NEW ECOLOGICAL PARADIGM AND SUSTAINABILITY ATTITUDES WITH RESPECT TO A MULTI-CULTURAL EDUCATIONAL MILIEU IN CHINA

Mona Wells and Lynda Petherick
Xi'an Jiaotong-Liverpool University
111 Ren'ai Road, Suzhou, Jiangsu Province, 215123, People's Republic of China

ABSTRACT

Institutions of higher education are increasingly interested in how the student experience may or may not influence world views and particularly with respect to sustainability. Here we report preliminary results from a New Ecological Paradigm (NEP) study in China to benchmark student responses, and we relate these results to findings from other studies in China and elsewhere. The 15-item NEP was administered to 265 students at Xi'an Jiaotong-Liverpool University in China, a Sino-British joint venture between research-led universities that confers both University of Liverpool and Chinese degrees and where the teaching language is English. We analyse item-by-item and aggregated results and find that, as expected, our study cohort, which is largely constituted of Chinese students, is unique in having a multi-cultural educational milieu, and results from our cohort differ from the comparison cohorts. Our cohort is aligned with a so-called Western world view with respect to Limits to Growth and Anti-anthropocentrism, however, differs from the Western view with respect to Balance of Nature. We find that the most relevant aspect for our purposes is to understand the causal differences influencing response from "high" and "low" responders within our particular cohort. Implications of these findings to education and the student experience are discussed.

KEYWORDS

Sustainability, education, environmental attitudes, New Ecological Paradigm, environmental culture change

1. INTRODUCTION

Universities often pride themselves in having a foundational and transformative role in society (Lozano et al., 2013, and references therein). However, it has recently been asserted that due to the slow rate of change and traditional nature of many such organisations, a present challenge for universities is to modernise with respect to sustainability and sustainable development (Lozano et al., 2013, and references therein). Institutions of higher education are increasingly interested in how the student experience might influence world views, and interest in sustainability in higher education is increasing. Sustainability education is particularly relevant in China given its recent history of economic growth and the government's ambitious plans for sustainable development. A recent Chinese study (Yuan and Zuo, 2013) on student perspectives with respect to Higher Education for Sustainable Development (HESD) conducted at Shandong University found that over 96% of students felt that they had some knowledge or knew very much about sustainability. As examples of the study's findings: a) over twice as many students strongly agreed that campus security was important to HESD in comparison to university accreditation via, e.g. the Global Reporting Initiative; b) in the overall ranking of considerations for achieving HESD, providing access for people with disabilities was top ranked (number 10 of 10), whereas reduction of toxic materials and radioactive wastes ranked 4; and, c) of six categories queried in the Graphical Assessment of Sustainability in Universities tool (GASU), awareness of the topic of environmental sustainability was lowest across all majors and year classes.

Economic development in China has proceeded at the cost of, in many respects, severe environmental degradation and pollution, and for many, increased income, price stability, social order, and education are prioritised over protection of clean air, natural ecology, and biodiversity (Harris, 2006). Chung and Poon (2006) have reported on how instrumental views of nature lead many individuals to believe that humans have the right to make any use of nature that they please and that human ingenuity in inventing technology will

eventually effect a solution to current problems. This has been equated by Chang (2015) as a trend mimicking the dominant social paradigm of Western Society. It is important to explore this issue as attitude is part of culture, inclusive of environmental culture and how this influences environmental outcomes, sustainability, and sustainability education.

One well-known instrument used in recent years to research environmental attitude is the New Ecological Paradigm (NEP, Dunlap, 2008; Dunlap et al., 2000), results from individual questions of which have been used in aggregate to calculate student sustainability attitudes (Jowett et al., 2014). Here we report preliminary results from a study in China to benchmark student NEP response and sustainability attitudes and we relate these results to findings from other studies. We examine three types of cohort: 1) Chinese students from "traditional" Chinese Universities (data from Chang, 2015), 2) Chinese students within an international educational milieu (this study), and 3) students in a traditional "Western" educational milieu (data from Amburgey and Thoman, 2012). While results are preliminary, it appears there are potential differences between the three groups.

2. METHODS

The 15-item NEP (Table 1) was administered to 265 students at Xi'an Jiaotong-Liverpool University (XJTLU). XJTLU is based in Suzhou, Jiangsu, China and was founded in 2006 as a result of a partnership between the University of Liverpool and Xi'an Jiaotong University. It is the first Sino-British joint venture between research-led universities, and on graduating students receive a University of Liverpool degree as well as a degree from XJTLU; the teaching language is English. XJTLU's vision is to become a research-led, international university, with a mission to explore new models for higher education that will exert a strong influence on the development of education in China and internationally, and to conduct research in areas where humanity faces severe challenges. Our cohort is comprised of students across all majors at XJTLU[1] and represents a group that we anticipated might be interesting to study with reference to the unique educational environment at XJTLU.

Table 1. NEP Scale from Dunlap et al. (2000)

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

For administration of the NEP, undergraduate students were provided with a paper instrument and asked to rate the level of agreement for each NEP statement on a 5-point Likert scale. Student respondents were also asked to provide, on the survey form, some additional sociodemographic information; applicable ethical procedures were followed. Average responses by item were tabulated for our cohort, and aggregated results, which have been used by others to characterize sustainability attitudes, were also examined. The approach to aggregation that we use follows results from factor analysis by (Dunlap, 2008; Dunlap et al. 2000) according to Table 2. NEP items were also summed according to the categories 1) "Environmental" (odd statement

[1]Architecture, Biological Sciences, Chemistry, China Studies, Civil Engineering, Computer Science and Software Engineering, Electrical and Electronic Engineering, English, Culture and Communication, Environmental Science, Industrial Design, International Business School Suzhou, Mathematical Sciences, Public Health, Urban Planning and Design.

numbers) and 2) "Anthropocentric" (even statement numbers) and an environmental / anthropocentric ratio calculated. In the next section, results are compared to published results from two other cohorts.

Table 2. NEP Aggregated categories from factor analysis

Aggregate Category	NEP Statements in Category (No.s)
Balance of Nature	3, 8, 13
Ecocrisis	5, 10, 15
Anti-exceptionalism	4, 9, 14
Limits to Growth	1, 6, 11
Anti-anthropocentrism	2, 7, 12

3. RESULTS – COHORT SIMILARITIES AND DIFFERENCES

Average responses to the NEP statements for three cohorts are shown in Figure 1 below. The two published cohorts we consider are from Amburgey and Thoman (2012, "Western cohort") and Chang (2015, "Chinese cohort"). The former of these consisted of 328 undergraduate students at the University of Utah, and the latter consisted of 1,148 undergraduate students, approximately half of which were from Lanzhou University (Gansu Province) and the other half of which were from Liaocheng University (Shandong Province), both in China. Generally, the level of precision makes it difficult to see statistically meaningful differences on a univariate basis, however, some preliminary observations can be noted. It appears that there is a tendency toward positive response bias from the Chang (2015) data, because the average response for all items is higher than for the other two cohorts, save for one item (6), despite that seven of the fifteen NEP items represent reverse Likert scaling. Thus, it is notable that Chinese students in Chang's cohort agree least with the notion that earth resources are limited (which echoes the findings of Yuan and Zuo, 2013, though no direct comparison can be made due to the different instruments that these authors used). The Chinese cohort's response to this item is about the same as for the Western cohort, whereas students from this study agree most to this item. Another two statements in which our cohort's responses were somewhat in contrast to the other two cohorts were items 8 (nature is strong enough to cope with human impacts) and 9 (humans are subject to the laws of nature), wherein our cohort take, respectively, a more or less "Environmental" (vs Anthropocentric) view. Other differences include that our cohort is in agreement with that of the Chinese cohort that the earth has plenty of resources if humans will only learn to develop same, whereas the Chinese cohort strongly agrees that humans were meant to rule over nature, with which the Western and our cohort, respectively, are neutral and disagree.

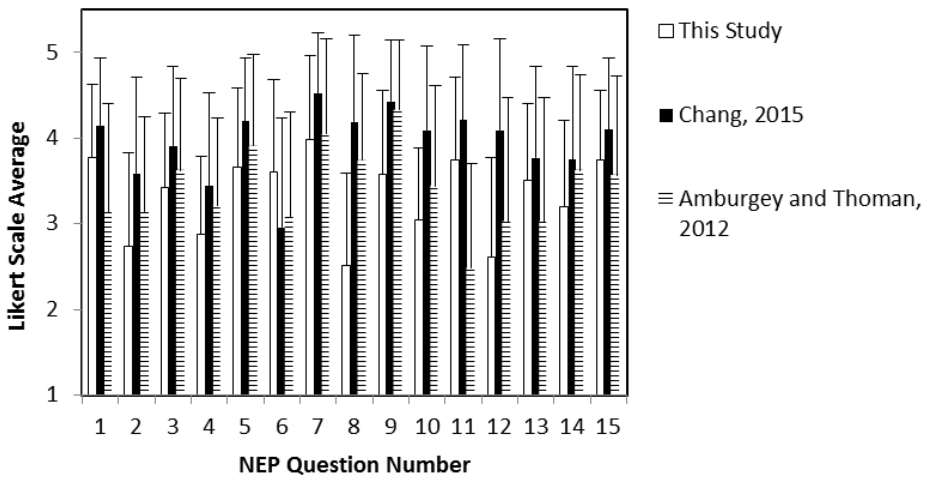

Figure 1. Average responses to the NEP statements for the three cohorts discussed herein. Average precision is ±1, expressed as standard deviation, with a minimum of 0.7 and a maximum of 1.45 and is relatively uniform across cohorts for most items

Interestingly, when averaged by factor-analysis determined categories (Dunlap, 2000, Figure 2), strong opinions are more or less effaced across all cohorts (average response ranges 7.2-9.5 where 7.5 is neutral, 15 is strongly agree, and 3 is strongly disagree), with the Chinese cohort of Chang being consistently neutral, but slightly less environmental than the other two cohorts on these points. All three cohorts are most aligned with respect to an, on average, agreement that an ecocrisis is building. The largest ordinate axis value in Figure 2 relates to our cohort's generally agreeing that the balance of nature is upset by humans, followed by the Chinese and Western cohorts, respectively.

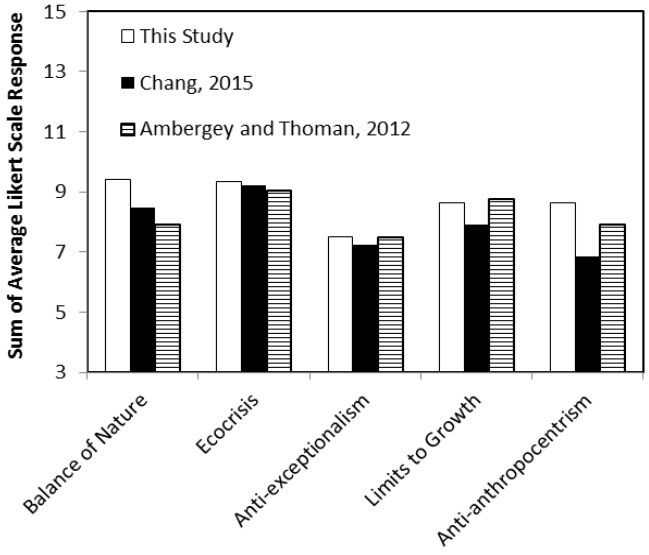

Figure 2. Average response according to aggregated categories representing overall sustainability attitudes

To try and understand more with respect to the specifics driving the attitudes of our cohort, we calculated a ratio of the summed response to "Environmental" versus "Anthropocentric" items in the NEP; this ratio is plotted versus cumulative percentile in Figure 3. Generally, viewed from this perspective, there is a smooth continuum of response with differences apparently most evident among a small number of students. The inflection points in this figure correspond to ratios of 1.11 and 3.15. Excluding all the responses in between these cumulative percentiles and replotting average NEP responses as a function of NEP item yields the graph in Figure 4. From this figure we see that there is little disagreement between "high" and "low" environmental responders for items 1, 3, and 11 (general agreement that we are approaching the limit of people that the earth can support, that humans may inflict disastrous consequences on nature, and that the earth does not have plenty of resources if humans can learn to develop same), and that the biggest differences are for items 2, 4, 6, 14, and 15 (whether or not humans have a right to modify the environment, humans can find a solution to problems, the earth has limited space and resources, humans can control nature, and we are on the verge of an ecocatastrophe).

4. DISCUSSION, LIMITATIONS, AND PRELIMINARY CONCLUSIONS

Various indications herein, as well as data not shown, suggest that our XJTLU cohort is different than the Western and Chinese cohorts – often with an intermediate world view, but sometimes differing from either. As results are preliminary, any conclusions must be viewed with caution. Irrespective of the preliminary nature of analysis of our results, many of the limitations and uncertainties in this study apply in a more general sense even for highly scrutinised and analysed data sets inasmuch as some authors question the utility of the NEP (see Sutton and Gyuris, 2015, for instance). Despite the NEP's shortcomings, it is arguably the most widely and longitudinally used instrument, and as such has value in terms of standardisation and transparency (Dunlap, 2008; Hawcroft and Milfont, 2010), and it would be difficult to argue that other instruments in development can be said to be demonstrably more material at the current stage of development, simply because of use history and available results.

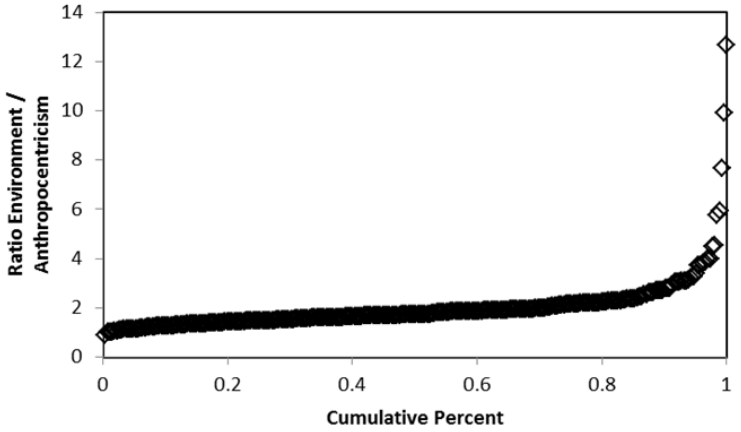

Figure 3. Ratio of the summed response to "Environmental" versus "Anthropocentric" items in the NEP versus cumulative percentile of response (this study)

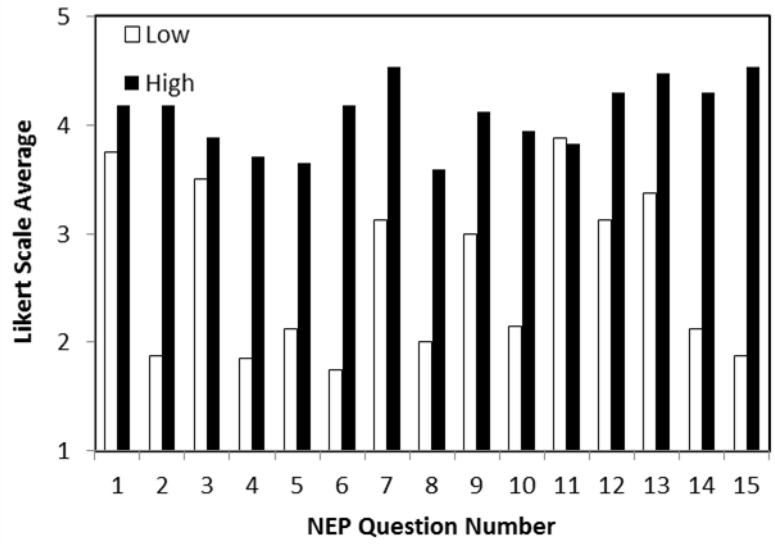

Figure 4. Average NEP responses as a function of NEP item replotted for "high" and "low" responding cohort members

Another issue to consider for any instrument is analysis of results. While the original instrument used here was to be used as 15 stand-alone items, subsequent work argues that the 15 items should be viewed as groupings (e.g. as demonstrated by factor analysis). While there is strong support for the five groupings that we use here (Amburgey and Thoman, 2012), plotted on the x-axis in Figure 2, other authors have argued for different groupings (Harraway et al., 2012). It is quite possible that the inter-relationships among items or the causal factors determining groupings vary as a function of perspective, for instance, cultural perspective. The method of data analysis for results shown in Figures 3 and 4, variations of which have been adduced by others (Jowett et al., 2014), suggest that such an approach deserves more investigation. For this work, Figure 3 suggests that the rankings of a small number of individuals in a population represented by the high cumulative percentile ("Environmental vs Anthropocentric") might greatly contribute to variance in responses to individual items (per Figure 1), and going forward we will focus further on this aspect. First, if there is a normative "majority", this would be helpful in better understanding differences in central tendency between different groups, which would increase the potential utility of the NEP as an instrument. Second, it would be further interesting to understand the influences contributing to the perspectives of individuals in highly differentiated subpopulations in terms of understanding the provenance of environmental culture.

This question of culture (Western, Chinese, Environmental, Anthropocentric, etc.) is undoubtedly an important element of environmental world view and to some extent or another engagement in issues relating to sustainability and behaviours relating to sustainability. Slimak and Dietz (2006) have reported results

indicating that the NEP has a role to play in better understanding relationships between personal values, beliefs and risk perception. From our results it is not clear to what extent so-called Western versus Chinese world views influence environmental culture, however, the issue of what drives the differing perceptions of high and low responders within our cohort are of greatest interest if we wish to understand drivers to attitudes that relate to sustainability education. With this in mind, we are undertaking focus group exercises to better understand the causal influences of such differences, and we hope to report on this in due course. Aside from the overarching question of environmental world view, culture, and environmental behaviour as relates to sustainability, our studies to date indicate that, as others have found, the NEP is a useful tool to benchmark and subsequently track how environmental world view and associated sustainability attitudes change during the course of university education.

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