Idea Sheet

Education at the Speed of Research: Strengthening Outdoor Learning through Research Connections

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Abstract

Just as changes in the composition of soil, air quality, geologic processes, and the lives of trees are slow to unfold, so too can the realities of most great research questions. A connection to the natural world offers an experience that is inquiry driven, observational and methodically followed. These are excellent precursors to thinking like a scientist- or like a mountain. One of the ways this connection is strengthened is through explicit, or transparent, connections to research opportunities in outdoor learning environments and in environmental education. Doing so increases the currency of information as well as techniques in teaching outdoor education, benefiting the youth, volunteers, teachers, and seasonal staff that contribute to the programming. Increasingly, learning experiences like those in outdoor education must show relevance to the current trends and discourse in STEM education as well as remain nimble in the changing landscape of education standards. The increased availability and use of learning technologies further enables this possibility.
Situation

In developing educational experiences that employ applied research, students should connect as authentically as possible to research opportunities in the areas they live, study, or visit. As graduate education has long held and undergraduate education has certainly made large strides in recently through research experiences for college students, approaches are integrating research more seamlessly into education that directly supports success in science, technology, engineering and mathematics (STEM) fields. Citizen science efforts have brought communities and k-12 classrooms into this movement as well, leading to excellent opportunities for environmental science and outdoor education. Framing research as experiential education, the benefits in environmental education as well as in outdoor education are tremendous and growing. Acknowledging the pervasiveness of technology and the contextualized relevance of place conscious approaches to education, these trends in education can enliven as well as make accessible to new audiences the potential of field-based science education (Hougham 2013).

Outdoor learning centers, environmental education programs and field-based courses have a long tradition of connecting students to special places outdoors. Long term ecological studies, climate science, biodiversity inventories, habitat restoration, observational field studies and the like stand to enliven the existing opportunities at sites that have historically inspired outdoor leadership, conservation and genuine exploration of the natural world. Key to unlocking this potential are relationships with researchers that contribute to the collection of authentic data and the interpretation of results into accessible talks, lessons, or labs onsite.
Objectives

The opportunities to strengthen positive youth development and impacts are numerous, and most strongly aligned to three critical elements of 4-H: a positive relationship with a caring adult, the opportunity for mastery, and the opportunity to see oneself as an active participant in the future (Ivey 2005).

- Working with a research project inherently will involve support from a researcher or team of researchers, a clear opportunity for a positive relationship with a caring adult. Additionally, this stands to broaden the appeal of volunteering to the academic community as well as develop real connections to professionals in a variety of career fields.

- Following through on scientific inquiry and learning how to authentically collect data that supports a project presents a clear connection for youth to have an opportunity for mastery. Following a research plan, examining data and analyzing results are all opportunities for youth to master skills and content areas in ways that support their development as well as their progress academically.

- Inquiries that are included in a research plan or funded proposal by definition contribute to greater understanding of a topic and, very often, the decisions and discoveries that shape our future. Thus, youth involvement in authentic research presents an opportunity to see oneself as an active participant in the future. Supporting collaborative and innovative research opportunities offers an accessibility to emerging knowledge and technologies that serve youth in many ways. Ways to apply this include a variety of options made accessible through the pervasiveness of mobile technologies that open new ways of collaboration, including:
o the collection of data in the field

o ‘expert chat’ online between students and mentors

o social media engagement as a form of digital story-telling

o developing scientific inquiries that can be connected to in an environment accessible to youth (Miller 2012).

Technologies for data sharing, video conferencing and an array of media production are increasingly available through cheaper, more portable and more connected devices. In part, it is advances such as this that make real connections to research more accessible.

While research processes are methodical and some may even be considered to be slow or gradual, even slower then is the emergence of research effort into curriculum. In many cases this can be understood by considering a number of factors including:

- disciplinary separation (between a research area and the domains of an educator)
- the intent of the project being explicitly focused on the research
- the research itself occurs in locations or labs not accessible to school-aged students
- the resources or expertise within the research group likely do not include the same things needed to facilitate an engaging class or lab with a middle school science class.

As this pertains to the example of outdoor education, excellent examples are found in the natural world that set up a similar relationship to the intentional, methodical and inquiry-based traditions and practices of research and the observations as well as lessons that can be found in the out of doors. Standard lessons in outdoor education known as the ‘water cycle,’ the ‘rock cycle,’ and even now the ‘carbon cycle’ begin with observation of natural processes that can be very slow. Outdoor classrooms do not get to see the formation of rocks, the formation of soil, the growth of
trees or even decomposition. Rather, students learn about where their observations of these phenomena are situated in a larger context that extends in many cases far beyond what you can see in a week outside or even in a lifetime. Whether it be the content itself or exposure to the processes of research, there are meaningful gains to be made in bridging the gaps between the lab, the classroom and the field.

**Methods**

An example of this type of effort might evolve in many ways, but certainly would include core features. Ideally, the research proposal or grant proposal writing process would identify an outreach partner such as a outdoor learning center and develop an education and outreach strategy to follow should the project be approved. The center staff and leadership would provide a letter of commitment for the application, as well as clear statements for the proposal of organizational capacity, in-kind support, demographics of youth and adult that would be served, and a research-based summary of literature that informs that pedagogical approach integrating authentic scientific inquiry into outdoor educational settings. A partnership could be made later in the process or post-award and would include many of the same considerations. The outdoor learning center in this type of arrangement will develop and implement an evaluation plan of project efforts pertaining to the content and activities outlined in the proposal. Assessment of project outcomes is key for programmatic reporting for the center, and also essential for reporting schedules in funded projects. Additionally, the technological capacities must be aligned between the site, the project and the researcher. This may include the inter-operability of applications or programs, the expectations of connectivity for data reporting or transmission, and
identifying strategic technological enhancements (devices, connectivity, or platform development) that can be explored in the project.

Opportunities to apply the educational strategies proposed in this paper are found in many examples at Upham Woods 4-H Outdoor Learning Center. The following examples have datasets that already exist and can form the foundation of research as well as curriculum for users of the site today. Inquiries and issues include:

- the development second generation successional forest patterns
- the affect of exclosures on understory biodiversity and density
- species composition as it changes canopy cover over time in a mixed hardwood forest
- water quality monitoring
- phenology and seasonal variance

None of these examples are currently seen in the formal curriculum, despite the availability of the data and site that make this research possible. While some of these examples are being explored, there is also great potential in pedagogical research about implementing learning technologies in outdoor settings for environmental educators. Examples such as these are entry points into improving curriculum, developing relationships with researchers, adapting land management, and supporting student-led inquiries.

**Implications**

Opportunities in this type of arrangement for the researcher are significant. Access to natural environment can be a significant part of a project, as well as using these venues for their
graduate students to learn and refine methodologies in communicating science. The importance of scientists and researchers gaining skills in mastering the message of their work is increasingly a part of graduate training and academic professional development, as seen in examples such as the National Science Foundation’s “Becoming the Messenger” series of workshops (National Science Foundation 2010). Additionally, this arrangement can support the greater impacts and dissemination efforts needed to balance a competitive research proposal. In partnering with able outdoor learning centers, a researcher stands to gain access to research space, graduate training grounds, and embedded outreach or service audiences.

Arrangements such as those advocated here benefit the centers and facilities that can align this work to their programming. This approach gives new energy and a fresh look to existing lessons and activities. Additionally, having researchers and research projects onsite genuinely adds value to the staff experience in the program. Considering this a part of staff or career development underlines the ‘value added’ nature of integrating current and emerging knowledge into modern programming, as well as broadening skill sets of staff that will support them in their next professional steps. Additionally, this stands to benefit volunteers in many of the same ways.

Fundamentally, integrated approaches to literacy in the sciences must be developed to effectively cross disciplines, include all stakeholders and situate environmental sciences into the consciousness of learners of all ages. Meaningful approaches to this challenge address education at all levels—students, teachers, and public. These efforts can be found in place-based environmental learning opportunities that communicate the exciting research in the natural world.
to students, while enriching the greater understanding of our changing world. Addressing many entry points into the education system, as outdoor learning centers traditionally have, while supporting a collection of materials suitable for education supports learners and provides the infrastructure for education at the speed of research. Students and educators need not wait for research results to trickle down through publication and eventually into textbooks, they can instead engage as meaningful partners along the path that research takes.

Exciting discoveries and research are occurring everyday at the university and by researchers all over the state and the world. Having teaching and education move a relative pace to research is vital to 21st century skills that prepare students to be responsible citizens and to become members of a global or local community and workforce. STEM education is important to students everywhere to participate in the economies of tomorrow. It is increasingly imperative that they have skills and literacies in science, technology engineering and math to make good decisions, to make new discoveries and to enrich quality of life for themselves and for those around them. Structuring outdoor learning to advance this effort is a step in the right direction for researchers, youth, volunteers and program managers.
References


