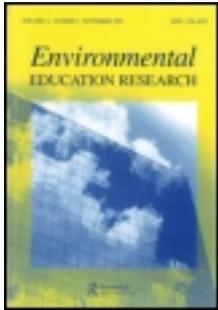


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### Measuring children's environmental attitudes and values in northwest Mexico: validating a modified version of measures to test the Model of Ecological Values (2-MEV)

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## Measuring children's environmental attitudes and values in northwest Mexico: validating a modified version of measures to test the Model of Ecological Values (2-MEV)

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This paper describes the validation process of measuring children's attitudes and values toward the environment within a Mexican sample. We applied the Model of Ecological Values (2-MEV), which has been shown to be valid and reliable in 20 countries, including one Spanish speaking culture. Items were initially modified to fit the regional dialect, culture, and bioregional context of our Mexican population. In Stage 1, we applied the scale to quantify the environmental attitudinal and value impacts of an environmental service learning program with 22 children in Baja California Sur, Mexico. Program effects were evaluated using a pre-test/post-test design quantifying preservation and utilization views of the environment. Based upon further cultural insights and the results from Stage 1, in Stage 2, we modified two more items to reflect the culture of philanthropy and associational life in Mexico. To test the structure of this finalized instrument, we applied the model in Stage 2 with a group of 335 children. We successfully extracted the already known factor structure covering the two higher order values of preservation and utilization. In general, the underlying primary attitudes were also confirmed, with the exception of two neighboring ones: Care with Resources and Intent of Support, which merged into one.

**Keywords:** environmental values; environmental attitudes; Model of Ecological Values; Mexico; experiential environmental education; measurement

### Introduction

#### *An 'instrumental' path to measuring environmental values*

Due to its multifaceted character, the study of children's environmental values has suffered from the lack of a solid age-appropriate empirical measurement scale. Despite numerous studies since the 1970s, a generally acknowledged and psychometrically confirmed empirical scale did not exist. Meta-analyses in the 1980s and 1990s (Hines, Hungerford, and Tomera 1987; Leeming, Dwyer, Porter, and Cobern 1993; Leeming, Dwyer, and Bracken 1995) found that there were as many scales as there were research groups in the field, a situation that was prevalent in other psychometric fields of earlier decades (Eysenck and Eysenck 1969).

A few theoretically based approaches supported subsequent scale development: The Dominant Social Paradigm (DSP; Dunlap and Van Liere 1984), the New

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Environmental Paradigm (NEP; Dunlap and Van Lier 1978; Arcury, Johnson, and Scollay 1986), and the Ecological World View scales (EVW; Blaikie 1992). All of these approaches masked some aspects of environmental perception by mapping only anthropocentric *or* ecocentric views toward nature and the environment (see also Catton and Dunlap 1978; Milbrath 1984; Dunlap 2008).

The anthropocentric framework of the DSP scale views nature as an inexhaustible resource for human exploitation, thus legitimizing human dominance over nature ('Human Exemptionalism Paradigm'; Arcury and Christianson 1990). The ecocentric framework of the NEP scale specifically described a veneration for life and living in harmony with nature, supporting stewardship of the natural world, and an unquestioning protection of nature (Leopold 1948; Catton and Dunlap 1978; Cotgrove and Duff 1981; Blaikie 1992): An ecocentric ethic espouses that all aspects of the environment, both the living and nonliving components, have inherent (intrinsic) value; human beings are considered a member of this community and its independent parts, all sharing equal rights. We note that the DSP and NEP were often regarded as separate and contrary to one another (Dunlap and Van Lier 1978; Milbrath 1984).

### ***Development of the model of ecological values (2-MEV)***

Nevertheless, until the mid-1990s, an age-appropriate empirical instrument to measure children's environmental values (following all existing psychometric standards) did not exist. At that time, Bogner and Wilhelm (1996) piloted such a scale by following the tradition of integrating as many possible primary factors as possible (with its own set of items). According to Rockeach (1973), the primary factors were defined as *attitudes*, whereby representing a set of environmental attitudes, and the higher order factors were defined as *values*. Environmental attitudes are more precisely understood to be 'a psychological tendency expressed by evaluating the natural environment with some degree of favor or disfavor' (Milfont and Duckitt 2010, 80), while environmental values are best understood as 'desirable transsituational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity' (Schwartz 1994, 21). The item selection was subsequently modified and adjusted in order to reach a European validity by giving specific attention to the transferability into other languages without losing validity or reliability (Bogner 1998b, 2000; Bogner and Wilhelm 1996; Bogner and Wiseman, 1997a, b, c, 1998, 2002a). Finally, the Model of Ecological Values (2-MEV), describing environmental attitudes contributing to an individual's Preservation (P) and Utilization (U) values, was first published (Bogner and Wiseman 1999, 2002a, 2006). Wiseman and Bogner (2003) espouse that the higher order values of preservation (P) and utilization (U) are uncorrelated; preservation is 'a biocentric dimension that reflects conservation and protection of the environment' and utilization is 'an anthropocentric dimension that reflects the utilization of natural resources' (787). The 2-MEV was specifically designed to tap the environmental values of children.

Milfont and Duckitt (2004, 2006) were the first to independently confirm the 2-MEV. Although many more primary factors were included in their study, the two higher order factor structure was confirmed in order to portray the individual environmental values in a valid and reliable way (Milfont and Duckitt 2010). Further, independent confirmation was undertaken by Johnson and Manoli (2008, 2011) for the specific purpose of assuring validity for US sample populations. Subsequently,

the scale was used for evaluating outdoor experiential field courses. Very recently, Belgian researchers added a third independent confirmation (Van Petegem and Blicck 2006; Van Petegem, Blicck and Boeve-de Pauw 2007; Boeve-de Pauw 2009; Boeve-de Pauw and Van Petegem 2010, 2013; Boeve-de Pauw, Donche and Van Petegem 2011). This group also confirmed advantages of the 2-MEV. First, the 2-MEV does not require a conflict between assigning importance to preserving the environment and the need to make use of natural resources. In this regard, the 2-MEV framework and the NEP scale are essentially different; endorsing P does not imply rejecting U, whereas endorsing the NEP does imply rejecting the DSP. Consequently, the 2-MEV provides multiple benefits: (1) it offers a fixed dimensional structure, (2) it allows interstudy comparisons, and (3) it fits well with the current psychology of sustainable development. The model has repeatedly shown in field tests to be an accurate tool for measuring *changes* in children's environmental attitudes and values in relation to a variety of environmental program designs (e.g., Bogner 1998a; Bogner 1999; Bogner 2002; Johnson and Manoli 2008).

### ***Implementing modified 2-MEV measures in Baja California Sur, Mexico***

Mexico is currently undergoing an increase in flexibility related to consumerism, due to the fact that 'in the past decade, the middle class in Latin America grew 50%, and now represents 30% of the population ... social programs and better access to education boosted the country's workforce' (The World Bank 2013). Throughout Mexico, The Secretary of Environment and Natural Resources (Secretaría de Medio Ambiente y Recursos Naturales [SEMARNAT]) is promoting the environment as an important subject area for public school education. Written in 2006, SEMARNAT's Strategy of Environmental Education for Sustainability in Mexico facilitates environmental education that is slated to be implemented by 2014 and beyond. Specifically within the middle school curriculum, SEMARNAT is working to heighten the importance of environmental subject areas related to personal responsibility, the consequences of human activity, civic and ethical responsibility. The focus areas in the plan are particularly pertinent for addressing the effects of hyperconsumerism. It is our intent that the modified Spanish language 2-MEV be more widely used as an evaluative tool for better understanding the environmental attitude and value outcomes of children, in relation to those participating in emerging environmental literacy programs.

Prior to our investigation in Baja California Sur, the 2-MEV had never been applied in Mexico. Since then, this has been translated into Spanish and used for research in Guatemala to explore the influence of environmental values on the environmental behavior of children (Boeve-de Pauw and Van Petegem 2013). Our Mexico-based research differs in that it addresses both the primary factors (attitudes) and higher order factors (values), while the study in Guatemala was solely focused on values. In addition, our Spanish sample items (see Appendix 1) differ from those used by Boeve-de Pauw and Van Petegem (2013). For instance, in addition to translating the sample scale items to align with the regional Spanish dialect in B.C.S., we also changed items to reflect cultural traits and the physical environment of north-west Mexico, all different than those found in the USA, New Zealand, Europe, Vietnam, and Guatemala, other places where the 2-MEV has been used.

While our broader goal is the implementation of a common and valid instrument, it does not mean that there can (and should) only be one version of the measures

used internationally. That is, in light of the contextual realities related to culture, geography, environment, and socioeconomic traits, researchers might be tasked with making needed changes – and this research effort is a chance to test a modified instrument with a group of children who are very different from the majority of the groups who have used the 2-MEV in other places. The purposes of our present study were (1) to use a modified primary factor scale (bioregional-Spanish language version) of Bogner and Wiseman's (1999, 2006) 2-MEV to investigate the effects of a course in Baja California Sur (B.C.S.), Mexico (during Stage 1), and (2) to design, implement, and validate a (further) modified version of the 2-MEV primary factor scale (during Stage 2).

While this mixed-methods research effort also qualitatively explored knowledge and behavioral outcomes, our specific quantitative evaluation of children's existing (and potentially changing) attitudes and values regarding preservation the environment and the need to make use of natural resources, was also of interest to the research team. Broadly speaking, at the outset of this research, we did not have a baseline understanding of the dominant social and environmental paradigm that was prevalent among children of this region, and only now better understand the extent to which participation in a year-long experiential environmental service learning course might affect how Mexican children view the natural environment and the place of humans within it.

As such, work under Stage 1 was conducted during a case study (Schneller 2008) of an environmental service learning course where the first version of the bioregional-Spanish language 2-MEV was used to measure Mexican children's environmental attitudes and values. Work during Stage 2 included further modifications of two survey items and testing the structure of this instrument with 335 children in two other parts of Baja California Sur.

## Methods

When designing the 2-MEV for use in Mexico, we built upon the work of Johnson and Manoli (2008), whose research was based on the Model mentioned above (Wiseman and Bogner 2003; Bogner and Wiseman 2006). As such, we based our modified 2-MEV on Johnson and Manoli's 16 item version of the 2-MEV scale. The 2-MEV is comprised of statements with Likert-type responses. In scoring, items are grouped via factor analysis into primary factors under each of the secondary (higher order) factors. The primary factors of Intent of Support, Care with Resources, and Enjoyment of Nature fall under the higher order factor of Preservation. The primary factors of Altering Nature and Human Dominance fall under the higher order factor of utilization. Each item has a 5-point Likert-type response set ranging from 1 'strongly disagree' to 5 (strongly agree), with a midpoint of 3 (not sure). For each factor, means are calculated by averaging the means scores of each item in that factor. A preservation score over 3.0 is interpreted to mean that a child has a positive preference for environmental preservation, since agreement is shown with statements that indicate preservation values, while a utilization score over 3.0 is interpreted to mean that a child has a preference for human induced changes to the natural environment because there is agreement with statements indicating utilization values. As mentioned above, the 2-MEV does not require a conflict between assigning importance to preserving the environment and the need to make use of natural resources.

In order to better reflect the bioregion and culture of B.C.S., Mexico, the modifications began in Stage 1 with the construction of one new 2-MEV item in relation to Altering Nature, the modification of two items in relation to Enjoyment of Nature, and the modification of one item in relation to Human Dominance. We selected modifications to these items based upon their reference to specific geographic features. For instance items referring to forests, fields, and ponds (common in rural United States, Europe, and New Zealand) are far less relevant to children in north-west Mexico who are more likely to have experienced beaches, deserts, and arid mountain ranges. Similarly, in regard to the Mexican cultural and political relationship to flora and fauna, children in northwestern Mexico sometimes live in under-served communities with a low level of consciousness about environmental issues, and inadequately enforced environmental laws; some people are engaged in poaching of endangered sea turtles, illegal dumping in the desert is rampant, and littering and/or driving on the beach is commonplace; people are less likely to have a strong commitment to promoting conservation of natural resources.

For translation, we followed conventional procedures of translation and back-translation (Brislin 1986; Munoz et al. 2009). A native Spanish speaker translated all survey items from English into Spanish. This initial translation was later revised collectively in the field in B.C.S. by the native English-speaking teacher of the environmental studies course, a Pescadero-based interpreter, and native Spanish-speaking teachers at the secondary school in which the environmental studies course took place. This process was meant to address clarity, accuracy, and the regional dialect of the instrument for children living in northwestern Mexico.

In order to test this initial 2-MEV and to see whether it could be used to measure changes in children's environmental attitudes and values after participating in an educational program, the scale was applied as a pre- and post-test with a treatment and control group of children. During this Stage 1 analysis, we worked with 20–22 children (mean age 12.5) in the treatment group and 12–15 in the control group. For ease of sampling, the control group was comprised of children from a pre-assembled intact nonparticipating class. Children in the treatment group participated in a year-long experiential environmental service learning course in the small agricultural and fishing community of Pescadero, B.C.S., Mexico. The course was designed and taught by United States expatriate and environmental educator, Patricia Baum. Children met weekly, both in the classroom and field, to study bioregional environmental problems, explore the physical environment, and promote the practice of personal pro-environmental behaviors and public outreach. This research also incorporated qualitative interviews that were utilized for their usefulness in triangulation, and for acquiring a more holistic understanding of participant responses (Creswell 2003; Silverman 2006). These semistructured interviews with course participants, their teacher, parents, and community influentials helped to inform the further modifications to the survey items and provided descriptive depth and insights regarding course participant and community outcomes.

The detailed qualitative outcomes of the course are described in (Schneller 2008); in summary, the course participants exhibited (in the short term) a heightened awareness of environmental issues facing their community and were found to be practicing pro-environmental behaviors at their homes. Further, through interviews with family and community members, we found consistent evidence that children were undertaking intergenerational environmental learning that included children

teaching friends and siblings, and children relaying information to parents, grandparents, community members, and tourists.

Additionally, our research effort incorporated a longitudinal study of 15 high school students who had participated in Baum's course during the 2004/2005 school year (when they were middle school students), two years prior to our study. Within this cohort, two years *after* taking Baum's course, students retained pro-environmental attitudes and behaviors and unexpectedly exhibited an expanded role in intergenerational learning.

Interviews provided us with responses detailing the positive feelings that course participants experienced when they engaged in environmental service learning. Their feelings emanated from: (1) taking personal action; (2) working in the natural environment for the community and endangered species; (3) setting an example for others to follow; (4) experiencing the immediate synergistic effects of their efforts; and (5) discovering the degree to which the environment of Pescadero is impacted and the complacency of some in the community towards environmental and species protection (Schneller 2008).

During the quantitative portion of the Stage 1 study, we hypothesized that the modified 2-MEV items would be sensitive enough to detect changes in the treatment group's environmental values and attitudes, when compared to a nonparticipating control group.

Later, based upon the results of Stage 1 we then implemented Stage 2. During Stage 2, we modified two more items in relation to Intent of Support. For instance, questions originally related to finances were altered to better reflect the culture of philanthropy and associational life in Mexico which has historically been weak (Sabet 2008; Bucher 2010). While Mexicans are apt to donate funds to Church causes, the Red Cross, or disabled persons in the streets, few Mexican NGOs in B.C.S. retain membership records, contact information, or even ask the public for funds; people are more likely to volunteer their time for environmental causes than donate money. If people are amenable to donating funds for environmental causes, a more common occurrence is to do so through a television-based telethon (teleton).

To test the factor structure of this finalized instrument during Stage 2, we then gave the 2-MEV to a much larger group of 335 children in the same region of Mexico, 240 from Ciudad Insurgentes, an agricultural community in the Santo Domingo Valley, and 98 from Puerto San Carlos, a fishing community on the shores of Magdalena Bay. A confirmatory factor analysis (CFA) was conducted to check the extent to which the data fit the 2-MEV.

## Results

### *Stage 1 – use of the 2-MEV to assess the impact of an educational programme*

The pretest 2-MEV scores of the treatment and control groups were compared using an independent sample *t*-test. No significant differences were found between the secondary order (preservation and utilization) value scores of the treatment group and control group (Table 1). The same was true for all five of the primary-order attitude scores. For both groups, scores were indicative of pro-environmental values and attitudes.

Independent sample *t*-tests were also used to compare differences in mean post-test survey scores between the control and treatment groups. Post-treatment scores

Table 1. (a) Pre-test (Preservation) independent sample *t*-test (two-tailed). (b) Pre-test (utilization) independent sample *t*-test (two-tailed).

		<i>n</i>	<i>M</i>	SD	<i>t</i>	<i>sig.</i>
(a)						
Control group	Pre	12	4.18	0.4338	0.380	0.706
Treatment group	Pre	22	4.23	0.4038		
(b)						
Control Group	Pre	12	2.69	0.4828	0.789	0.436
Treatment Group	Pre	22	2.91	0.8930		

became more pro-environmental for both the treatment and control groups; however, there were no statistically significant differences between the mean post-test survey scores for preservation or utilization (Table 2).

Paired samples *t*-tests were used with the treatment and control groups to identify differences in individual student mean pre and post-test survey scores for the two secondary factors – preservation and utilization. We cross-checked the parametric statistic findings utilizing nonparametric methods by creating individual ‘tandem’ data using the Wilcoxon Matched-Pair Signed Ranks test. Nonparametric statistical tests ‘Are free of assumptions about the specific shape of the distribution of the population of scores’ (Minium 1978, 346). We found that the utilization value scores had not significantly improved for the control group students, but had significantly improved for the treatment group students (Table 3). For the preservation value scores, there was virtually identical improvement for both groups from a practical standpoint; while that change was statically significant for the treatment group, it was not for the control group because of the smaller sample in that group. Looking at the primary factor area improvements, the treatment group demonstrated higher scores for Enjoyment of Nature ( $p = 0.049$ ), and the score for Human Dominance was significantly lower (more pro-environmental) ( $p = 0.035$ ).

### Stage 2 – further instrument modification and testing

After further revision of two items, the instrument was completed by the 335 children in Ciudad Insurgentes and Puerto San Carlos.<sup>1</sup> An initial (CFA) of the 16 item 2-MEV, based on the 2-MEV revealed issues with some of the items. Four of the items elicited different response patterns by the children from the two different communities (farming versus fishing), which may be related to the fact that children living in the fishing community of Puerto San Carlos are closely tied to the economy

Table 2. (a) Post-test (Preservation) independent sample *t*-test (two-tailed). (b) Post-test (Utilization) independent sample *t*-test (two-tailed).

		<i>n</i>	<i>M</i>	SD	<i>t</i>	<i>sig.</i>
(a)						
Control group	Post	15	4.37	0.4865	-0.841	0.406
Treatment group	Post	20	4.50	0.4084		
(b)						
Control group	Post	15	2.42	0.5160	-0.899	0.375
Treatment group	Post	20	2.60	0.6651		

Table 3. (a) Post-test (Preservation) paired samples *t*-test (two-tailed). (b) Post-test (Utilization) paired samples *t*-test (two-tailed).

		<i>n</i>	<i>M</i>	SD	<i>t</i>	<i>sig.</i>	<i>r</i>
(a)							
Paired samples							
Control group	Pre	10	4.19	0.4660	1.780	0.109	0.588
	Post	10	4.49	0.3241			
Treatment group	Pre	20	4.21	0.4128	3.172	0.005	
	Post	20	4.50	0.4084			
(b)							
Paired samples							
Control group	Pre	10	2.6	0.4970	0.823	0.432	0.473
	Post	10	2.46	0.6080			
Treatment group	Pre	20	2.91	0.9385	2.341	0.030	
	Post	20	2.60	0.6651			

of the sea, the long-held coastal tradition of eating sea turtles during festivities, and even the illegal trade in sea turtle products. When compared to responses from the children living in the farming community of Ciudad Insurgentes, children from Puerto San Carlos were far more enthusiastic (statistically significantly so) about the item which asked about being able to eat the eggs and meat from sea turtles on special occasions like quinciñeras and Christmas (Item 12 ‘People should be able to eat the eggs and meat of sea turtles on important occasions, like quinciñeras and Christmas’). This was a *new* utilization item that we added in order to make the instrument more relevant to the bioregional context; however, the children in Puerto San Carlos *did not* respond to this item in the same way they did to other utilization items.

In a similar vein, children from the farming community of Ciudad Insurgentes were far more likely (statistically significantly so) to agree with the item which asked them to state their preference if: Item 11 ‘Weeds should be cut because they take up space from plants we need.’ It appears that having items so closely tied into the geographical locations had tapped into their cultural and economic traditions rather than their attitudes toward using nature (more broadly). These questions cannot be utilized in the 2-MEV.

After dropping four items, a model with 12 items in four factors resulted (see Figure 1). Fit statistics indicated that the model fit the data moderately well ( $\chi^2/df$  ratio = 1.738, CFI = 0.912, TLI = 0.862, RMSEA = 0.047). The  $\chi^2/df$  ratio and RMSEA indicate model fit. CFI and TLI are often accepted if they are above 0.90, though a higher cutoff value of 0.95 is frequently recommended (Hu and Bentler 1999).

This model differs from the original Model of Ecological Values in just one distinct way: The items for the Intent of Support and Care with Resources merged into one primary factor. However, still under the secondary factor of Preservation. Mexican children in our investigation did not differentiate between their intentions of supporting environmental causes and their willingness to be careful with their personal use of resources.

It is also important to note that in this Model, Preservation and Utilization are moderately negatively correlated. The Model of Ecological Values posits that they are uncorrelated (Wiseman and Bogner 2003). However, other studies have found a

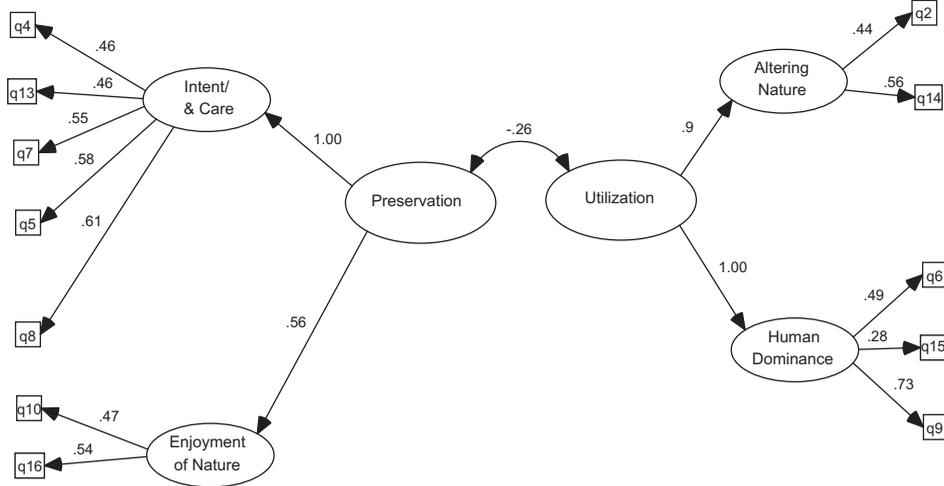


Figure 1. Confirmatory factor analysis of the 12-item section of 2-MEV.

similar negative correlation (Milfont and Duckitt 2004; Milfont and Gouveia 2006; Johnson and Manoli 2008). It is clear that while these values are not truly uncorrelated, they are ‘distinct, though related, constructs’ (Milfont and Duckitt 2004, 299).

We then compared the modified 12-item 2-MEV results for the two groups, children from the inland agricultural community of Ciudad Insurgentes, and children from the coastal fishing community of Puerto San Carlos (see Table 4).

Scores on preservation (and for its two primary factors) were virtually the same for the two groups. Both the farming and fishing groups had high preservation scores and low utilization scores. Utilization differed significantly, and when broken down into primary factors, it was Human Dominance which split both samples. Children from the farming community of Ciudad Insurgentes scored lower on utilization than did those from the fishing community of Puerto San Carlos. While the economy of Puerto San Carlos is buoyed by a sea turtle ecotourism and whale watching sector that thrives off protected and abundant wildlife, the economy is still heavily dominated by the artisanal fishing fleet, often embracing exploitive fishing practices that are illegal and unsustainable.

Table 4. Mean 2-MEV scores.

	Farming		Fishing		<i>t</i>	<i>P</i>
	<i>n</i>	Mean	<i>N</i>	Mean		
<i>Preservation total</i>	232	4.22	96	4.26	-0.596	0.552
Intent and care	232	4.21	97	4.22	-0.189	0.850
Enjoyment of nature	237	4.23	97	4.34	1.102	0.271
<i>Utilization total</i>	234	2.45	96	2.90	4.897	0.000*
Altering nature	236	2.54	98	2.77	1.897	0.059
Human dominance	235	2.39	96	3.01	6.146	0.000*

\*Statistically significant difference ( $p < 0.01$ ) between pre- and post-questionnaire scores.

## Discussion

The experiential environmental learning program under investigation in Stage 1 of our study was a uniquely designed service learning course and operated in the geographical and cultural context of northwest Mexico. In light of this context, we hoped not to have findings so different from those previously published so as to render our results incomparable. However, similar to a study by Johnson and Manoli (2008), our initially modified 2-MEV showed results pointing to a ceiling effect in the children we studied. Both the treatment and control groups exhibited high scores at pre-treatment for the construct area of environmental preservation (over 3.0), and low scores for the construct area of environmental utilization (under 3.0). Despite the fact that we did not expect to find drastic shifts in these higher order factor areas (preservation and utilization) – due to high scores on pro-environmental values at pretest – our initially modified 2-MEV proved to be sufficiently sensitive: we uncovered statistically significant gains within the treatment group in the primary factor area of Enjoyment of Nature (related to the higher order factor of preservation), and in the primary factor area of Human Dominance (related to the higher order factor of utilization).

The quantitative results of the modified 2-MEV measures parallel the qualitative outcomes that we encountered when interviewing the Stage 1 treatment group participants in Baum's experiential environmental service learning course. For instance, in regard to Enjoyment of Nature, children reported having never visited the beach or gone camping before participating in the course. Additionally, we found that children wanted to visit nature and were aware of the natural protected areas in Mexico. Similarly, in relation to Human Dominance of Nature, many of the children exhibited dismay about the human impacts to Pescadero's beach and desert environment, the public's unwillingness to change destructive environmental behaviors and discussed their personal relationship to nature (Schneller 2008). Outcomes collected during the qualitative portion of the research (again) parallel results from the quantitative application of the 2-MEV.

After further insights into the weak culture of Mexican philanthropy and associational life, we decided to modify two more items and tested this more culturally accurate 2-MEV with a much larger group of 335 children in the state, during Stage 2. We were able to successfully extract the already known factor structure for the two higher order values of preservation and utilization. The underlying primary attitudes were also confirmed, with the exception of two neighboring ones: Care with Resources and Intent of Support, which merged into one. Fit statistics indicated that this new 12-item (four factor) model fit the data moderately well. As such, the successful adjustments that were made to six of the 2-MEV questions to reflect the culture and geography of Mexico highlight the transferability of this practice for other researchers utilizing the 2-MEV within a variety of international contexts and educational systems. The practice can also be replicated in future endeavors to reflect a broader range of bioregions and cultures. As mentioned earlier, while a common instrument to measure children's attitudes and values is desirable, modifications to the instrument to better reflect these international contexts may be necessary. From a research perspective, the modified 2-MEV measures proved to be a valid tool for measuring children's environmental attitudes and values with a group of respondents who are very different from the majority of the groups who have used the 2-MEV in other contexts.

Finally, since there are so few published research findings that address environmental learning, attitudes and values in Mexico, the outcomes of this research effort (and related future efforts) will contribute to the existing fields of evaluation, research, and theory on experiential environmental pedagogies in Mexico. Our research findings are pertinent to the contemporary institutional changes in environmental pedagogies that are being broadly promoted throughout the Mexican educational system. SEMARNAT now recognizes the environment as a subject area of importance in Mexico's public schools. As mentioned above, in their *Strategy of Environmental Education for Sustainability in Mexico*, SEMARNAT (2006) proposed broad educational goals that are currently (slowly) being implemented through 2014 and beyond. SEMARNAT's educational goals work to promote the creation of an environmentally literate culture through: (1) consolidating environmental education for sustainability as a public policy; (2) allocating financial resources; and (3) training teachers and environmentalists to respond to the demands of sustainability. Within the middle school curriculum, SEMARNAT is promoting the environmental subject areas of personal responsibility; consequences of human activity; biology; civic and ethical responsibility; loss of biodiversity; and environmental conservation. The focus areas in the abovementioned plan are particularly pertinent for addressing the effects of an increase in flexibility related to Mexican consumerism.

In light of this newfound Mexican governmental support for environmental literacy, and the positive outcomes of our research on a Spanish language 2-MEV, in-country practitioners, researchers, and educators now have more diverse and accurate opportunities for evaluating the outcomes of new adventures in environmental curriculum and pedagogies. On the Baja California peninsula specifically, there is a robust movement to enhance environmental literacy in the region. Based out of the San Diego Natural History Museum, the Bioregional Environmental Education Project (PROBEA) continues to offer workshops and curriculum for budding environmental educators and community members in Mexico. And in conjunction with the University of Guadalajara and The Mexican Secretary of Education (SEP), Baja California Sur branch, Baum has newly designed (and will disseminate widely) an experiential middle school curriculum with a focus on marine conservation and the protection and recovery of endangered species of sea turtles. It is our intent that the 2-MEV be used within these (and other emerging programs) as an evaluation tool focused on the potential attitudinal and value outcomes of participants.

### Note

1. The children from Ciudad Insurgentes and Puerto San Carlos (used in the CFA) are not included within the treatment and control groups mentioned in the previous paragraph.

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Understanding Resident Attitudes towards Sea Turtle Conservation and Opportunities for Enhanced Community Participation in Bahia Magdalena, Mexico”, *Journal of Ocean & Coastal Management* (2011). “Environmental Service Learning: Outcomes of Innovative Pedagogy in Baja California Sur, México” *Environmental Education Research* (2008).

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### Appendix 1. Model of Ecological Values scale – Mexico version

- (1) *Me aseguro que todas las luces estén apagadas cuando ya no las necesito.*  
*I make sure that all the lights are turned off when I don't need them.*
- (2) Las personas tienen el derecho de cambiar el ambiente (naturaleza).  
People have the right to change the environment (nature).
- (3) *Me siento bien en el silencio de la naturaleza.*  
*I feel good in the silence of nature.*
- (4) Si algún día tengo tiempo libre, me gustaría hacer trabajo para ayudar a proteger el ambiente.  
If some day I have free time, I would like to volunteer to help protect the environment.
- (5) Trato de caminar o usar mi bicicleta cuando salgo en vez de usar el carro.  
When I leave I try to walk or use my bicycle instead of using the car.
- (6) Construir nuevas carreteras es tan importante, que debemos de cortar los árboles y los cactus.

- Constructing new roads is so important that we should cut down trees and cactus
- (7) Intento de decirles a otros que la naturaleza es importante.  
I try to tell others that nature is important.
- (8) Trato de cuidar el agua teniendo mis duchas mas cortas, o cerrando la llave del agua cuando me lavo los dientes.  
I try to save water by taking shorter showers, or turning off the water when I brush my teeth.
- (9) Las personas deben de reinar sobre la naturaleza.  
People are supposed to rule over nature.
- (10) Me encantaría visitar un oasis en el desierto para mirar pájaros volando.  
I would really enjoy visiting an oasis in the desert to watch birds in flight.
- (11) *La mala hierba debe de ser cortada porque toman el espacio de las plantas que necesitamos.*  
*Weeds should be cut because they take up space from the plants that we need.*
- (12) *Las personas deben de comer huevos y carne de las tortugas del mar en ocasiones importantes, como quinceañeras y navidad.*  
*People should be able to eat the eggs and meat from sea turtles on important occasions like quinceañeras and Christmas.*
- (13) Si yo tuviera dinero extra estaría de acuerdo para dar a un teletón que proteja la naturaleza.  
If I have extra money I would be open to donating to a telethon that protects nature.
- (14) Para alimentar a las personas, la naturaleza debe de ser quitada para poder cultivar comida.  
To feed people nature should be cleared in order to grow food.
- (15) Debido a que los mosquitos viven en las áreas húmedas, sería mejor drenar las tierras para poder cultivar.  
Because mosquitos live in wetlands, it would be better to drain the land for farming.
- (16) Me gusta ir de paseo a la naturaleza, por ejemplo a la playa, las montañas o el desierto.  
I like to go on trips to nature, for example to the beach, the mountains or the desert.

Note: Items 1, 3, 11, and 12 (in italics) were dropped from the final scale.