afterward. However in studying of human geography, it revealed that both physical and biological features are the stimulants to make

people express their behavior in different approaches of place, surrounding people and experience. These are unable to ignore, since the human and environment are deeply and tightly related to each other while environment plays a role as stimulant to make human to perform different activities. These activity expressions are influenced by these environments and it causes the change in the environment. Therefore, the human behavior was expressed by environmental influencing and also caused to make a change of environment. This might be called as environmental behavior characteristics (Suwan, 2006). The ability of understanding about behavioral occurrence or expression of human, it leads to predict and control the undesirable behavior or promote and build the desirable behaviors. Studying on cause of human behaviors there are different main guidelines. In this study, the researcher was interested in Interactionism model. In 1997, the academics in psychology, leading by David Magnusson and Norman S. Endler proposed the textbook called personality at the crossroads that compiled the theories of human behavior on integration of mind and states together (Punthumnavin, 2008; Magnusson and Endler, 1997; Magnusson, 1999; Magnusson, 2001).

The Interactionism model is a popular theory that was universal recognized including in Thailand because it helps the researchers to have a point of view on studying of causes of behavioral expression in different dimensions such as cause of mind, cause of states and cause of co-influence or interaction between characteristics of mind and state of actor.

The holistic interactionist paradigm offers a prospect where individual characteristics tend to be variable (Cervone, 1991; Magnusson, 2001; Pervin and John, 1990; Cairns, 1979). In a given situation, the activity of a person is a process of integration and complex adjustment of which the components; brain, perceptions and cognition (including automatic processes), emotions and values, physiological system and behavior, etc., interact between each other and in a functional way with the environment: physical and social aspects of situations, particularly those which are close and which are interpreted by the individual because they offer possibilities and constraints for adaptable responses (Cairns, 1979; Magnusson, 1999). The complexity of the processes at work implies that the operation of the organization cannot be explained by only one factor and rests on a group of psychological and biological processes of a holistic nature (Susman, 2001). A certain number of principles apply to individual development such as those of multi-determination, equi-potentiality and equi-finality of level (Pervin, 1999, 2001; Zuckerman, 1998) or of linear transformation and synchronization (Magnusson, 2001). From the literature reviews of behavioral science, it was found that the research was done on factors and causes

that affected behavior of conservation of natural resources and environment relating to psychological traits, psychological states and environment. At present, it is very rarely and there is no research is holistically integrative done about environmental education when it compared with other aspects of relating factors affecting to behaviors. Therefore, this research was designed to study by covering all factors relating as mentioned above, it would be able to develop a model of environmental behavior that happened from inspiration to have public mind that was affected by psychological traits, psychological states and environmental education principle.

Purpose of research: The purpose of this research was as follows:

- To study the influences of demographic characteristics, psychological traits and states and environmental education affecting to create the inspiration of having public mind for environmentally conservative behavior
- To develop an environmental education model for global warming alleviation

MATERIALS AND METHODS

The research design was implemented in steps by step as follows; the populations were 33,682 undergraduate students of the first semester in academic year, 2010 of Mahasarakham University. The 455 undergraduate students were collected by simple random sampling from different faculties of Mahasarakham University with the same proportion.

The research instrument was the questionnaire and it was used for data collecting. The content and structural validity were determined by Item Objective Congruent (IOC) with 5 experts in the aspects of environmental education, psychology, social science and social research methodology. The reliability was done by collecting the sample group from 50 undergraduate students of Rajabhut Mahasarakham University. The reliability was determined by Cronbach's Alpha. The reliability for psychological traits was 0.838 and psychological states was 0.910, environmental education was 0.937, inspiration was 0.805, behavior was 0.829 and the whole questionnaire was 0.969. The descriptive statistics used were frequency, percentage, mean and standard deviation. The inferential statistics used were t-test, one way ANOVA, Pearson correlation and Path analysis for data analysis

RESULTS

General characteristics of sample group: The sample group of this study was 455 undergraduate students that

were collected by random sampling technique from different faculties Mahasarakham University with the same proportion in the first semester of academic year of 2010. Most of them were female with 309 students (67.91%), most of them had Grade Point Average (GPA) between 2.50-2.99 with 179 students (39.69%) and most of them study in the field of social science with 176 students (38.68 %).

Comparison of demographic characteristics on inspiration of sample group: The demographic characteristics of sample in terms of sex, Grade Point Accumulation (GPA) and field of study of sample group presented as follows:

Comparison of inspiration between different sex of sample group: The demographic characteristics of sample in terms of sex, the comparison of inspiration between different sex of sample group was revealed that it was highly statistical significance (p<0.01) as shown in Table 1.

Comparison of inspiration among different GPA of sample group: The demographic characteristics of sample in terms of GPA, the comparison of inspiration among different GPA of sample group was revealed that it was no difference among different GPA of 1 to <2.50, 2.50 to <2.99 and ≥3.00 with statistical significance (p>0.05) as shown in Table 2.

Comparison of inspiration among different fields of study of sample group: The demographic characteristics of sample in terms of field of study included health science, science and technology and social science, the comparison of inspiration among different fields of study of sample group was revealed that it was highly statistical significance (p<0.01) as shown in Table 3.

Table 1: Comparison f inspiration between different sex of sample group

Sex	Number (n)	Mean	SD	t	Sig.
Male	146	3.402	0.897	3.710	0.000**
Female	309	3.653	0.827	-	-

**Statistically significant at the 0.01 level

Table 2: Comparison of inspiration among different GPA of sample group

Source of variation	Sum of square	df	Mean^2	F	Sig.
Between group	2.377	2	1.189	1.190	0.305
Within group	447.577	448	0.999	-	-
Total	449.954	450	-	-	-

Table 3: Comparison of inspiration among different fields of study of sample group

Source of variation	Sum of square	df	Mean^2	F	Sig.
Between group	53.008	2	26.504	29.875	0.000**
Within group	400.992	452	0.887	-	-
Total	454.000	454	-	-	-

**Statistically significant at the 0.01 level

Table 4: LSD multiple comparison of inspiration among different fields of study of sample group

				95% confidence interval	
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Each pair of variables	Mean diff (I-J)	SE	Sig.	Lower bound	Upper bound
Field 1 and 2	-0.61765703*	0.10411055	0.000**	-0.9006443	-0.4930247
Field 1 and 3	-0.77620318*	0.10991595	0.000**	-0.9629691	-0.5326198
Field 2 and 3	-0.15854614	0.11331045	0.162	-0.2727797	0.1708599

*Statistically significant at the 0.05 level; **Statistically significant at the 0.01 level

The LSD multiple comparison was used for analysis of each pair of inspiration among field of study of sample group. The differences of field of study included social science (Field 1), science and technology (Field 2) and health science (Field 3) to determine the mean score differences of their field of study, it showed that social science and science and technology were statistical difference (p<0.01) while social science and health science were statistical difference (p<0.01) including science and technology and health science were statistical difference (p>0.05) as shown in Table 4. Comparison of characteristics and consumption behavior of sample group are as follows:

Comparison of consumption behavior between different sex of sample group: The demographic characteristics of sample in terms of sex, the comparison of consumption behavior between different sex of sample group was revealed that it was highly statistically significant (p<0.01) as shown in Table 5.

Comparison of consumption behavior among different GPA of sample group: The demographic characteristics of sample in terms of GPA, the comparison of consumption behavior among different GPA of sample group was revealed that it was no difference among different GPA of 1 to <2.50, 2.50 to <2.99 and ≥3.00 with statistical significance (p>0.05) as shown in Table 6.

Comparison of consumption behavior among different fields of study of sample group: The demographic characteristics of sample in terms of field of study included health science, science and technology and social science, the comparison of consumption behavior among different fields of study of sample group was revealed that it was highly statistically significant (p<0.01) as shown in Table 7.

The LSD multiple comparison was used for analysis of each pair of consumption behavior among field of study of sample group. The differences of field of study included social science (Field 1), science and technology (Field 2) and health science (Field 3) to determine the mean score differences of their field of study, it showed that social science and science and technology were statistical significance (p<0.01) while social science and

Table 5: Comparison of consumption behavior between different sex of sample group

Sex	Number (n)	Mean	SD	t	Sig.
Male	146	3.465	0.696	4.141	0.000**
Female	309	3.755	0.699	-	-

**Statistically significant at the 0.01 level

Table 6: Comparison of consumption behavior among different gpa of sample group

Source of variation	Sum of square	df	Mean^2	F	Sig.
Between group	3.150	2	1.575	1.572	0.209
Within group	448.862	448	1.002	-	-
Total	452.012	450	-	-	-

Table 7: Comparison of consumption behavior among different fields of study of sample group

Source of variation	Sum of square	df	Mean^2	F	Sig.
Between group	26.936	2	13.468	30.143	0.000**
Within group	201.955	452	0.447	-	-
Total	228.892	454	-	-	-

**Statistically significant at the 0.01 level

health science were statistical significance (p<0.01) including science and technology and health science were no statistical significance (p>0.05) as shown in Table 8.

An environmental education model for global warming alleviation: The results revealed that psychological traits in terms of Goal of Life (GL) showed the highest directly affected to inspiration in aspects of Role Model (RM) with 0.432 and it also showed the highest directly affected to the consumption behavior for global warming alleviation (CB) with 0.568 while Role Model (RM) showed directly affected to the consumption behavior for global warming alleviation (CB) with 0.555. Moreover, psychological states in terms of Religion Belief (RB) showed the highest directly affected to inspiration in aspects of Role Model (RM) with 0.529 and it also highest directly affected to impressive environment (IV) with 0.527 as shown in Fig. 1.

Additionally, psychological traits in terms of Goal of Life (GL) illustrated the highest directly affected to inspiration in aspects of impressive environment (IV) with 0.527 and psychological states in terms of Religion Belief (RB) illustrated the highest directly affected to inspiration in aspects of impressive environment (IV) with 0.562 and affected to the consumption behavior for global warming

Table 8: LSD multiple comparisons of consumption behavior among different fields of study

Each pair of variables	Mean diff (I-J)	SE	Sig.	95% confidence interval	
				Lower bound	Upper bound
Field 1 and 2	-0.36880*	0.07340106	0.000**	-0.8222578	-0.4130563
Field 1 and 3	-0.53220*	0.07415048	0.000**	-0.9922129	-0.5601935
Field 2 and 3	-0.16340	0.08129426	0.162	-0.3812268	0.0641345

*Statistically significant at the 0.05 level; **Statistically significant at the 0.01 level
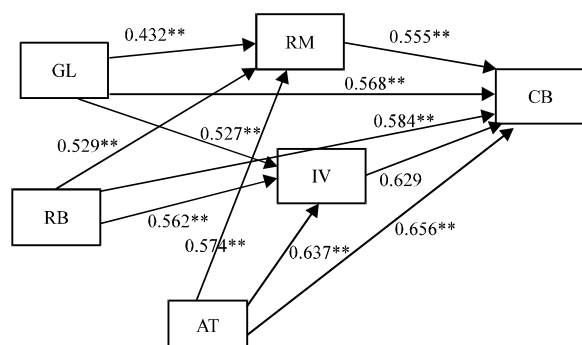

Fig. 1: An environmental education model for global warming alleviation; **Statistically significant at the 0.01 level

alleviation (CB) with 0.584 while impressive environment showed directly affected to the consumption behavior for global warming alleviation (CB) with 0.629 as shown in Fig. 1.

Considering on environmental education in aspect of environmental attitude (AT) showed the highest directly affected to inspiration in aspects of Role Model (RM) with 0.574 and it showed also directly affected to inspiration in aspects of impressive environment (IV) with 0.637 and directly affected to the consumption behavior for global warming alleviation (CB) with 0.656 as shown in Fig. 1.

DISCUSSION

The findings illustrated that for the demographic characteristics of sex, GPA and field of study, the female had better inspiration with mean score of 3.653 and male with mean score of 3.402. This might indicate that the female might be easily to stimulate to have inspiration to have public mind for changing the consumption behavior easier than male. After testing with Independent t-test, it was found that the mean score of female is higher than male with statistically significant (p<0.01). The result of comparison of inspiration among different GPA of sample group was revealed that it was no statistical significance (p>0.05). This might explain that there are no difference of consumption behavior among different GPA of students, therefore whether they got low, moderate or high, the same consumption behavior. Moreover, the comparison

of inspiration among different fields of study of sample group was revealed that it was highly statistical significance (p<0.01).

Regarding on consumption behavior, the female had better consumption behavior with mean score of 3.465 and male with mean score of 3.755. After testing with Independent t-test, it was found that the mean score of female is higher than male with statistically significant (p<0.01). This might indicate that the female might be easily to stimulate to change consumption behavior easier than male. The result of comparison of consumption behavior among different GPA of sample group was revealed that it was no statistical significance (p>0.05). This might explain that there are no difference of consumption behavior among different GPA of students, therefore whether they got low, moderate or high, the same consumption behavior.

Moreover, the comparison of consumption behavior among different fields of study of sample group was revealed that it was highly statistical significance (p<0.01), then the LSD multiple comparison was used for analysis of each pair of consumption behavior among field of study of sample group. It showed that health science and science and technology were statistical difference (p>0.05) while health science and social science were statistical difference (p<0.01) including science and technology and social science were statistical difference (p<0.01). This might explicit that the student of health science had a better consumption behavior than others but the science and technology had a better consumption behavior than social science. It might conclude that the students of field of health science and students of field of science and technology had learn about the environmental topic more than the students of field of social science, therefore they might gain more knowledge and understanding on environmental issues then they had more inspiration and better consumption behavior. From an environmental education model for global warming alleviation as shown in Fig. 1, the results showed that inspiration in terms of impressive environment (IV) showed directly affected to the consumption behavior for global warming alleviation (CB) with 0.629 and environmental education in aspect of environmental attitude (AT) showed the highest directly affected to inspiration in terms of Role Model (RM) with 0.574 and it

showed also directly affected to inspiration in aspects of impressive environment (IV) with 0.637 and directly affected to the consumption behavior for global warming alleviation (CB). This might conclude that whether factors of goal of life as psychological trait, religion belief as psychological states and environmental education in aspect of attitude directly affected to inspiration in terms of role model and impressive environment at highly statistical significance (p<0.01). Furthermore, factors of goal of life as psychological trait, religion belief as psychological states and environmental education in terms of attitude directly affected to consumption behavior at highly statistical significance (p<0.01).

CONCLUSION

Inspiration in terms of role model and impressive environment directly affected to consumption behavior at highly statistical significance (p<0.01). Therefore, in order to change consumption behavior can be done through inspiration in terms of role model and impressive environment based on goal of life as psychological trait, religion belief as psychological states and environmental education in terms of attitude.

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