Students’ Environmental Literacy Survey and Public Environmental Education Countermeasures in Agricultural University

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Abstract. With the deepening of the public’s awareness on environmental issues, more and more scholars agree that solving environmental problems cannot simply rely on environmental technology innovation and capital. Instead, one of the most important factors to consider is how to effectively enhance public's environmental literacy, which will be the fundamental driving force to promote environmental protection. Because university students form the social frontier communities of new ideas and technologies, as well as globally cultured senior professionals, their environmental literacy is essential for the effective implementation of future national environmental protection work. In this paper, students' environmental literacy was assessed using questionnaires completed by non-environmental majors in Shenyang Agricultural University. The basic conditions and characteristics of students’ environmental literacy were analyzed, which resulted in several proposals for public environmental education reform at the university level.

Introduction

The term, \textit{environmental literacy} (EL), first appeared in the early 990s in the US, immediately received a lot of attention from all sectors in the US, especially the government and environmental education arenas. Educators agree that EL is one of the most important reflections of excellent worldview. Rosalyn McKeown-Ice, an American scholar, put forward the characteristics that people possess with true EL, including sensitivity to nature and society; understanding the relationship between people; understanding environmental issues; knowledge about the natural world; knowledge about the interaction between humans and nature; skills of analyzing environmental issues; and an environmentally responsible lifestyle in daily life\cite{1}. After decades of continuous improvement of related theories, EL is now generally being considered as the conventional system, containing 5 aspects: environmental emotion, environmental awareness, environmental ethics, environmental behavior and environmental skills \cite{2}. It emphasizes that through establishing environmental emotion, environmental awareness, especially environmental ethics and ecological philosophy worldview, people master environment skills, improve environmental behavior, and voluntarily form an environment conducive to healthy living habits.

Environmental education is the most direct and effective means to improve students’ EL. Students’ Environmental Literacy Survey (ELS) is an important foundation for the implementation of environmental education in universities \cite{3,4}. Besides the fact that it can effectively grasp the basic condition and characteristics of student’s EL, ELS can provide guidance for a reasonable entry point for environmental education as well. In this paper, ELS was conducted among non-environmental majors in Shenyang Agricultural University. The basic characteristics of students’ EL were analyzed to provide new ideas for public environmental education reform in agricultural colleges and universities.
Environmental Literacy Survey Method

Combining the actual professional setting of agricultural university, an evaluation system was built and optimized within the frame of 5 aspects of EL system mentioned above. The questionnaire was updated and prepared based on the optimized evaluation system. Surveying began in mid-March of 20 and lasted for one week. 800 questionnaires were distributed randomly, and 778 were recovered. After careful identification and sorting, 769 questionnaires were confirmed valid. The investigation was conducted in different departments. Statistical analysis was carried out in 3 categories including Agronomy, Science and Engineering, and Economics and Management. SPSS statistical software was used for data analysis.

Basic Characteristics of Students’ EL

Relationship between Majors and EL

The results showed that scores with respect to different majors were in order of: Economics and Management > Agronomy > Science and Engineering. Among them, the scores of students majoring in Science and Engineering were significantly lower than the scores of economics and management majors (Fig.). Scores in the 5 aspects of EL revealed the consistency of students’ EL in different majors, which suggests with higher literacy of environmental emotional and environmental ethics comes lower literacy of environmental skills and environmental behavior. The questionnaire analysis showed that the higher environmental emotional literacy mainly manifested in 4 aspects concerning more attention to environmental issue, higher sensitivity to ecological environment, a good attitude towards the environment, and a strong environmental responsibility. The higher environmental ethics literacy was reflected in ethics, concept development and worldview, including being kind to nature, respect for life, and understanding the value of natural ecosystems. However, these questionnaires also showed that college students lacked the capability of analyzing and solving specific environmental problems. Most students were very willing to participate in environmental protection and to promote environmental protection in their daily behaviors. However, due to the lack of in-depth understanding of environmental issues, their environmental awareness could not be turned into action, This conclusion is consistent with the fact that students’ EL scores were lower in environmental skills and environmental behavior. Scores of environmental awareness were at the middle level in the 5aspects of EL, and science and engineering students’ scores were the lowest among the scores of students participating in the survey, which may have certain relationships with professional backgrounds.

Relationship between Gender and EL

Fig.2 showed the average score of male college students in environmental skills literacy was slightly higher than that of girls, while the average scores of female students in the other 4 aspects of EL were higher than those of male. Especially in environmental behavior literacy, the average score of the female was significantly higher than that of male. Overall, female's score of EL was higher than that of male.

Figure 1. EL score map of different professional college students.  
Figure 2. EL score map of different gender college students.
Relationship between Residential Area and EL

Students from different residential areas were also slightly different in EL. From the total score of EL (Fig.3), students from big cities had the highest EL score, while scores of students from medium-sized cities, rural areas and towns were in a descending order. Standard deviation analysis showed that EL scores of students from big cities changed slightly. However, scores of students who came from rural areas fluctuated considerably, indicating that their EL levels were quite different.

Relationship between Family Income and EL

From EL scores shown in Fig.4, college students’ EL level rose with monthly family income growth, but the difference was not significant. Using ¥ 3,000 as the dividing line, students with monthly family income above ¥3,000 had generally higher EL level. This difference mainly came from the scores of environmental behavior and environmental skills literacy. It was worth noting that students with more than ¥ 0,000 in family income had the lowest environmental behavior literacy but the highest environmental skills literacy.

EL Education for College Students

The questions about EL education were also included in the questionnaire. The results showed that most of the tested students obtained environmental knowledge through the classroom (79%). The proportion of students doing so through the media (2%), extracurricular activities (6%) and family (3%) access to get environmental knowledge was in descending order. 97% of college students agreed that they could improve EL through classroom learning, and 70% of the 97% agreed to improve significantly. 98% of students recognized the importance of EL education, but only a small portion of students could identify the significance of EL education.

EL Survey Analysis

Incomprehensive Environmental Awareness and Majors Differences

Environmental awareness is a fundamental part of EL. Only with proper environmental knowledge and correct environmental emotion, individuals may have good environmental attitudes, in order to improve the level of their environmental behavior. The survey showed that college students had good environmental common sense, but poor environmental behavior in their daily lives. This might be related to their access to obtain environmental knowledge. Survey results indicated that the main way for students to acquire knowledge was the classroom and the media, while only 5.85% of students do so through participating in extracurricular activities. This led to the result that most of the students did not have environmental practices in real life, while only thinking green.

Different majors affected college students to obtain different levels of environmental knowledge. Surveys showed that scores of EL for Science and Engineering students were relatively lower than
those for Economics and Management and Agronomy students. The main reason might be the division of education for liberal arts and sciences, which led to the sidedness of students’ knowledge structures. The structure of engineering knowledge determined students’ lack of education for natural and human-related environmental science. This difference could be changed by strengthening environmental education targeted towards engineering students.

**Performance of Low Environmental Behavior and Environmental Skills Literacy**

Overall, although college students had a high level of EL, the scores of their environmental behavior and environmental skills literacy were relatively low. This result was consistent with the findings of previous studies [5]. The performance of low environmental behavior literacy was mainly in poor consciousness and habits of environmental behavior. Dutch scholars analyzed the seriously inconsistent reasons of college students’ environmental behavior and attitudes. They uncovered that a person would seriously consider environmental issues, but generally tend not to implement them first. This is especially true when the environmental behavior calls for a huge effort, perhaps even needing to sacrifice economy and life[6]. Therefore, training and advocating for environmental friendly advanced elements and helping people develop good environmental behaviors will be critical to improve the overall level of environmental behaviors.

Environmental skills literacy includes three parts: finding, analyzing and solving environmental problems. Survey results showed that college students had a lower level of environmental skills literacy. The ability of finding environmental problems was relatively high, followed by the ability of analyzing, while the ability of solving environmental problems was the lowest. This may be because the non-environmental majors have environmental emotion literacy, but their environmental awareness remains in the appearance of problems. Students did not have systematic learning knowledge of environmental science. They lacked the ability to analyze problems and ideas, resulting in the poor ability to solve environmental problems.

**Individual Differences in EL**

There are gender differences in the level of EL, which have been confirmed by results of many scholars at a body of international research. Research has shown that boys’ scores of environmental knowledge were higher than those of girls[6]. Yang found that girls are better than boys on environmental attitudes in China[4]. Similarly, results of this research showed that female students were better than male students in literacy of environmental emotion, awareness, behavior and ethics, with the only exception being in environmental skills literacy. This seems to find its ideological origins from environmental ethics. As a genre of environmental ethics, ecological feminists think men regard the world as a hunting ground and fight against nature while women live in harmony with nature. Therefore, women are more suitable than men for nature protection and more responsible for ending the situation of ruling nature and healing the alienation between human and nature. This is the ultimate goal of the ecological movement.

In general, resident area in higher administrative level has higher population density. The people living in higher level residential areas have more opportunity to get information, are more sensitive to the environment, and participate in more activities to protect the environment, which caused EL differences of college students from different residential areas [7]. The conclusion of this paper can be summarized with this trend. Students from big cities had the highest EL score, while scores of students coming from medium-sized cities, rural areas and towns were in a descending order.

The family’s economic situation was also one of the factors affecting students’ EL. Survey results showed that college students’ EL level rose with family monthly income growth. This was mainly related to the growth environment that family provided. Under conditions in which basic needs were met, individuals were more readily concerned about the environment and accepted the idea of environment protection and followed through on these ideas.
Recommendations for Students’ EL Improvement

The above survey results indicated college students’ EL had differences with respect to major, but they were almost all low for the scores of environmental behaviors and skills literacy. Before accepting formal environmental education, individual differences affected students’ EL. But students generally recognized the importance of environmental education. Thus we make the following recommendations for improving EL of students in the public college environmental education curriculum.

Importance of Imparting Environmental Knowledge in Classroom

Public college environmental education curriculum is the most important educational pathway for students’ EL. Through classroom teaching students can acquire systematic knowledge and skills as much as possible in a short period of time, and improve learning efficiency, which lays a good foundation for students’ EL. A notable feature of public environmental education in college is the particularity of the object; students attended were with different professions and different knowledge structure. This requires teachers to readily adjust their teaching methods and content during the teaching process. By a combination of traditional teaching and multimedia presentations, showing pictures of environmental problems and videos of pollution incidents, students are given an intuitive visual impact. During teaching knowledge theory, teachers should stimulate students’ environmental emotion and establish their correct environmental attitude and responsibility. In addition, with particular emphasis on curriculum design, teachers should combine the cases of different areas of expertise to help students digest and absorb environmental science knowledge. Teaching content should dilute environmental pollution control technologies, strengthen environmental ethics education, and expand the practice of sustainable development. Curriculums try to turn the concept of environmental protection into students’ values, and reduce the EL gap caused by professional and individual differences.

Create a Good Practice Environment for EL

The campus is a place for people’s education. A green campus culture can provide an effective atmosphere for EL education. We therefore urge society to carry out various activities to create a conservation-oriented campus, establish and improve resource conservation related rules and regulations. Through propaganda and education, we should initiate teachers and students to join the actions of the ‘low carbon lifestyle and green campus’. At the same time, we should develop environmental groups among students, and publicize environmental knowledge through a variety of activities on campus as well as off-campus, to promote students to participate in environmental protection practices. For example, making environmental knowledge publicity boards for different environmental protection days; inviting experts to give seminars around the current environmental hot spots; organizing knowledge contests of resources and environmental themes; carrying out a variety of social practices would all be viable suggestions. We should make full use of the advantages of online media, and educate students through blogs, micro blogs, and other forms of micro letters. In practice, students accumulate environmental skills, improve environmental behavior, and voluntarily form an environment with conducive living habits. Through a variety of practical activities, we can enhance the effectiveness of public environmental education. Society should make sure that students’ EL of environmental emotion, awareness and ethics can be combined together with environmental behaviors and skills, and change the current situation in which students merely bear environmental awareness while lacking environmental action.

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References


