Environmental Education Function of Urban Forest Park and Efficiency Evaluation

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Abstract. This research presents a case study of how vising urban forest park will influence people's environmental literacy. Beijing Olympic park is being evaluated from multiple aspects and its score is compared to testee's knowledge level of environment using a survey. The assumption of the research is that urban forest park is efficient and convenient for city people to learn about nature and environment. After statistical analysis, the hypothesis was partly rejected. The efficiency of its education function need to be improved by increasing creativity education facilities, adding more family convenient elements and doing further visitor based researches.

1. The background of the research

Nowadays, it is very common to see a "beware of the grass" notice board standing in the middle of a green belt. People are so used to it that few of them would think about it deeply. What is the purpose of having such a notice board all around the city? What task is it actually performing? How does it influence people's lives? When we think thoroughly about this little notice board, we will surprisingly find out that how important this facility can be to our city. Behind this board, it is the necessity for urban people to raise up environmental awareness. It is also the reflection of relatively low environmental education level. More importantly, it is a reminder of action to make up for the environment under our rapid urbanization development.

2. Key concepts

2.1. Environmental education

Even though environmental education is a new brunch of comprehensive education that appeared in China mainland no more than 20 years, it has been a hot topic in western countries for decades. The history of environmental education can be traced back to 20th century. At the beginning of 1960s, due to the increasing population and the followed demand for natural resources, many scientists started to argue that in order to deal with the environment problem, technology and science is far not

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enough [1]. Since then, scientists started viewing education as a fundamental way to provide the public with more information and raise the awareness of environment issue [2].
Proof by fact, the combination of education and environment problems resulted in an awareness booming at early 1970s. Countless environmental education conferences were held since then, including the 1972 United Nations Conference on the Human Environment in Stockholm and the U.S. Tbilisi Conference in 1977. In these conferences, scientists developed the definition of environmental education from multiple aspects.

Most of the definitions focus on the purpose of it. According to the UN Conference on Environment and Development, environmental education was "Education which is critical for promoting sustainable development and improving the capacity of people to address environment and development issues" [3]. The definition indicates that the essence of environmental education is to sustain human life with scarce natural resource [4]. This result is further verified by another conference. In 1991, caring for the Earth: a strategy for sustainable living came out. It emphasizes the sustainable lifestyle behind environmental education. This document also asserted that "education programs reflect the importance of an ethic for living sustainably" [5]. In other words, education environment was expected to aim at optimizing human life patterns in a most eco-friendly way.

2.2. Urban forrest park

Visiting forest parks is a great way for people to interact with and learn from nature. This approaching become especially significant for the urban population since they have limited resources to access to the nature. In 2007, the urban share of China's population was almost 44 percent [6]. With this increasing demand, urban forest parks were built all over China.
In 2005, a group of South Korea researchers gave the definition of such parks as "the parks provide opportunities for active outdoor recreation as well as for quiet relaxation and escape from daily urban stress." Wonsop later in 2013 [7], Zhang explained urban forest parks in a different point of view as "is protected from urbanization, serves as a site of biodiversity preservation and is termed the "green lungs" of the urban agglomeration" [8].

As the easiest way to connect with nature, urban forest parks not only take the responsibility of bringing beautiful views to people but also provide environmental education functions to the public. China is not the only country that try to apply environmental education on tourists. Early in 1997, an Australian researcher conducted a research about turning tourists into greenies through environment education. Later in Sweden, a group of researchers conducted a research on urban forest gardens. Their purpose is to provide "new opportunities for urban children to understand and develop relationships with other organisms" [9]. But successful cases about utilizing the same system in urban forest parks are relatively limited. By using means of planting, observation and interacting. Based on their data, they concluded that children between six and twelve years developed values of humanistic, symbolic, aesthetic and scientific rapidly [10]. Meanwhile, teenagers between thirteen and seventeen are benefited from "a significant expansion in moralistic, naturalistic, and ecological components of the scientific values of nature" [11].

3. Methodology

3.1. Research goal

Under this big background, it is natural for researchers to wonder the inner connect between the satisfaction degree of a specific environmental education system and its efficiency. To be more specific, it is necessary to dig deeper in to the root of an urban forest park, which is Beijing Olympic Park in this case. The main goal of this is research is to evaluate the satisfaction degree of the environmental education system of Beijing Olympic Park and the efficiency of this system. Meanwhile, I will devote into searching for the probable improvements of this system. As a result,

not only satisfaction degree can be improved through this research, but also education efficiency will be greatly enhanced.

3.2. Research methods

In this research, I use two research methods. The first one is literature research. Through reviewing literatures in the past 50 years, I gained a basic understand of environmental education both in the Europe and in Asia. Based on what I learned, I generated a questionnaire to test the education system in Beijing Olympic Forest Park. After careful selection, there were 279 valid surveys. In order to make sure the validity of my survey, I followed very strict generation and selection process. First, I generated a sample survey and handed it out. After I receive approximately 50 samples, I did an efficiency analysis. This analysis is to test outliers, which maybe the confusing question itself or inappropriate asking way. I ruled out several outlier questions and did a careful revision on those questions who did not show an obvious normal distribution. After all these revisions, I eventually handed them out and started collecting data.

The questionnaire also shows a clear structure. In the first part, test takers are required to provide some basic information including age, gender, family member and education level. This part is to gain a basic understanding of the person thus a further evaluation on how their living background influence their ability to receive the education can be done. Then the questionnaire comes to the efficiency evaluation part. This part asks question about if people notice a specific education facility and how they are satisfied about it. To be more specific, the efficiency evaluation includes audio guide efficiency, notice board efficiency, explanation board efficiency, creativity facility efficiency, comprehensive efficiency and environmental literacy evaluation. After this part has finished, the questionnaire will accomplish its duty and help me understand the way that how satisfaction and efficiency are influenced by each other.

4. Data analysis

4.1. Education level & environmental literacy

Table 1. Descriptive Statistics.

	Mean	Std.	N
V5-Question 4. Educational background 1. Primary school 2. Junior high school 3. Senior high school 4. Bachelor degree 5. Master degree or above	3.93	.649	200
Score of environmental literacy	22.9900	1.99997	200

$\bar{X} \pm Z\, s/\sqrt{n}$, 95% Confidence Interval: 3.93 ± 0.09

In this paper, environmental literacy is designed to be a key evaluation to measure the relationship between one's behavior and one's knowledge level about environmental and science. This term was originally used to describe "the capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems" (Roth, 1992). In recent researches, environmental literacy is usually used to measure the outcome of environmental education. Researchers also believe that environmental literacy will greatly influence person's behavior facing environment related issues. For instance, a group of Israeli researcher attempted to evaluate an Israeli school students' environmental literacy. "Blum conducted the first survey of environmental knowledge [12] and attitudes among school students in Israel in the early 1980s by using a model based on the British National Survey of Environmental Knowledge and

Attitudes of Fifth Year Pupils in England" [13]. Later, several researchers have been modified on the survey to makes sure its efficiency and accuracy. In order to make sure the reliability of this paper, the survey used to evaluate test taker's environmental literacy contains questions that were randomly selected from the final version of the survey. The environmental literacy score presented in the following data is expected to be a valid reflection of taker's environmental knowledge level.

We are 95% confident that the true mean of education background is between the range of (3.84, 4.02). This is being said, most of the testees have a college degree. The following environmental literacy is evaluated based on this level.

Table 2. Correlations.

		Score of environmental literacy
Education background	Pearson Correlation	.123
	Sig. (2-tailed)	.082
	N	200
	N	200

Then the research used Pearson correlation to evaluate the relation between education background and their score of environmental literacy. The initial assumption is that with higher education level, one may receive more sufficient environmental education, thus a higher score of environmental literacy should be presented.

The Pearson Correlation between education background score and environmental literacy score is 0.123, which is positive but very close to 0, there is a weak positive linear relationship between the two variables.

In conclusion, there is a very small relation between education level and environmental literacy, which violates the initial assumption. So it is common to ask another question: Is it because education itself cannot improve environmental literacy or just the education we receive fail to improve our environmental literacy?

4.2. Visiting frequency & environmental literacy

Table 3. Correlations.

		V6 – Question 5	Score of environmental literacy
V6 – Question 5	Pearson Correlation	1	.132
	Sig. (2-tailed)		.062
	N	200	200
Score of environmental literacy	Pearson Correlation	.132	1
	Sig. (2-tailed)	.062	
	N	200	200

(Qestion 5. How many times do you go to Olympic forrest part in recent year? 1. Everyday 2. Several times a week 3. Several times a month 4. Several times every three months 5. Several times semi-annually 6. several times per year)

Since education is not the only variable that may influence one's environmental literacy, it is necessary to turn to other variables. As previously mentioned, urban forest parks take the responsibility of using its green resource to provide city people a chance to know and learn about environmental. Take Beijing Olympic Forrest Park as an example, notice signs, notice boards and environmental reminder audio systems are distributed around the park. The initial assumption is that once visitors entered the park, environmental education should followed him/her gradually without being noticed. Thus how often he/she interact with the nature may influence their environmental literacy score.

This part of data tested the relation between vising frequency and environmental literacy. It turns out that there is no strong relation between visiting frequency and environmental literacy. However, an efficient education function will educate visitors more effectively with the increase visiting times. But Beijing Olympic Forest Park failed to accomplish this task. So generally speaking, the educational function of Beijing Olympic Forest Park has a long way to go. This makes the research more important since it concerns everyone in this city and the next generation.

Later, we specific this education in to environmental education. In this case, the amount of time that people receive environmental education in the park. Since the two variable have weak correlation, the frequency of vising Beijing Olympic Forest Park does not strongly improve the grade of environmental literacy.

4.3. Comprehensive Satisfaction Degree& Environmental Literacy

Table 4. Correlations.

		Synthesizing	Score of environmental literacy
Synthesizing	Pearson Correlation	1	.308
	Sig. (2-tailed)		.000
	N	200	200
Score of environmental literacy	Pearson Correlation	.308	1
	Sig. (2-tailed)	.000	
	N	200	200

**, Correlation is significant at the 0.01 level (2-tailed).

Satisfaction degree correlates to environmental literacy. The Pearson relation here is 0.308. With such high correlation, it is easy to draw a conclusion that even though it is hard to identify the specific relation between each satisfaction degree with environmental literacy, but a general higher comprehensive satisfaction degree will result in a higher score in environmental literacy. As a result, how to build a highly satisfied park for visitors is one of the top questions for environmental educators.

4.4. Satisfaction degree with other factors

In order to improve the satisfaction degree, it is essential to discovered the essence of it. Satisfaction degree is a relatively objective term, it may be influenced by a very small indicator that is irrelevant to this test. To eliminate these factors, a background test was run for the survey as followed.

In addition to education background, other factors turned out to be also important. Based on the data, people who are 50-60 years old or older showed more interests in vising urban forest park compared to other ages. Besides, people who are single prefer to enjoy their spare times in the park but not that interested in parks after they get married or have children. Even though people who have more than one children have increasing interest in parks compared to single child family, the popularity among single person may reflect questions. Further test of how many family-convenient facilities were installed in the park, such as sufficient parking lot, family restrooms or rest area for children and parents should also be done.

Table 5. Coefficient.

	Unstandardized coefficient		Standardized coefficient		t	Sig.
	B	Std. Error	Beta	Std. Error		
(constant)	16.862	3.200			5.270	.000
V2-Questions 1. Your gender?	-.224	.414	-.063	.116	-.541	.590
V3-Question 2. Your age?	-.026	.425	-.008	.129	-.060	.952
V4-Question 3. Have lived in Beijing more than one year?	-1.368	.992	-.179	.130	-1.379	.173
V5-Question 4. Educational background	.144	.370	.049	.125	.390	.698
V6- Question 5. How many times do you go to Olympic forrest part in recent year?	.226	.185	.162	.133	1.218	.228
V7-Questions 6. Your family members? 1. yourself	-.446	.516	-.123	.142	-.865	.391
V8-Question 6. Your family members? 2. You and your spouse	.652	.482	.169	.125	1.352	.182
V9-Question 6. Your family members? 3. One child	-.618	.495	-.170	.136	-1.248	.217
V10-Question 6. Your family members? 4. Two children	-.880	.839	-.131	.124	-1.050	.298
V11-Question 6. Your family members? 4. With your parents	1.005	.452	.271	.122	2.224	.030
V12-Questions 7. Have you been involved in environment-related activities?	-.198	.893	-.025	.112	-.222	.825

4.5. Satisfaction degree with various education systems

Table 6. Correlations.

		Audio system	Score of environmental literacy
Audio system	Pearson Correlation	1	.283**
	Sig. (2-tailed)		.006
	N	93	93
Score of environmental literacy	Pearson Correlation	.283**	1
	Sig. (2-tailed)	.006	
	N	93	200

**, Correlation is significant at the 0.01 level (2-tailed).

Table 7. Correlations.

		Explanation Board	Score of environmental literacy
Explanation Board	Pearson Correlation	1	.286**
	Sig. (2-tailed)		.001
	N	143	143
Score of environmental literacy	Pearson Correlation	.286**	1
	Sig. (2-tailed)	.001	
	N	143	200

**, Correlation is significant at the 0.01 level (2-tailed).

Table 8. Correlations.

		Direction Board	Score of environmental literacy
Direction Board	Pearson Correlation	1	.271**
	Sig. (2-tailed)		.000
	N	185	185
Score of environmental literacy	Pearson Correlation	.271**	1
	Sig. (2-tailed)	.000	
	N	185	200

**, Correlation is significant at the 0.01 level (2-tailed).

Table 9. Correlations.

		Creativity	Score of environmental literacy
Creativity	Pearson Correlation	1	.388**
	Sig. (2-tailed)		.000
	N	200	200
Score of environmental literacy	Pearson Correlation	.388**	1
	Sig. (2-tailed)	.000	
	N	1200	200

**, Correlation is significant at the 0.01 level (2-tailed).

The correlation coefficient is around 0.27 for audio system, explanation board, notice boardd and direction board except for creativity facilities. The correlation coefficient between creativity facilities and environmental literacy score rapidly increases to 0.388. This means the creativity of environmental literacy will greatly improve how people perceived knowledge during the education process. These creativity facilities include music players hiding in the grass and cartoon-like dustbins.

5. Conclusions

Based on what was found in this research, creativity facilities are crucial for urban forest parks to educate the public effectively. The creativity that these facilities presented are only the tip of the iceberg. What hide behind the high satisfaction degree of interacting with creative education facilities is the strong willingness of tourism to participate in the environment protection. So in the near future, environmental education systems may try to engage visitors, turn them into participants in the

environment. Thus, not only the environmental education will be more efficient, the visitors themselves will also gain a higher satisfied experience.

In addition to the environmental education system in parks, the data above also showed that our general education lacks environmental education, and it has already shown its influence on our young generation through their behaviors.

As a result, it is necessary and urgent to advocate the generation of a systematic and functional environmental education system. This system will not only influence the public in parks solely but also plays it important role in schools. Only by this mean, the future generation will be a generation of high environmental awareness.

Beijing Olympic Forest Park was originally built for the Olympic games. Due to its rare size and convenient location in Beijing city, it quickly becomes one of the most popular parks in Beijing. And also because of its recently designed park system, it can be viewed as one of the most modern and recent parks in Beijing. As a result, the problems in Beijing Olympic Forest Park can be a problem in the entire park environmental education system since it already represents the highest level of park design in China. More and more city started borrow the idea of building urban green areas, if problems in Beijing Olympic Parks have not been fixed, there will on be more and more "fail parks" in environmental education.

It is urgent for people to notice and research about these parks, raising questions about them is helping other similar parks to improve.

Even though the situation now may seem not optimistic, the data also showed more and more families started to realize the importance of environmental education. With this awareness as powers, the society further pushes us to improve the education systems of these parks.

This paper only discussed the efficiency of environmental education system by sorting the facilities by their content, results may be different in other methods. As environment becomes more and more important in the development of a country, evaluate the existing efficient environmental education system or how to build one becomes increasingly significant. It is worthy to do further research in this area.

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