

Common Discourse: Using Literacy to Advocate for Environmental Issues

Caryl Crowell, Tiffany Sulser, Kerry Teeple

We created Common Discourse as a forum to invite conversation among practitioners about issues of praxis that cut across the boundaries of learning contexts. In each issue, we pose a question to educators from early/elementary, secondary, postsecondary, and adult education in an effort to promote a broader context for understanding literacy teaching and learning across the lifespan. We see this as a venue to learn from the lived experiences of practitioners and asked contributors to consider the following question: *How can we use literacy to advocate for environmental issues?*

In the process of collaboratively constructing this piece, the authors drafted individual responses, read each other's, and then revisited their own. What follows is each individual's response to the question, including a retired elementary teacher and professional development consultant, a middle school science teacher, and a literacy teacher educator. Each contributor describes a project that engaged students in posing critical questions and conducting inquiries using multiple literacies to create a deeper awareness of sustainability and shared responsibility. Their collective projects exemplify how literacy embedded in the practice of science enabled their students to research the impact of carbon footprints, understand the rationale and science behind crop rotation, and recognize the influence of power and privilege to take action. In their responses, the contributors provide an overview of the texts, tools, and techniques used to springboard their projects and invite us to envision how we can support a more sustainable future.

Literacy in the Service of Science

Caryl Crowell, Partners for Equitable Science Instruction, Tucson, AZ



"What's a carbon footprint?" This was a question that arose repeatedly during our science inquiries throughout the year in my second-grade and third-grade multiage class. Our district provided science curriculum in the

form of three modules per year purchased from FOSS (Full Option Science System) (Lawrence Hall of Science, 1998–2016) and Biological Science Curriculum Studies (2006). We studied earth materials, water, and ecosystems, three topics that intersected perfectly when approached through the lens of sustainability.

During our studies, the students kept running into terms like "global warming," "greenhouse gases," "carbon footprint," and "sustainability" in course materials and non-fiction books, such as *Once I was a Cardboard Box ...but now I'm a book about polar bears!* (Poitier, 2009) and *Get Down to Earth: What You Can Do to Stop Global Warming* (David & Gordon, 2008). Water issues and a warming planet resonated with us because of our desert location. After learning how each of us contributes to the amount of carbon dioxide warming our earth and our carbon footprint, the students wondered about the school's carbon footprint and how they could reduce it. Their earnestness, questions, and concerns drove the last big project of the year. Our driving question became "How can we create and implement a plan to reduce (School)'s carbon footprint?"

Borton Magnet Elementary School, a K–5 magnet school, focuses on project-based learning (PBL) and systems thinking. PBL is a way of organizing learning across content areas around students' authentic questions. Student projects result in long-term, in-depth

CARYL CROWELL is retired from Borton Magnet Elementary School, Tucson, Arizona, USA, and is at the Partnership for Equitable Science Instruction, Tucson, Arizona, USA; email uom1971@gmail.com.

TIFFANY SULSER is a middle school science teacher at Marion Junior High School, Marion, Illinois, USA, and a Noyce Master Teaching Fellow at Southern Illinois University Carbondale, Carbondale, Illinois, USA. Her classroom inquiry was funded by a grant from the National Science Foundation and the Robert Noyce Teacher Scholarship Program: DUE-0175 8497 River Region Master Teaching Fellows; email tsulser@marionunit2.org.

KERRY TEEPLE an assistant professor at the University of Findlay, Findlay, Ohio, USA; email teeple@findlay.edu.

learning that involves inquiry, research, investigation, planning a product, and presenting their learning. Literacy is meaningfully embedded in PBL alongside science concepts in the service of science and not the other way around. Literacy skills and math skills are learned and practiced throughout each project.

Similarly, systems thinking is a way of looking at the world and understanding that we are part of multiple, interconnected systems. It promotes habits such as seeing the big picture, understanding the circular nature of cause–effect relationships, and noticing that systems change in ways that generate patterns and trends. Students use tools such as Behavior Over Time Graphs to show how a particular system changes over time and Causal Loops to show the circular nature of cause–effect relationships. The students put their literacy knowledge and experience to work as scientists, using questionnaires to audit how paper was used and wasted, how much electricity the school consumed, and what was thrown out in the cafeteria. Interviews with office staff, resource teachers, and custodial staff augmented these audits. The data were sorted, collated, and analyzed with lots of graphing, description, discussion, and, at times, disagreement. During this phase, students used Behavior Over Time Graphs and other systems thinking tools to examine what kinds of structures, rules, and mental models might be driving the systems they observed.

The children then planned how to reduce the school's carbon footprint. They broke into small groups to address their plans. Plans included making a video of how to use paper responsibly, writing a song to encourage carpooling, and researching trees to shade a new building on campus and writing letters to Tucson Clean and Beautiful and Trees for Tucson asking for trees and help with planting. One group wrote a letter to the district's cafeteria supervisor to share their data and request that metal utensils be used instead of plastic. Another wrote a book for each classroom entitled "Turn Out the Light, Piggy" and developed a system to remind others to turn out lights, while other children created a school recycling program and wrote letters to community businesses requesting help to obtain recycling bins for each room. Lastly, one group gathered paper used only on one side and redistributed it to use for scrap paper. The students wrote a short speech to introduce the new system to the school community.

Our authentic literacy, math, and science work, however, was not done, as every project ends with a celebration of learning and is shared with the wider school community. The children wrote invitations to classrooms, families, and community members, created displays, and made placards showing what items in the cafeteria could be recycled and which could not.

There was quite a bit of moral disquietude over whether or not it was okay to feed leftover chicken nuggets to the school's chickens (the chickens got the chicken). The night of our celebration, the multipurpose room was packed with students, families, district administrators, school board members, and community members who contributed their support. The students confidently and competently delivered their messages about conservation and our place in our planet's ecosystems. More importantly, similar to Kerry's students, the project deepened students' understanding of their personal role in creating a sustainable future.

Lots of literacy learning and practice occurred during this project. The children learned about and made use of the features of nonfiction text to deepen their understanding of what they were reading and to locate specific information. They researched using multiple texts and sources and organized informational text for presentations on posters and in PowerPoints. They created storyboards and wrote scripts for the videos they made. Throughout, the students made use of the comprehending strategies we had developed over the year—using schema, inferencing, questioning, determining importance, and synthesizing (Keene & Zimmerman, 1997). All of this literacy work occurred without a curriculum map or commercial reading program but rather in the service of science and in the search for solutions to problems that were relevant to students' lives. Like Tiffany's students, these young citizen scientists made use of disciplinary literacy to interact as experts with the larger community of the school.

As a retiree, I offer professional development in systems thinking, science education, and literacy. Teachers sometimes tell me that, with all the reading mandates and testing, they don't have time to teach science. This carbon footprint project and the other projects described by Tiffany and Kerry demonstrate that "literacy is best enacted as a set of learning tools that support knowledge acquisition rather than as a set of independent curriculum goals" (Pearson et al., 2010, p. 461).

Using Disciplinary Literacy to Educate Future Scientists

Tiffany Sulser, Marion Junior High School, Marion, IL, and Southern Illinois University Carbondale, Carbondale, IL



Teachers have a unique responsibility to help students become critical thinkers, investigators, informed consumers, and advocates for the environment. Literacy is a powerful

tool to help students grow into lifelong environmental stewards who make sustainable choices and informed decisions. One way of using literacy to advocate for environmental issues is to teach content in a way that is meaningful and authentic, which means not only presenting factual data but also finding ways for students to connect with the content.

Inquiry and problem solving are fundamental to knowing and understanding the world. Teachers introduce environmental content and teach students the tools they need to interact with content. We use the Amplify (Lawrence Hall of Science, 2019) program at Marion Junior High School. Each unit starts with a phenomenon that students observe and explain in their own words. It may be why spiders in a family all have different traits or why fossils of a plant species can be found on continents thousands of kilometers away separated by oceans. Students create models, use simulations, conduct hands-on labs, engage in discussions and explanations, evaluate claims and evidence, watch videos produced by scientists, and collaborate with peers to understand how the world around them works.

We teach students as citizens and future scientists to pose and pursue questions, conduct investigations, analyze data, write meaningful persuasive arguments, and find solutions to problems. As disciplinary literacy is reading, writing, reasoning, and interacting with others in ways that are characteristic of experts in knowledge-building communities (Shanahan & Shanahan, 2012), it is at the heart of NGSS-based science instruction, which emphasizes using scientific language, comprehending, and thinking and acting like scientists. For example, students read nonfiction articles related to each unit of study and respond to prompts using scientific terms introduced in the unit. I have found students enjoy the challenge of using new vocabulary, which means they need to understand what each term means and how it relates to the concepts they are learning. The students then share their responses with group members which provides opportunities to hear how others think and respond.

Another favorite literacy tool I use with students is text annotation. Often students quickly read through text without taking time to comprehend what they are reading. Like sleep walking through a text, we have all found ourselves at the end of a page thinking, "I have no idea what I just read." Annotating encourages students to pause throughout their reading and think through the text by making notes. This could be as simple as jotting down a question they developed or making a connection to another concept they learned. Students read to search for clues and explanations to the phenomenon they are investigating. By pausing to think and make

annotations, students engage in science literacy and sense-making.

A key aspect of using literacy to advocate for environmental issues is to teach students to be observant of the motivation behind the text they are reading. It is crucial that students read critically to identify bias and select credible sources. It is becoming more common to find environmental articles with political undertones. Literature is written for a purpose, and authors communicate their views on specific topics. Educational and environmental articles can be identified as destructive, beneficial, or ambivalent. Destructive stories do not protect essential ecosystems; however, beneficial stories do (Stibble, 2015). Simply put, the everyday stories students see on social media or online sources have the power to persuade and influence beliefs and environmental ethics.

The Covid-19 pandemic is a perfect example of why disciplinary literacies are necessary to teach students to accurately read graphs, analyze statistics, and comprehend vocabulary. We can battle misinformation by teaching students to talk, read, and think like scientists. Teachers can guide students to identify destructive stories across a range of texts (fiction/nonfiction and print/digital) using critical questioning (e.g., What story is being valued? Who benefits from this story? Who doesn't?), which might include students inquiring into destructive stories as readers and citizens (Damico et al., 2020). When students can identify the purpose of a text, it is easier to correct misinformation and misunderstandings and address biases that undermine environmental needs. Doing this type of investigative work with text through an ecolinguistic lens promotes climate justice literacy in classrooms (Damico et al., 2020), meaning students need to look closely at the language chosen to communicate the relationship between ecology and humans and focus on factual data rather than persuasive storytelling.

I along with a colleague recently received a grant from an NSF-funded program to which we both belong. We used the grant to fund materials and tools for a place-based inquiry on corn and soybeans. In our region of the country, we are surrounded by fields of corn and soybeans, yet students had no idea why. They observed nitrogen-producing bacteria to answer the question of "Why do we see corn in a field one year and soybeans the next?" They learned how soybean plants help replenish nitrogen used by corn during the previous crop cycle. They practiced cellular staining techniques where they were able to observe single cells in the plants, made bioplastics out of corn-based ingredients, and observed the difference in GMO and non-GMO soybean

seeds, which enabled them to develop a deeper connection with a plant they have seen since they were young.

All these processes involve multiple literacies that helped students build connections and feel invested through hands-on inquiries. Whatever is happening around a school and community can allow students to problem solve and be part of a solution. Emphasizing inquiry with students using local environmental issues shifts the story to learners' lives and communities. Literacy and content area teachers can begin this work by making climate justice central in their classrooms and exploring place-based relations between nature, communities, and beyond to develop and spark students' explorations and intentionally engage with the world in ways that shape their "ecological wisdom" and beliefs (Damico et al., 2020).

As Kerry points out, environmental issues and sustainability have been a topic in children's literature for years and for good reason. The current generation has some big environmental problems to solve, but as Caryl showed us in her carbon footprint project, students can decipher and solve big problems when they have tools in hand. Reading Caryl and Kerry's pieces emphasizes the importance of literacy in comprehending environmental issues and sustainability. I hope other teachers will be inspired to expand the walls of their classrooms out into their communities. As Kerry said, our students are left with a great duty of saving the planet, and it is our job to make sure they have the tools they need so they are not doing it alone.

Children's Literature as a Change Agent for the Environment

Kerry Teeple, University of Findlay, Findlay, OH



Recently, I began teaching a general education course focusing on the impact of humans on the environment. As a teacher educator, I frequently use children's literature in my courses knowing that research has shown picture books can be useful tools to boost content learning (Moss, 2005). Because of this, I decided to use children's literature as texts in this course. Picture books are brief and can act as a vehicle for creating common knowledge while adding some levity to an already heavy subject. Additionally, I chose to use children's literature because environmental science is not my area of expertise, so utilizing vetted, quality picture books about sustainability provided a trustworthy framework for discussion (Wells & Zeece, 2007).

Before reading, the students investigated the idea of personal power. We discussed spheres of influence,

money, voting, and voice. Then, each student participated in an activity to determine where their individual powers lie, such as how they decide on the candidates for whom they vote, how they choose to spend their money, and their reach on social media. After each book, we discussed the concept of how to harness personal power to make a difference and advocate for change. The books I selected were as follows: *The Lorax* (Seuss, 1971), *Buried Sunlight* (Bang & Chisolm, 2014), *World Without Fish* (Kurlansky & Stockton, 2011), and *The Last Wild* (Torday, 2013). I chose these books because each focuses on a different aspect of environmentalism, offering a springboard for research and conversation about related topics not explicitly mentioned in the books such as meat consumption and equity.

The Lorax (Seuss, 1971) is a book often associated with environmentalism. The students enjoyed this book greatly, as it brought back memories of when they were young, even though many stated that they did not realize the story was symbolic of the environment. Reading it as adults, they were able to recognize different themes related to sustainability, such as corporate greed, deforestation, renewable resources, and materialism. The students felt inspired by the famous call to action: "Unless someone like you cares a whole awful lot, nothing is going to get better. It's not!" (Seuss, 1971, p. 62). I was, however, surprised when a student expressed feeling angry because this phrase was another example of previous generations handing down problems for younger generations to solve. This was a turning point for me. I realized the students felt a great burden for saving the planet but also resented being left with the duty of doing it.

The second book, *Buried Sunlight* (Bang & Chisolm, 2014), is written from the perspective of the Sun and references the history of fossil fuels and our consumption of them. Because the Sun narrated the book, students felt the information seemed less biased. They stated that a human narrator would have made it more likely for readers to question the validity of the information, an ongoing struggle for their generation. I used this text as a gateway to discuss climate change and the need for utilizing renewable energy sources to combat this problem. To bolster this concept and their confidence in the science, I incorporated a field trip to a nearby wind farm where experts in the field shared their knowledge and introduced the idea of using alternative energy sources in their future homes.

In *World Without Fish* (Kurlansky & Stockton, 2011), a graphic novel on topics related to ocean destruction, each chapter opens with a fictional, dystopian,

mini-story about an ocean scientist and his daughter, which takes place over the daughter's lifetime. Much like the boy in *The Lorax*, the daughter experiences the consequences of others' indifference. The rest of each chapter is informational with explanations for the consequences of overfishing and lack of biodiversity. As the majority of students come from rural, midwestern communities, ocean destruction is an aspect of environmentalism they rarely consider. This new knowledge caused many of them to pledge to stop supporting companies with irresponsible fishing practices in favor of sustainably sourced fish.

The final text of the semester was *The Last Wild* (Torday, 2013), which is the first story in a trilogy about a young boy in a dystopian world who lost his ability to speak to humans but is able to speak to animals, which are nearly extinct due to a secret, man-made virus used to force people to eat "FormulaA," a new food source created by the Facto Corporation. As we read, I introduced real-world instances of corporations that have hidden evidence of environmental corruption of which most students were unaware. Our discussions introduced the idea of harnessing power by researching companies and their practices before purchasing their products.

To complete the course, students crafted original stories about environmentalism and sustainability. Through their artifacts, I was able to examine each student's personal awareness of environmental issues and gauge their understanding of ways they can make a difference. The stories revealed mitigation efforts the students hoped to implement such as recycling, composting, conscious purchasing, choosing sustainable food sources, and conserving energy.

As a reflective practitioner, I continuously work to improve the course and my teaching. Knowing that science is ever-changing, it is important to offer current, relevant texts. It is also important to place more emphasis on privilege within the context of sustainability. As students come to realize their power, they also begin to acknowledge the lack of equity that climate change and non-sustainable practices are creating around the world. Most importantly, I will continue to model environmental advocacy through activities that encourage students to contact policymakers, participate in citizen science, and urge local decision makers to increase sustainability efforts. My hope is that I can help students believe that changing the world is possible. If the work of Caryl, Tiffany, and my own is any indication of practitioners around the world, the next generation will be honing their critical thinking and problem-solving skills

and innovating new sustainable solutions that past generations have created.

Concluding Thoughts

Caryl, Tiffany, and Kerry's stories reflect the power of literacy to advance sustainability and advocate for environmental justice. As seen in Caryl's project, young children solved complex problems with a level of sophistication beyond their years. Using systems thinking tools, the children took action which resulted in school-wide systemic change. In the context of a sixth-grade science classroom, Tiffany drew on disciplinary literacies embedded in the NGSS to engage students in authentic scientific inquiry using the language and tools of the discipline. As scientific inquiry is scenario driven and place based, Tiffany and her students investigated a local phenomenon to build scientific knowledge of concepts central to sustainable farming in the region. Lastly, Kerry drew on children's literature in a general education college course to promote discussion and reflection on environmental issues. Through readings, discussion, and activities, college students questioned their positionality and roles in creating a more socially and environmentally just future.

The authors demonstrate how literacy tools—reading, writing, graphing, speaking, and creating—enabled students to conduct scientific inquiries, answer important questions, and use their knowledge to enact environmental justice. In reflecting on their stories, we ask readers to consider how literacy can be used to advocate for environmental issues and continue the conversation. One idea might be to share this article with colleagues to generate interest in a cross-disciplinary collaboration. Another might involve reaching out to the community to identify organizations involved in environmental concerns and explore connections and potential partnerships. These ideas and those of the authors offer a framework for shifting perspectives and practices beyond the classroom to effect purposeful, meaningful, and impactful learning in the development of citizen scientists.

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Conflict of Interest

We have no known conflict of interest to report.

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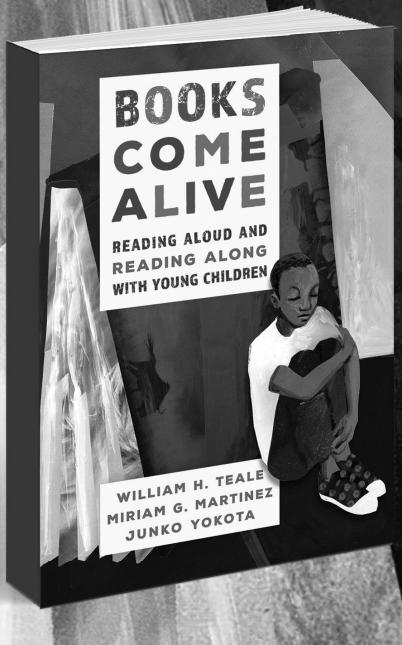
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HEIDI R. BACON is an associate professor at Southern Illinois University Carbondale, Carbondale, Illinois, USA: email hrbacon@siu.edu.

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