ENVIRONMENTAL LITERACY: SETTING THE STAGE

ENVIRONMENTAL LITERACY BRIEF VOLUME 1

As environmental and sustainability-related issues become increasingly complex, the need for environmentally literate people who can grapple with and take action on those issues enhances in importance. Environmental education (EE), which works to build environmental literacy throughout the life course, can help address this need. Yet, organizations, agencies, schools, and other entities that design and implement EE programs and initiatives, as well as the researchers who study those experiences, often vary in how they define, conceptualize, and measure environmental literacy. This variation creates challenges when developing a unified understanding of how, and under what conditions, EE experiences enhance and support environmental literacy.

The ambiguity around the term *environmental literacy,* perhaps, should not be surprising, considering its roots. First appearing in a 1968 *Massachusetts Audubon* article, author Charles Roth asked, "How shall we know the environmentally literate citizen?" Since then, numerous scholars and organizations have worked to clarify environmental literacy's definition and components (For an overview of various environment literacy frameworks, see Roth 1992; Disinger and Roth 1992; Athman and Monroe 2001; McBeth and Volk 2009; Hollweg et al. 2011; NEEF 2015; and McBride et al. 2013).

The North American Association for Environmental Education (NAAEE) led a collaborative process with researchers and practitioners to develop a consensus definition, which is one of the most widely used. NAAEE proposed that this synthetic definition also be a framework for assessing environmental literacy (Hollweg et al. 2011).

proclivity toward the environment and natural world, and (4) pro-environmental behavior in personal and civic realms.

Even given NAAEE's often-cited definition of environmental literacy, it remains a complicated term to study for several reasons. Researchers infrequently study environmental literacy holistically, particularly through empirical approaches. This is partly because environmental literacy has no endpoint and, therefore, determining at what stage someone is "environmentally literate," or even where they are on a pathway, is complex. Given that each person's pathway or trajectory may look different, it is challenging to demarcate specific stages that will be consistent among research participants.

For those researchers who do study environmental literacy empirically, and work to do so holistically, a limited number of measures exist. As a result, these studies examine environmental literacy dimensions with a single tool. One of the most frequently used assessment tools is the Middle School Environmental Literacy Survey (MSELS) (McBeth and Volk 2009), which includes "ecological knowledge; verbal commitment; actual commitment, or environmental behavior; environmental sensitivity; general environmental feelings; issue identification and issue analysis skills; and action planning" (McBeth and Volk 2009, p. 58). Although this instrument is one of the few comprehensive and consistently used measures, it only focuses on one student cohort, namely middle school students. This is understandable given the time and effort needed to design a reliable, valid instrument that includes many different concepts. In addition, given the range of concepts covered, the survey requires a substantial amount of time to complete (approximately an hour), which risks student fatigue.

While researchers design few studies or instruments to examine environmental literacy holistically, numerous studies and instruments focus on the various dimensions of environmental literacy as individual concepts. Researchers study the concepts in multiple fields in different ways and may consider them as either components or as

Environmental literacy is knowledge of environmental concepts and issues; the attitudinal dispositions, motivation, cognitive abilities, and skills, and the confidence and appropriate behaviors to apply such knowledge in order to make effective decisions in a range of environmental contexts. Individuals demonstrating degrees of environmental literacy are willing to act on goals that improve the well-being of other individuals, societies, and the global environment, and are able to participate in civic life (Hollweg et al. 2011, 15–16).

The NAAEE framework (Hollweg et al. 2011) expands on the first part of this definition to describe aspects of environmental literacy: (1) conceptual understanding about environmental issues, (2) problem-solving and critical thinking skills, (3) a

outcomes of environmental literacy. In addition, the majority of studies attending to the dimensions are not actually studying environmental literacy per se; for example, researchers across an array of fields, including education, psychology, sociology, ecology, law, and business, among others, study environmental behavior. A researcher may focus on examining a change in knowledge, attitudes, or civic participation, without connecting those notions to the concept of environmental literacy more broadly.

In addition, researchers examine diverse environmental literacy dimensions through various ontological, epistemological, and theoretical lenses.[1] Researchers vary with regard to how they consider the constitution of knowledge, the sources of knowledge, and the evidence for knowledge. This complexity makes comparing or synthesizing dimensions challenging. Relatedly, much of the work examining environmental literacy is evaluative, rather than theoretically based, and, therefore, is not rooted in learning, behavior, attitude, or civic-engagement theory.

Discussion continues about what dimensions should be included when studying and educating for environmental literacy. Debates about whether to consider behavior and action related to the environment, for example, persist within the research and practice communities (McBride et al. 2013). Some researchers consider environmental literacy to focus on attitudes, knowledge, and problem-solving skills (Clark 2016), envisioning environmental literacy as a precursor to action but stopping short of the action itself. NAAEE's definition, by contrast, embraces action and participation, stating that, "environmental literacy includes both personal decisions and those decisions and actions that have broader consequences in time and space for the environment and societies" (Hollweg et al. 2011, 17). This perspective describes action as more prominent at higher levels of environmental literacy, suggesting that environmental literacy operates along a continuum or hierarchy (Hollweg et al. 2011; Roth 1992). Our briefs build on a foundation of NAAEE's definition; therefore, we do consider behavioral dimensions.

Policymakers, practitioners, and researchers also often use the terms *ecological literacy* and *ecoliteracy* interchangeably with environmental literacy, although the genesis of the terms indicates that the purposes of each may be quite different (Orr 1992; McBride et al. 2013). In addition, other educators and researchers argue for taking a more critical stance on environmental literacy processes and outcomes as well as questioning common discourses in environmentalism (Stables and Scott 1999). Furthermore, some researchers reject the environmental literacy term altogether, suggesting that it is nebulous and aconceptual (Payne 2006).

Despite these complexities, environmental literacy continues to be widely used by practitioners, policymakers, funders, and other stakeholders. Numerous programs articulate environmental literacy as a primary outcome, funding agencies describe it as an area of emphasis, and researchers endeavor to operationalize the concept holistically, as well as in elements. As such, this series of briefs attempt to highlight some areas of discussion related to environmental literacy grounded in the research literature, with the intention of sparking dialogue among researchers and practitioners as well as providing common background.

[1] In short, an ontology refers to the nature of reality (e.g., one reality or multiple, socially constructed realities), epistemology refers to the nature of knowledge (e.g., objectivity and subjectivity), and theoretical refers to explanatory ideas based on generalized principles (Mertens 2015).

This Series: Pathways, Progressions, and Dosage

To ground this series of research/practice briefs, we draw on NAAEE's characterization of environmental literacy. We provide an exploratory literature review related to three EE programming considerations relevant to practice: pathways, progressions, and dosage.[2] Specifically, we discuss: (1) potential avenues for considering *pathways* in environmental literacy, informed primarily by science education; (2) learning, developmental, and environmental literacy *progressions*; and (3) *dosage*, as applied in and relevant to the notion of environmental education, informed by perspectives from other sectors and fields.

The pathways framework presents a macro view of the dimensions that comprise a person's unique, lifelong learning trajectory. Pathways are enduring and move in meaningful directions that are shaped by one's social interactions as well as participation in social activities. Environmental education programming and experiences (among other aspects) can be a component of such a pathway. EE programs can influence what and how people learn about the environment, and they do so within the larger frame of each person's social and cultural context.

Within pathways, progressions (at the meso-level) represent movement from one component to another through different stages or levels. What one learns or experiences in a certain stage lays the foundation for the next stage. There may be different types of progressions: for instance, a *learning progression* indicates movement from simple toward more complex understandings of a topic, such as biodiversity. A *developmental progression*, however, may refer to movement through specific life stages in connection with environmental learning.

Finally, *dosage* occurs at the micro-level of the pathway, as it refers to a specific characteristic of EE programming such as the amount of time spent in a particular program or the intensity level of a program.

Although we present this macro–meso–micro framework, we note that there are multiple ways to frame these concepts and that they do not nest together neatly. These terms, especially *pathways* and *progressions*, are generic in research; there is no single agreed-upon definition, especially in education. In addition, researchers study these concepts in different ways depending on their epistemological and theoretical perspectives. This is evident in the briefs, namely the one on pathways, which predominantly uses sociocultural frameworks, while the literature about progressions mainly employs constructivist or stage-developmental psychology frameworks. Finally, the literature on dosage rarely presents an explicit theory. While certain aspects of dosage, namely repetition, have been theorized in general, dosage is more of a programmatic or measurement concept.

[2]We explore these terms and concepts as practice-oriented stakeholders, such as program planners, funders, and policymakers, frequently use them.

Further, although the Pathways brief presents a critical perspective—suggesting that concerns related to equity, power structures, and cultural values are foundational to environmental literacy—the other briefs pursue different lines of discussion. The foci of the other briefs, namely Progression and Dosage, derive from epistemologies and ontologies that emphasize positivism and constructivism. To engage further with critical perspectives in environmental education, including topics about pedagogy, place-based education, Indigenous environmental science education, the role of caring, and environmental citizenship and neoliberalism, we urge readers to explore resources such as Lousley (1999), Gruenewald (2003), Lowan (2012), Bang and Marin (2015), and Schindel and Tolbert (2017), and Dimick (2015).

Finally, current perspectives of environmental literacy focus primarily on the individual, emphasizing development of competencies that enable fuller, richer participation in civic life, with environmental wellbeing as a goal. Other disciplines, such as science and health, have begun to consider literacy not just as belonging to individuals but also to a collective, such as a community (National Academies of Sciences, Engineering, and Medicine 2016). While these briefs focus on the individual lens of environmental literacy, we believe that a collective lens needs to be theorized, researched, and connected to practice (Wheaton et al. in prep.).

ENVIRONMENTAL LITERACY: LITERATURE REVIEW PROCESS

We gathered, analyzed, and synthesized current (to 2018) theoretical and empirical literature to inform development of these briefs. We performed Boolean searches using four primary thematic terms (pathways, progressions, dosage, and duration) and 20 education-specific terms in Google Scholar, EBSCO, and Web of Science. Examples of our Boolean searches included phrasing such as *pathways* AND *environmental literacy*, and *pathways* AND *conservation education*. Then, we conducted additional snowball searches using relevant articles from our previous searches. We included academic articles, books, and conference papers; white reports; and research briefs, with the majority of references being peer-reviewed journal articles.

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