Heartland Farm Sanctuary: "Bug Week" Summer Camp Curriculum

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After almost four years in Project Dragonfly studying the myriad roles that bugs (i.e., invertebrates) play in our world— along with all the reasons humans tend to fear, hate, and revile them— I recently took some big steps in the direction of a science communication career. In addition to starting an internship with renowned science communicators The Bug Chicks, I also got the opportunity to practice my skills with some summer campers, a demographic with which I previously lacked any meaningful experience. Back in May, a friend in Wisconsin who works at Heartland Farm Sanctuary's (HFS) (Heartland Farm Sanctuary, 2020) summer camp informed me that they want to include bugs in their curriculum, but none of the staff there have any bug knowledge. They knew I was passionate about inspiring fascination with bugs, so they connected me with their Humane Education Manager to discuss a project partnership, and I realized it would make a great independent study project for my portfolio.

This project is meant to be a culmination of all of my master plan work so far. I have spent the last several years learning about the importance of invertebrates to a healthy planet, how to conserve them effectively, and the role that human fear and disgust play in the widespread unwillingness to protect the "little things that run the world" (Wilson, 1987, p. 344). Now I need to start applying what I have learned to real-world education, especially for young kids and their camp counselors who might be afraid of these important organisms.

Unfortunately, due to personal logistical issues, I was not able to make it out to Wisconsin this summer in person, so I conducted the curriculum via a series of videos and live Zoom sessions with in-person assistance from the HFS staff (see the Curriculum section for

details). My hope is that, if all goes well, I will be able to expand on this curriculum and be invited to attend “Bug Week” in person next year.

In this paper, I will summarize the main principles behind my method of teaching, the science that inspired them, and how I implemented them in my curriculum for HFS.

Inspiring Fascination and Empathy

Despite consuming a wide variety of science communication (the translation of scientific topics for the general public, commonly abbreviated to “sci-comm”) for most of my life, it took Kristie Reddick of The Bug Chicks to help me realize that it was a field I was meant for. When I saw her speak at the Cincinnati Nature Center in 2019, her opening statements grabbed my attention: “Fear and fascination are two sides of the same coin” (Reddick, 2019). She felt it was her job as a scientist and educator to help people experiencing only the fear side to flip that coin over and open themselves up to the fascinating world of bugs right beneath their feet. While I had never put it into those words before, this resonated with my personal mission of encouraging people to think before killing bugs just because they are startled or disgusted by them.

In terms of this project, both because of the age group as well as my personal experiences with science learning, I decided to put as much emphasis as possible on the “fascination” side of bug science. Fascination often leads to empathy, and empathy has been shown to be one of the leading motivators behind pro-environmental behavior (Monroe, 2003). Lasting empathy is best encouraged through positive stories and lessons (McAfee et al., 2019), so I wanted to highlight all of the amazing features and behaviors of bugs. The students will have plenty of time as they grow up to learn more about the many misconceptions about bugs and how our bug-related fears

can actually hurt our planet. Summer camp is supposed to be fun, and my hope is that these campers' fascination will turn to empathy.

The Montessori Method

The Montessori method of teaching was created in the early 1900s by Maria Montessori, an Italian physician and educator with a special interest in child development and special education. Based on her own observations working with special needs children, as well as the works of French physicians Jean Marc Itard and Edouard Séguin, Montessori developed a method of teaching centered on student-led learning, multisensory activities, multi-age classrooms, the teacher's respect for the child, and the child's respect for their peers (L'Ecuyer et al., 2020).

While HFS is not specifically a Montessori institution, I was pleased to find that they utilize many aspects of the Montessori method of teaching in their programs. I have long believed that many of modern society's most pressing problems could be addressed by applying Montessori principles in public schools. I credit my Montessori education with my academic success, passion for science, creativity, and emotional strength, and I am not the only one to observe that kind of outcome. The Montessori method has long been shown to increase both academic performance and socioemotional health without one detracting from the other (Denervaud et al., 2019; Lillard, 2019). To honor my Montessori upbringing as well as respect the academic atmosphere at HFS, I made sure to include as many Montessori approaches as possible when designing my curriculum. In the following sections, I will summarize some of the main tenets of Montessori teaching, how HFS uses those tenets, and how I incorporated them into my curriculum.

Multi-age Classrooms

Montessori classes are usually composed of children within a three-year age range, or the equivalent of having three grades in one classroom. This allows older children to develop leadership skills by mentoring their younger peers, and allows younger children to bring unique perspectives to their older peers (American Montessori Society [AMS], 2021; Lopez, 2016). HFS enrolls children from age eight to fifteen, and often splits them up into two or three groups by age to complete certain activities, so that the curriculum is never too difficult for the younger children or too simple for their older peers. In keeping with this, I made sure that my curriculum made room for the counselors to adjust the complexity of the activity according to the age group working on it. I used the simplest language possible in my educational videos, and clearly defined any necessary jargon so that the young children would not be too confused and the older children could still glean more complex implications from the information. For example, for the adaptations activity (where campers get to design a bug that lives in a specific habitat; see Appendix A for full curriculum), I made notes for the counselors to focus more on the creativity aspect with the younger campers (even if they could not fully grasp the complexities of natural selection and evolution), and to focus more on the technical aspects of adaptations with the older campers. In true Montessori form, at the end of the activity, all the campers came together to share their creations with one another.

Natural Spaces and Materials

One educational model explains that children learn about nature better through outdoor play and direct interaction with nature, and that this type of learning allows them to build meaningful relationships with animals and, subsequently, develop empathy and conservation

behavior (Sobel, 1996). Similar to this notion, the Montessori method also encourages contact with natural materials and environments. Montessori believed that for children to develop normally, they need to be in contact with nature to experience its various cycles and processes, as well as to move and touch natural objects according to their own instincts in order to build a sense of independence, work ethic, and critical thinking (Durakoglu, 2014). In my Montessori upbringing, many of our science lessons were taught outside in the garden, at the edge of the pond, or on one of the many nature trails weaving through the old farm property. Learning and doing science in the natural places where our lesson topics occurred made the natural world come alive for me, as I was able to physically interact with plants, animals, and habitats in ways that a textbook or lab lesson could never allow. This was a significant part of my childhood, and I cannot be sure that I would love nature as much as I do or have enrolled in Project Dragonfly without this early exposure to nature.

HFS already immerses campers in nature through their on-site gardens and farm animal care activities, and while I did not have complete control over the materials or spaces used by HFS for my curriculum, I was able to take advantage of their outdoor spaces and the use of some near-natural materials. I planned the paper wasp activity (see Appendix A for full curriculum) for one of their outdoor spaces, so that they could make use of the fields, forests, and gardens on their property. To save HFS funds for the paper wasp nest materials, I suggested the use of cardboard boxes, toilet paper tubes, and other recyclable or repurposable materials. While a more traditional Montessori classroom might have used more natural materials like wood, clay, stone, and organic textiles, I felt that the rough, brown cardboard was a good compromise between

natural, sustainable, easy to find, and cost effective for HFS, and also closely mimicked the material of a paper wasp nest.

Multisensory Activities

Montessori also recommended using multisensory modalities for every activity so as to give children who learn better through one sense than another the chance to learn as effectively as their peers, as well as to develop the senses in ways appropriate to each age group. This principle was ahead of its time in terms of neuroscience research, which later confirmed the importance of training and learning through all of the senses at critical points during childhood, which Montessori called “sensitive periods.” Montessori teaching usually occurs through a series of hands-on activities with sets of materials designed to teach a specific skill or concept. These materials— often made of natural substances for the reasons outlined above— are composed of different colors, textures, and sizes to stimulate the senses in different ways. When appropriate, some activities may even include sound-making objects, or exercises in smell or taste. Once they have completed one of these activities, students also learn responsibility and respect for their environment by putting the materials back on the shelf where they found them (L'Ecuyer et al., 2020).

It would have been easy to simply create a video or verbal lesson for the campers, but I wanted to make every activity interactive and hands-on, both to engage the children and keep them moving and burning energy. Each activity in my curriculum had a visual and verbal component in the form of a short video (see Appendix B), and some sort of physical material that the campers could touch, move, or manipulate however they wanted (see Appendix A for all activities and Appendix C for the digital file for the food web activity).

Child-directed Learning in the Prepared Environment

Montessori believed that by simply instructing children on what to do and which things to remember, traditional teachers were stifling a child's ability to learn independence, which would cause them to become reliant on others to complete basic tasks throughout life. On the other hand, allowing the child to use teacher-prepared materials to learn and ask questions on their own leads to better social, emotional, intellectual, spiritual, and physical outcomes. They also build self-confidence because they see that they can accomplish things on their own, and leadership skills by sharing, discussing, and collaborating with classmates (Livstrom et al., 2019).

I tried to make my curriculum as child-directed as possible, with only some guidance from me and their counselors. This was challenging, especially since I could not be there in person, and the counselors needed to maintain a schedule and framework for the campers' day. Still, I was able to create activities that mostly let the kids follow their curiosities and start conversations with each other, their counselors, and me over Zoom. The adaptations activity (see Appendix A for full curriculum) allowed the campers to decide what sort of habitat they wanted their bug to live in, and what sorts of unique adaptations they might have to help them live there. While the paper wasp activity was a little more structured, HFS' education director told me that the conversation they all had at the end brought up some interesting questions, and inspired the kids to actually rework the game to play again the next day in a different way to simulate the threat of predators to baby wasps. The food web activity was a perfect example of the types of activities I used to do as a Montessori student; the animal cards were there to arrange and connect as the campers saw fit, with counselors available to answer questions and guide the

activity, and the last part of the activity where organisms are removed from the food web was a great way to inspire the kids to think about what would happen when certain combinations of animals disappeared.

Conclusion

The Montessori method is a proven system of educational techniques that help to develop the whole child, not just their ability to memorize and recall information. Focused on sensory learning, inquiry, nature, and independence, the method allows children to follow their own curiosities, ask and answer their own questions, and develop leadership skills, which are all important qualities for the next generation of conservationists and ecologists to have. For these reasons, the Montessori method is a great option for inspiring fascination and empathy in children, which can ultimately lead to a lifetime love and appreciation of nature.

In the case of this specific curriculum, preliminary feedback from HFS points toward a good proof of concept for the activities I designed, and a hopeful future for Bug Week in years to come. I intend to keep working on the activities, incorporating feedback from HFS, and adding more activities, videos, and lessons to cover even more bug topics. My hope is that I will be invited back next year to attend in person (COVID permitting). I also hope to keep creating these types of curriculums to use with other organizations and add to my resume as I embark on my sci-comm career.

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Appendix A

HFS Summer Camp “Bug Week” Curriculum

“Bug Week” Curriculum

Appendix B

Educational Videos

Bug Adaptations

Paper Wasps

Food Webs

Appendix C

Food Web Activity Cards

Food Web Activity Cards