

Michigan Hunter Education Instructors' Attitudes, Beliefs and Knowledge toward Environmental and Ecological Systems

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Abstract

Departments of natural resources are stressed to adapt to meet current societal and management pressures of the 21st century and ensure the long-term viability of wildlife and wildlife management for future populations. Michigan has gained an elite reputation as a national leader for abundant fishing and hunting opportunities. While the necessary skill-sets and knowledge are changing for new hunters, little research exists on Michigan Hunter Education (MHE) Instructors and their beliefs and knowledge about the environment and ecosystems as it relates to educating future hunters. The purpose of this study was to establish baseline attitudes, beliefs, and knowledge of environmental and ecological systems among a subset of MHE instructors. The survey measured demographics and Michigan Hunter Education instructor ecological world view as defined by the New Ecological Paradigm (NEP) at the 2015 MHE Academy. This was a descriptive/correlational research study. Socio-demographic variables had limited effect on relationships between environmental concerns and attitudes toward management of ecosystems. Further, MHE instructors held an anthropocentric worldview and an alternative ecological paradigm. However, there were strong correlations between MHE instructors NEP scores and Scale Items related to understanding the: (a) Reality of limits to growth, (b) Possibility of eco-crisis, and (c) Fragility of nature's balance.

Keyword: Hunter Education; eco-crisis; New Ecological Paradigm; New Ecological Paradigm; Recreation

1. Introduction

Hunting in Michigan is an important source of recreation and leisure for many (Frawley, 2004). Between 2011 and 2016, Hunting participation (-16%), days in the field hunting (-35%) and expenditures related to hunting (-26%) have all declined significantly according to the 2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (FHWAR, 2018). Additionally, in 2008, Michigan's overall economy was severely impacted during the nation's economic recession (Carnevale & Smith, 2011). However, Michigan's tourism economy has provided a consistent source of revenue prior to, during, and post-economic recession (Popp & McCole, 2014). Recent studies have even suggested that the overall economic impact of tourism in Michigan provides significant revenue (Popp & McCole, 2014).

The hunting industry is one revenue source for tourism through the sale of licenses and hunting equipment both nationally and in Michigan (FHWAR, 2018) as well as related expenses associated with trips. Wildlife management in the United States is supported through the Pittman-Robertson Act's 11% excise tax applied to the sale of hunting and fishing equipment, firearms, ammunition, and hunting licenses (Winkler & Warnke, 2013). One use of Pittman-Robertson monies is through the support of state-run hunter education (HE) programs. Hunter education provides an educational system for training new hunters about firearm and archery safety, wildlife, and wildlife management.

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As hunting population demographics, beliefs, and attitudes continue to change over time (Winkler & Warnke, 2013) and rapidly growing populations are placing pressure on wildlife populations and ecosystems (Gangaas, Kaltenborn, & Andreassen, 2015), it is important that hunter education instructors understand and appreciate differing beliefs and attitudes toward hunting that may complicate teaching and learning about firearm safety, safe hunting, wildlife and wildlife management in the context of hunter education.

Hunter Education (HE) is a nationally recognized framework for educating interested individuals in becoming new hunters. The role of hunting as a wildlife management approach is based on the assumptions of North American Model of Wildlife Conservation (Heffelfinger, Geist, & Wishart, 2013). According the Heffelfinger et al. (2013), the conservation movement rose out of the need for regulation due to the over-exploitation of wildlife species across the U.S. during that latter part of the nineteenth century. Due to the development and implementation of the North American Model of Wildlife Conservation (NAMWC) by hunters in the twentieth century, wildlife populations have become a treasured renewable resource that can be enjoyed as a public trust in perpetuity (Heffelfinger et al., 2013).

The NAMWC frames hunting as an ethical, conservation-motivated movement of the modern-day U.S. governmental system (Heffelfinger et al., 2013). However, the term “hunting” or “hunter” is not always synonymous with positive perceptions among non-hunting populations (Lute, Bump, & Gore, 2014). The NAMWC has two principal tenets that include fish and wildlife belonging to all U.S. citizens, and management of those populations is critical for long-term sustainability of those populations. Within the tenets are seven guidelines or “sisters” that make up the NAMWC. Those guidelines or “sisters” include: 1) wildlife is held in the public trust, 2) prohibition on commerce of deceased wildlife, 3) democratic rule of law, 4) hunting opportunity for all, 5) non-frivolous use of wildlife, 6) prohibition of wildlife as an international resource, and 7) scientific management as a management tool (Heffelfinger et al., 2013).

Connecting HE to outdoor and conservation education provides one potential avenue to sustain hunter populations and educate new hunters with differing environmental and ecological beliefs and behaviors. According to Louv (2006), educating individuals about opportunities in the outdoors and nature is important for the overall health and wellbeing of youth and adults alike. However, understanding differences in attitudes and behaviors toward wildlife and wildlife management is critically important to acceptance of hunting by populations that continue to become more interested in sustaining the environment and wildlife within ecosystems (Kaltenborn, Andersen, Vitterso, & Bjerke, 2012). Environmental and conservation education has had common linkages to the outdoors and nature (Cooper, Larson, Dayer, Stedman, & Decker, 2015; Frantz & Mayer, 2013; Hungerford, 2010; Hungerford & Volk, 1990). In a research study by Cooper et al. (2015), pro-environmental behavior (PEB) participation in consumptive and non-consumption behaviors as well as both behaviors combined were more likely to engage individuals in conservation behaviors than those individuals who participated in either behavior. These findings support the understanding of the importance of relationships between both conservation and recreation (Cooper et al., 2015). Additionally, this research supports the notion that experiences with nature promote pro-environmental behavior and nature related valuation placed on the outdoors (Cooper et al., 2015). Hunter education (HE) as a subset of various aspects of environmental and conservation education provides linkages to those individuals interested in sustaining the environment through wildlife and ecosystem management.

1.1 Problem Statement

Michigan HE is facing the prospect of educating future hunters who may have differing skill sets, knowledge, attitudes, values, and experiences than students of previous generations. Educating students who have similar belief and attitudes toward ecosystems and the environment may provide more authentic experiences between teaching and learning for both instructor and student. Very little is known about Michigan HE instructor environmental and ecological attitudes, beliefs, and knowledge. With potential attitudinal changes of future hunters, environmental and ecological attitudes and behaviors of Michigan HE instructors may be influential to students and their willingness to hunt in the future. Also lacking is research on whether HE attitudes, beliefs, and perceptions impact their instructional practices related to HE curriculum. If perceptions of the environment and ecosystems are related to behavioral beliefs, then considerations should be made about instructional practices (Hawcroft & Milfont, 2010). Therefore, additional research is needed to inform possible HE curricula revisions, assessment of student knowledge, and potential development of additional HE instructor professional development highlighting environmental and ecological education.

2. Purpose and Research Questions

The purpose of this study was to establish baseline ecological and environmental attitudes, beliefs, and knowledge among Michigan Hunter Education (MHE) instructors. The following research questions were used to guide this study.

1. What are the ecological worldviews of MHE instructors as measured by the New Ecological Paradigm?
2. What relationships exist between MHE instructor demographics, scale items of the NEP, and overall NEP scores?

3. Theoretical Framework

Milfont and Duckitt (2010) theorized that environmental attitudes (EA) are a crucial construct of environmental psychology and as such, utilization of Environmental Attitudes Inventories (EAI) are important in understanding latent constructs associated with attitudes, behaviors, beliefs, and intentions. Milfont and Duckitt (2010) suggested that proponents of EA subscribe to three valid and reliable ways of measuring these latent constructs. Milfont and Duckitt (2010) also posit that EA can be reliably and accurately measured using the: (a) Ecological Scale (Maloney, Ward, & Braucht, 1975); (b) Environmental Concern Scale (Weigel & Weigel, 1978); and (c) New Ecological Paradigm (NEP) scale (Dunlap, Van Liere, Mertig, & Jones, 2000).

Cordell, Green, and Betz (2002), indicate that the rise in proportion of the population which lives in urban areas will change levels of recreational participation, however will not change environmental opinion. Additionally, the authors also suggested that as incomes continue to increase, so too will participation in recreational activities and environmental attitudes toward a more sustainable future (Cordell et al., 2002). Peterson, Hull, Mertig, & Liu (2008) found positive relationships among the NEP scale and participants in appreciative outdoor activities and negative relationships among respondents and consumptive activities. Appreciative activities included hiking, camping, and bird watching; whereas consumptive activities included hunting and fishing (Peterson et al. 2008). Interestingly, Peterson et al. (2008) found that NEP scores for hunting activities were more likely to be related to the number of respondent's household members than their own participation. Therefore, the association between environmental orientations and outdoor activities may be an important component to understanding environmental attitudes, behaviors, beliefs, and intentions (Kaltenborn et al., 2012). Additional studies have provided support for use of the New Ecological Paradigm (NEP) Scale to measure psychometric properties of individuals in various recreational activities (Dunlap, 2008; Dunlap et al., 2000; Dunlap & Heffernan, 1975; Hawcroft & Milfont, 2010; Kaltenborn et al., 2012; Peterson et al., 2008).

3.1 New Ecological Paradigm

According to Dunlap (2008), the New Ecological Paradigm (NEP) is a valid and reliable scale used to measure environmental attitudes (EA). Environmental attitudes (EA) are defined as the degree that humans and the environment interact from an "ecological" perspective (Dunlap, 2008). An environmental paradigm began to emerge out of the constructs of the Dominant Social Paradigm (DSP) when Dunlap and Van Liere (1978) argued that there was a need for a paradigm to emerge that would measure human relationship and their value to the environment. Dunlap and Van Liere (1978) recognized that there were three central concepts around which the paradigms were in opposition to the DSP including: (a) limits to human growth, (b) balance between human and nature, and (c) anti-anthropocentrism where anthropocentrism is defined as nature and natural resources exist for human consumption and pose no inherent value without human interaction (Dunlap et al., 2000). The NEP was able to capture the measurement of anthropocentrism through one's worldview as opposed to specific environmental events. This measure of anthropocentrism makes the NEP unique to other EA scales (Dunlap et al. 2000).

NEP scores range from 15 to 75. Lower scores indicate support of the DSP in which one views the human relationship with the environment from an anthropocentric perspective. Scores in the higher range of the spectrum support the New Ecological Paradigm (NEP) in which conceptions of that relationship are more focused on the environment and ecosystems. NEP indicators of environmental attitudes are measured using two sub-scales including ones "new ecological worldview," and the "human exemptionalism paradigm." Personal "ecological worldview" is defined as humans are a part of nature and must realize this perspective when utilizing resources. An individual's "human exemptionalism paradigm" provides human exemptions from the laws of nature and rules over the physical world. Within the NEP scale instrument, "human exemptionalism" items are reversed. Research by Dunlap et al. (2000) suggests that the NEP scale is valid in the determination of environmental behavior.

The validity and reliability of the NEP scale has also been supported by Kaltenborn et al. (2012) and Raven et al. (2018) in the context of hunting and education, respectively. Over time, Dunlap et al. (2000) renamed the New Ecological Paradigm and updated the 15-item scale to maintain the strong reliability and validity of its predecessors in measuring EA (Hawcroft & Milfont, 2010).

While the NEP has been used worldwide, no studies were found that utilized the NEP with MHE instructors from a natural resources' education perspective. One international study targeted pre-service teachers in Australia, Indonesia, and the Republic of Maldives. Watson and Halse (2005) reported that pre-service teacher NEP score means were as follows: 1) Australians (M=60.0); 2) Indonesians (M=55.7); and 3) Maldivians (M=51.6). Another study was focused on Michigan school based agricultural education instructors (SBAE). Results of this study found that Michigan SBAE teacher NEP scores ranged 22 to 71 with an average score of 49.6 (SD = 8.7) (Raven et al., 2018). Although research exists regarding NEP scores of hunters, previous studies utilize different variations of the NEP scales (Cordell et al. 2002; Kaltenborn et al., 2012; Peterson et al., 2008). Previous research suggests that there were no relationships between NEP and hunting, however no research exist regarding the intersection of hunting and education of hunters about hunting.

4. Methods and Procedures

This descriptive-correlational study utilized survey research methodology to determine attitudes, beliefs, and knowledge of MHE instructors (Dillman, Smyth & Christian, 2009). The paper-pencil survey consisted of the NEP (Dunlap et al., 2000) as well as a demographic section. Demographics collected included age and gender of MHE instructor participants.

Instrumentation

The New Ecological Paradigm (NEP) determines one's ecological perspective with respect to an individuals' worldview and is agauge for one's level of environmental concern (Dunlap, 2008). The NEP instrument consists of questions that address five subscales as well as an overall NEP score. The five subscales include: (a) limits to growth; (b) the balance of nature; (c) anti-anthropocentrism; (d) rejection of exemptionalism; and (e) the possibility of ecocrisis (Dunlap et al., 2000). NEP instrument scores may range from 15 (highly anthropocentric worldview) to 75 (highly ecocentric worldview) (Raven et al., 2018). Scores on the anthropocentric spectrum indicate support of a Dominant Social Paradigm (DSP) in which one views the human relationships to the environment more centric than any other perspective. Dunlap et al. (2000) defined anthropocentric relationships as "the belief that nature exists primarily for human use and has no inherent value of its own" (p. 431). Scores opposing an anthropocentric worldview indicate support for the New Ecological Paradigm (NEP) in which the environment and ecosystems are more centric to human relationships. Fifteen subscale items make up the NEP scale (Table 1). Reliability, face validity, and content validity of the NEP instrument and scale were established through use in a previous study (Raven et al., 2018). The NEP scale and the demographics section were placed into a single paper-pencil survey distributed at the Michigan Hunter Education Instructor Academy. Internal reliability of the survey was determined using Cronbach's alpha for the NEP (0.88).

Table 1 New Ecological Paradigm (NEP) scale item number and question.

NEP Item Number	NEP Item Question
1	We are approaching the limit of the number of people that 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 livable.
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 our 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 were 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.

The population frame was constructed using participants from the 2015 MHE Academy. The resulting population frame consisted of 55 HE instructors from the state of Michigan. This number represents the population of hunter education instructors who elected to attend the 2015 MHE Academy. The MHE Academy is held each year at the Ralph A. MacMullan Conference Center in Roscommon, Michigan. The Academy is a four-day volunteer professional development opportunity for current MHE instructors. The goal of the Academy is to expose MHE instructors to teaching tips and opportunities related to firearm safety, hunting safely, wildlife and wildlife management. Additionally, the Academy provides MHE instructors with resources and resource professionals to assist instructors in creating quality learning opportunities for future MHE students. As of August 8, 2015, there were 2,968 hunter education instructors in the state of Michigan. A total of 51 of the 55 participants of the Michigan Hunter Education Instructor Academy completed the NEP survey for a response rate of 93%.

Data were analyzed using the Statistical Packaging for Social Sciences (SPSS) (version 24.0). Where descriptive statistics were used, the mean, standard deviation, minimum and maximum scores were reported. Frequencies were reported using valid percentages unless specified. Where correlations were reported, effect size was estimated as follows: 1) a strong correlation for Pearson (r) values between ± 0.50 and ± 1.00 ; 2) a moderate correlation for (r) values between ± 0.30 and ± 0.50 ; and 3) a weak correlation for (r) values between 0 and ± 0.30 (Cohen, 1992). Pearson's Correlational Coefficient was used to test relationships between demographic information collected (age and gender), overall NEP score, and each of the 5 NEP subscale items. New Ecological Paradigm subscales were summated based on appropriate scale items. A Pearson's Point Biserial Correlation was used for the relationship between gender and the dependent variables.

The NEP measured quantitative, interval data on a five-point Likert scale, which measured agreement. A response of Strongly Disagree was assigned a 1, a response of Disagree was assigned a 2, a response of Neutral was assigned a 3, a response of 4 was assigned Agree, and a response of Strongly Agree was assigned a 5. Agreements with the seven even NEP scale items favor the dominant social paradigm; scores for these seven scale items were reversed. NEP responses were summated.

5. Results

The average age of the respondents ($n = 51$) for this study was 51.8 (SD = 15.3). The average age of males in this study was 53.4 (SD = 15.1), whereas the average age of female respondents was 42.0 (SD = 13.8). Of the 51 respondents, 13.7% of the population was female. Respondents' average NEP score was 49.1 (SD = 11.0) with a minimum of 28 and a maximum of 73. Female respondents had an average NEP score of 50.6 (SD = 15.9) with a minimum of 29 and a maximum of 73, whereas male respondents had an average NEP score of 48.9 (SD = 10.2) with a minimum of 28 and a maximum of 69. These results indicate that female MHE instructors tend to have a slightly less anthropocentric worldview than that of their male counterparts in this study. Individual NEP scale item data frequency distributions were in accordance with Dunlap and Van Liere (1978) and Raven et al. (2018) (Table 2). Overall, 82% of respondents agreed with item 9 that "humans are subject to the laws of nature." The next most agreed upon response by respondents was item 13. Fifty-nine percent of respondents agreed, "The balance of nature is very delicate and easily upset."

Reality of limits to growth

The subscale for measuring limits of growth consisted of items 1, 6, and 11 (Table 1). Reality of limits to growth is defined as "there are limits to growth beyond which our industrial society cannot expand" (Dunlap, 2008, p. 7). Fifty-seven percent of respondents agreed with each subscale item "we are approaching the limit of the number of people the earth can support." Conversely, only 24% agreed or strongly agreed with item 6 that we have "plenty of natural resources if we learn how to develop them." Finally, over half (55%) of respondents agreed with item 11 that the "earth is like a spaceship with limited room and resources." Respondents believe that there are limits to growth in terms of the human population, natural resources, and space; and a high percentage of MHE instructors believed that we are close to reaching the limit for human population growth. According to the subscale, the 67% of respondents who believe that the earth does not possess a vast array of natural resources is cause for concern among the conservation education community. Similar frequencies of respondents disagreed with and felt neutral about each subscale item; this also occurred between items. Over a quarter (26%) disagreed with and 18% felt neutral about item 1 that "we are approaching the limit of the number of people." Slightly less than one-third (31%) disagreed with and 14% felt neutral towards item 11 that the "earth [has] limited room and resources."

A high percentage of MHE instructor respondents thought that humans did not have an adequate understanding in how natural resources should be developed for future use.

Anti-anthropocentrism. The anti-anthropocentrism subscale consisted of items 2, 7, and 12 (Table 1). Anti-anthropocentrism is defined as the rejection of “the belief that nature exists primarily for human use and has no inherent value of its own” (Dunlap et al., 2000, p. 431). Overall, respondents were divided in terms of their attitudes toward anti-anthropocentrism. MHE instructor respondents were more likely to disagree with Item 2 (53%) and 12 (47%); whereas, MHE instructors were more likely to agree with items 7 (49%). While 49% of respondents agreed or strongly agreed with item 7, that “plants and animals have as much right as humans to exist,” over a third (37%) disagreed or strongly disagreed with this construct (Table 2). The data indicated that MHE instructor respondents’ attitudes and beliefs were not consistent in how they regarded a human’s place in the environment and the value and worth that humans place on ecosystems. This division over the attitudes and beliefs of MHE instructors are contrary to the belief that a human’s rightful place is as a ruler over nature, and the idea that plants and animals are due an entitlement to life.

Table 2 Michigan Hunter Education Instructors Means, Standard Deviations, and Frequency Distributions for NEP Scale Items (n=51).

NEP Scale Items	M	SD	Responses				
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1 We are approaching the limit of the number of people that the earth can support.	3.3	1.26	7 (13.7%)	6 (11.8%)	9 (17.6%)	22 (43.1%)	7 (13.7%)
2 Humans have the right to modify the natural environment to suit their needs.	2.9	1.39	6 (11.8%)	21 (41.2%)	5 (9.8%)	8 (15.7%)	11 (21.6%)
3 When humans interfere with nature, it often produces disastrous consequences.	3.5	1.29	4 (7.8%)	10 (19.6%)	9 (17.6%)	15 (29.4%)	13 (25.5%)
4 Human ingenuity will ensure that we do not make the earth unlivable.	3.0	1.36	8 (15.7%)	13 (25.5%)	12 (23.5%)	8 (15.7%)	10 (19.6%)
5 Humans are severely abusing the environment.	3.4	1.30	6 (11.8%)	8 (15.7%)	7 (13.7%)	20 (39.2%)	10 (19.6%)
6 The earth has plenty of natural resources if we just learn how to develop them.	2.3	1.30	17 (33.3%)	17 (33.3%)	5 (9.8%)	8 (15.7%)	4 (7.8%)
7 Plants and animals have as much right as humans to exist.	3.2	1.43	9 (17.6%)	10 (19.6%)	7 (13.7%)	14 (27.5%)	11 (21.6%)
8 The balance of nature is strong enough to cope with the impacts of modern industrial nations.	3.5	1.22	4 (7.8%)	7 (13.7%)	12 (23.5%)	16 (31.4%)	12 (23.5%)

	M	SD	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
9 Please indicate to what extent you AGREE with the following statements: Despite our special abilities, humans are still subject to the laws of nature.	4.1	1.04	2 (3.9%)	3 (5.9%)	4 (7.8%)	21 (41.2%)	21 (41.2%)
10 The so-called “ecological crisis” facing humankind has been greatly exaggerated. The earth is like a spaceship with very limited room and resources.	2.6	1.28	13 (25.5%)	13 (25.5%)	11 (21.6%)	10 (19.6%)	4 (7.8%)
11	3.4	1.39	6 (11.8%)	10 (19.6%)	7 (13.7%)	14 (27.5%)	14 (27.5%)
12 Humans were meant to rule over the rest of nature.	2.8	1.41	11 (21.6%)	13 (25.5%)	10 (19.6%)	8 (15.7%)	9 (17.6%)
13 The balance of nature is very delicate and easily upset.	3.5	1.39	6 (11.8%)	8 (15.7%)	7 (13.7%)	14 (27.5%)	16 (31.4%)
14 Humans will eventually learn enough about how nature works to be able to control it.	3.4	1.32	4 (7.8%)	10 (19.6%)	12 (23.5%)	10 (19.6%)	15 (29.4%)
15 If things continue on their present course, we will soon experience a major ecological catastrophe.	3.2	1.43	8 (15.7%)	10 (19.6%)	9 (17.6%)	11 (21.6%)	13 (25.5%)

Note. Full Prompt: Based on your own ATTITUDES, please indicate to what extent you AGREE with the following statements.

Fragility of nature's balance. Items 3, 8, and 13 made up the subscale (Table 1). Fragility of nature's balance is defined as that which "humans must live in harmony with nature in order to survive" (Dunlap, 2008, p. 7). Nearly half of respondents (55%) agreed with item 3 that "when humans interfere with nature, it often produces disastrous consequences." Whereas, nearly 55% agreed with item 8 that nature can cope with the impacts of our modern industrialized world. Additionally, nearly 60% of respondents agreed with item 13 that the "balance of nature is very delicate and easily upset." In general, respondents also indicated that that man should live in harmony with nature (82%). Frequencies for this item (9) were the highest for all the subscales. While nearly 60% of MHE instructor respondents thought that severe consequences could emerge when nature has been disrupted, nearly 55% believed that nature was fragile and our modern, industrialized world carries a heavy toll on the balance of nature. A low percentage of respondents strongly disagreed or disagreed with item 8 (22%) that nature could cope with the modern world and item 3 (27%) that humans' interference was disastrous. A low percentage of respondents rated items 3 (18%) and 13 that the balance of nature was delicate neutrally (20%) (Table 2). Therefore, approximately 20% of Michigan Hunter Education instructors did not feel compelled one way or another whether human interference with nature was detrimental to the environment and ecosystems. The high levels of agreement for items 3, 8, and 13 suggest that MHE instructor respondents are cognizant of the fragile nature of the environment and ecosystems.

Rejection of exemptionalism. The determination of rejection of exemptionalism subscale consisted of items 4, 9, and 14 (Table 1). Rejection of exemptionalism is defined as the rejection of the idea that "humans, unlike other species, are exempt from the constraints of nature" (Dunlap et al., 2000, p. 432). MHE instructor responses varied between subscale items. Thirty-five percent of respondents agreed with item 4 that "human ingenuity will ensure that we do not make the earth unlivable." Whereas, Eighty-two percent strongly agreed or agreed with item 9 that "humans are still subject to the laws of nature." Forty-nine percent agreed or strongly agreed with item 14 that "humans will eventually learn enough about how nature works to be able to control it" while 24% answered neutral (Table 2). Overall, exemptionalism-related NEP items were inconsistent. However, there was high agreeability about human beliefs toward laws of nature, which provide support that humans are limited to the confines of nature. Additionally, nearly half of respondents thought that humans would eventually learn enough about how nature works to be in a position to control nature, however only 35% thought that human ingenuity would at least keep earth viable as a place to live. Despite MHE instructors thinking that humans are subject to nature, many instructors do not believe that human ingenuity can help solve these challenges.

Possibility of eco-crisis. The potential for eco-crisis was measured using subscale items 5, 10, and 15 (Table 1). Possibility of eco-crisis is defined as the "likelihood of potentially catastrophic environmental changes or 'ecocrises' besetting humankind" (Dunlap et al., 2000, p. 432).

Respondents agreed with item 5 that "humans are severely abusing the environment" (59%), whereas 28% disagreed with this subscale statement. Fifty-one percent of respondents disagreed and only 27% agreed with item 10 that the "'ecological crisis' facing humankind has been greatly exaggerated." Additionally, less than half (47%) agreed with item 15 that "we will soon experience a major ecological catastrophe." Only 18% were neutral regarding a potential eco-crisis, and the remaining 35% did not agree that an eco-crisis would occur in the future. This result created an interesting range in differences among beliefs by MHE instructors about the present course of our ecosystem and potential for an ecological catastrophe. Results of respondent beliefs about eco-crisis were not consistent across the three items measured. However, given that well over half (59%) of respondents believed that the environment was being abused and that the potential for an ecological crisis did exist, there is support that a high percentage of Michigan Hunter Education instructors are environmentally and ecosystem friendly.

Pearson's Correlational Coefficient tested for the presence of relationships between respondent age and gender, NEP subscale items and overall NEP scores. There were no correlations between age and subscale and overall NEP scores. A Pearson's Point Biserial correlation indicated that there was no relationship between gender and subscale and overall NEP scores. Strong and moderate correlations existed between most subscale items and overall NEP scores obtained from Hunter Education Instructor respondents (Table 3).

Table 3 Pearson's correlations of demographics, subscales and overall NEP score.

Variables	1	2	3	4	5	6	7	8
1. Age	–							
2. Gender	-.26	–						
3. Total NEP Score	.03	.05	–					
4. Reality of limits to growth	.15	-.06	.77**	–				
5. Anti-anthropocentrism	-.01	.14	.77**	.43**	–			
6. Fragility of nature's balance	.20	-.05	.77**	.62**	.44**	–		
7. Rejection of exemptionalism	-.03	-.03	.60**	.18	.53**	.24	–	
8. Possibility of eco-crisis	-.14	.05	.86**	.67**	.49**	.63**	.43*	–

* $p < .05$. ** $p < .01$.

6. Conclusions

MHE instructors reported a more anthropocentric worldview on the NEP scale ($M=49.1$; $SD=11.0$). From scale item to scale item, respondents held a weak and divided ecological worldview; with very few scale items receiving agreement or disagreement on a majority of responses. This result indicates that in general, MHE instructors tend to have a more anthropocentric worldview than many other populations in the literature and a similar worldview to Michigan School-based Agricultural Educators (Raven et al., 2018). The standard deviation of 11.0 along with the range of a minimum of 28 to a maximum of 73 indicated that there were different ecological worldviews among the MHE instructor respondents. Notable results of MHE instructor responses were that: 1) man should live in harmony with nature (82%); 2) the earth does not possess a vast array of resources for misuse (67%); and 3) humans are abusing the environment (57%). Thirty-five percent of respondents agreed that “human ingenuity will ensure that we do not make the earth unlivable.” One scale item strongly disagreed or disagreed with by 67% of respondents was that “the earth has plenty of natural resources if we just learned how to develop them.” This result suggests that natural resources management is important to MHE instructors. Two scale items received high rates of mixed agreement from respondents; interestingly, one scale item made up part of the anthropocentrism subscale while one item made up the rejection of exemptionalism subscale. While most of the respondents (53%) strongly disagreed or disagreed that “humans have the right to modify the natural environment to suit their needs” as a construct related to anthropocentrism, approximately a third (37%) still agreed that humans should have the right to modify the environment. Further, while approximately 41% of respondents strongly disagreed or disagreed that “human ingenuity will ensure that we do not make the earth unlivable” as a construct related to rejection of exemptionalism, thirty-five percent agreed that humanistic behavior will make the planet unlivable over the long term.

While Michigan Hunter Education (MHE) Instructors' hold a more anthropocentric worldview of the environment and ecosystems, the high frequencies of neutrals on items 4, 8, 10, and 14 indicated that there was strong lack of commitment to environmental and ecological beliefs.

With two items in the rejection of exemptionalism subscale, this is a compelling argument that the MHE instructor respondents could not agree on their rights and belief about the environment. Previous research by Rideout, Hushen, McGinty, Perkins, and Tate (2005) experienced high levels of neutral ratings that ranged from 20-35% for almost half the items. Raven et al. (2018) also cite a high level of neutrality in a large number of instrument items. The authors cite that this hesitance may be related to associating to a particular belief or attitude related to agricultural education (Raven et al., 2018). Conversely, MHE instructors should have a strong worldview about conservation of plants and animals as they are teaching others about management of land and wildlife in the context of hunting as a wildlife management tool.

In this study, MHE instructors' beliefs about human's role in the balance were largely based on being subject to the laws of nature. Research by Hunter and Rinner (2004) and Raven et al. (2018) supports this claim and experienced similar results within their respective studies. Additionally, MHE instructors strongly believed that interference in nature could produce disastrous consequences for future generations while considering the environment to be in a fragile state with a finite amount of space and resource availability. Additionally, a high percentage of respondents also believed that plants and animals have as much right as humans to exist, which further confounds human's in the balance of ecosystems.

Finally, many MHE instructors also believed that a potential “eco-crisis” has not been exaggerated and if we continue on our current course, we may soon experience an “ecological” catastrophe. This result is consistent with many who believed that humans are severely abusing the environment and that we are approaching the limit of the number of people that the earth can support. These results are consistent with other conservation and environmental education research that suggests that nature education is central to pro-environmental beliefs and attitudes (Frantz & Mayer, 2013; Hungerford, 2010). This research also supports the notion that MHE instructors exhibit pro-environmental behaviors that are the result of beliefs that humans may be impacting the environment and ecosystems in ways that are detrimental to human populations.

While research has not targeted hunter education instructors to determine their ecological paradigm, MHE instructors had an anthropocentric worldview of the environment based on the constructs used to assess anti-anthropocentrism. MHE instructors held a similar anthropocentric worldview ($M = 49.1$) to Michigan SBAE ($M = 49.6$; Raven et al., 2018). Additionally, the worldview of MHE instructors was more anthropocentric than international pre-service student teachers in research conducted by Watson and Halse (2005). Research by Watson and Halse (2005) suggested that individual countries student teachers scored differently from other countries including: Australia ($M = 60.0$), Indonesia ($M = 55.7$), and the Maldives ($M = 51.6$). In comparison to Beus and Dunlap (1992), MHE instructors held a more ecological worldview than Washington State faculty ($M = 44.9$). Kaltenborn et al. (2012) suggest that the ecological paradigm of hunters is an important facet and that a balance between consumptive and appreciative experiences may provide valuable information that influences an individuals’ degree of environmental orientation toward pro-environmental behavior.

Pearson’s correlations between subscale items as defined by Dunlap et al. (2000) provided support for the NEP Scale Instrument as well as positive relationships between specific subscale items and overall NEP (Table 3). There were strong and moderate positive relationships between four of five subscales as defined by Dunlap et al. (2000). Strong correlations among subscale items support the work of Dunlap et al. (2000). However, strong correlations between unrelated subscale items suggest that subscale items may be interrelated to the overall values of respondents for this study. These results also suggest that MHE instructors have a strong affinity toward the reality of limits of growth on the planet, anthropocentric behavior, belief in the fragility of nature, and the potential for eco-crisis. Additionally, there was strong agreement and a positive correlation toward the belief that humans are abusing the environment. These results support the notion that hunter education instructors in this sample are centered on humanistic behaviors yet believe that the planet is a vessel to be conserved and managed appropriately. This result merits further investigation and application on a larger scale. In general, MHE instructors’ anthropocentric worldview was not consistent to their beliefs about the environment and ecological worldview. Despite demographic differences, MHE instructors believed that the environment was fragile and should be managed appropriately to last for future generations. MHE instructors believed in a worldview where natural resources are limited; and that we are approaching the limit of the number of people that can be supported on earth. In general, MHE instructors were thoughtful about the environment and ecosystems when answering NEP scale items directly related to preserving the environment and management of ecosystems similar to the philosophical approach as defined in the North American Model of Wildlife Conservation (Heffelfinger et al., 2013).

The results of this research generated more questions about beliefs and attitudes of MHE instructors and the education that occurs within the hunter education classroom in Michigan. Based on the results of this research there is a clear disconnect between the anthropocentric beliefs of respondents in this study and beliefs regarding reality toward limits of growth, fragility of the natural environment, and potential for an eco-crisis. As cited by Cooper, Larson, Dayer, Stedman and Decker (2015), “Shifting patterns of wildlife-based recreation have created challenges for wildlife managers” (p. 455). Hunter education both state and nationally will not be immune from these trends in new hunter attitudes, beliefs, knowledge, and behavior. Over time new hunter attitudes, beliefs, knowledge and behavior about hunting and wildlife management will change. Will HE instructors change to meet the needs of future hunters is still to be determined. The authors believe there is merit in application of the NEP scale on a census of MHE instructors. The authors recommend future research that includes additional demographic data as well as questions to HE instructors about hours hunted in the past year and types of hunting participation as these items may be related to NEP constructs. These research findings also prompt research questions about current curricular aspects of HE in Michigan and nationally.

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