

# Study of the Effect of Environmental Education on Environmental Awareness and Environmental Attitude Based on Environmental Protection Law of the People's Republic of China

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## ABSTRACT

The rapid development of technology and economy in past years has largely enhanced the quality of life. However, the emergence of various social and environmental problems could be discovered when looking back. Implementing the idea of environmental education in school systems therefore becomes a primary issue to promote environmental education. In this case, the practice of governmental policies has to implement the idea of environmental education in school systems, provide complete and comprehensive resources, information, and channels for environmental education, and positively promote the practice of Environmental Protection Law of China and the legislation revision. Aiming at college students in Beijing City, total 322 students in 6 different departments of Minzu University of China are selected as the research objects for the 16-week (3hrs per week for total 48 hours) experimental teaching. Total 322 copies of questionnaire are distributed, and 287 valid copies are retrieved, with the retrieval rate 89%. The research results reveal significantly positive effects of 1.environmental education on environmental awareness, 2.environmental awareness on environmental attitude, and 3.environmental education on environmental attitude. It is expected to enhance environmental awareness, attitudes, and behaviors related to environmental education based on the revision of Environmental Protection Law of the People's Republic of China.

**Keywords:** environmental protection law, environmental education, environmental awareness, environmental attitude

## INTRODUCTION

Along with the advance of western industry, various countries largest developed the economy and accelerated the industrial process in the end of 1960s, when natural environment was seriously destroyed and lots of environmental problems appeared, e.g. water, air, and soil pollution, radioactive waste, and the flood of other toxic substances. After the long-term damage of natural environment, a lot of scholars proposed warnings and regarded it as the source of environmental consciousness. After then, people gradually concerned about global environmental resources and realized that such resources should not be squandered by human beings. The rapid development of technology and economy in past years has largely enhanced the quality of life. Nevertheless, the emergence of various social and environmental problems could be discovered when looking back. Rubbish war was everywhere in cities and the countryside and air and noise pollution, cadmium rice incident caused by polluted water quality were heard from time to time. It is definitely regulated in Article 6 of Environmental Protection Law of the People's Republic of China that "Citizens shall raise their awareness of environmental protection, adopt low-carbon and economical lifestyles, and conscientiously fulfill their obligation to protect environment". Accordingly, people notice that environmental problems could be thoroughly solved merely by establishing people's keen awareness and brand-new understanding of the living environment and cultivating the environmental action skills.

### **Contribution of this paper to the literature**

- To have students be glad to participate in environmental education learning and easily absorb the contents to pay attention to environmental education and promote the performance on environmental awareness, environmental attitudes, and environmental behaviors.
- Educational sectors could encourage schools holding environmental education related activities or contests related to the revision of Environmental Protection Law of the People's Republic of China to guide students developing the professions and creativity and establishing the awareness and behaviors to active understand the revision of Environmental Protection Law of the People's Republic of China.
- Schools should cultivate students' thinking and action abilities to participate in and improve environmental problems, design environment experience courses aiming at environmental protection issues.

Environmental education, particularly environmental law-related education, is the basic measure to promote environmental attitudes and environmental behaviors.

As a result, implementing the idea of environmental education in school systems becomes a primary issue to promote environmental education. The practice of governmental policies therefore has to base on legal empowerment. For the legal empowerment, the idea of environmental education should be implemented in school systems, citizens, communities, schools, non-profit organizations (NPO), government departments, and enterprises should be provided with complete and comprehensive resources, information, and channels for environmental education, and people should positively promote the legislation and revision of Environmental Protection Law of China. Past research on students' environmental awareness, attitudes, and behaviors related to Environmental Protection Law of the People's Republic of China was limited to largely impact the practice of environmental education in schools. Aiming at the revision of Environmental Protection Law of the People's Republic of China, this study intends to discuss the effect of environmental education on environmental awareness and environmental attitude.

## **LITERATURE REVIEW**

### **Environmental Protection Law of the People's Republic of China**

The following clauses are quoted in the standard content. The valid version of reference without a date is applied. The major terms and definitions in "Measures for the Administration of National Environmental Protection Standards Revision" (National Central Science and Technology [2017] No. 1) are described as below.

- (1) Pollution prevention techniques: The techniques to avoid or reduce pollutants in the production process in order to reduce the emission of pollutant.
- (2) Pollution control techniques: The techniques to eliminate or reduce the effect of pollutants on environment.
- (3) Environmental management measurement: The management and measures applied in enterprises to effectively prevent and control pollutants.
- (4) Available techniques of pollution prevention and control: The pollution prevention techniques, pollution control techniques, and environmental management measurement applied in the pollution prevention and control process, according to domestic environmental needs and economic standard in certain period, to have stable emission of pollutants achieving national standard of pollutant emission and the scale application.
- (5) Advanced available techniques of pollution prevention and control: The available techniques of pollution prevention and control should at least have the stable emission of a major pollutant be lower than 70% of the limit of national pollutant emission standard.

### **Environmental Education**

Clements, Chenyang, and McCright (2014) pointed out the nature of environmental education as to understand the environment through education, to be aware and conscious of the relationship between people's subjective desires& needs and the environment, and to modify and reflect people's attitudes towards and value of the pursuit and utilization of natural environment. Hall (2013) regarded environmental education as the process of cognitive value and concept clarification to develop, understand, and appreciate necessary skills and attitudes in the mutual relationship among humans, culture and the creatures, and physical environment. Environmental education should also be applied to the decision-making of environmental quality problems and self-oriented codes of conduct. Atkins (2016) specifically explained that environmental education was not simply to objectively understand the environment, but to objectively understand people's desires and value and the relationship with the environment

as well as to perceive and cultivate the self-restricted and self-reflected survival and life and the permanent relationship with natural environment. Liu et al. (2016) pointed out environmental education as the educational process aiming at the association among, people, the nature, and the artificial environment, including environmental problems of population issues, pollution issues, energy distribution and energy conservation issues, natural conservation issues, technology development, traffic infrastructure, and urban and rural planning. The relationship between humans and the environment was understood through education. Gifford (2014) referred environmental education as humans' understanding, attitudes, and cultivation towards the environment. From a certain aspect, it was the education without personal choice or freedom. Specifically speaking, it should be the education or cultivation for everyone that it essentially was mandatory and required for citizens. Minton et al. (2016) regarded environmental education as the process to achieve the improvement, the education process to clarify concepts and form value, and the knowledge, skills, and attitudes required for human development and the understanding of the mutual relationship among people, culture and creature, and physical environment. Environmental education also taught people to make decisions when facing issues related to environmental quality and to develop self-behavior criteria.

Referring to Chen (2016), the following dimensions are applied to environmental education in this study.

- (1) Natural system: General ideas of environment, globe, and biosphere.
- (2) Global resources: The distribution, consumption, management, and conservation of natural resources as well as the pollution.
- (3) Human and environment: Since humans are a part of the environment, the law should be reinforced to establish the environmental value.

### **Environmental Awareness**

Li and Chen (2014) regarded environmental awareness as the formation of cognition in the memory through the process of sensory stimulation, notice, identification, and perception. Cui, Hoje, and Velasquez (2015) defined environmental awareness as the emotional attitudes towards the environment and environmental value, leading students emotionally and conceptually to respect the environment, concern about the environment, and to further correctly treat the environment. Morrison, Roderick, and Parton (2015) regarded environmental awareness as the public perceiving the understanding of the entire environment and the related problems. Environmental awareness referred to people's understanding and awareness of the environment and the related issues (such as waste disposal, noise and air pollution, water pollution, soil pollution, ozone layer destruction, greenhouse effect, and acid rain) (Brehma, Eisenhauerb, & Stedman, 2013). The so-called environmental awareness, also called "environmental consciousness", referred to the concerns and comprehension of environmental problems (Ramkissoon, Smith, & Weiler, 2013), meaning that an individual could be aware of the existence of problems and cultivate the perception, appreciation, and exploration of the environment through the interaction with the environment and the cultivation of aesthetics (Gifford & Nilsson, 2014). Environmental awareness was the process of people storing, understanding, and reassembling environmental stimulation. In this case, environmental awareness was the process of people storing, understanding, and reassembling environmental stimulation. It involved in the elements in the environment as well as the involved events, the emotion of individuals and groups, and the symbolic meanings (Hirsh, 2014).

Referring to Lee (2017), environmental awareness in this study contains the following three dimensions.

- (1) Environmental knowledge: Including issues in biology and ecology, e.g. the composition and function of ecosystem, the flow of materials and energy in ecosystem, ethnic groups and clusters, and effects of humans on ecosystem.
- (2) Problem knowledge: Containing the resources in natural environment and the environmental problems derived from the overuse of resources.
- (3) Action knowledge skills: The variety of environmental action, the use of proper actions to solve problems, and the use of environmental action knowledge and skills.

### **Environmental Attitudes**

Environmental attitudes are explained as personal attitudes for or pro and liking or disliking the environment or affairs related to the environment (Brick & Lewis, 2014). Pepper and Leonard (2016) defined environmental attitudes, with persistency and consistency, as individual opinions about the value of the environment and human responsibility and role in the environment as well as the emotional inclination of loathe or favor and agreement or oppose according to the cognition and feeling. Some scholars considered that the content of environmental attitudes should focus on environmental ethics, including natural resources, environmental protection, environmental development, ecological relations, and environmental responsibility (Frantz & Mayer, 2014). Lokhorst, Hoon, le

Rutte and de Snoo (2014) regarded environmental attitudes as individual persistent and consistent psychological awareness, feeling evaluation or action idea and intention towards environmental problems. Snowden (2014) pointed out environmental attitudes as organizational and reliable personal characters enhancing an individual to pay attention and concern and to eventually become environmental protection action. Aiming at specific objects in the environment, the psychological reaction, including good and bad evaluation, was generated according to past learning experience or perceived experience in the natural environment. Generally speaking, environmental attitudes referred people's judgment of the belief in natural resources (good or bad, positive or negative) to the evaluation criteria (Kurusu, 2016).

Referring to Cheng, Wu, and Huang (2014), three major dimensions of environmental attitudes are covered in this study.

- (1) Environmental sensitivity: Referring to the seriousness of environmental problems and individual opinions.
- (2) Environmental belief: Referring to the opinion about the mutual relationship between individuals and natural environment.
- (3) Environmental value: Trinidad, Sharplin, Ledger, and Broadley (2014) regarded value as a comprehensive structure of individuals distinguishing right & wrong and good & bad to make decisions.

### **Research Hypothesis**

Liu et al. (2016) pointed out an objective of environmental education as to enhance the environmental knowledge of the educated (containing, but not restricted to, relevant environment legislation knowledge). Although a lot of scholars doubted whether the enhancement of environmental knowledge would change individual environmental attitudes and behaviors, the measurement of environmental knowledge, at least, could understand the effectiveness of environmental education in cognition (Brehma et al., 2013). Environmental education was regarded as an important tactic to solve environmental problems. Moreover, the key spirit of environmental education was to cultivate a person presenting environmental awareness, environmental attitudes, and environmental behaviors and becoming the citizen with environmental literacy. Taylor (2016) pointed out environmental education as the process of concept cognition and value clarification to develop the skills and attitudes required for understanding and appreciating the mutual relationship among humans, culture and the creatures, and physical environment. Chen (2016) stated that the promotion of environmental education aimed to enhance the citizens understanding the dependency between individuals & society and the environment, enhance the citizens' environmental awareness, environmental ethics and responsibility, environmental protection law rights and obligations, and further maintain ecological balance of environment, respect life, enhance social justice, and cultivate the learning community between environment citizens and environment to achieve the sustained-yield development. The following hypothesis is therefore proposed in this study.

**H1:** Environmental education presents significantly positive effects on environmental awareness.

Li and Chen (2014) discovered that students with high environmental awareness outperformed those with low environmental awareness on environmental attitudes. In the research on senior high school students' environmental awareness and environmental protection action, Taylor, Gretel, and Zaleha (2016) indicated that ones with higher protection awareness and more active protection action appeared more contact with natural environment, revealing the relationship between awareness and practice attitudes. In the research on communities environmental activity participants' attitudes (cognition, emotion, and action inclination), Morrison et al. (2015) mentioned that activity participants showed more positive and significant environmental attitudes and higher cognition, emotion, and action inclination than those without participation. The participation in activity would change the environmental attitudes and remarkably enhance the action inclination. Research pointed out positive correlations between students' environmental knowledge and environmental attitudes, i.e. students with higher environmental awareness revealing more positive attitudes towards environmental problems (Hirsh, 2014). Wong, Lin, and Tan (2014) indicated that elementary school students had achieved moderate environmental awareness and even presented positive attitudes towards environmental problems. In this case, the following hypothesis is proposed in this study.

**H2:** Environmental awareness shows remarkably positive effects on environmental attitudes.

In addition to achieving the cognition goal, environmental education particularly needs to cultivate correct environmental attitudes of the educated and the environmental behaviors responsible for daily practice (Kurusu, 2016). Apparently, the establishment of attitudes was primary for promoting environmental education. Tonge, Ryan, Moore, and Beckley (2014) stated that the effect of "environmental education action research teaching" on students' environmental education cognition appeared no difference from traditional teaching. However, the process of planning, action, review, reflection, and reaction showed remarkable influence on students' environmental attitudes and behaviors. Pepper and Leonard (2016) mentioned that environmental education aimed to have students understand the nature and realize the current condition and importance of environmental

**Table 1.** Confirmatory Factor Analysis

Research dimension	Overall fit	Analysis result
environmental education	$\chi^2=0(P<0.001)$ ; DF=0; GFI=1.00; CFI=1.00	good overall model fit
environmental awareness	$\chi^2=0(P<0.001)$ ; DF=0; GFI=1.00; CFI=1.00	good overall model fit
environmental attitude	$\chi^2=0(P<0.001)$ ; DF=0; GFI=1.00; CFI=1.00	good overall model fit

problems as well as cultivate the knowledge, attitudes, and skills for environmental protection to create the living environment with sustainable utilization of resources. Regarding the practice of environmental education, Zaleha (2013) stressed on reinforcing students' basic environmental knowledge and environmental action skills, assisting students in establishing positive environmental attitudes, and regarding the practice of environmental protection behaviors as the final goal of environmental education. Cheng et al. (2014) revealed that environmental education aimed to have students understand the nature, realize current conditions and importance of environmental problems, and cultivate the knowledge, attitudes, and skills for environmental protection through environmental education to create the living environment with sustainable utilization of resources; and, the final goal of environmental education was to cultivate the environmental cognition and environmental attitudes. Accordingly, the following hypothesis is proposed in this study.

**H3:** Environmental education reveals notably positive effects on environmental attitude.

## RESEARCH METHOD AND DESIGN

### Operational Definition and Measurement of Variable

#### *Environmental education*

Environmental education is divided into natural system, global resources, and human and environment. The scale is referred to Chen (2016). The reliability coefficients appear natural system 0.83, global resources 0.81, and human and environment 0.87.

#### *Environmental awareness*

Environmental awareness contains three dimensions of environmental knowledge, problem knowledge, and action knowledge skills. The scale is referred to Lee (2017). The reliability coefficients show environmental knowledge 0.84, problem knowledge 0.82, and action knowledge skills 0.86.

#### *Environmental attitudes*

Referring to Cheng et al. (2014), environmental attitudes are divided into environmental sensitivity, environmental belief, and environmental value. The reliability coefficients present environmental sensitivity 0.85, environmental belief 0.88, and environmental value 0.90.

### Research Object

Aiming at college students in Beijing City, 322 students in six departments of Minzu University of China are preceded 16-week (3hr per week, for total 48 hours) experimental teaching. Total 322 copies of questionnaire are distributed, and 287 valid copies are retrieved, with the retrieval rate 89%.

### Verification of Reliability and Validity

The reliabilities of dimensions in this study achieve above 0.7, showing high reliability of the dimensions. The construct validity of the scale in this study is analyzed with Confirmatory Factor Analysis. From **Table 1**, the scale in this study presents favorable convergent validity and construct validity.

## ANALYSIS RESULT

### Correlation Analysis

From **Table 2**, environmental education, environmental awareness, and environmental attitude show notable correlations, revealing the possibility of multiollinearity among dimensions. Nested Model Analysis could be used

**Table 2.** Correlation Analysis

Research dimension	$\alpha$	environmental education	environmental awareness	environmental attitude
environmental education	0.83			
environmental awareness	0.85	0.33**		
environmental attitude	0.87	0.26**	0.36**	

**Table 3.** Overall linear structural model analysis

Overall model fit	$\chi^2/Df$	1.738
	GFI	0.982
	AGFI	0.924
	RMR	0.006

Note: \* stands for  $p < 0.05$ , \*\* for  $p < 0.01$ , \*\*\* for  $p < 0.001$

**Table 4.** Nested Model Analysis

Model	$\chi^2$	$\Delta\chi^2$	GFI	CFI	RMSEA
Theoretical model	251.26		0.982	0.991	0.08
Model 1: Hypothesis test	255.48	4.22*	0.982	0.991	0.08
Model 2: Hypothesis test	260.61	5.13*	0.982	0.991	0.08
Model 3: Hypothesis test	266.25	5.64*	0.982	0.991	0.08

**Table 5.** Hypothesis test

Research hypothesis	Correlations	Empirical result	P	Result
H1	+	0.372	0.00	supported
H2	+	0.383	0.00	supported
H3	+	0.351	0.00	supported

for solving such a problem. The significant correlation among research dimensions also reveals the match with research hypotheses.

### Overall Model Discussion

Regarding overall model fit, **Table 3**, the overall model fit criteria  $\chi^2/Df=1.738$ , smaller than the standard 3, and  $RMR=0.006$  show the appropriateness of  $\chi^2/DF$  and  $RMR$ . Furthermore, chi-square value is sensitive to sample size that it could not be directly used for judging the fit. However, the overall model fit criteria  $GFI=0.982$  and  $AGFI=0.924$  reach above the standard 0.9 (the closer  $GFI$  and  $AGFI$  to 1, the better model fit) that this model presents better fit indices.

### Research Hypothesis Discussion

Nested Model is utilized for testing the research hypotheses with chi-square differences. Since each Nested Model appears a degree of freedom, the set casual path coefficient 0 is remarkable when the difference of chi-square value between Nested Model and theoretical model achieves the significance. The research result shows the model achieving the significance. The Nested Model analysis is shown in **Table 4** and the hypothesis test results are shown in **Table 5**.

### CONCLUSION

The research results reveal that students with better environmental awareness present more positive environmental attitudes. Environmental awareness refers to the process of humans absorbing, understanding, storing, and organizing information in the environment. It does not simply involve in various elements in the environment, but also involves in affairs, emotional attributes, and symbolic meanings in the environment. For this reason, environmental awareness is affected by individual attributes, perceived environment, and experience. The cognition refers to individual understanding, knowledge, and opinions of affairs and is the powerful evaluation. To have students appear environmental awareness, the following dimensions should be taken into account. To have students present environmental awareness of environmental protection and energy saving, e.g. regarding the improvement of environmental quality as personal responsibilities and concerning the effect of air pollution and water pollution on humans, support the participation and understanding of the revision of Environmental Protection Law of the People's Republic of China for the natural environment, concern about environmental

protection issue at any time, participate in environment protection donation, report illegal behaviors, join in procession and petition actions, believe in the insistence on garbage classification, community maintenance, and reduction of resources, and not care about whether others would take the similar actions. In regard to the cognition of ecological environment, to be strongly proud of and be glad of the natural landscape and ecology, to feel that there are many people would struggle for the environment in People's Republic of China, and to present strong perception to imitate them. It therefore could have students present the knowledge of creatures or physical characteristics in the nature or natural environment, e.g. habitats, wetland conservation, through environmental education, or enhance students' knowledge of the environment to result in proper attitudes and enhance the positive environmental attitudes. In this case, using environmental education for reinforcing the understanding of the revision of Environmental Protection Law of the People's Republic of China could reinforce students' environmental awareness and environmental attitudes.

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## RECOMMENDATIONS

From the research results and findings, practical suggestions are proposed in this study.

1. To timely apply video media or board games with environmental protection elements or situational teaching with environmental issues to have students be glad to participate in environmental education learning and easily absorb the contents to pay attention to environmental education and promote the performance on environmental awareness, environmental attitudes, and environmental behaviors.
2. Educational sectors could encourage schools holding environmental education related activities or contests related to the revision of Environmental Protection Law of the People's Republic of China to guide students developing the professions and creativity and establishing the awareness and behaviors to active understand the revision of Environmental Protection Law of the People's Republic of China, e.g. competition of resource recycle among classes and selection of microfilms related to the revision of Environmental Protection Law. It could subtly lead students actively participating in the discussion of environmental problems and thinking of solutions as well as cultivating the environmental responsibility to positively present positive environmental attitudes and behaviors.
3. In the environmental education related to the revision of Environmental Protection Law of the People's Republic of China, schools should cultivate students' thinking and action abilities to participate in and improve environmental problems, design environment experience courses aiming at environmental protection issues (e.g. waste disposal, resource recycle, green consumption, national land development, ecological conservation, environmental policies), practice opportunity education, and guide students actively participating in the discussion and thinking of the revision of Environmental Protection Law of the People's Republic of China, realizing the responsibility for the environment, actively developing moral courage, and positively presenting positive environmental attitudes and behaviors.

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