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## Addressing Nature-Deficit Disorder Using A Multi-program Area, Multi-State Approach

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### Cover Page Footnote

We are indebted to the licensed teachers of Indiana and Maine for continually supporting and incorporating our curriculum into the classroom. Their efforts have resulted in thousands of youths being more conscious of their natural world. The Nature of Teaching has received financial support from Purdue's Office of Engagement, Cooperative Extension, and Department of Forestry and Natural Resources. Maine's funding sources include the Maine Department of Inland Fisheries and Wildlife and Maine Outdoor Heritage Fund. All survey data were collected under the approved Purdue Institutional Review Board protocol number 1810021119A005.

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**Abstract.** Youth are spending less time outdoors compared to previous generations. Because youth spend much of their time in school, teachers can provide the critical linkages that introduce students to nature. Unfortunately, teachers often lack access to standards-based STEAM curricula focused on natural resources, do not feel comfortable taking their students outside, and may not be knowledgeable about how to incorporate nature into the classroom. Addressing the nature deficit disorder facing today's youth and the lack of professional development for teachers requires involvement from Extension (agriculture and natural resources specialists, health and human science educators) and natural resources professionals.

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### INTRODUCTION

The education of our youth is critical to their understanding and appreciation of natural resources. Unfortunately, today's youth suffer from nature-deficit disorder (Louv, 2008). Fewer youth are exposed to nature or nature-related activities and, as a consequence, more and more youth do not have an understanding or appreciation of the natural environment (Nabhan and St. Antoine, 1993). As the environmental experience of our youth dwindles, school grounds are becoming more significant sites for their environmental learning (Malone and Tranter, 2003).

The lack of youths' environmental awareness has been compounded because many school systems lack educational materials targeting STEAM (science, technology, engineering, art, math) standards in natural resources. We argue that, with proper professional development training, teachers can provide the direction through which youth can reconnect with nature. This argument is consistent with that of the No Child Left Inside coalition, a grassroots effort to increase environmental awareness by providing teachers with the knowledge and tools necessary to incorporate environmental education in the classroom (North American Association for Environmental Education, 2009).

Studies have shown that children learn best through discovery and interaction with concrete, 'hands-on' experiences (Allen et al., 2011; Fler and Hardy, 2001; Schlink, 2000). To this end, over 40 organizations have worked to incorporate natural areas in and around schoolyards (U.S. Fish and Wildlife Service, 1996). Comprehensive studies of teachers' use of outdoor environments have suggested, however, that teachers tend not to use outdoor environments for formal learning (Keown, 1986; Orion et al., 1997).

Even if outdoor spaces exist, K-12 teachers have been unlikely to use these resources because they (a) lack lesson plans targeting STEAM standards in natural resources, (b) lack professional development to integrate nature into curricula, and (c) lack formal assessment tools to document impact (Williams, personal communication, 2009). Compounding these shortcomings, schools have faced an expected 15% cut in federal funds and another 13% in state funds allocated for teacher professional development (Balonon-Rosen, 2017). As cuts are made to education programs, it is important for Extension and natural resources agencies to partner with school systems and provide research-based trainings using expertly designed curricula.

## PROGRAM DESCRIPTION

The Nature of Teaching (TNT) is a Purdue Extension program that was created by the lead author in 2010 to provide a K–12 nature curriculum specifically focused on wildlife to teachers. A needs assessment conducted in 2016, in the form of group interviews with teachers, indicated additional TNT curricular topics were required to address academic needs. As a result, county and campus Extension staff as well as biologists from the Department of Maine Inland Fisheries and Wildlife formed a new multi-state, multi-program area team.

The team expanded curricular content into two new areas: health and wellness (which focused on the health benefits of youths' connecting with nature) and food waste (which focused on the environmental costs associated with wasting food). The partnership with Maine Inland Fisheries and Wildlife provided a means to expand the program outside of Indiana, connect teachers with local natural resources professionals, and assess the potential for expanding the program nationally. All TNT curriculum remains free to download at the program's website ([www.purdue.edu/nature](http://www.purdue.edu/nature)).

The team introduced K–12 teachers to this curriculum via professional development workshops. Having Extension educators from the areas of agriculture and natural resources, health and human sciences, and 4-H youth development provided a holistic learning experience for workshop participants (see "Impact" section). Each workshop consisted of two days of classroom instruction coupled with outdoor activities. Workshops covered all three TNT curricular areas, highlighting interconnected lesson plans from each area. We designed the workshops to provide teachers with the lesson plans, materials, background knowledge, and comfort level necessary to integrate natural resources concepts related to wildlife, health and wellness, as well as food waste into their classrooms.

## METRICS TO MEASURE IMPACT

We surveyed teachers at the end of each workshop using a retrospective post-then-pre survey instrument that addressed perceived knowledge gained, the intended adoption of program lessons or activities, and likeliness to recommend Purdue Extension. A 4-month follow-up survey assessed the actual adoption of lessons into the curriculum.

As a further means to assess impact, each educational unit included a student assessment tool. Participating teachers conducted pre/post student assessments and reported data back to the TNT team. This model allowed the team to assess teacher and student knowledge gain through workshops and curriculum, respectively.

## IMPACT

From 2016–2018, the TNT team hosted five teacher workshops for K–12 instructors to introduce The Nature of Teaching program. Workshop participants included 190 teachers (116 IN, 74 ME) across 37 school corporations (19 IN, 18 ME) in Indiana and Maine. Teachers submitted student pre/post assessment data from 2,225 students (1,481 IN, 744 ME).

The results of teacher and student assessments showed that on average 56% of teachers who attended workshops implemented lessons in their classroom and submitted student data; teacher knowledge gain ranged from 0 to 208% with an average of 55%; student knowledge gain ranged from 0 to 125% with an average of 28%.

These results indicate that K–12 teachers in Indiana and Maine will be more likely to incorporate nature into their curricula and teach about nature topics, including wildlife, health and wellness, and food waste, in response to being exposed to The Nature of Teaching curricular resources. Therefore, students from Indiana and Maine may exhibit reduced nature-deficit disorder and instead improve academic performance (American Institute for Research, 2005; Kellert, 2005; Wells, 2000); improve emotional, social (Kuo and Taylor, 2004), and physical health (Dyment and Bell, 2008); and foster long-term responsible land use and conservation of natural resources (Zelezny, 1999).

Overall, The Nature of Teaching curriculum and workshop model are a successful means for increasing teacher comfortability with teaching about natural resources, increasing student knowledge of natural resources topics, and connecting youths with nature.

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