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Based on Environmental Education to Study the Correlation between Environmental Knowledge and Environmental Value

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ABSTRACT

Global warming has aroused international emphasis in past years. The improvement in global environmental problems is urgent, and the promotion of environmental education is an important route to enhance humans' environmental literacy and solve environmental problems. People have paid more attention to environmental education or environmental issues in management education, expecting to enrich people's environmental knowledge and environmental value through environmental education so as to change people's attitudes. In this case, people would naturally emphasize environmental issues, take behaviors beneficial to the environment, i.e. responsible environmental behaviors, particularly the environmental knowledge of the next generation, and cultivate the habit to protect the environment. Aiming at students of Central University of Finance and Economics, total 360 copies of questionnaire are randomly distributed, and 288 valid copies are retrieved, with the retrieval rate 80%. The research results show significant and positive correlations between 1.environmental education and environmental knowledge, 2.environmental knowledge and environmental value, and 3.environmental education and environmental value. According to such results, suggestions are proposed, expecting to find out the effect of environmental education on people's environmental knowledge and environmental value and have relevant environmental units find specific ways to strengthen the citizens' responsible environmental behaviors.

Keywords: environmental education, environmental knowledge, environmental value, action knowledge

INTRODUCTION

Most ethnic groups used to present "inexhaustible" opinions about and attitudes toward nature and environment. Such "inexhaustible" nature and environment provided survival, living, and even enjoyment for human beings, who had no idea about the source. Such unknown nature and environment offered humans with needs for survival and living (Fazli, Imani, Abedini, 2018; Singh, 2015; Romine, Banerjee, Barrow, Folk, 2012; Kamga et al., 2018; Elnashaie, 2018; Zhang et al., 2018; Marques & da Silva, 2017; Kopnina & Cocis, 2017). The lack of knowledge and technology had people rely on natural environment for the survival and living. The idea to rely on the "God" for survival and living became extremely strong. The first Earth Day reminded people that human behaviors seriously damaged the environment on the earth and threatened the survival of humans and other species. People, particularly consumers and developed countries, therefore were aware of the changes in the production and consumption habits. In other words, improper human behaviors were the cause of environmental pollution, and a lot of environmental problems were the by-product of people satisfying individual safety, comfort, status, power, effort saving, and joy. Such an idea inspired many behaviorists, who started to propose various technologies to correct human behaviors and protect the earth.

Contribution of this paper to the literature

- Environmental education teacher training institutions should hold trainings and studies related to course planning, design, and integration for in-service teachers' environmental education study, cultivating in-service teachers' professional ability of environmental education research and development.

- When promoting environmental education, teachers should be induced the potential, affirm the efforts, and enkindled the insistence and passion for environmental education. Teachers would not give up the mission because of not being materially rewarded.

- In environmental education teaching process, students should be encouraged to present opinions aiming at various environmental problems and guided deeper discussions aiming at different types of environmental knowledge and value so that students could re-clarify and construct the environmental value through criticism and comparison.

People, in past years, have gradually paid attention to environmental education or environmental issues in management education, and consumers also stress more on the possible impact of purchase decisions on the environment. The government and public sectors have made a lot of efforts to enhance the development of environmental education, aiming to enrich the citizens' environmental knowledge and environmental value through environmental education to change the attitudes. People therefore would naturally emphasize environmental issues and take beneficial behaviors to the environment, i.e. responsible environmental behaviors, particularly the environmental knowledge and the environmental protection habit of the next generation. Although there are more environment-friendly products nowadays and more consumers present positive attitudes towards environmental issues and green consumption, the actual consumption is full of contradiction and inconsistency. Would the promotion of environmental education have people present responsible environmental behaviors? From the observation of the real society, the environment is worsening and environmental incidents happen endlessly, while people seldom develop responsible environmental behaviors. For this reason, this study intends to discuss the correlation among environmental education, environmental knowledge, and environmental value, expecting to find out the effect of environmental education on people's environmental knowledge and environmental value and have environmental units find specific ways to strengthen the citizens' responsible environmental behaviors.

LITERATURE AND HYPOTHESIS

Environmental Education

Pandit, Dhakal, and Polyakov (2015) proposed the essence of environmental education that humans should know the environment through education and present awareness and consciousness about the relationship between subjective desires & needs and the environment, as well as correct and reflect the attitudes towards and value of the pursuit and utilization of natural environment. Baumgartner (2014) specifically explained that environmental education was not simply to objectively know the environment, but objectively know and understand the relationship between humans' subjective desires & value and the environment as well as be aware of and cultivate how to self-constrain and self-reflect the permanent relationship between human survival & living and natural environment. Siew et al. (2015) indicated that the entire education essence and content should present science and humanity, especially the philosophy knowledge among natural environment, natural rules, and natural law. Pluess (2015) argued that environmental education should not simply focused on knowing the scientific knowledge of objective environment and the technique to deal with environment problems. Zorrilla-Pujana and Rossi (2014) indicated that balance, limitation, extremity, and relativeness in natural law as well as the awakening and reflection of humans' self-desire and value, from the aspect and viewpoint of humanity, were the major and essential problems and issues faced and emphasized in future environmental education. Gomez (2015) regarded environmental education as proper understanding, attitudes, and accomplishment of humans toward the environment. From certain aspect, it did not have personal choice or freedom. Specifically speaking, it should be the education or accomplishment which everyone should accept; essentially, it presented compulsion and national needness. Kendra and Marianne (2014) mentioned that the content and requirement were not to satisfy individual interests or needs, but to educate and shape the knowledge, cognition, attitudes, and accomplishment of a person, in the world or on the earth, facing the common natural environment or earth of human beings. In other words, Varela-Losada, Vega-Marcote, Perez-Rodríguez, and Alvarez-Lires (2016) pointed out the compulsory character of environmental education, whose contents showed human communality and were different from general scientific education, skill education, or general knowledge education.

Referring to Wee, Mason, Abdilla, and Lupardus (2016), the following dimensions are proposed in this study for environmental education.

(1) Natural system: General concepts of environment, earth, and biosphere.

(2) Earth resources: The distribution, consumption, management, conservation, and pollution of natural resources.

(3) Human-environment: Humans are a part of the environment that regulations should be made to establish environmental value.

Environmental Knowledge

Environmental knowledge is not a primary factor in consumers' environmental behavior (Kopnina, 2014); however, few researchers reveal different opinions (Damerell, Howe, & Milner-Gulland, 2013). For instance, Ramdas and Mohamed (2014) discovered that consumers with richer environmental knowledge were more possible to engage in purchase behaviors beneficial to the environment. Similarly, Joanne and Erminia (2015) indicated that consumers who purchased organic food once a week presented more knowledge about environmental products than those seldom purchased organic food. In the research on consumers' choices of drinks, Aminrad, Zakariya, Hadi, and Sakari (2013) discovered that consumers with high environmental awareness would most possibly purchase drinks with packages beneficial to the environment. For this reason, environmental knowledge was a prerequisite when engaging in beneficial behaviors to the environment. Besides, the lack of environmental awareness would be restricted the beneficial behavior to environment. Perez-Belis, Bovea, and Ibanez-Fores (2015) regarded environmental knowledge as an interdisciplinary subject, which was induced the knowledge from nature, social science, and anthropology; sometimes, it would involve in morality of value and power allocation that it covered broadly, including food, clothing, housing, and transportation of humans. In this case, knowledge related to living and environment could be regarded as environmental knowledge (Hanisch, Rank, & Seeber, 2014).

Referring to Cheng and Wu (2015), the following cognitive dimensions are covered in environmental knowledge in this study.

(1) General knowledge: including the knowledge about the entire environment, e.g. history and ecology of natural environment, social history, and human ecology.

(2) Problem knowledge: containing resources in natural environment and environmental problems caused by resource overuse.

(3) Action knowledge: covering types of environmental actions, solving problems with proper actions, and skills for environmental actions.

Environmental Value

Environmental value refers to "human belief, attitudes, and value to environment to lead and regulate humans' environmental behaviors", and environmental value should present the spirit and content of environmental ethics (Liu, Feng, & Chen, 2013). Individual value orientation of natural environment was the environmental value (Ardoin, Clark, & Kelsey, 2013). Individual value orientation of natural environment was the environmental value, but each person's intrinsic environmental value would affect the attitudes and intrinsic motivation to the environment and form the environmental paradigm (Sapci & Considine, 2014). Simmons and Widmar (2015) divided value into general value and environmental value and advocated that general value would affect environmental value, while environmental value would further influence environmental behaviors. In other words, personal value would affect attitudes, which would further influence the responsible environmental behaviors (Feng, Xindi, & Fushen, 2014). There were many factors in value, e.g. social factors (family, neighbors, peers), exosystem (media, political organizations), and macro system (culture, religion) (Pienaar, Lew, & Wallmo, 2015). For example, some researchers considered that collectivists concerned more about environmental protection than individualists (Kaffashi et al., 2015). Researchers indicated that Judaeo-Christian value was unfavorable to environmental protection (Wee et al., 2016). Kang and Moon (2014) proposed the value-belief-norm (VBN) model to explain the generation of responsible environmental behaviors. Vicente-Molina, Fernández-Sáinz, and Izagirre-Olaizola (2013) regarded environmental value as the special situations in the environment, overall environment, and the belief composition of people, affairs, and objects directly related to the environment. Generally speaking, environmental attitudes could be the behaviors performed by an individual or a group, based on the cognition of the environment, through emotion and motivation (Choi & Fielding, 2013). Wolters (2014) defined environmental value as individual opinions about the entire environmental value and the responsibility and role of humans in the environment to appear the emotional tendency of pro or con, like or dislike environment related affairs.

Referring to Ho (2013), environmental value is composed of following dimensions in this study.

(1) Cognitive component: Understanding and judgment of the environment.

(2) Affective component: Like/dislike emotion to the environment, with emotional tendency.

(3) Behavioral component: Behavioral tendency to the environment.

Correlation Research on Environmental Education and Environmental Knowledge

Gomez (2015) pointed out the ultimate objective of education as to change human behaviors. Most environmental education course plans accept the "knowledge-attitude-behavior" theory, i.e. believing in the increase in environmental knowledge being able to change personal attitudes toward the environment and to further generate responsible environmental behaviors. Environmental education therefore aimed to cultivate and enhance individual or group environmental knowledge (Yucel & Ozkan, 2016). Pandit et al. (2015) regarded environmental education as the educational process to improve environmental problems, mainly teaching people to know the relationship between people and natural environment & artificial environment and cultivate basic concepts to understand the knowledge, attitudes, and skills required for the interaction among culture, creature, and physical environment. Varela-Losada et al. (2016) mentioned that the promotion of environmental education had become the common trend globally. The practice of environmental education could assist people in understanding the ecological role in natural environment and the effect on the environment as well as taking rational preparation or presenting environmental knowledge for sequential management when encountering environmental problems (Hanisch et al., 2014). The following hypothesis is therefore proposed in this study.

H1: Environmental education presents significant correlations with environmental knowledge.

Correlations Research on Environmental Knowledge and Environmental Value

Joanne and Erminia (2015) pointed out the correlations between students' environmental knowledge and environmental value. Research also indicated the positive correlation, i.e. students with higher performance on environmental knowledge presented more active value to environmental problems (Kaffashi et al., 2015). In the research on elementary school students' environmental knowledge and value, Cheng and Wu (2015) indicated that the environmental knowledge had achieved above intermediate degree and revealed positive value on environmental problems. Simmons and Widmar (2015) mentioned that each environmental behavior could not be predicted with a variable a set; apparently, factors in environmental behaviors were complicated. It was necessary to enrich individual basic knowledge of the environment and environmental behaviors, skills, and knowledge to establish individual correct environmental value, cultivate the ability to analyze environmental problems, and think of factors in environmental behaviors so as to effective predict environmental behaviors and solve environmental problems. Accordingly, it is inferred in this study that environmental knowledge cognition would enhance environmental value (Liu et al., 2013). The following hypothesis is then proposed in this study.

H2: Environmental knowledge shows remarkable correlations with environmental value.

Correlation Research on Environmental Education and Environmental Value

Pluess (2015) pointed out the importance to understand students' environmental value in environmental education. According to research on environmental education, Wolters (2014) mentioned the importance to establish students' positive environmental attitudes and value for effectively practicing environmental education. Vicente-Molina et al. (2013) indicated that environmental education also taught people to make decisions when actually facing environmental quality related issues and to develop self-behavioral environmental value. Kang & Moon (2014) revealed the importance of establishing students' positive environmental value in education as it would help solve environmental problems and enhance environmental quality. Siew et al. (2015) stated that environmental education led and educated people how to live in the environment. From the viewpoint of ecology, deep environmental education referred to ecological philosophy, environmental ethics, and responsible environmental value (Feng et al., 2014). Ho (2013) regarded environmental education as the "integrated" education, rather than practicing for certain age groups or certain groups of people; it presented universality, lifelong, and integrity, integrated politics, economics, society, culture, and aesthetics, and was a kind of value and lifestyle (Pienaar et al., 2015). As a result, the following hypothesis is proposed in this study.

H3: Environmental education reveals notable correlations with environmental value.

RESEARCH METHOD

Method and Model

Test for goodness-of-fit in LISREL model is generally measured with overall model fit (i.e. external quality of model) and internal quality of model. In terms of overall model fit, the commonly used goodness-of-fit indicators contain (1) "χ^2 ratio (Chi-Square ratio), standing for the gap between theoretical model and expected value, which

Table 1. Model analysis result

	Evaluation indicator	Judgment standard	result
Overall goodness-of-fit	*p*-value	*p*-value > 0.05	0.000
	χ2/d.f.	< 3	1.671
	GFI	> 0.9	0.976
	AGFI	> 0.9	0.907
	CFI	> 0.9	0.962
	RMR	< 0.05, excellent to be < 0.025	0.015
	RMSEA	0.05~0.08 good excellent to be < 0.05	0.018
	NFI	> 0.9	0.927
	IFI	> 0.9	0.911

is better smaller than 3, (2) goodness of fit index (GFI) and adjusted goodness of fit index (AGFI), which is better close to 1, (3) root mean square residual (RMR), reflecting the square root of "residual variance/covariance mean", which is better smaller than 0.05, and (4) incremental fit index (IFI), which reveals good goodness-of-fit when being higher than 0.9.

Fit of the internal structure model is often used in LISREL, including (1) square multiple correlation (SMC) of individual manifest variable, as R2 of manifest variable and latent variable, which should be higher than 0.5, (2) component reliability (ρ) of latent variable, as the Cronbach's α of the observation indicators of latent variables, which should be higher than 0.6, and (3) average variance extracted of latent variable, which is calculated with the R2 sum of manifest variables of a latent variable divided by the number of manifest variables, revealing the percentage of latent variable being measured with manifest variables, which is better higher than 0.5.

Research Sample and Object

Aiming at students of Central University of Finance and Economics, 360 copies of questionnaire are randomly distributed, and 288 valid copies are retrieved, with the retrieval rate 80%. Central University of Finance and Economics is one of the national "211" key universities to which the Chinese central government has attached top priority for the 21st Century.

Reliability and Validity Test

Validity refers to a measuring scale being able to actually measure the degree which a researcher intends to measure. The common validity contains "content validity", tending to qualitative verification, "criterion validity", using identified external criterion and the correlation coefficient in the test for the evaluation, and "construct validity", used for evaluating the theoretical consistency of a measurement with other observable variables. The questionnaire content in this study is based on past theories and referred to the real situation to design the measuring tool, which could truly express the essence of affairs and complete representativeness, to ensure the questionnaire conforming to content validity. Besides, the ultimate commonality estimate of the Factor Analysis result is applied to test the construct validity of items, and the validity appears in 0.8~0.9, showing good validity test of this questionnaire.

ANALYSIS OF EMPIRICAL RESULT

Model Fit Test

With "maximum likelihood" (ML) estimate, the analysis result achieves the convergence. Overall speaking, the overall model fit indicators pass the test, **Table 1**, reflecting good external quality of model.

Path Relationship Test

In regard to the test of internal quality of model, SMC of manifest variables is higher than 0.5 (**Table 2**, **3**), revealing good measuring indicators of latent variables. Furthermore, latent variables of environmental knowledge, environmental education, and environmental value show the component reliability higher than 0.6, and the average variance extracted of dimensions is higher than 0.5 (**Table 4**), apparently conforming to the test requirement for fit of the internal structure model.

Table 2. SMC of variable to dimension

environmental knowledge		
general knowledge	problem knowledge	action knowledge
0.72	0.76	0.83

Table 3. SMC of variable to dimension

environmental education			environmental value		
natural system	earth resources	human-environment	cognitive component	affective component	behavioral component
0.75	0.80	0.86	0.77	0.79	0.82

Table 4. Component reliability and average variance extracted of variable

Item	environmental knowledge	environmental education	environmental value
component reliability	0.827	0.856	0.891
average variance extracted	0.83	0.85	0.89

Table 5. Linear Structural Relations Model analysis

Evaluation item	parameter/evaluation standard	result	t
internal fit	environmental education→environmental knowledge	0.874	27.39**
	environmental knowledge→environmental value	0.866	16.73**
	environmental education→environmental value	0.835	21.46**

Table 6. Hypothesis test

Research hypothesis	Correlations	Empirical result	P	result
H1	+	0.874	0.00	supported
H2	+	0.866	0.00	supported
H3	+	0.835	0.00	supported

From the model analysis result, **Table 5**, environmental education presents positive and significant correlations with environmental knowledge (0.874), environmental education reveals positive and remarkable correlations with environmental value (0.835), and environmental knowledge appears positive and notable correlations with environmental value (0.866) that H1, H2, and H3 are supported. The research hypothesis test is shown in **Table 6**.

CONCLUSION

The research results reveal that environmental education is the fundamental part, allowing students knowing and understanding objective and tangible environmental facts and phenomena, realizing how to deal with, solve, or prevent from environmental damage or worsening, understanding the essence of tangible natural environment, the unchanged abstract rules behind natural environment, and the status and role in natural environment, as well as cultivating environmental knowledge and environmental value to seek for getting along with natural environment permanently. The orientation and shaping of environmental value is the major objective, the final objective and pursuit of environmental education, as well as people getting along with natural environment without damaging the nature. Students spend about one-third of a day at schools that campuses naturally become the largest learning space for students. Under limited educational resources, administrators or teachers being able to well plan campus environment to match with campus environment for education could benefit students' physical and mental development as well as acquire environmental knowledge and intangible environmental value in the environmental education to develop the maximal learning effect.

SUGGESTION

Aiming at the important research results and findings, following practical suggestions are proposed in this study.

1. Environmental education teacher training institutions should hold trainings and studies related to course planning, design, and integration for in-service teachers' environmental education study, cultivating in-service teachers' professional ability of environmental education research and development, and enhancing in-service teachers' environmental education integration concepts and abilities.

2. When promoting environmental education, teachers should be induced the potential, affirm the efforts, and enkindled the insistence and passion for environmental education. Teachers would not give up the mission because of not being materially rewarded. Schools should create the affirmative and supportive climate and timely provide spiritual and material incentives so that teachers would devote themselves due to spiritual encouragement and support. Moreover, schools should provide environmental education trainings and even announce sharing opportunities for environmental education teachers present self-confidence on the stage and be touched with the growth.

3. In environmental education teaching process, students should be encouraged to present opinions aiming at various environmental problems and guided deeper discussions aiming at different types of environmental knowledge and value so that students could re-clarify and construct the environmental value through criticism and comparison. Extending and responding to environmental problems discussed in classes could gave the discussion in classes be deeper and more efficient. Students could respond to environmental problems in daily life and announce personal ideas by writing diaries. Teachers could effectively understand students' environmental knowledge and value with value sheets and diaries and give guidance and affirmation to students' environmental knowledge and value.

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