

Environmental attitudes of incoming and outgoing students of an environmental studies undergraduate degree course: case study at Royal Thimphu College, Bhutan

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Abstract

We conducted a questionnaire study to measure college students' attitudes towards environmental issues and determine if environmental studies students completing the three-year degree curriculum at Royal Thimphu College under the Royal University of Bhutan exhibited more positive attitudes towards the environment than fresh incoming students. A 45-item Likert-type Environmental Attitude Questionnaire, which consisted of four

dimensions, viz. awareness of environmental problems, awareness of national environmental problems, solutions to the problems and awareness of individual responsibility, was used to measure students' environmental attitudes. A separate scale, the 15-item Revised New Ecological Paradigm, was also used. A total of 134 students were surveyed (78 incoming and 56 outgoing students). Data from the two sample categories were analysed using one-way MANOVA (multivariate analysis of variance) and Student's *t*-test for

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comparison of means. There was a statistically significant difference between the incoming and outgoing students with regard to their attitudes towards environmental issues with both scales: in general, outgoing students had marginally more positive attitudes towards the environment. Statistically significant differences that indicated more positive environmental attitudes could be detected in the Environmental Attitude Questionnaire dimensions of attitude towards environmental problems (general), national environmental problems (specific to Bhutan), solutions, and individual responsibility, as well as in the ecocentric dimension of the Revised New Ecological Paradigm scale. The study establishes the feasibility of conducting such measurements of environmental attitudes and provides a baseline for comparison in future studies to help evaluate the impact of environmental education in Bhutan.

Keywords: Environmental attitudes, Revised New Ecological Paradigm, environmental education, Royal Thimphu College, ecocentric, anthropocentric, students

Introduction

Environmental concern continues to gain prominence globally as people increasingly understand the impact of environmental issues directly or indirectly on their lives. Individuals and governments have compromised significant natural resources to achieve economic growth, and thus global sustainability has been threatened. In addition, global climate change is expected to continue posing disruptive environmental impacts caused by atmosphere and ocean temperature rises, reduction in amounts of snow and ice, and rising sea levels (IPCC 2014). Bhutan is no exception to such impacts. The country previously experienced a glacial lake outburst flood at Punakha in 1994, where substantial damage to property occurred and lives were lost.

Bhutan's own policies have generally been regarded as environmentally friendly in external reports (Brown & Bird 2011; Bertelsmann Stiftung 2014). Environmental protection in

Bhutan is enshrined in the nation's constitution as "the fundamental duty of every citizen" (Article 5.1, Constitution of Bhutan), and the country's leadership has been recognized with international accolades for efforts towards environmental conservation. The country is committed to maintaining forest cover over at least 60% of its area and remaining a net carbon sink; according to recent assessments, the country is covered with true forests over 70% of its total area (MoAF 2012).

However, there are also increasing concerns over the growth of certain environmental problems in Bhutan. The 2014 State of the Nation report highlighted concerns over growing human-wildlife conflict due to anthropogenic pressure on natural resources, an increasing number of mines and quarries, deterioration of air quality over urban and industrial areas, loss of forest area, and in particular, inadequacies in waste management (Cabinet of Bhutan 2014). For example, Thimphu city produces 30 MT of solid wastes per day with a population of just 104,000 (Thimphu Thromde, 26th May 2014), despite its sole landfill having exceeded capacity since 2002 (Thimphu City Corporation 2010). Solid waste management has been found to be a serious concern among the general public as well as relevant authorities, and in need of immediate attention (NEC 2014). Although considerable legislation already exists to address waste management and other environmental issues, according to Dolkar et al. (2013), self-rated public awareness of key environmental policies is moderate to low among the general public. Moreover, the enforcement of existing laws has proven to be challenging (MoAF 2008; RAA 2013).

Beyond the creation and enforcement of environmental laws, citizens' individual environmental attitudes may also significantly aid efforts towards environmental protection. The government has called for increased efforts on the part of citizens towards caring for our environment and conserving natural resources (Cabinet of Bhutan 2014). Some effective methods to instill positive environmental attitudes could involve emphasizing the economic benefits that people may gain out

of environmental conservation. According to Wang et al. (2006), positive attitudes of the farmers in the Jigme Singye Wangchuk National Park were related to economic benefits of conservation and their literacy. Tavanxhi (2014) also asserts that public awareness of benefits, in both the spiritual and economic sense, is essential to successful conservation of protected natural areas.

Environmental education can also be a strategy for promoting positive environmental attitudes. Barthwal and Mathur (2012) state that environmental education programs are necessary to promote pro-environmental views and behaviour; and Thote (2013) suggests that such education should begin from early childhood through the support of parents and teachers: students with better knowledge on environment rate higher in terms of pro-ecological views.

Environmental attitudes of students can be measured and compared across different samples. For example, Tuncer et al. observed in Ankara, Turkey, that students in private schools had stronger pro-ecological views compared to those in public schools (Tuncer et al. 2005), as did students from urban schools in comparison to those from rural schools (Tuncer et al. 2004), though these differences were not analysed with regard to underlying differences in environmental education curricula. However, this opens up the possibility of asking whether environmental education can be a factor in influencing students' attitudes. Studies have shown that environmental education does have a positive impact on environmental knowledge and attitudes, though conclusive evidence is still lacking on whether it can promote behavioural change that tangibly impacts the environment positively in the long term (Palmer 2002; Galton et al. 2004; Hsu 2004; Kuhar et al. 2010).

Bhutan has embraced environmental education throughout its school curricula. "Environmental Studies" is a required subject in schools from Pre-Primary to Class III and subsequently recurs as a theme in science classes through Class XII. Also, "Environmental

Science" is anticipated to be offered as its own subject in Class IX and X from 2015 onwards. At the tertiary education level, environmental studies curricula are offered under the Royal University of Bhutan, currently the country's sole university system for undergraduate degrees. Despite the considerable focus on environmental education in Bhutan, there have been no studies till date to assess the degree to which environmental education actually influences the environmental attitudes of students. We therefore sought to conduct such a study on students of an environmental studies undergraduate degree course at Royal Thimphu College under the Royal University of Bhutan. The purpose of this study was to determine students' attitudes towards the environment, and whether environmental studies students completing the three-year degree curriculum at Royal Thimphu College under the Royal University of Bhutan exhibited more positive attitudes towards the environment than fresh incoming students, particularly in terms of their worldviews and attitudes towards environmental problems (general), national environmental problems (specific to Bhutan), solutions, and individual responsibility.

The study may help establish baselines for further research on a broader scale in Bhutan, e.g., for cross-sectional assessments across different educational programmes, or longitudinal before-and-after studies on the efficacy and impact of certain educational initiatives aiming to instill positive environmental attitudes. For example, with the high school environmental science subject expected to be implemented in the near future, it will be possible to determine how those new high school graduates compare in attitudes with the incoming cohort tested herein (that did not go through such a curriculum). Moreover, with the Royal Thimphu College expected to phase in a revised environment curriculum, the current study provides a basis for comparison against potential future studies on the new curriculum.

For our study, we utilized the revised New Ecological Paradigm scale (rNEP), one of

the most widely employed survey-based instruments for measuring participants' worldviews (ecocentric vs. anthropocentric), which has been used to assess the impact of environmental education programmes, including those at the tertiary education level (Anderson 2012; Harraway et al. 2012). Although the rNEP scale is broadly used and extensively accepted, it has been critiqued for its single-dimension approach that may not account for the complexity of human attitudes towards the environment (Kopina 2012). We therefore also utilized the Environmental Attitude Questionnaire (EAQ), which addresses participants' attitudes towards environmental problems (general problems or those specific to a nation), attitudes towards solutions, and attitudes towards individual responsibility (Tuncer et al. 2004).

Methods

For this study, we adopted the Revised New Ecological Paradigm (rNEP) questionnaire, which consists of 15 statements developed by Dunlap et al. (2000). We also adopted a 45-item Environmental Attitude Questionnaire (EAQ) used by Worsley and Skrzypiec (1998), originally developed by Herrera (1992) as cited in Tuncer et al. (2004). The Likert-type scale used for either questionnaire was similar, in which participants could rate their level of agreement with each statement item on a scale of 1 to 5: 1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree. We treated the responses as interval data to calculate mean scores.

We collected data from two sample populations: (1) incoming 1st year students to Royal Thimphu College who were freshly enrolled in the degree courses with majors in environmental studies (in the combination degree courses of either Environmental Studies and Economics, or Environmental Studies and English); and (2) students who were in their final semester completing the three year course in the same discipline. The exact time of collection was just at the beginning of the course in the first week for the incoming students and at the end

of the course (in the last week) for the outgoing students.

We analysed the data using SPSS to calculate frequency distributions (for visual comparison of survey responses), compare means (*t*-test), correlate variables (Pearson product-moment correlations), and perform one-way multivariate analysis of variance (MANOVA) and univariate ANOVA. The cohort category (two sets of samples, incoming and outgoing students) comprised the independent variable while the mean scores in the different dimensions of the two scales comprised the dependent variables (see next paragraph on calculation of mean scores). From the rNEP, we analysed two dimensions: ecocentric (eight items, Table 1A) or anthropocentric (seven items, Table 1B). From the EAQ, we analysed six dimensions. As originally categorized (Tuncer et al. 2004), four were: Awareness on Environmental Problems, AEP (12 items, Table 1C); General Attitude about Solutions, GAS (14 items, Table 1D); Awareness of Individual Responsibility, AIR (13 items, Table 1E); and Awareness on National Environmental Problems, ANEP (6 items, Table 1F). We rephrased the items under ANEP slightly to make them Bhutan-specific. From the EAQ, we analysed two additional dimensions that were naturally apparent based on categorizing each statement as ecocentric (26 items) or anthropocentric (19 items) for the purpose of adjusting scores for consistency (see below). For the MANOVA, the six variables used were rNEP ecocentric and anthropocentric dimensional means, and EAQ AEP, GAS, AIR, and ANEP dimensional means.

To create aggregate metrics for each of the dimensions, the means of the ratings for each item within the dimensions (as shown in Table 1) were themselves averaged. In calculating the mean scores for each of the four dimensions under the EAQ, for statements representing ecocentric attitudes toward the environment, 5 points were assigned to "strongly agree", 4 to "agree", 3 to "undecided", 2 to "disagree", 1 to "strongly disagree". As for statements representing anthropocentric attitudes, the scores were reversed before averaging into the respective dimensions (adjusted means)

to maintain consistency. In a limited number of cases where blank responses on individual items of the survey would hamper the ability to calculate dimensional scores, the responses were assigned as “undecided”.

For significance testing for comparison of means, equal variances were not assumed, and the tests were two-tailed. Where indicated, Cohen’s *d* was calculated as the effect size using original means and standard deviations rather than *t*-statistics.

We also computed Pearson product-moment correlation coefficients, *r*, to establish the relationships between the ecocentric and anthropocentric variables of both the rNEP and EAQ scales. For this analysis, the variables were not disaggregated by category (incoming vs. outgoing students)—all responses for each dimensional variable were included together in the calculation.

Results

A total of 134 students were surveyed, of which 78 were incoming first-year students and 56 were outgoing (graduating) students of an undergraduate environmental studies degree course. This comprised over 95% of the total possible in the population sampled (those students absent on the day of the survey could not be included). Looking at the mean scores of responses across the Likert-type agreement/disagreement scale, it was apparent that in general, both incoming and outgoing student cohorts had fairly high mean scores with regards to ecocentric statements (on average showing agreement) and lower scores with regards to anthropocentric statements (on average showing disagreement or uncertainty), indicating positive environmental attitudes overall (Table 1).

In addition to individual statements, dimensions comprising multiple items in aggregate were also analysed. Statistically, for each cohort, mean scores were significantly higher on the ecocentric dimensions than the anthropocentric dimensions of both scales (rNEP and EAQ), respectively, as determined

by paired-samples *t*-tests, with strong effect sizes (Table 2).

The results imply that the students of both the incoming and outgoing cohorts had overall positive attitudes towards the environment, tending towards ecocentric worldviews. Interpreting all the mean scores greater than or equal to 4.00 for both cohorts as showing broad agreement with specific statements, and all the statements with mean scores less than or equal to 2.00 for both cohorts as showing broad disagreement, certain specific trends were apparent across the whole sample (both incoming and outgoing students) (Table 1). First, in terms of students’ views on human impacts on the environment, the results indicate consensus with the idea that humans do impact the environment, and that they do so in largely negative ways. Second, in terms of environmental problems, students readily accepted that such problems do exist and are of serious concern, both globally and in Bhutan. Third, there was broad agreement with statements indicating that environmental protection should be accorded priority over purely economic development for the overall well-being of society, future generations, and other living beings (Table 1).

The outgoing students’ responses were statistically different from the incoming student responses for 18 of the 60 total items within the rNEP and EAQ scales (Table 1). In 17 of those cases, the outgoing student responses demonstrated more positive attitudes towards the environment than the incoming student responses did (higher mean scores on the ecocentric statements and lower mean scores on the anthropocentric statements). For example, although 78% of incoming students agreed with the statement “The ultimate solution for environmental problems depends on drastic changes in our lifestyles”, an even greater percentage, 97%, of outgoing students shared this sentiment (Table 1D).

In addition to the analysis of individual statements, in comparing the scale dimensions between the incoming and outgoing cohorts, the following results were obtained: the

TABLE 1 Summary of incoming and outgoing student responses to statements on the various Likert-type scales used in the study. The % of responses that provided the indicated responses (SD=Strongly Disagree, D=Disagree, U=Undecided, A=Agree, SA=Strongly Agree) is given. The responses were scored as indicated in (parentheses) to determine the mean scores. The means for the incoming and outgoing cohort responses were compared using an independent samples *t*-test and the resulting *p*-values are given, along with an indication of the significance of the differences (* indicates $p < 0.05$ and ** indicates $p < 0.01$). A. rNEP (Revised New Ecological Paradigm) scale, ecocentric dimension. B. rNEP scale, anthropocentric dimension. C. EAQ (Environmental Attitude Questionnaire) scale, AEP (Attitude towards Environment Problems) dimension. D. EAQ scale, GAS (General Attitude towards Solutions) dimension. E. EAQ scale, AIR (Attitude towards Individual Responsibility) dimension. F. EAQ scale, ANEP (Attitude towards National Environment Problems) dimension. For the EAQ scales, the statements are further categorized into ecocentric and anthropocentric dimensions.

Statement	INCOMING										OUTGOING					Sig. (t-test <i>p</i> -value)
	% SD (1)	% D (2)	% U (3)	% A (4)	% SA (5)	Mean	Std. Dev.	% SD (1)	% D (2)	% U (3)	% A (4)	% SA (5)	Mean	Std. Dev.		
1. We are approaching the limit of the number of people the Earth can support.	8	14	10	42	26	3.64	1.227	4	4	11	54	29	4.00	0.934	0.057	
3. When humans interfere with nature, it often produces disastrous consequences.	1	4	6	39	49	4.29	0.870	0	2	7	45	46	4.36	0.699	0.647	
5. Humans are severely abusing the environment.	1	3	3	51	43	4.29	0.775	0	0	6	44	50	4.39	0.652	0.429	
7. Plants and animals have as much right as humans to exist.	3	3	6	27	62	4.45	0.847	2	2	5	27	66	4.57	0.684	0.356	
9. Despite our special abilities humans are still subject to the laws of nature.	1	10	19	47	22	3.78	0.949	2	7	14	55	21	3.88	0.896	0.564	
11. The Earth has only limited room and resources.	10	14	14	32	29	3.58	1.344	4	5	11	53	27	3.93	0.970	0.081	
13. The balance of nature is very delicate and easily upset.	3	16	16	55	11	3.54	0.963	0	0	18	62	20	4.00	0.632	0.001**	
15. If things continue on their present course, we will soon experience a major ecological disaster.	1	0	3	21	76	4.69	0.651	0	2	2	30	66	4.61	0.623	0.445	

TABLE 1 (cont'd)

Statement	INCOMING										OUTGOING					Sig. (t-test p-value)
	% SD (1)	% D (2)	% U (3)	% A (4)	% SA (5)	Mean	Std. Dev.	% SD (1)	% D (2)	% U (3)	% A (4)	% SA (5)	Mean	Std. Dev.		
2. Humans have the right to modify the natural environment to suit their needs.	24	31	10	26	9	2.64	1.338	17	24	15	30	15	3.02	1.328	0.109	
4. Human ingenuity will insure that we do NOT make the Earth unliveable.	9	23	26	36	6	3.08	1.102	0	7	29	45	18	3.73	0.842	<0.001**	
6. The Earth has plenty of natural resources if we just learn how to develop them.	3	9	6	32	49	4.15	1.070	2	7	13	39	39	4.07	0.988	0.646	
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.	24	42	13	17	4	2.33	1.136	20	32	18	25	5	2.64	1.212	0.137	
10. Human destruction of the natural environment has been greatly exaggerated.	9	17	11	46	17	3.44	1.212	5	30	16	32	16	3.23	1.206	0.338	
12. Humans were meant to rule over the rest of nature.	27	40	6	19	8	2.41	1.284	29	38	14	9	11	2.36	1.285	0.814	
14. Humans will eventually learn enough about how nature works to be able to control it.	3	15	31	36	15	3.46	1.015	9	9	23	50	9	3.41	1.075	0.783	

TABLE 1 (cont'd)

C. EAQ scale, AEP dimension	INCOMING											OUTGOING					Sig.
	Statement	% SD (1)	% D (2)	% U (3)	% A (4)	% SA (5)	Mean	Std. Dev.	% SD (1)	% D (2)	% U (3)	% A (4)	% SA (5)	Mean	Std. Dev.	(t-test p-value)	
9. We are overloading the Earth's natural ability to support life on earth.	0	10	12	56	22	3.90	0.862	0	0	4	57	39	4.36	0.554	<0.001**		
27. Erosion and desertification are types of environmental problems.	5	1	6	46	41	4.17	0.986	2	0	0	39	59	4.54	0.687	0.012*		
28. Humanity is abusing the environment.	3	5	9	64	19	3.91	0.856	2	0	5	46	46	4.36	0.749	0.002**		
33. Extinction of dinosaurs was due to natural causes, but decreasing numbers of black-necked cranes is caused by humans.	7	13	25	32	24	3.51	1.170	4	7	13	48	29	3.91	1.014	0.038*		
35. Environmental pollution has harmful effects on human health.	5	3	3	45	44	4.19	1.007	5	4	2	30	59	4.34	1.066	0.422		
1. Environmental pollution is not at the dangerous level all over the world.	49	36	4	9	3	1.81	1.045	39	39	14	4	4	1.93	1.006	0.501		
3. Environmental pollution is a temporary problem.	54	33	4	6	3	1.71	0.995	61	27	7	2	4	1.61	0.966	0.569		
5. Industrialized societies give most people who live in them a high standard of living.	4	11	18	55	12	3.59	0.959	2	20	22	49	7	3.39	0.947	0.240		
6. Mankind is very adaptive so there is no need to be concerned about human survival in a polluted environment.	42	42	8	6	3	1.88	0.993	41	32	20	7	0	1.93	0.951	0.796		
36. River pollution is a natural event.	32	39	6	17	5	2.24	1.219	39	39	7	9	5	2.02	1.152	0.277		
37. The natural sources of energy, such as sun, wind and water, can never be exhausted, so energy will never be scarce on Earth.	18	36	21	21	4	2.58	1.123	18	44	25	7	5	2.39	1.039	0.330		
39. Over the next ten years environmental problems will diminish.	23	40	27	3	8	2.32	1.099	38	25	30	5	2	2.09	1.032	0.215		

TABLE 1 (cont'd)

Statement	INCOMING										OUTGOING										Sig.
	% SD (1)	% D (2)	% U (3)	% A (4)	% SA (5)	Mean	Std. Dev.	% SD (1)	% D (2)	% U (3)	% A (4)	% SA (5)	Mean	Std. Dev.	(t-test p-value)						
2. Humanity should live in harmony with nature.	1	0	1	35	63	4.58	0.655	2	2	2	27	68	4.57	0.783	0.966						
7. The ultimate solution for environmental problems depends on drastic changes in our lifestyles.	5	9	8	48	30	3.87	1.097	0	0	4	63	34	4.30	0.537	0.003*						
8. Protection of the environment is more important than economic growth.	4	4	12	29	51	4.21	1.049	0	0	9	30	61	4.52	0.660	0.036*						
12. It is increasingly likely that an industrial accident will contaminate the environment.	3	7	5	47	38	4.09	0.969	0	5	4	50	41	4.27	0.774	0.240						
18. Exhaust gases produced by automobiles cause climatic changes.	4	4	5	42	45	4.21	0.985	2	0	5	46	46	4.36	0.749	0.312						
22. Storing industrial waste is too dangerous.	7	3	7	50	34	4.00	1.057	5	9	11	36	39	3.95	1.166	0.786						
38. In dealing with any kind of problem we need to first consider how it will affect the environment.	5	4	6	50	35	4.05	1.018	0	0	7	46	46	4.39	0.623	0.018*						
40. Society should encourage the conservation of nature.	0	4	0	30	66	4.56	0.713	2	0	0	20	78	4.70	0.685	0.281						
11. The benefit of technology is greater than its harmful effects.	9	20	32	31	8	3.08	1.078	15	36	24	18	7	2.68	1.146	0.044*						
16. Environmental problems have always existed & been solved, so there is no need to worry about the future.	45	40	10	1	4	1.79	0.958	36	50	14	0	0	1.79	0.680	0.949						
17. Science and technology are advancing so rapidly that it will be always in control of any environmental problems that arise.	24	35	22	17	3	2.38	1.108	13	32	36	20	0	2.63	0.945	0.179						
21. Just as science and technology monitor environmental problems, they also solve them, so such issues will not be causes for concern in the future.	16	53	21	11	0	2.28	0.851	13	45	34	9	0	2.39	0.824	0.450						
34. Environmental pollution is not related to population growth.	57	36	3	3	3	1.63	0.899	59	34	0	0	7	1.63	1.054	0.985						
43. The sustainable use of natural resources means the continuous use of them.	20	36	8	26	11	2.73	1.316	38	36	7	9	11	2.20	1.327	0.023*						

TABLE 1 (cont'd)

Statement	INCOMING										OUTGOING										Sig.
	% SD (1)	% D (2)	% U (3)	% A (4)	% SA (5)	Mean	Std. Dev.	% SD (1)	% D (2)	% U (3)	% A (4)	% SA (5)	Mean	Std. Dev.	(t-test p-value)						
	(1)	(2)	(3)	(4)	(5)			(1)	(2)	(3)	(4)	(5)									
14. We must conserve our resources for future generations.	1	1	0	8	90	4.83	0.612	2	0	0	14	84	4.79	0.624	0.661						
15. Fast food consumption is harmful for both our health and nature.	1	17	30	39	13	3.45	0.962	0	2	11	54	34	4.20	0.699	<0.001**						
19. If we do not change our current consumption patterns, land degradation and topsoil losses will increase to the point where they can no longer support crops.	1	7	11	38	43	4.13	0.958	2	2	0	44	53	4.41	0.781	0.063						
24. Individual responsibilities are very important in preventing environmental pollution.	3	0	4	9	84	4.71	0.791	3	0	0	11	86	4.75	0.792	0.747						
25. The hole in the ozone layer will never stop growing if we continue to operate as we do now.	6	12	10	26	45	3.91	1.271	5	7	5	32	50	4.14	1.151	0.272						
30. We can accept lifestyle changes to protect natural resources.	0	17	16	50	17	3.65	0.951	2	14	14	52	18	3.70	0.989	0.803						
31. Spending long times in shopping centres is a type of lifestyle that has negative effects on both consumption patterns and the exploitation of natural resources.	6	23	32	32	5	3.06	1.011	0	4	23	52	21	3.91	0.769	<0.001**						
44. Economical use of water and energy is important for the sustainable use of natural resources.	3	5	19	44	29	3.90	0.961	0	2	20	43	36	4.13	0.788	0.135						
45. Everybody has a part in environmental degradation but it varies according to individual consumption patterns.	4	3	14	60	19	3.88	0.882	0	2	4	61	34	4.27	0.618	0.004**						
10. Environmental protection is a governmental responsibility.	21	45	5	18	12	2.55	1.316	22	33	13	20	13	2.70	1.347	0.536						
13. The world authorities will find ways to decrease population growth, so over-population will not be problem in the future.	17	23	15	31	14	3.03	1.338	25	27	21	23	4	2.54	1.206	0.029*						
32. We should exploit current resources for the benefit of our own generation	28	31	12	19	10	2.53	1.355	38	45	11	5	2	1.89	0.928	0.002**						
41. Consumption patterns are not related to natural resources depletion.	9	51	28	12	0	2.44	0.815	36	39	16	7	2	2.00	0.991	0.008**						

TABLE 1 (cont'd)

F. EAQ scale, ANEP dimension Statement	INCOMING										OUTGOING					Sig. (t-test p- value)
	% SD (1)	% D (2)	% U (3)	% A (4)	% SA (5)	Mean	Std. Dev.	% SD (1)	% D (2)	% U (3)	% A (4)	% SA (5)	Mean	Std. Dev.		
23. There are many plant and animal species in our country that are at the edge of extinction.	1	5	5	46	42	4.23	0.867	2	0	4	36	59	4.50	0.739	0.055	
26. As population increases in bigger towns like Thimphu and Phuntsholing, the environmental problems also increase.	1	5	1	32	60	4.45	0.863	2	0	0	27	71	4.66	0.668	0.112	
42. The solution to environmental problems in Bhutan is closely related to raising environmental awareness.	0	9	12	59	21	3.91	0.825	4	4	11	66	16	3.88	0.854	0.811	
4. There is no environmental pollution in Bhutan.	25	61	8	5	1	1.99	0.814	35	49	9	4	4	1.95	0.961	0.797	
20. Bhutan needs to be industrialized; therefore environmental destruction due to industrialization can be ignored.	28	46	12	10	4	2.15	1.070	45	32	14	5	4	1.91	1.066	0.196	
29. Bhutan is rich in natural resources; therefore it is not possible to use them up.	10	49	21	17	3	2.53	0.977	23	48	20	9	0	2.14	0.883	0.019*	

TABLE 2 Comparison of aggregated means of individual scale dimensions for the rNEP and EAQ scales. The per-item mean scores were averaged together into the indicated scale dimensions. The means for the incoming and outgoing cohort responses were compared using independent samples *t*-tests and the resulting *p*-values are given, along with an indication of the significance of the differences (* indicates $p < 0.05$ and ** indicates $p < 0.01$) and Cohen's *d* value of the effect size. With the incoming or outgoing cohort data, the rNEP or EAQ ecocentric and anthropocentric dimension means were compared using paired samples *t*-tests as indicated (notes a-d).

Dimension	Incoming Mean, StdDev	Outgoing Mean, StdDev	Incoming vs. Outgoing <i>t</i> -test <i>p</i> -value	Effect size (<i>d</i>)
rNEP ecocentric	4.03, 0.42 } ^a	4.22, 0.38 } ^b	0.010**	0.45
rNEP anthropocentric	3.07, 0.57	3.21, 0.63	0.204	0.23
EAQ ecocentric	4.05, 0.41 } ^c	4.32, 0.31 } ^d	<0.001**	0.71
EAQ anthropocentric	2.36, 0.42	2.19, 0.45	0.026*	0.40
EAQ AEP adjusted	3.80, 0.42	4.01, 0.44	0.005**	0.50
EAQ GAS adjusted	3.98, 0.33	4.12, 0.33	0.012*	0.45
EAQ AIR adjusted	3.77, 0.40	4.09, 0.35	<0.001**	0.85
EAQ ANEP adjusted	3.99, 0.42	4.17, 0.44	0.016*	0.43

^a Mean difference = 0.96, StdDev = 0.76; *p*-value <0.001**, effect size *d* = 1.91

^b Mean difference = 1.01, StdDev = 0.71; *p*-value <0.001**, effect size *d* = 1.93

^c Mean difference = 1.69, StdDev = 0.61; *p*-value <0.001**, effect size *d* = 4.08

^d Mean difference = 2.13, StdDev = 0.62; *p*-value <0.001**, effect size *d* = 5.48

outgoing sample showed significantly higher dimensional scores for the rNEP ecocentric dimension and EAQ ecocentric, AEP, GAS, AIR, and ANEP dimensions, and a significantly lower dimensional score for the EAQ anthropocentric dimension (Table 2). These results indicate more positive, pro-environmental attitudes and awareness among the outgoing students. The effect sizes were moderate for the rNEP ecocentric dimension and the EAQ anthropocentric, AEP, GAS, and ANEP dimensions, and strong for the EAP ecocentric and AIR dimensions.

To look at all the scales together, a one-way multivariate analysis of variance (MANOVA) was conducted to determine the effect of the cohort category (incoming vs. outgoing) on six variables derived from four dimensions of the EAQ scale (AEP, GAS, AIR, ANEP) and two dimensions of the rNEP scale (ecocentric, anthropocentric). The EAQ ecocentric and anthropocentric sub-dimensions were excluded from this analysis to avoid double-counting scale items that are already captured in the four mutually exclusive dimensions of the EAQ. A statistically significant difference was found between incoming and outgoing students on the dependent measures (*Wilks' Λ* = 0.805, *F*(6,127) = 5.128, *p* < 0.001). The multivariate η^2 value of 0.195 indicated that 19.5% of multivariate variance of the dependent variables was associated with the cohort category.

Finally, in our analyses, we noted that for the rNEP scale, the mean score differences between the ecocentric and anthropocentric dimensions were not as pronounced as those between the EAQ ecocentric and anthropocentric dimensions (Table 2). The differences between the rNEP ecocentric and rNEP anthropocentric mean scores were 0.96 and 1.01 for the incoming and outgoing cohorts, respectively. However, for the EAQ ecocentric and EAQ anthropocentric dimensions, the mean score differences were 1.69 and 2.13 for the incoming and outgoing cohorts, respectively, with much greater corresponding effect sizes for the differences. We had expected similarly strong differences with the rNEP scale dimensions, under the assumption that strong agreement with

ecocentric statements should also reflect strong disagreement with anthropocentric statements.

We therefore performed a correlation analysis among the ecocentric and anthropocentric dimensions of both the rNEP and EAQ scales. Pearson product-moment correlation coefficients were calculated for each pairwise combination of dimensions (Table 3). The rNEP and EAQ ecocentric dimension scores showed significant positive correlation (*r* = 0.290, *p* = 0.001) and the respective anthropocentric dimension scores also showed significant positive correlation (*r* = 0.361, *p* < 0.001). As expected, internally within the EAQ scale, ecocentric dimension scores showed significant negative correlation with the anthropocentric dimension scores (*r* = -0.224, *p* = 0.009). However, the ecocentric and anthropocentric dimension scores within the rNEP scale did not show the expected significant negative correlation (*r* = -0.022, *p* = 0.803). Moreover, although the rNEP ecocentric and EAQ anthropocentric dimension scores did show a significant negative correlation (*r* = -0.186, *p* = 0.031), the rNEP anthropocentric and EAQ ecocentric dimension scores did not (*r* = -0.045, *p* = 0.609). Taken together, the results indicate that the rNEP anthropocentric dimension was not as strongly polarizing as the other three dimensions.

Discussion

Environmental studies subjects are part of the school curriculum in Bhutan, and environmental protection is a key feature of the nation's constitution as well as its development philosophy of "Gross National Happiness". We therefore expected that citizens living in Bhutan and who had completed their schooling in the Bhutanese education system would have positive attitudes towards the environment. Moreover, students choosing to further their education in environmental studies would probably be inclined to have positive environmental attitudes. In our questionnaire-based survey study of environmental attitudes of incoming and outgoing cohorts of students of an undergraduate degree course in environmental studies at Royal Thimphu College, we found that this was indeed the case.

TABLE 3 Inter-correlations between rNEP and EAQ scale dimensions. The Pearson product-moment correlation coefficient (r) is shown for each pair-wise comparison of variables as indicated, along with the statistical significance (p) of the correlation in parentheses (* indicates $p < 0.05$ and ** indicates $p < 0.01$).

	Correlation r (Significance p)			
	rNEP ecocentric	rNEP anthropocentric	EAQ ecocentric	EAQ anthropocentric
rNEP ecocentric	1	-0.022 (0.803)	0.290 (0.001**)	-0.186 (0.031*)
rNEP anthropocentric	-0.022 (0.803)	1	-0.045 (0.609)	0.361 (<0.001**)
EAQ ecocentric	0.290 (0.001**)	-0.045 (0.609)	1	-0.224 (0.009**)
EAQ anthropocentric	-0.186 (0.031*)	0.361 (<0.001**)	-0.224 (0.009**)	1

Both cohort samples showed a high level of agreement with ecocentric statements and a low level of agreement with anthropocentric statements, indicating positive environmental attitudes and alignment with an ecocentric worldview, overall.

However, it was encouraging that despite this expected result, attitudes still tended to be slightly more pro-environmental in the outgoing cohort. These results indicate overall that the students' experiences during their three years of college were in some way transformative, affecting their environmental attitudes. The results obtained herein with the rNEP scale (a more widely utilized instrument) demonstrate that the sampled students' views were either as comparably ecocentric or more so than those from similar studies (Thapa 1999; Hsu 2004; Rideout 2005; Harraway et al. 2012).

Some of the most significant differences were detected in the Awareness of Individual Responsibility dimension of the EAQ, suggesting that graduates were more likely than incoming students to make connections between individual lifestyle choices and humans' environmental impacts. With respect to awareness of national environmental problems, both cohorts showed a high degree of awareness. It may be possible to leverage this by way of tailoring curricula and contents with more Bhutan-specific context and relevance to promote growth in general environmental awareness and eco-friendly attitudes.

Although the statistically significant differences cannot be ascribed directly to the curricula or any other single variable by this limited study, the results should help establish baselines and points for comparison in further studies, for example across samples of students from different disciplines. By measuring attitudes of non-environmental studies students in comparison to those of environmental studies students, it may be possible to establish the degree of influence of the environment curriculum on students' attitudes. Moreover, as curriculum changes to incorporate more environmental education are introduced at both the high school and college level in Bhutan

in coming years, the baseline and methods established in this study may help guide strategies for evaluating the impacts of those future programmes. In particular, the Royal Thimphu College seeks to introduce a revised environment-based degree offering focused on "Environmental Management" that triples the number of credit hours devoted to environment topics and incorporates more themes specifically addressing human impacts on the environment and solutions to environmental problems. It will be interesting to measure whether the new curriculum promotes even stronger ecocentric worldviews in students.

Finally, an additional purpose of our study was to evaluate the feasibility of conducting such studies of students' environmental attitudes in Bhutan, and in particular, the utility of established instruments for doing so. We utilized the 15-item rNEP scale, being one of the more widely applied instruments worldwide for measuring environmental attitudes—specifically, environmental worldviews along the ecocentric-anthropocentric dimension (Dunlap et al. 2000; Anderson 2008), as well as the 45-item EAQ, which attempts to probe attitudes along multiple environmental attitude dimensions (Tuncer et al. 2004). Our results indicated that both scales could be useful for reflecting the expected student attitudes: positive attitudes overall (greater agreement with ecocentric statements and disagreement with anthropocentric statements), and improvement in attitudes (becoming more positive) after completion of a three-year environmental studies degree course.

As originally designed, the rNEP scale could in fact be analysed uni-dimensionally, considering the ecocentric and anthropocentric statements as opposites along a single dimension (Dunlap et al. 2000; Anderson 2012). However, although the rNEP as designed is expected to be highly internally consistent and constitute a "single measure of endorsement of an ecological worldview", its designers have noted that "differing populations will no doubt vary in the degree to which the rNEP beliefs are organized into a highly consistent belief system, and in many cases it will no doubt be more appropriate

to treat the rNEP as multidimensional” (Dunlap et al. 2000). Correspondingly, we found that for students’ levels of agreement with the ecocentric and anthropocentric statements, while the difference was statistically significant as expected (agreement with ecocentric statements and disagreement with anthropocentric statements), it was not so large as to consider the two types of statements as polar opposites along a single dimension. Our results indicated that the rNEP anthropocentric dimension was not as strongly polarizing as the rNEP ecocentric, EAQ anthropocentric, and EAQ ecocentric dimensions. Therefore, the rNEP scale would not have been suitable for analysis as a single consistent dimension for the population sampled in this study. We therefore recommend maintaining the ecocentric and anthropocentric items in distinct dimensions of the rNEP scale.

In contrast, we found that the EAQ ecocentric and anthropocentric dimensions used for this study behaved nearly as polar opposites, potentially allowing them to be considered opposite poles along a single dimension. This would confer the advantage that the scale could then be used to generate a single metric useful in correlations studies with more complex measures such as the Gross National Happiness Index. Although we found the EAQ scale useful, it does not have as long a history of testing for validity as does the rNEP scale. We therefore recommend further development of the scale, independently of its original design, to address the need for evaluating the impacts of environmental education and other initiatives (such as environmental awareness campaigns or sensitization on environmental policies) in Bhutan. Such development can investigate more thoroughly the specific items in the EAQ and their wording to ensure they conform to social survey best practices and match the language usage and proficiency in Bhutan.

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