Supplementary Materials: Contributing to Sustainability Education of East Asian University Students through a Field Trip Experience: A Social-Ecological Perspective

Tae Kyung Yoon, Seongjun Kim, Takako Takano, Sun-Jin Yun and Yowhan Son

Table S1. The questionnaire of the new environmental paradigm (NEP), the revised version of Dunlap [1] in 2000. Agreement with the eight odd–numbered items and disagreement with the seven even–numbered items indicate pro–environmental attitude.

Questionnaire	
NEP-1	We are approaching the limit of the number of people the earth can support.
NEP-2	Humans have the right to modify the natural environment to suit their needs.
NEP-3	When humans interfere with nature, it often produces disastrous consequences.
NEP-4	Human ingenuity will ensure that we do not make the earth unlivable.
NEP-5	Humans are severely abusing the earth.
NEP-6	The earth has plenty of natural resources if we just learn how to develop them.
NEP-7	Plants and animals have as much right as humans to exist.
NEP-8	The balance of nature is strong enough to cope with the impacts of modern industrial nations.
NEP-9	Despite our special abilities, humans are still subject to the laws of nature.
NEP-10	The so-called "ecological crisis" facing humankind has been greatly exaggerated.
NEP-11	The earth is like a spaceship with very limited room and resources.
NEP-12	Humans were meant to rule over the rest of nature.
NEP-13	The balance of nature is very delicate and easily upset.
NEP-14	Humans will eventually learn enough about how nature works to be able to control it.
NEP-15	If things continue on their present course, we will soon experience a major environmental catastrophe.

Table S2. Environmental literacy questionnaire. The questionnaire was adapted from original questionnaire [2] and modified ones [3–5] (○: adapted without modification, Δ: adapted with modification, –: not available). In addition, ELQ-13 was made by ourselves.

Questionnaire	Coyle [2]	DeChano [3]	O'Brien [4]
ELQ-1	There are many different kinds of animals and plants, and they live in many different types of environments. What is the word used to describe this idea? ■ Biodiversity □ Biodegradable □ Evolution □ Recycling □ Don't know	○	○	Δ
ELQ-2.	Human population of the Earth is now approximately… □ 1 billion □ 3 billion ■ 7 billion □ 10 billion □ Don't know	○	○	○
ELQ-3.	Global climate change is the warming of our planet Earth, a process also known as global warming. Which of the following better represents its cause(s)? □ Ozone layer depletion □ Fossil fuel consumption □ Carbon dioxide (CO_2) emission ■ All of the above □ Don't know	–	Δ	○

Table S2. *Cont.*

Questionnaire		Coyle [2]	DeChano [3]	O'Brien [4]
ELQ-4	What is the most common cause for plant and animal species to become extinct? □ Predation by other species ■ Habitat loss and fragmentation □ Temperature change □ Competition between species □ Don't know	○	○	○
ELQ-5	Where does most of the energy that people use worldwide come from? ■ Fossil fuels　　□ Wind power □ Hydro power　　□ Nuclear power □ Don't know	∆	○	∆
ELQ-6	Which of the following is a non-renewable resource? ■ Oil　　□ Trees　　□ Fresh water □ Wind　　□ Don't know	○	–	○
ELQ-7	Many people around the world suffer from hunger. This is because… □ There is not enough food production to fulfill the global demand ■ Food is not equally distributed among, between, and within nations □ Food trade is in hand of multinational exportation companies □ All of the above　　□ Don't know	–	–	○
ELQ-8	Most elephants are killed every year to provide people with… □ Trophies　　■ Ivory　　□ Meat □ Oil　　□ Don't know	–	○	–
ELQ-9	Which one of the following is NOT a greenhouse gas which causes global warming? □ Carbon dioxide (CO_2) □ Water vapor　　□ Methane (CH_4) ■ Sulfur dioxide (SO_2)　　□ Don't know	–	○	○
ELQ-10	An item which CANNOT be recycled and used again is… ■ Disposable diaper　　□ Newspaper □ Tire　　□ Plastic bottle □ Don't know	–	○	–
ELQ-11	Phosphates (P) are harmful in sea water because they… □ Can cause cancer in fish ■ Increase algae and reduce dissolved oxygen for fish □ Stop reproduction in fish □ Make the water cloudy □ Don't know	–	○	–

Table S2. *Cont.*

Questionnaire		Coyle [2]	DeChano [3]	O'Brien [4]
ELQ-12	Ozone forms a protective layer in the Earth's upper atmosphere. What does ozone protect us from? □ Acid rain ■ Harmful, cancer-causing sunlight □ Dioxin precipitation □ None of the above □ Don't know	○	○	–
ELQ-13	In 1992, the United Nations' Rio Conference or Earth Summit adapted a concept which aims to meet the needs of the present without compromising the ability of future generations to meet their own needs, What is the word used to describe this concept? □ Third way □ Ancient future ■ Sustainable development □ Green growth □ Don't know	–	–	–
ELQ-14	Which one of the following is NOT a function of wetlands? □ To reduce damage from disaster such as tsunami, flood, and so on □ To provide habitat for wildlife □ To filter out run-off water to remove soil and nutrients ■ None of the above □ Don't know	△	–	○
ELQ-15	Approximately 70% of all fresh water withdrawn for human use is used for… □ Drinking □ Industry use □ Washing people and clothing ■ Irrigation □ Don't know	–	○	–

Table S3. Questionnaires responses evaluating the field trip environmental education program for East Asian university students using a 5-point Likert scale (1: strongly disagree; 2: mildly disagree; 3: unsure; 4: mildly disagree; 5: strongly agree). Asterisks (*) and daggers (†) indicate a significant difference of means ($p < 0.05$). Numbers in parentheses indicate the standard deviation.

	Questionnaire	Total	Nationality				Gender	
			China	Japan	South Korea	Vietnam	Female	Male
EQ-1	I learned a lesson about the interactions between humans and the environment from the places on Jeju Island.	4.54 (0.58)	4.50 (0.61)	4.82 (0.40)	4.44 (0.62)	4.53 (0.61)	4.57 (0.59)	4.50 (0.59)
EQ-2	I agree that today's environment management on Jeju Island is appropriate for environmental preservation.	4.07 (0.82)	4.20 (0.62)	3.73 (1.19)	4.39 (0.61)	3.84 (0.83)	4.07 (0.82)	4.08 (0.83)
EQ-3	I agree that today's tourism development on Jeju Island contributes to a sustainable relationship between humans and the environment.	4.04 (0.82)	4.15 (0.75)	3.73 (1.10)	4.17 (0.86)	4.00 (0.67)	3.95 (0.91)	4.21 (0.59)

Table S3. *Cont.*

	Questionnaire	Total	Nationality				Gender	
			China	Japan	South Korea	Vietnam	Female	Male
EQ-4	I can find examples similar to Jeju Island in my country or local community.	3.81 (1.08)	4.10 (0.85)	4.09 (0.83)	3.72 (1.07)	3.42 (1.35)	3.70 (1.11)	4.00 (1.02)
EQ-5	The Jeju Folklore & Natural History Museum was interesting. *	3.81 (1.24)	3.80 (1.24)	3.91 (1.14)	3.06 (1.35)	4.47 (0.77)	4.05 (1.12)	3.38 (1.35)
EQ-6	Geomun Oreum was interesting.	4.16 (0.86)	4.00 (0.86)	4.00 (1.00)	4.44 (0.62)	4.16 (0.96)	4.23 (0.74)	4.04 (1.04)
EQ-7	The Olle Trail was interesting.	4.13 (0.94)	3.90 (1.07)	4.00 (1.10)	4.28 (0.89)	4.32 (0.75)	4.20 (0.95)	4.00 (0.93)
EQ-8	Jeju Folk Village was interesting.	4.04 (1.04)	4.05 (1.15)	4.27 (0.90)	3.78 (1.06)	4.16 (1.01)	4.16 (0.81)	3.83 (1.37)
EQ-9	I want to re-visit Jeju Island for tourism in the future.	4.49 (0.76)	4.55 (0.76)	4.36 (1.03)	4.44 (0.70)	4.53 (0.70)	4.48 (0.79)	4.50 (0.72)
EQ-10	Jeju Island could be an excellent place for environmental education.	4.31 (0.74)	4.40 (0.75)	4.09 (0.94)	4.39 (0.61)	4.26 (0.73)	4.36 (0.78)	4.21 (0.66)
EQ-11	I learned a lesson about the interactions between humans and the environment from the places in Samangeum.	4.24 (0.81)	4.35 (0.59)	4.45 (0.52)	3.89 (1.08)	4.32 (0.82)	4.14 (0.90)	4.42 (0.58)
EQ-12	I agree with the purpose, process, and result of the Saemangeum Sea Dike Project in terms of environmental management.	2.82 (1.27)	3.25 (1.07)	2.36 (1.29)	2.72 (1.36)	2.74 (1.33)	2.61 (1.22)	3.21 (1.28)
EQ-13	The ecosystem disturbance caused by the Saemangeum Sea Dike Project could be acceptable to achieve benefits for human society. *,†	2.94 (1.27)	3.50 (1.10)	3.09 (1.58)	2.06 (0.80)	3.11 (1.24)	2.68 (1.23)	3.42 (1.21)
EQ-14	I can find examples similar to the Saemangeum Sea Dike Project in my country or local community. *	3.44 (1.31)	4.00 (0.92)	3.64 (1.50)	3.28 (1.23)	2.89 (1.45)	3.27 (1.34)	3.75 (1.22)
EQ-15	I agree with the meaning of the tree-planting activity on the Saemangeum Sea Dike. *	4.06 (0.94)	4.40 (0.68)	3.09 (0.94)	4.00 (0.97)	4.32 (0.82)	3.98 (0.98)	4.21 (0.88)
EQ-16	The sea dike was interesting.	3.76 (1.11)	3.95 (1.00)	3.55 (1.13)	3.89 (1.28)	3.58 (1.07)	3.61 (1.13)	4.04 (1.04)
EQ-17	The lecture from the local NGO worker was interesting.	4.03 (0.95)	4.20 (0.83)	3.91 (0.94)	4.28 (1.07)	3.68 (0.89)	3.98 (1.07)	4.13 (0.68)
EQ-18	The tree-planting activity was interesting.	4.25 (0.87)	4.40 (0.68)	3.64 (1.21)	4.28 (0.75)	4.42 (0.84)	4.32 (0.80)	4.13 (0.99)
EQ-19	Saemangeum could be an excellent place for environmental education.	3.81 (1.12)	3.65 (1.09)	4.18 (0.87)	4.06 (1.16)	3.53 (1.22)	3.73 (1.19)	3.96 (1.00)
EQ-20	I learned a lesson about the interactions between humans and the environment from places in Jeonju. *,†	4.01 (1.04)	4.15 (0.93)	3.00 (1.34)	4.22 (1.00)	4.26 (0.65)	4.20 (0.85)	3.67 (1.27)
EQ-21	I can find similar examples to Hanok Village in my country or local community.	3.99 (1.07)	4.15 (0.99)	4.27 (0.90)	3.78 (1.06)	3.84 (1.26)	3.98 (1.09)	4.00 (1.06)
EQ-22	Hanok Village was interesting.	4.50 (0.63)	4.35 (0.75)	4.64 (0.67)	4.78 (0.43)	4.32 (0.58)	4.59 (0.54)	4.33 (0.76)

Table S3. *Cont.*

| | Questionnaire | Total | Nationality | | | | Gender | |
			China	Japan	South Korea	Vietnam	Female	Male
EQ-23	Hanok Village could be an excellent place for environmental education. *,†	3.72 (1.03)	3.75 (1.02)	2.91 (1.38)	4.06 (0.87)	3.84 (0.76)	3.91 (0.88)	3.38 (1.21)
EQ-24	I learned a lesson about the interactions between humans and the environment from places in the DMZ.	3.68 (1.00)	3.75 (1.16)	3.55 (1.04)	3.56 (0.86)	3.79 (0.98)	3.73 (0.97)	3.58 (1.06)
EQ-25	The DMZ represents unique interactions between humans and the environment that are difficult to find in any other place.	4.07 (0.90)	4.25 (0.91)	4.27 (0.90)	4.06 (0.80)	3.79 (0.98)	4.05 (0.91)	4.13 (0.90)
EQ-26	I agree that the environmental value in and around the DMZ are very high.	4.13 (0.93)	4.20 (0.83)	4.27 (0.79)	4.22 (0.73)	3.89 (1.24)	4.11 (0.95)	4.17 (0.92)
EQ-27	The environment in and around the DMZ area was interesting. †	3.78 (1.10)	3.90 (1.17)	3.73 (1.49)	3.83 (0.79)	3.63 (1.12)	4.00 (0.96)	3.38 (1.24)
EQ-28	The DMZ area could be an excellent place for environmental education. †	3.63 (1.02)	3.55 (1.05)	3.82 (1.40)	3.83 (0.86)	3.42 (0.90)	3.82 (0.84)	3.29 (1.23)
EQ-29	I learned a lesson about the interactions between humans and the environment from places in Seoul.	4.12 (0.87)	3.90 (1.02)	4.45 (0.93)	4.06 (0.73)	4.21 (0.79)	4.14 (0.85)	4.08 (0.93)
EQ-30	I agree that the human technology was successfully applied to the restoration of Nanjido and Cheonggyecheon in terms of environmental management.	4.03 (0.93)	4.10 (0.97)	3.45 (1.37)	4.17 (0.79)	4.16 (0.60)	4.05 (0.83)	4.00 (1.10)
EQ-31	I agree that the environment management in Seoul contributes to the balance between humans and the environment in the metropolitan area.	4.03 (0.73)	4.00 (0.65)	4.00 (1.00)	4.11 (0.68)	4.00 (0.75)	3.98 (0.82)	4.13 (0.54)
EQ-32	I agree with constructing parks and streams like Nanjido and Cheonggyecheon despite the financial costs.	4.13 (0.84)	4.20 (0.62)	3.73 (1.10)	4.22 (0.88)	4.21 (0.85)	4.14 (0.88)	4.13 (0.80)
EQ-33	I can find examples similar to Nanjido and Cheonggyecheon in my country or local community. *,†	3.56 (1.14)	4.00 (0.73)	3.91 (0.94)	3.89 (0.96)	2.58 (1.22)	3.34 (1.20)	3.96 (0.91)
EQ-34	Nanjido was interesting.	4.25 (0.84)	4.00 (0.97)	4.55 (0.69)	4.50 (0.62)	4.11 (0.88)	4.30 (0.76)	4.17 (0.96)
EQ-35	Cheonggyecheon was interesting.	4.13 (0.92)	4.10 (1.02)	4.09 (1.04)	3.76 (0.90)	4.53 (0.61)	4.21 (0.77)	4.00 (1.14)
EQ-36	Nanjido and Cheonggyecheon could be excellent places for environmental education.	4.24 (0.74)	4.10 (0.91)	4.27 (0.65)	4.39 (0.61)	4.21 (0.71)	4.27 (0.69)	4.17 (0.82)
EQ-37	My motivation and expectations for ASEP 2013 were strong before the program started.	4.22 (0.84)	4.30 (0.73)	3.82 (1.17)	4.33 (0.69)	4.26 (0.87)	4.39 (0.72)	3.92 (0.97)
EQ-38	I actively participated in ASEP 2013.	4.49 (0.59)	4.45 (0.51)	4.55 (0.69)	4.50 (0.62)	4.47 (0.61)	4.55 (0.59)	4.38 (0.58)
EQ-39	The group activity with participants from other countries was effective to understand diverse and different thoughts on the environment.	4.51 (0.61)	4.50 (0.61)	4.55 (0.52)	4.39 (0.78)	4.63 (0.50)	4.59 (0.50)	4.38 (0.77)

Table S3. *Cont.*

	Questionnaire	Total	Nationality				Gender	
			China	Japan	South Korea	Vietnam	Female	Male
EQ-40	I learned a lesson about the interactions between humans and the environment during ASEP 2013.	4.51 (0.68)	4.45 (1.00)	4.55 (0.52)	4.44 (0.51)	4.63 (0.50)	4.61 (0.49)	4.33 (0.92)
EQ-41	My experience in ASEP 2013 has motivated me to be involved in environment-related activity in the future.	4.44 (0.74)	4.25 (1.02)	4.45 (0.69)	4.44 (0.62)	4.63 (0.50)	4.57 (0.55)	4.21 (0.98)
EQ-42	My experience in ASEP 2013 will be helpful for dealing with environmental issues in my country or local community.	4.32 (0.76)	4.25 (1.02)	4.45 (0.69)	4.28 (0.67)	4.37 (0.60)	4.34 (0.61)	4.29 (1.00)
EQ-43	The ASEP 2013 program successfully taught the main topic about the interactions between humans and the environment. *,†	4.43 (0.76)	4.35 (0.99)	4.55 (0.52)	4.11 (0.76)	4.74 (0.45)	4.59 (0.54)	4.13 (0.99)
EQ-44	I believe that my knowledge of my major can contribute to appropriate environment management.	4.25 (0.94)	4.30 (0.73)	3.91 (1.45)	4.39 (0.98)	4.26 (0.73)	4.14 (1.03)	4.46 (0.72)
EQ-45	I'm satisfied with ASEP 2013.	4.57 (0.72)	4.30 (1.03)	4.91 (0.30)	4.61 (0.50)	4.63 (0.60)	4.66 (0.57)	4.42 (0.93)

References

1. Dunlap, R.E.; Van Liere, K.D.; Mertig, A.G.; Jones, R.E. New trends in measuring environmental attitudes: Measuring endorsement of the New Ecological Paradigm: A revised NEP scale. *J. Soc. Issues* **2000**, *56*, 425–442.
2. Coyle, K. *Environmental Literacy in America*; National Environmental Education & Training Foundation: Washington, DC, USA, 2005.
3. DeChano, L.M. A multi-country examination of the relationship between environmental knowledge and attitudes. *Int. Res. Geogr. Environ. Educ.* **2006**, *15*, 15–28.
4. O'Brien, S.R.M. Indications of environmental literacy: Using a New Survey Instrument to Measure Awareness, Knowledge, and Attitudes of University-Aged Students. Master's Thesis, Iowa State University, Ames, IA, USA, 2007.
5. Jin, O. A Study on the Conceptual Evolution of Environmental Literacy and Its Assessment. Master's Thesis, Korea National University of Education, Cheongju, Korea, February 2004.