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Julia C. Torquati
University of Nebraska-Lincoln, jtorquati1@unl.edu

Julie A. Ernst
University of Minnesota–Duluth

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Beyond the Walls: Conceptualizing Natural Environments as "Third Educators"

Julia Torquati[1] & Julie A. Ernst[2]

1 Department of Child, Youth and Family Studies, University of Nebraska–Lincoln, Lincoln, Nebraska
2 Department of Health, Physical Education and Recreation, Center for Environmental Education, University of Minnesota–Duluth, Duluth, Minnesota

Corresponding author — Julia Torquati, Department of Child, Youth and Family Studies, University of Nebraska-Lincoln, 247 Mabel Lee Hall, Lincoln, NE 68588-0236, USA.
E-mail: jtorquati1@unl.edu

Abstract

This research examined preservice early childhood educators' perceptions of outdoor settings and their intentions to use outdoor settings in their teaching practice. Students enrolled in an early childhood education program (n = 110) at a university in the Great Lakes region completed surveys that assessed perceptions of natural settings, intentions to use natural settings in future teaching, knowledge of the benefits of nature for children, and personal nature relatedness. Participants reported relatively high intentions to use natural settings in future teaching, as well as knowledge of the benefits of nature for children, but moderate levels of personal nature relatedness. Participants were more likely to select "maintained" settings such as parks for educational purposes, and more "natural" settings, especially those with water, for personal purposes. Knowledge of the benefits of nature experiences, the perceived difficulty in using natural settings, and personal levels of nature relatedness each significantly predicted intention to use natural settings in future teaching. We recommend that teacher preparation programs provide: opportunities for students to observe and/or interact with children as they engage in unstructured play in natural environments; opportunities to engage in both structured and unstructured learning experiences in natural environments; and preparing students to provide appropriate supervision in natural environments.

The role of environments in early childhood education has been beautifully explicated by the scholars of Reggio Emilia. According to Gandini (1998), educational spaces are essential elements of any educational approach. Spaces are carefully and intentionally planned within the Reggio Emilia schools to be welcoming, to reflect the culture of the children and the community, to make visible the teaching and learning, to support social interactions, to be appropriate for children at different ages and levels of development, to afford opportunities for active learning, and to communicate the values and opportunities for learning within. Environments and spaces are viewed as flexible, active, and responsive to the children and teachers who use them, as "elements that condition and are conditioned by the actions of children and adults who are active in it" (Gandini, 1998, p. 177). Even the placement of schools as a central part of urban planning was intentional and communicates value and respect for children. The schools themselves are an active part of the environment, influencing the community and in turn influenced by it. A strong sense of place and culture are encouraged as investigations extend outward into the city and culture flows inward as families, children, and visitors bring cultural artifacts and meaningful treasures into the school.

American educators have eagerly studied the Reggio Emilia approach to early childhood education, and have adopted "Reggio-inspired" practices such as pedagogical documentation (e.g., Edwards et al., 2007). The pedagogy and practice of Reggio Emilia evolved within its own ecological niche within the city, geography, and culture of Reggio Emilia; therefore, educators who are inspired by this approach must "re-cast" it to fit within their own ecological niche, which includes community, culture, ecosystem, and climate (e.g., Fu, Stremmel, & Hill, 2001). Educators in the U.S. have been inspired by the design of indoor environments for children in Reggio Emilia, and principles for transformation of early education environments have been described and documented (e.g., Greenman, 2005). Educators in the U.S. who are implementing Reggio-inspired approaches to designing environments have primarily focused on indoor environments. However, recently greater attention has been given to the design of outdoor spaces in early childhood programs that incorporate natural elements (e.g., Keeler, 2008; Moore & Cooper-Marcus, 2008; Sobel, 2008). This

shift in focus to natural outdoor environments is evidenced by policies such as the "No Child Left Inside" act in the U.S. and the inclusion of Education for Sustainable Development (ESD) in the national curriculum of the UK (Office for Standards in Education, Children's Services and Skills [OFSTED], 2003), and position statements such as the "Re-Connecting the World's Children to Nature" call to action (World Forum Foundation Nature Action Collaborative for Children, 2008). Natural environments are those that contain many natural elements found in the local ecosystem such as plants, animals, rocks, water, and insects. There is a range of natural environments, from those that are nearly wild, such as a nature center, to those that contain a few human-made materials and surfaces such as slides, balls, or concrete, to those that contain a mix of many human-made materials and natural elements. In contrast, "built" environments are comprised primarily of human-made materials, structures, and surfaces. On the whole, in the U.S., natural outdoor environments have been underutilized in early childhood education and have largely been limited to human-designed play areas adjacent to school buildings. The purpose of this article is to address this gap by extending the Reggio Emilia conceptualization of learning environments as "third educator" to natural environments and by investigating early childhood preservice teachers' perceptions of the potential for different outdoor environments to provide opportunities for learning.

Conceptualizing Natural Outdoor Environments as a "Third Educator"

The idea that "nature teaches" is not new. Listening to and learning from nature has been the purview of poets and philosophers throughout human history, and the Nature Study movement of the late nineteenth and early twentieth century incorporated nature into formal schooling (Knight, 2009). Currently there is growing interest in nature and environmental education (e.g., Broda, 2007; Stone, 2009) and especially within early childhood education (Bailie, 2010; North American Association for Environmental Education [NAAEE], 2010; Rivkin, 2011; Torquati, Gabriel, Jones-Branch, & Leeper Miller, 2011; Wilson, 1994). However, the ability of early childhood educators to capitalize

on the opportunities afforded by natural environments is dependent upon their perceptions of those affordances. According to Gibson, an affordance is a relationship between an individual and "some offering of the environment" (Gibson, 2000, p. 295). For example, a tree is an affordance for climbing, food is an affordance for eating, and water is an affordance for splashing or swimming. Affordances are learned through exploration of environment and self to discover how the two are related. Natural outdoor environments hold endless possibilities for education in all curricular domains, and especially for environmental education. Frequent opportunities to explore, observe, and play in natural environments is a cornerstone of excellence in early childhood environmental education (NAAEE, 2010). However, the extent to which early childhood educators in the U.S. are able to perceive the potential opportunities for teaching and learning in natural environments is not known. Many early childhood educators belong to a generation that was limited in exploration of natural environments, and therefore may not have had the foundational experiences necessary to "read" the affordances in the environment. Understanding early childhood educators' perceptions of educational affordances in natural environments can inform teacher preparation and professional development focused on environmental education.

Many early childhood educators in the U.S. are familiar with the concept of the environment as "third educator," and so building upon this conceptualization may be a fruitful avenue for advancing understanding of affordances in natural environments for teaching and learning. Consistent with the conceptualization of Reggio educators (e.g., Gandini, 1998), use of natural outdoor educational spaces can be carefully and intentionally planned to be welcoming, to reflect the culture of the children and the community, to make visible the teaching and learning, to support social interactions, to be appropriate for children at different ages and levels of development, and to afford opportunities for active learning. Natural environments are flexible, active, and responsive to the children and teachers who use them. Natural environments communicate values and opportunities for learning; can early childhood educators read what the natural environment communicates? This research examines this question in order to determine whether early childhood teacher education can benefit from incorporating environmental literacy into teacher preparation.

Benefits of Nature Experience and Personal Connection to Nature

A growing body of research provides evidence that spending time in natural environments can benefit physical, cognitive, social, and emotional development. For example, preschool children with daily access to a natural outdoor area demonstrated better motor skills and focused attention than children with a man-made playground devoid of natural elements (Grahn, Martensson, Lindblad, Nilsson, & Ekman, 1997). Children are more physically active when playing outdoors than indoors (Baranowski, Thompson, Durant, Baranowski, & Puhl, 1993). A study of elementary-aged children moving from homes that were "less green" to homes that were "more green" indicated that increased proximity to natural surroundings predicted decreased symptoms of attention deficit-hyperactivity disorder (ADHD) (Wells, 2000). Kuo (2004) studied associations between children's weekend leisure activities and symptoms of ADHD and found that "green" outdoor activities reduced symptoms significantly more than did activities in other settings. Faber Taylor and Kuo (2009) used an experimental design to compare children's attention after a 20-minute walk in an urban area, suburban area, or natural area, and found that only the walk in a natural area facilitated attentional recovery after fatigue. A study of 59 elementary schools in Canada that enhanced their outdoor environments in a variety of ways reported that "green" school grounds support a wider variety of play opportunities that promote physical activity, especially for children who are disinclined to participate in competitive team sports; support more imaginative and constructive play; promote more prosocial behavior; and strengthen the link between play and learning (Bell & Dyment, 2006). Nature play contributes to children's interest in and knowledge of nature (Fjortoft, 2001) and may promote proenvironment attitudes and beliefs (Ewert, Place, & Sibthorp, 2005). Frequent positive experiences in nature can help children to develop respect for the environment (Phenice & Griffore, 2003). Taken together, this body of evidence indicates that spending time outdoors is good for children, but more specifically, spending time outdoors in natural areas benefits children more than spending time outdoors in built environments. It is reasonable to hypothesize that early childhood teachers with knowledge of the benefits

for children of spending time in natural areas would be more likely to use natural outdoor areas in their teaching and learning. This hypothesis is tested in the present study.

Another potential predictor of teachers' intention to use natural environments in their teaching is teachers' degree of comfort in natural environments and sense of "connectedness to nature." According to E. O. Wilson (1984), humans have an innate preference to affiliate with life and "life-like processes." Wilson refers to this phenomenon as the "biophilia hypothesis." This connectedness to nature, or "biophilia," has been operationalized in research in a variety of ways. Research has documented preference for views of natural settings (Kuo 2001; Ulrich 1984) and evidence that access to natural settings through photographs or windows has been associated with reduced anxiety and blood pressure presurgery, use of less pain medication, and earlier hospital discharge in comparison to participants randomly assigned to a nonnature condition such as a view of a brick wall (Ulrich, 1984, 1993). A psychological sense of connectedness to nature has been examined as a potential mediator between the experience or condition of being in a natural setting and the psychological benefits that have been documented. Adult participants were randomly assigned to a 10-minute urban or nature walk led by a researcher, and completed measures of state connectedness to nature, positive and negative emotions, and perceived ability to "tie up a loose end" (Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009). After the walk participants also completed a measure of attentional capacity to determine whether attention restoration accounted for associations between condition (urban vs. nature) and the outcomes of interest, positive affect, and ability to reflect. Results indicated that "state" connectedness to nature, that is, how connected to nature participants felt immediately after their walk, partially mediated the association between condition and positive affect, even after controlling for "trait" connectedness to nature (measured prior to the walk). State connectedness to nature also partially mediated the association between condition and ability to reflect. In sum, the study provided evidence that experiencing a sense of connectedness to nature is one of the mechanisms by which individuals experience enhanced psychological well-being as a consequence of spending time in natural areas (Mayer et al., 2009). What is not known, however, is the degree to which teachers' connectedness to

nature may influence their proclivity to use natural environments in their teaching. Thus, teachers' personal comfort and connectedness to nature as well as their anticipated students' comfort and connectedness may be important to consider when preparing students to teach in outdoor environments. Building on these findings, the current study will examine the role of teachers' sense of connectedness to nature as a predictor of their intention to use natural settings in their teaching.

Preservice Teacher Perceptions of Benefits and Barriers to Using Natural Outdoor Settings for Education

Types of natural outdoor areas can be considered on a continuum from nearly wild with little human design or intervention, to highly maintained natural areas. One study comparing teachers' use of classrooms, zoos and museums, and natural settings found that teachers reported using built settings more than natural settings for environmental education (Simmons, 1994). Teachers may perceive different educational affordances according to where on the continuum from "wildness" to highly maintained an environment may lie, as well as teachers' own sense of comfort with "wildness" or connection to nature. Therefore, this study examines teachers' intention to use both "natural" and "maintained" outdoor environments in their teaching.

A few studies have documented teachers' perceptions of the benefits of using particular types of natural outdoor settings for education. For example, Simmons (1998) compared teachers' perceptions of deep woods, wetlands, urban nature, and park settings and found that teachers perceived greater educational opportunities in the deep woods and wetland settings, but also perceived greater hazards in these areas. Another type of natural outdoor setting is one that is designed specifically for educational use. Skamp and Bergmann (2001) examined elementary and secondary teachers' perceptions of school-based "learnscapes," which are areas designed for education that include many natural elements and are located adjacent to schools in Australia. The authors found a wide range of perceived benefits and barriers. Teachers perceived that learnscapes enhanced learning, and that students would learn directly from the environment. This resonates with the concept of environment as "third teacher." Some

teachers cited the "real" or "practical" aspects of learning outdoors that complement more "theoretical" learning in the classroom. Some teachers reported that students' feelings and attitudes toward school became more positive as a consequence of learnscape experiences. Despite these benefits, Skamp and Bergmann found that only 15% of teachers reported regularly using learnscapes (which were readily available on or near their school grounds), and reasons cited included concerns about managing student behavior outdoors, uncertainty about how to use the environment to enhance teaching and learning, timidity about leaving the classroom, and perceiving specific subject areas as not relevant to the natural environment. The learnscapes examined in the Skamp and Bergmann study represent one type of natural outdoor area that has been human-designed and planned but incorporates many natural elements. These perceived barriers point to the importance of teachers' perceptions about the usefulness or barriers to using natural environments in their teaching, as well as the need for professional development in this area. The present study examines the role of teachers' perceptions of barriers or difficulties associated with using natural environments for teaching and learning.

The purpose of this study was to examine preservice early childhood educators' perceptions of outdoor settings and their intention to use natural outdoor settings in their teaching practice. The following predictors were examined: (a) knowledge about the benefits of experiences in nature for children's development and learning; (b) perceived barriers to using natural settings; (c) beliefs about the appropriateness of nature experiences within a formal school setting; (d) type of natural setting (natural or maintained); and (e) teachers' personal sense of connectedness to nature or "nature relatedness."

Methods

Sample

One hundred and ten students enrolled in the early childhood education program at a university in Minnesota participated in this study. The program in which participants were enrolled prepares students for work in a variety of settings with children of diverse ability levels,

from birth through age 8. All students in this program complete a common core of courses in child development, parent–child relations, early childhood curriculum and programming, early childhood special education, community resources, and educational leadership and program administration. Completion of the program prepares students for Minnesota licensure in early childhood education (birth through grade 3) and early childhood special education.

Participants were in various levels of the program: 34.5% were in the 1st year, 22.7% were in the 2nd year, 20% were in the 3rd year, and 22.7% were in their 4th year and were student teaching in an early childhood setting. Of these participants, 12.7% planned to teach infant/toddlers, 25.5% planned to teach preschoolers, 31.8% planned to teach kindergarten or first grade, and 30% planned to teach second or third grade. The majority (96%) were female.

Measures

Participants completed surveys that assessed perceptions of natural settings, intention to use natural settings in teaching, knowledge of nature benefits for children, and nature relatedness. A survey was designed for this research to assess participants' perceptions of 16 photographs of natural settings that could be used with young children. This methodology was adapted from the preference rating approach used by Kaplan (1995) and Simmons (1993, 1998). The approach used in this study was preference ranking, in which participants selected and ranked their top three preferences. This method allowed for follow-up questions regarding participants' top-ranked preferences. All photographs were of the same season (late spring), and none of the photographs contained people, so as to keep these factors from potentially influencing preference selections. The photographs were of four outdoor setting types found within the part of the state where the university is located: water, woods, open field/grassy area, and park. There were four photographs in each setting type, and each setting type included photographs of spaces that were maintained by humans and spaces that were primarily natural or unmaintained (human influence setting attribute, as in Kaplan, 1995) in order to examine a continuum of naturalness. See **Table 1** for a description of the 16 photographs.

Table 1. Description of Outdoor Setting Photographs

Outdoor setting type	*Setting label*	*Photograph description*	*Degree of human influence*
Water	13	Stream dotted with small rocks; water appears still; wooded/brushy vegetation on edge; narrow foot path leading down to water's edge	Natural
	14	Stream cutting through large rock outcropping, forming small waterfalls; dense forest/vegetation along rock outcropping	Natural
	15	Small lake with calm water; trail alongside edge of lake; small dock and shelter with canoes; forested backdrop	Maintained
	16	Shore of larger lake (likely recognizable as Lake Superior from its distinct pebbly beach), with forested shoreline	Natural
Forest	9	Dense forest with a wide paved trail winding through; visually "open" due to the wideness of trail, allowing enough sun to create shadows on pavement	Maintained
	10	Dense forest; narrow foot path winding through; very little light appears to be shining through forest cover	Natural
	11	Open forest with a mix of grasses/vegetation on forest floor; crushed gravel path lined by wooden fencing	Maintained
	12	Open forest, with vegetation, underbrush, and fallen trees on forest floor; no path	Natural
Open field/ grassy area	6	Open natural area, with tall grasses, wildflowers, and a small wet area visible; several trees in the background	Natural
	5	Open natural area, with tall grasses, wildflowers, and a small area visible; several trees and a building in the background; gravel road leading to and alongside grassy area	Maintained
	8	Open area of grass and wildflowers, with a single tree near the foreground; no paths	Natural
	7	Open area of grass and wildflowers, with a single tree near the foreground; a gravel path with a wooden bridge midway	Maintained
Park	4	Open area with a mix of tall grass and wildflowers, with a forested background; park bench that seems almost hidden by long grass	Natural
	3	Open grassy area, with several park benches scattered about; grass is very short and appears mowed	Maintained
	2	Open area, with several large trees dotting foreground; pavilion with picnic tables; forested background; grass appears mowed	Maintained
	1	Playground on a raised woodchip-filled area, with mowed grass and trees in background	Maintained

Participants' assessments of settings. In the first section of the survey, participants viewed the set of 16 photographs and chose the three settings they would personally like to visit most and least. Participants also described why they selected each setting. In the second section, participants chose three settings they felt were the most and least conducive to meeting educational outcomes for their future early childhood students. Participants also described why they selected those settings, indicated what they would do with their students in such settings, and what resources needs they anticipated for bringing students to those settings.

Intention to use natural settings in teaching. In the third section of the survey, participants indicated how likely they were to use natural settings with their future students on a scale ranging from 1 (*disagree strongly*) to 5 (*agree strongly*), how likely they were to use maintained outdoor settings with their future students, and how difficult they perceived it would be to use natural settings with their future students. Participants rated the extent to which they agreed with a statement that "nature experiences belong within the formal school setting" on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Participants responded to open-ended questions regarding motivations and barriers associated with use of natural settings with their future students.

Participants' knowledge of nature benefits. This section of the survey included five statements regarding benefits of experiences in nature, and participants were asked to indicate the extent to which they agreed with the statements on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). For this section of the questionnaire, "natural settings" was defined for participants as outdoor settings that range from relatively natural to wild, as opposed to maintained or developed outdoor spaces, such as mowed grassy areas, landscaped park settings, playgrounds, etc.

Participants' nature relatedness. Participants completed the 21-item Nature Relatedness Scale (Nisbet, Zelenski, & Murphy, 2009), used with permission of the authors. This scale assesses the affective, cognitive, and experiential aspects of individuals' connection to

nature, and was selected because of its ability to serve as a quantitative method for investigating human–nature relationships and its potential influence on setting preference. Participants rated the extent to which they agreed with the statements on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Procedures

Permission was obtained from early childhood teacher education faculty to visit one section of a required course from each of the four levels (years) in the program. Students were invited to participate, and those consenting completed the surveys in class.

Results

Perceptions of Outdoor Settings

Preservice early childhood educators' perceptions of outdoor settings were examined as follows: (a) participants' ratings of the three *most and least conducive environments for achieving educational outcomes* were examined using descriptive statistics; (b) participants' ratings of the three most and least *personally* preferred environments were examined using descriptive statistics, and their ratings of educational and personal preferences were qualitatively compared; (c) educational and personal preferences were compared as a function of setting type (park, forest, water, open field) and human influence attribute (maintained, natural) using chi square analysis; and (d) characteristics of environments that participants rated as most and least conducive to achieving educational outcomes were qualitatively coded and examined using descriptive statistics.

Characteristics of Most- and Least-Preferred Outdoor Settings

Outdoor settings most frequently selected as *most conducive to educational outcomes* were the playground (n = 64), the pavilion in open woods (n = 44), and the pebbly shoreline of Lake Superior (n = 42). The three settings most often selected as the *least conducive to educational outcomes* were the open forest with no path (n = 34), the

open, unmowed grassy area with no path (n = 33), and the stream in a wooded area with a narrow path (n = 31).

Outdoor settings selected as the *most personally preferred* were the pebbly shoreline of Lake Superior (n = 90), the stream cutting through a rocky outcropping forming small waterfalls (n = 62), and a stream in a wooded area with a narrow path (n = 36). Outdoor settings selected as *least personally preferred* were the open mowed grassy area with park benches (n = 65), the pavilion in open woods (n = 44), and the open unmowed grassy area with no path (n = 35). There were both similarities and differences in educators' personal and educational preferences. The shoreline of Lake Superior was selected as most preferred both personally and professionally, and the open unmowed grassy area with no path was among those places selected as least preferred personally and professionally. Interestingly, educators rated the pavilion in open woods as one of the least preferred personally but one of the most preferred for educational purposes. The stream in the wooded area with a narrow path was one of the most preferred personally, and one of the least preferred educationally.

Participants' selections of most- and least-preferred sites, both educationally and personally, were categorized according to the dimensions of setting type (park, forest, water, or open field) and degree of human influence (maintained or natural; see **Table 2**). Chi square analysis was used to examine the probability that educational and personal preferences were equally distributed as a function of setting type and degree of human influence. Analysis of setting type indicated that the distribution differed significantly from the expected values

Table 2. Preferences by Outdoor Setting Type and Human Influence Attribute

Item	*Frequency of participants selecting setting as educational preferences*	*Frequency of participants selecting setting as personal preferences*
Outdoor setting type		
Park	67	11
Forest	19	15
Water	12	73
Open field/grassy area	8	10
Human influence attribute		
Maintained	87	25
Natural	22	84

($\chi^2_{(1)} = 84.64$; $p < .001$). The park setting was more likely to be selected as an appropriate educational setting, and a site with water was more likely to be selected as personally preferred. Analysis of degree of human influence also differed significantly from the expected values ($\chi^2_{(3)} = 70.59$; $p < .0001$). Maintained settings were more likely to be selected for educational purposes, and natural settings were more likely to be selected for personal purposes.

Participants' responses to open-ended questions about why they selected the most and least preferred settings were coded for the purpose of data reduction and sense-making. Open coding was conducted by repeatedly and thoroughly reading through participants responses, followed by focused coding in which codes were reviewed, less useful ones eliminated, smaller categories combined into larger ones, and broad categories divided into more specific ones (e.g., Lofland & Lofland, 1995). The most frequent reason cited for rating a particular site as *conducive to education* was ease of use with young children (for example, clear boundaries and traffic patterns, places to gather or sit, level terrain for walking or for strollers) and the most frequent reason provided for rating a site as *least conducive for education* was safety hazards (see **Table 3**). The most frequently cited reason for personally preferring a specific site was the presence of water, and the most frequent reason provided for rating a site as least preferred was lack of things to do.

Table 3. Characteristics of Educationally Conducive and Personally Preferred Outdoor Settings

Reasons why most preferred (frequency)	*Reasons why least preferred (frequency)*
Educational preferences	
Easy to use (42)	Safety hazards (47)
Opportunities for unstructured play (22)	Lack of things for children to do (37)
Opportunities for structured learning about nature (21)	Difficult to use (13)
Opportunities for unstructured learning about nature (11)	
Safe (8)	
Familiar (5)	
Personal preferences	
Presence of water (49)	Lack of things to do (54)
Setting seemed relaxing (44)	Hard to navigate/easy to get lost (21)
Setting was pretty (29)	Too much human influence (18)

Perceived Educational Affordances

Participants' responses to the open-ended question about the activities early childhood educators thought were appropriate in the settings they rated as most conducive to achieving educational outcomes were coded into the following categories: structured learning about nature; nature hike; unstructured play for physical, health, or social benefits; unstructured learning about nature; picnic; reading and/or art activities; and picking up litter. The frequencies of each of these responses are presented as a function of area type (park, forest, water, open field) in Table 4. The most frequently identified educational activity for all types of settings was structured learning about nature, and the least frequently identified activity for all types of settings was picking up litter. The most frequently identified activity overall was unstructured play for physical, health, and/or social benefits in a park setting; unstructured play was not identified for the forest area or the grassy open field. Fewer than 10% of respondents identified "nature hike," "unstructured learning about nature," or "reading and/or art activities" as appropriate in any of the outdoor settings selected as educationally preferred.

Participants were asked to identify resources they thought they needed in order to achieve educational outcomes in outdoor settings. The most frequent response to this open-ended question was more adults to supervise children (68% of participants), field equipment specific to the activity (such as nets for collecting aquatic insects,

Table 4. Activities Associated With Educationally Preferred Outdoor Settings

Item	*Park*	*Forest*	*Water*	*Open field/ grassy area*	*Frequency total by activity*
Structured learning about nature	31	28	32	10	101
Nature hike	3	47	4	9	63
Unstructured play for physical/health/social benefits	59	—	1	—	60
Unstructured learning about nature	10	6	11	2	29
Picnic	20	1	—	—	21
Reading and/or art activities	7	1	1	—	9
Pick up litter	2	—	—	—	2

Numbers represent the frequencies of participants indicating that particular activity.

magnifying glasses, posters of different kinds of trees to look for, etc.; 31%), bags or jars for collecting nature items (25%), a field guide for the instructor (18%), and appropriate shoes (15%). Other resources identified as necessary were: a first aid kid, accessibility accommodations, nice weather, safety rules, lesson plans, prior knowledge or background information, and a naturalist to accompany the group.

Intentions to Use Outdoor Settings in Future Teaching

The third purpose of this paper was to test a model predicting early childhood educators' intention to use natural outdoor settings in their teaching practice from: (a) their status in their program (freshman, sophomore, junior, senior); (b) the age of children they intend to teach; (c) their knowledge of the benefits of experiences in nature for young children; (d) their perceptions of outdoor spaces; and (e) their personal level of nature relatedness. Descriptive statistics for participants' intention to use natural settings, knowledge of benefits, and nature relatedness are presented in **Table 5**. Students rated their intention to use natural settings and their intention to use maintained settings as quite high, between 4 and 5 on a scale ranging from 1 (*disagree strongly*) to 5 (*agree strongly*). Students rated the perceived difficulty of using natural settings just above the midpoint of the scale (M = 2.83; SD = .86). Students rated the extent to which they agreed with a statement that "nature experiences belong within the formal school setting" just above the midpoint of the scale indicating some agreement but not very strong agreement on average. Students reported high knowledge of the benefits of experiences in nature for children, and moderately high connectedness to nature.

Table 5. Descriptive Statistics for Intention to Use Natural and Maintained Settings in Teaching and Predictors of Intention to Use Natural Settings

Item	*Range*	*Mean*	*SD*
Intend to use natural settings	1–5	4.82	0.44
Intend to use maintained outdoor settings	1–5	4.33	0.80
Perceived difficulty of using natural settings	1–5	2.83	0.86
Nature experiences belong in formal school	1–5	3.78	1.20
Knowledge of nature benefits	1–5	4.52	0.57
Nature relatedness	1–5	3.48	0.48

Table 6. Stepwise Multiple Regression Analysis Predicting Respondents' Intention to Use Natural Settings With Future Students

Predictors in model	*Adj R^2*	*SE*	*β*	*F*
Recognition of the health and wellness benefits of nature experiences	.08	.85		9.31**
Recognition of the health and wellness benefits of nature experiences	.13	.82		8.22***
Perceived difficulty in using natural settings				
Recognition of the health and wellness benefits of nature experiences	.17	.80	.24	7.73***
Perceived difficulty in using natural settings			.23	
Personal level of nature relatedness			.22	

Variables not in equation: Level in preservice program, age of students they intend to teach, recognition of the cognitive benefits of nature experiences, recognition of the social-emotional benefits of nature experiences, recognition of the physical development benefits of nature experiences, recognition of the environmental benefits of nature experiences, belief regarding nature experiences belongs within formal school setting, intention to use maintained outdoor settings.

* $p < .05$; ** $p < .01$; *** $p < .001$

Multiple regression analysis identified the following significant predictors: knowledge of health and wellness benefits for children; perceived difficulty of using natural environments; and personal level of nature relatedness. Stepwise multiple regression analysis indicated that knowledge of the health and wellness benefits of nature experiences ($\beta = .24$; $p < .01$), perceived difficulty in using natural settings ($\beta = .23$; $p < .001$), and personal level of nature relatedness ($\beta = .22$; $p < .001$) significantly predicted 16.7% of the variance in intention to use natural settings in their future teaching practice ($R^2 = .17$, $F_{(3,98)} = 7.73$, $p < .001$; see **Table 6**). In other words, the more knowledge about benefits of nature experience, the greater the perceived difficulty of using natural settings, and the greater participants' level of nature relatedness, the higher they rated the likelihood of using natural settings in their future teaching.

Discussion

This article examined the extent to which preservice early childhood educators are prepared to use natural environments as contexts for

learning. There is increased interest in environmental education in early childhood specifically, and recognition of the benefits of nature for children's development in general. However, few studies to date have examined early childhood educators' knowledge of the benefits of experiences in nature for children's development or predictors of their intention to use natural environments in their teaching practice. Overall, participants in this study rated their intention to use natural environments in their future teaching quite high, and they did not perceive using natural environments as particularly difficult. Natural settings that were maintained by humans (i.e., parks) were more likely to be selected as appropriate settings for early education than were more natural settings such as forest, open fields, or locations with natural bodies of water. Recognition of health and wellness benefits to children, perceived difficulty of using natural environments, and teachers' personal "nature relatedness" significantly predicted intention to use natural environments in future teaching. However, preservice teachers in this sample reported an average level of nature relatedness near the midpoint of the scale, indicating that there is much room to increase their comfort with and connection to nature.

Preservice early childhood educators in this sample did not seem to perceive educational affordances in the natural, nonmaintained environments examined. This is consistent with the Skamp and Bergmann (2001) finding that teachers did not know what to do with children in the natural learnscapes. Less than one third of participants in the current study reported that the natural areas offered opportunities for structured learning about nature, and fewer than 10% of participants reported that the natural areas offered opportunities for unstructured learning about nature. The affordance most frequently reported was unstructured play for physical, health, or social benefits in the park area. Participants' lack of awareness of affordances is also evident in the frequent response of "lack of things for children to do" in the least preferred settings, which tended to be the more natural, nonhuman maintained settings. This provides evidence that preservice early childhood educators need to become acquainted with affordances in natural environments in order to effectively use these environments as "third educators."

As described by Gibson (2000), it is necessary to explore the environment to discover affordances and to understand how the self is related to the environment, in order to capitalize on the available

affordances. If preservice teachers are to be adequately prepared to provide meaningful educational and developmental opportunities for young children in natural environments, teacher preparation programs must scaffold their exploration and understanding of affordances in natural environments. For example, it is likely that the more-natural forest, water, and open field each support diverse life forms (plants and animals, including insects and invertebrates) that are uniquely adapted to each environment; yet 9% of participants identified unstructured learning about nature as appropriate for the park setting, which is likely to have fewer and less diverse life forms, and approximately the same proportion of participants identified unstructured learning about nature as appropriate for the settings with water. Very few participants cited unstructured learning about nature as appropriate for the forest or open field settings, which paradoxically would offer much richer opportunities for unstructured learning because these environments support a greater diversity of life forms. Professional development can scaffold knowledge about the rich affordances for structured and unstructured learning about more "natural," less-maintained environments. Beginning with exploration and investigation of life forms in students' own ecosystem, and the interdependence of those life forms with each other and with the physical environment is a logical place to start because it is local, somewhat familiar, situated within an ecosystem that can also be investigated, and relevant to students' future teaching. The life forms investigated should be readily available in the environment for the teachers' future students to observe and experience. Such investigations would prepare student teachers to be aware of affordances for learning in local natural environments, and to provide structured learning opportunities (i.e., looking for a particular plant or animal and learning about what it eats and where it lives) as well as unstructured exploration (using field guides to identify new discoveries).

The most frequently identified activity overall was unstructured play for physical, health, or social benefits, in a park setting. This is not surprising given the importance of play for development during early childhood (e.g., Copple & Bredekamp, 2009; Lester & Russell, 2010; NAAEE, 2010; Pellegrini, 2009). However, it is interesting to note that this activity was really only identified in the park setting, given that more natural areas such as forests, open fields, and areas with water present more open-ended opportunities for play and more

"loose parts" such as sticks, acorns, pebbles, leaves, and other found objects that can be manipulated for use in symbolic play. This is an example of how a natural environment can be flexible, active, and responsive to the children and teachers who use them—fitting with the role of the environment as "third educator." While of course it is important to interact with nature with respect and care, educators can allow children to gather natural items for open-ended and imaginary play while also instilling an ethic of caring (see "Some Ethical Considerations of Picking and Collecting," in NAAEE, 2010 p. 12). Early childhood teacher preparation programs can provide opportunities for students to observe and/or interact with children as they engage in unstructured play in natural environments, in order to scaffold preservice teachers' understanding of the affordances for play available in natural environments.

The most frequently identified activity across all types of natural environments was structured learning about nature. This may reflect the participants' perceptions of the role of the teacher in structuring learning, but it may also reflect participants' lack of confidence in exploiting learning opportunities present in the natural environments. It is important to provide for children both structured and unstructured opportunities to learn about nature. Intentional introduction of nature concepts helps children to build relationships of familiarity with nature and also provides a foundation from which to build more complex and accurate knowledge of nature, while unstructured opportunities allow children to explore and discover, thus nurturing their curiosity and enthusiasm for nature (NAAEE, 2010; Wilson, 1994). Natural environments present abundant opportunities for learning; in the words of E. O. Wilson, "The natural world is the most information-rich environment people will ever encounter" (1993). Early childhood teacher preparation programs can provide opportunities for preservice teachers to engage in both structured and unstructured learning experiences in natural environments, or in the terms of Chalufour and Worth (2003), "open" and "focused" exploration.

Examination of participants' reported reasons for selecting sites as least preferred also informs design of professional development. The most frequently cited reason for not preferring a particular site was the presence of safety hazards. In many cases the hazard was the presence of water, although for relatively inexperienced educators the presence of trees, shrubs, or tall grass that may impede a clear view

of children at all times might be perceived as a hazard as well. This would be consistent with the teachers reporting concerns about managing student behavior outdoors in the Skamp and Bergmann (2001) study. An increasing number of nature-focused early childhood programs are safely taking children to natural environments featuring water and dense vegetation on a daily basis (e.g., Bailie, 2010), providing evidence not only that it is possible to safely take children to such natural environments, but also that these experiences promote children's self-regulation when teachers provide appropriate guidance. Early childhood teacher preparation programs must prepare their students to provide appropriate guidance and supervision when in natural environments. It is helpful to call upon the Reggio Emilia concept of the "image of the child" as " ... rich in potential, strong, powerful, competent, and, most of all, connected to adults and other children" (Mallaguzzi, 1993, p. 10). Framing guidance with an understanding of children as capable of understanding boundaries and the reasons for them, of exercising self-regulation, and of honoring relationships with teachers and peers may provide early childhood educators with the tools to promote children's cooperation with expectations and the confidence that children are capable and motivated to do so.

For early childhood educators or teacher preparation programs that draw upon the principles and pedagogy of Reggio Emilia, it may be helpful to consider how to collaborate with the natural environment as a "third educator." According to Gandini (1998), environments should be welcoming, reflect the culture of the children and the community, make visible the teaching and learning, support social interactions, be appropriate for children at different ages and levels of development and afford opportunities for active learning. Environments should be flexible, active, and responsive to the children and teachers who use them. Applying these principles to natural environments, it is evident that natural environments have "restorative" properties that help children and adults to have more focused attention and ability to cope with stressors (e.g., Faber Taylor & Kuo, 2009; Grahn et al., 1997; Kuo, 2001; Mayer et al., 2009; Wells, 2000). This is in part due to aesthetic properties of natural environments, which are "gently absorbing," with a balance of visual, auditory, and olfactory stimulation that is fascinating and rich in diversity but not overstimulating (e.g., Kaplan, 1995). Fostering appreciation of the beauty of nature is consistent with the attention to beauty and design of environments evident in Reggio schools

(Gandini, 1998). Teacher education programs can guide students to encourage children's sensory awareness and aesthetic appreciation in natural environments. One strategy to do this is to take students as a group to a natural area, or assign them to visit a natural area on their own and to spend an hour without any technology, experiencing the environment "through the eyes of a child." Journaling about the experience and then discussing it can help students to reflect and become aware of the multitude of sounds, smells, textures, temperatures, and sights to which they can draw children's attention. Using the Reggio concept of a "provocation," students can generate ideas for nurturing children's sensory awareness. Provocations might include providing children with prompts to: "listen; who do you hear?" in response to birds, crickets, or frogs; close their eyes and see if they can feel the warmth of the sun on their faces; compare the texture of bark on different trees; or smell approaching rain or snow.

Culture arises out of natural environments and therefore natural environments inherently reflect culture; exploration of what it means to be a "child of the prairie," a "child of the forest," "a child of the farm," a "child of the desert," or "a child of the river," for example, is a way to explore the ways our home ecosystems shape our everyday lives. Research suggests that natural environments promote more prosocial behavior, thus supporting social interactions (e.g., Bell & Dyment, 2006). Natural environments provide developmental and learning opportunities for children at all levels of development, and especially opportunities for active learning (Baranowski et al., 1993; Torquati et al., 2011).

Limitations and Future Directions

Limitations of this study point to future directions for research. This research examined a sample of preservice teachers from a single early childhood teacher education program, and generalization is therefore limited to students in programs with similar structure, content, and perhaps biome. Some of the predictors of intention to use natural environments in future teaching were assessed via a single item, so further development of measures of knowledge of the benefits of nature for children, the appropriateness of nature experiences in formal schooling, and the intention to use different types of natural environments should be undertaken in future research. This study examined

associations between knowledge and beliefs related to nature and the actual use of different types of natural environments. Examination of these associations by practicing teachers in the field would also inform understanding of teacher developmental processes. Professional development is often predicated upon the assumption that changing knowledge and/or beliefs will lead to changes in behavior. It is important to examine associations with practicing teachers to determine whether this is the case, or if other factors and/or processes should be considered when designing professional development.

Summary and Conclusions

Natural environments have been underutilized in contemporary early childhood education in the U.S., and a minority of participants in the present study provided examples of activities that indicated they were aware of educational and developmental affordances in natural environments. Considering that natural environments offer rich affordances for learning and development, it is imperative that teacher preparation programs provide opportunities for preservice teachers to become acquainted with educational and developmental affordances in natural environments in order to effectively use them as the "third educators." Natural environments offer opportunities for unstructured play, structured and unstructured learning about nature, and opportunities for social interactions among peer dyads, small groups, and large groups. Results of the present study indicate that preservice teachers' nature relatedness significantly predicted their intention to use natural environments in their future teaching. This suggests that teacher preparation programs should investigate ways to scaffold preservice teachers' own connections with nature.

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