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Wendy L. Chambers
Georgia Southern University

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Abstract
This article describes a service project involving a 3–year partnership between a university professor (the author) and P–12 faculty at a local rural Title I elementary school. Major aims of the project were to provide an opportunity for students to explore and learn about their natural surroundings through the use of nature photography activities and to connect these experiences to classroom activities with the goal of supporting academic skill development. The author visited the school twice per week to take children around the school grounds to photograph nature for about 20 minutes per session. Outcomes included the following: (a) students demonstrated increased interest in and curiosity about the subjects of their photographs over time; and (b) the nature photography project provided a beneficial context for supporting students’ learning in art and technology and for practicing their writing skills. Sample student photographs and writing excerpts are presented here.

Keywords
nature photography, outdoor learning, environmental education

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Wendy L. Chambers
Georgia Southern University

"How high your awareness level is determines how much meaning you get from your world. Photography can teach you to improve your awareness level." (Ansel Adams, 1902–1984, iconic American landscape photographer)

"The camera is an instrument that teaches people how to see without a camera." (Dorothea Lange, 1895–1965, American photojournalist)

"I learned that taking pictures helps me see and understand more clearly and I learned to pay more attention to nature and its features." (Tameka[1], age 9, in a written response to an open-ended general question about what she learned from the photography project)

See Appendix for nature images taken by students involved in this project.

With increasing advancement of technologies and other cultural changes that have led to a decrease in the amount of time children spend outside exploring their natural surroundings, many American children of this generation appear to be disengaged from nature—physically, cognitively, and emotionally. This lack of exposure to and immersion in the natural environment has been argued to contribute to a host of detrimental issues for children (see Louv, 2008, for a thorough review of research investigating the connection between experience in nature and cognitive and emotional development in children). Teachers and researchers working in the field of environmental education are naturally aware of the importance of connecting outdoor experiences with learning; however, this connection does not come as easily in many public school contexts, where teachers are pressured to focus on meeting standards using traditional instructional methods.

Nature photography activities have great potential for supporting this connection between classroom learning and getting children into the outdoors. One of the unique aspects of nature photography is that in addition to creating a sense of accomplishment through the making of images, the camera can be used as tool to help support the larger objective of providing an opportunity for children to learn about and develop an appreciation for their natural surroundings. Carlone et al. (2015) discussed the use of "boundary objects" that connect children to nature, allowing them to explore their surroundings with a sense of protection from danger of the unknown. In the current project, digital cameras served as boundary objects for the students; specifically, the cameras provided a "protective space" within which the children could examine unfamiliar animals and plant life while learning to feel more at ease as they ventured into nature (L. Huffling, personal communication, October 15, 2015). The current service project involved a collaboration between a university professor (the author) and teachers at a local Title I elementary school with the overall aim

of providing a supportive context for learning activities within the "standard" curriculum while allowing for meaningful experiences in nature for students using photography-related activities. Thus, digital cameras also served as boundary objects on another level by providing a common means through which different goals could be met (see Clark et al., 2015; Star & Griesemer, 1989).

METHOD

Background

The school chosen for this project was a rural Title I elementary school in southeast Georgia that serves a predominantly low income, minority population. The specific racial and ethnic group demographics were as follows: 54% African American, 23% White, 16% Latino/a (with 14% ELL students), 4% two or more races, and 2% Asian. Ninety percent of the students were eligible for free or reduced lunch. Although the school serves a very rural population, many of the students do not spend much time in the outdoors when they are at home as their community neighborhoods are not considered safe by their parents and caretakers.

The author chose not to pursue a specific research agenda or question but rather focused on simply providing a community support service to the school in her role as university collaborator by supplying equipment (cameras and supplies for printing and matting images) and volunteering her time to lead the nature photography activities with the students. One important focus of this project, from the standpoint of the author, was to empower the classroom teachers with the opportunity to develop activities that they felt best suited their students' learning needs while taking into consideration their specific time and resource constraints. In addition, the Board of Education for the county in which this school is located prohibits educational research of any kind in public schools, unless the activities are "part of the normal school and curriculum process." Thus, the only "data" that were collected were writing samples from students involved with the project (during Year 3); these materials were de-identified and transcribed by a graduate assistant before being viewed and examined by the author. In addition, relevant student comments and dispositions were documented by the author following each photography session (although no individual student names were included in any documentation). The sample images presented in the Appendix of this article were selected from the cameras that students used, but no individual students were identified with specific cameras. Permission was obtained through the university Institutional Review Board, the county Board of Education, and the school principal for collection of these data.

Procedure

The author wrote a university service grant for the purchase of 15 high quality point and shoot digital cameras. After grant was awarded, she visited the school two times per week to take groups of students in grades 3–5 around the school grounds to photograph nature. The school grounds included roughly 10 acres of open green space, dotted with trees and bordering a wooded area. The classroom teachers decided which children would be allowed to go out for nature photography activities, how much time could be devoted to being outside each week, and in what ways the nature photography activities would be connected with classroom learning. Although all students were taught some basics on how to use the cameras during the first session and informally offered tips on how to take effective images throughout the program, it should be noted that the focus of this project was not on photography techniques but rather on discovering nature.

During Years 1 and 2, these excursions took place in the context of art and technology classes; the author (along with the art and technology teachers) took whole classes of

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fourth- and fifth-grade students outside for 15–20 minute nature photography sessions. The children were encouraged to wander around the school grounds, looking for birds and animals as well as interesting leaves, rocks, and flowers. They were encouraged to remain relatively quiet and use the zoom lenses on their cameras to photograph any animals they encountered so as not to disturb them. Students took photos and learned how to use digital photo-processing and image sharing software in technology class, and, in Year 1, the fifth-grade students subsequently matted their images (which were printed for the students by the author) in art class for exhibition at a local gallery. Although the author continued her work with students throughout Year 2, the school was experiencing a change of administration and the invitations to visit and work with students were less frequent and inconsistent.

In Year 3, the collaborating teachers decided to connect the nature photography project to a focus on writing. The author worked with a small group of eight third-grade students; these students went outside to take photos twice a week for 20 minutes and then wrote responses to open-ended questions pertaining to nature in (ungraded) "field journals" to reflect on their experiences while practicing their writing skills. The students who were allowed to participate in this project were identified by their homeroom teachers as high-achieving "good students" based on monthly test scores and classroom behavior. Five of the eight spaces in the group were retained by the same students throughout the school year with the other three spaces being filled by various students throughout the school year. The photography project began in early fall of the academic year and extended to midway through the spring semester. It is of interest to note that this project was considered by the homeroom teachers as an "extra" (as in extracurricular activity) that was offered to students as a reward for their classroom performance as well as an opportunity to further engage these academically motivated students. The author's role during this year remained limited to serving as the nature photography instructor for the students; the classroom teacher who was responsible for the students during "extra" time (and who was the media specialist) created the questions that students would reflect upon and respond to in their field journals. Most of the questions were deliberately open-ended in nature; for example, on several occasions students were simply asked to write about the day's nature photography outing.

RESULTS

Over the course of the 3-year project, several notable outcomes were observed by the classroom teachers and the author.

Students were enthusiastic about the photography activities from the beginning; gradually, however, they became more curious about the things they were photographing, often lowering their cameras and simply observing and asking questions. In this way, the cameras served as "boundary objects" (e.g., Carlone et al., 2015) that created a space for connecting students to the things in nature that they were observing. Although the main goal for students was always to "get the photo" of an object or animal, they lingered and asked questions after they captured the image. For example, at around the midpoint of the program during Year 3, one student was observed lying on the ground with her camera, saying quietly "Say cheese, little bug" as she photographed a beetle. Afterwards, she laid her camera on the ground and just watched it. Another child noted in the final writing sample of her field journal, "I enjoyed taking pictures with the camera 'cause you can zoom in and you can look at it closely."[2] Additionally, on several occasions while the group was outside, children asked if they could be allowed to research the object or animal in their images once they returned to the classroom.

In Year 3, students' comments and written reflections generally demonstrated an increasing appreciation for their natural surroundings as well as improvements in level of descriptive detail. About midway through the semester, one student exclaimed as the group walked outside, "Nature is always changing! It's different every time we come out here!" As another example, the following journal excerpts were written by a student during Weeks 1 and 6 of the photography program:

> We went to Miss Renaldo and we went outside and tried to get out of the gate and it was locked so we went back inside and got out that way and we went across the street and took pictures of nature and at the end I kind of took some selfies. And went back in. The end. (Latasha, Week 1 response when asked to write about her nature photography experience)

> I love nature because it is so beautiful and quiet and peaceful. The reason that I love nature is because it is so wonderful. The trees were beautiful and the butterflies were awesome but the swarm of bees! At first I was scared that they would sting me so I did not move and they did not sting me, they went right around me. I liked the mockingbird it was so cute. I loved flowers the grasshoppers and the eagle [hawk]. I love nature thank you for teaching me about nature. (Latasha, Week 6 response to the same writing prompt as Week 1)

Incidentally, the apparent increased interest in nature and the environment did not dissipate as soon as the program was over. One of the collaborating classroom teachers reported that later in the spring of that same year, the third-grade students were required to submit short essays for possible entry in a statewide public school writing competition. Students were allowed to choose any topic to write about, and nearly all of the students in the nature photography group chose to write about nature, with two of these students earning district honors with their essays.

In a related theme, several of the students appeared to have an increased sense of self-efficacy with respect to spending time in nature (as noted in the journal entry above). For example, prior to the first session for one group, when the author was explaining the procedures and rules for taking photos outside (including paying attention to where they were standing, always respecting animals, and so on), one child exclaimed, "I think I'm sort of afraid." Often, during the first or second photography session, several of the students would scream when they found a bee, a worm, or an anthill. As sessions progressed, however, children were observed to make comments that indicated an increased sense of confidence. For example, while walking back to the classroom, one student said, "I love taking pictures with you, Miss Wendy. At home I'm not allowed to go outside." The following excerpts from student field journals and notes support this observation:

> What I think about nature is that it is beautiful because it is peaceful and quiet and you can just look around and see a great view of anything, of colors and kindness. The kindness is that nature does not hurt you it is just a world of beautiful flowers and trees and leaves and mockingbirds. I hope you enjoyed my adventure. (Alyssa, midpoint writing sample)

> I love taking pictures so I can see different things in nature like spiders, flowers and bugs. I am so proud of myself. (Nita, final writing sample)

> My mom says I should be a photographic guy because I take good photos. I do wish to be one day but thank you so much for that now we should give you something! (Jarrod, final note to author)

On one specific outing, while this group was walking with the author close to the

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wooded edge of the school grounds, they all heard the distinct, very loud warning sound of a rattlesnake coming from the tall weeds several yards away, which reflexively stopped them in their tracks. Although some of the children appeared to be frightened at first, most of them later exclaimed that it was the most amazing experience for them. One of the students, referring to the experience, wrote in her final excerpt, "I learned lots of stuff about nature. For one I learned that you should shuffle your feet when you walk in the woods."

Over the course of the 3-year project, the nature photography activities provided a supportive context within which students were able to learn artistic appreciation and technology skills as well as practice their writing. Students maintained very positive dispositions toward all of these classroom activities; in fact, many of the students in Year 3 expressed disappointment when it was time to stop writing in their field journals. In addition, as noted earlier, several students requested time to research the animals and plants they were seeing outside once back inside the classroom.

CONCLUSIONS

It is argued that even short, simple activities involving nature photography can help support the development of a variety of academic skills while providing meaningful learning experiences in the outdoors for children. These types of activities can be relatively easy to create and manage even with whole classes of children (see, for example, Ewald, 2001, for ideas on how to connect photography experiences with literacy instruction). Online resources are also readily available; some resources include ideas for outdoor learning activities that could be modified to include nature photography while others provide ideas for effective "prompts" for journal reflections and writing about nature-related topics.

Although the author was able to acquire high quality digital cameras for this project, classroom teachers could use iPods or other transportable devices if they are available at the school, and students can work as partners or even in small groups, sharing the equipment to create a group art and research project centered on a theme. An added bonus of using nature photography activities is that every child can feel a sense of pride and accomplishment in the photos he or she creates as it is not difficult for children to take very good photos with a bit of direction and focus (as exhibited by photos in this article). On a related note, effective nature photography requires the photographer to slow down and hold the camera steady while viewing the subject in different light conditions; thus, close attention to the subject of the photo is necessary and provides a unique opportunity for purposeful examination of plants and creatures in nature as well as phenomena like clouds, wind, and morning dew. Also, as one group of students in Year 1 nearly yelled in unison in response to the question of what they learned about photography after the very first outing, "You need to be really quiet to take photos of wildlife!" On this day, a very patient red-tailed hawk sat on the flagpole of the school and allowed 25 students (sharing cameras) to "sneak up" on it with their zoom lenses fully engaged as it posed for them. Thus, these types of activities provide a supportive context for enabling true appreciation of and respect for the animals, plants, and landscapes one encounters.

The current project is not without limitations. One of these is that, in an effort to ensure that the classroom teachers maintained complete control over the activities and the ways by which they would connect with student learning in the classroom, the organization and implementation of the project was admittedly less than perfect. For example, in Years 1 and 2, the fourth- and fifth-grade homeroom teachers agreed that any nature-photography related learning activities

would take place "separately" from homeroom time within the art and technology classes. Although they were pleased to see what their students were learning with this project, they were not able to find time to extend the nature photography-related activities into their own classrooms as a hands-on means of learning about environmental science. In Year 3, the nature photography and writing project was limited to serving the eight highest-achieving third-graders in the school as an "extracurricular" activity. Although the significance and impact of this project on these children should not be overlooked, *all* elementary level students can benefit from spending time in nature. Moreover, Carlone et al. (2015) pointed out that youth from socioeconomically disadvantaged homes and communities will likely grow up to become stewards of these communities, largely responsible for protecting the natural habitats surrounding them. Thus, they argued, "Providing all youth opportunities to spend time outdoors, learn about and connect with native flora and fauna, is a social justice issue" (p. 1526).

Future projects involving nature photography activities can build upon the present one with improvements, particularly during the planning stages. For example, if classroom teachers can be more explicitly made aware of the potential for great benefits in terms of student achievement through these activities and are provided with enough time in advance of the academic school year to deliberately and systematically build such activities into their lesson plans, then projects have a greater chance of being implemented successfully with a sustained commitment from all stakeholders. When these conditions are met, long-lasting positive impacts on young learners are attainable.

"Nature is exactly what I imagined!"
(Tamyra, age 10)

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NOTES

[1]Names of all students and participating classroom teachers have been changed to protect their privacy.

[2]All student writing samples have been corrected for spelling errors.

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Wendy Chambers is a professor in the Department of Curriculum, Foundations and Reading. She earned her Ph.D. in Developmental Psychology from the University of Florida in 1993. Her primary research interests are in cognitive development in early childhood. She has published research articles in top tier peer-reviewed journals, and, in 2013, she published a short undergraduate textbook titled Cognitive and Language Development: The Child's Journey.

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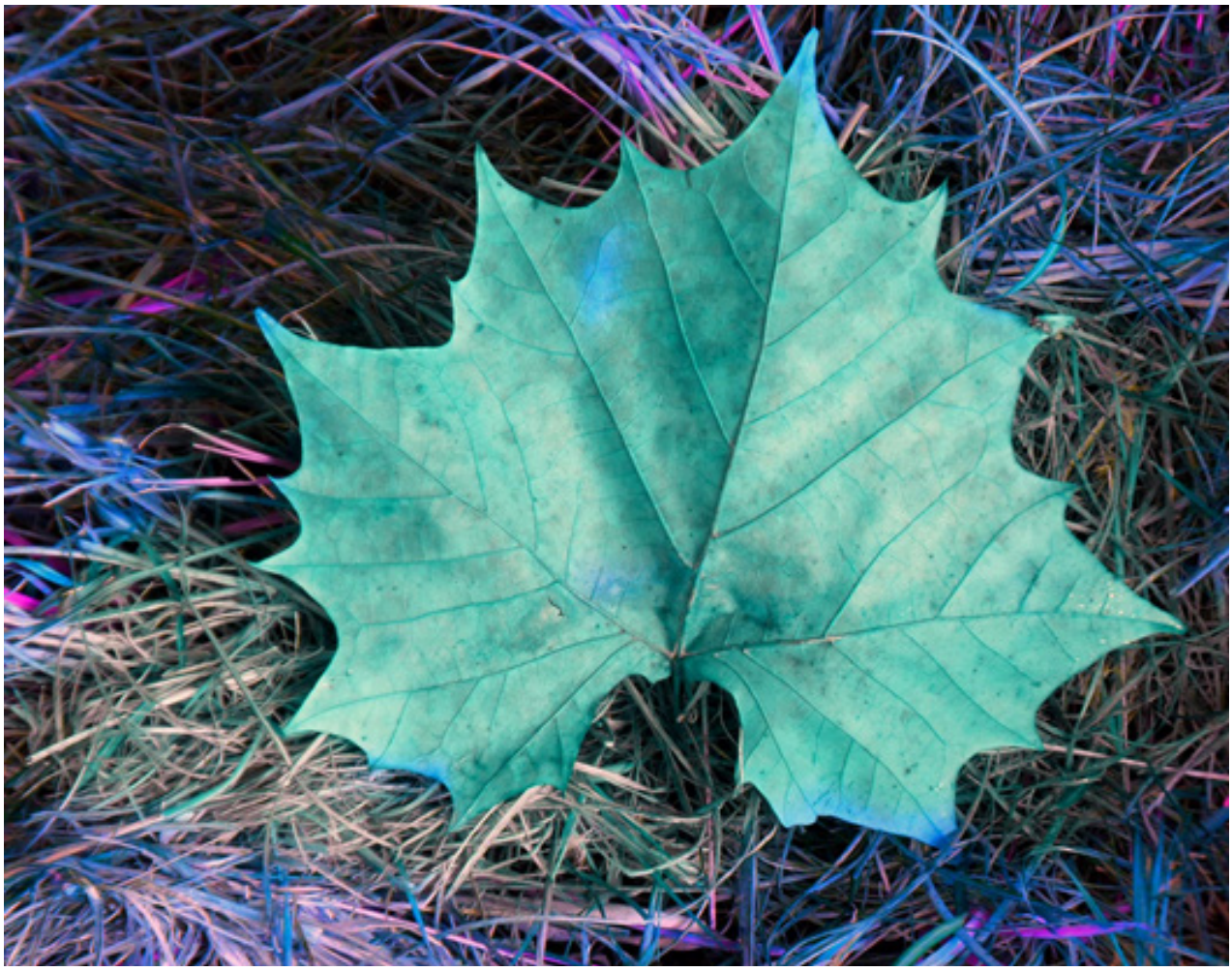
Appendix

Student Photographs

Feather as Art

Students engaged in nature photography activities



Sample photograph taken in Year 1 by a student who utilized photo processing software techniques

Dandelion Art

Spider Web on an Autumn Morning

Busy Bee

Redbud Tree in Bloom

Tree in the Mist

Busy Bee 2.0

Patterns in a Leaf

Spring Wildflower