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We Are All Learning about Climate Change: Teaching with Picture Books to Engage Teachers and Students

Ysaaca D. Axelrod, Denise Ives, and Rachel Weaver

People around the world are increasingly concerned about climate change and its effects on the world and on our lives. These concerns are not only being voiced by adults. Young people are also leading efforts to make significant shifts to change the course of our impact on the environment. Youth activists such as Greta Thunberg, environmental activist from Sweden; Isra Hirsi, co-founder the U.S. Youth Climate Strike; Autumn Peltier, water protector and advocate for clean drinking water in First Nations communities; Helena Gualinga, Indigenous environmental and human rights activist from Ecuador; and Mari Copeny, youth activist from Flint, Michigan, are among the many youth climate activists who work in their local contexts and on a global level to enact change.

Scholars in environmental education have focused on climate change for decades. However, young children were seldom included in their research. Most followed the advice of David Sobel (1996), who saw climate change as one of the “big, complex problems beyond the geographical and conceptual scope of young children” (p. 27). Sobel advocated for teaching young children a love of and care for nature and only gradually moving towards more complex environmental topics as children get older (Chawla, 2020). However, given the pervasiveness of climate change in the media, the increasing interest among communities to adapt and adjust to reduce their impact on the environment, and the efforts of high-profile activists such as Greta Thunberg, many children have become active participants in conversations and actions around climate change (Davis, 2010). For instance, some children have seen images or heard talk of wildfires raging in California and Australia and hurricanes devastating Puerto Rico and the Caribbean. Other children have experienced such events themselves, along with their families. Clearly, schools and teachers need to be prepared to work to support children’s understanding and questions around climate change and climate justice (Chawla, 2020).

Fear and worry over “age-appropriateness” of content are similar to the concerns adults express about having conversations with children around other challenging topics, such as race, gender diversity, immigration, and death (Doucet & Adair, 2013; Koplou, Dean, & Blachly, 2018; Mankiw & Strasser, 2013; Sexton-Read, 2004). Children are often seen as “too young” to understand these tough topics, teachers feel unprepared or uncertain about how to tackle the issues, and teachers are concerned about parents’ reactions to discussing these sensitive issues in the classroom. As a result, many topics that are considered controversial or sensitive are not addressed in elementary school classrooms.

We, like many others (e.g., Adair, 2014; Bloch, Canella, & Swadner, 2014) push against notions that children are too young to engage with complex topics, and instead view young children as capable and agentive. Climate change affects all of our lives and children should be invited to engage in conversations around a topic that impacts and will continue to impact their lives.

Beyond concerns about age appropriateness, the topic of climate change and climate justice is politically charged, and doesn’t sit neatly within a single subject or content area. Pizmony-Levy and Pallas (2019) argue

that teaching about climate change is a scientific matter as well as a social and ethical one, one that would benefit from a multi-pronged approach that adjusts and shifts curriculum to address the topic and builds collaboration with people engaged in sustainability work.

We, Ysaaca and Denise, teach pre-service teacher courses in literacy, social studies, and child development. We approach the topic of climate change and climate justice in an interdisciplinary way, attending to the ways that children understand and see the world, the contexts in which they live. Drawing on resources from scholars in environmental education and social justice education, and from organizations that focus on teaching about climate change and climate justice, we started to think about how to support future teachers to engage in curricula that teaches children about climate change. Our particular focus is on the use of children's literature to anchor these lessons and conversations.

Given our expertise in literacy and child development, we were familiar with the use of children's literature to address controversial and challenging conversations. We discuss with our pre-service teachers the myriad ways that children's literature can be "mirrors, windows, and doors" (Bishop, 1990), providing opportunities for children to see themselves and others and to engage deeply in discussions that are challenging and yet necessary for them to develop a sense of themselves in our complex world.

In this article, we, two teacher educators, are joined by Rachel, a pre-service teacher, to describe how we started the process of reimagining our work to include climate change and climate justice in our elementary teacher education program. We document the way that Rachel took up the topic of climate change and climate justice in her first-grade student teaching placement and designed a unit around a trade book that focuses on the words and work of Greta Thunberg.

The next section is written in two voices: of Denise, who teaches social studies and English language arts methods courses, and of Rachel, the pre-service elementary teacher.

Teaching the Climate Justice Learning Module (Denise)

I teach the social studies methods class in a one-year, graduate level teacher education program. This course focuses on student-centered, inquiry-based methods for teaching the content of history and social studies for grades 1 to 6. It emphasizes critical pedagogy, multicultural children's literature, anti-bias education, and social justice perspectives. It is one of the first two classes taken by our elementary licensure students and is taught in the summer with five weeks of online and one week of face-to-face instruction. For each week of the online portion of the class, students complete a thematically organized learning module.

Weekly modules include activities such as exploring web-based resources, reading and viewing a variety of texts, and participating in online discussions. I ask students to read *Black Ants and Buddhists: Thinking Critically and Teaching Differently in the Primary Grades* (Cowhey, 2006), a book written by a local teacher, and to explore websites such as the [National Council for the Social Studies](#), [Teaching Tolerance](#), [Social Justice Books](#), and the [Zinn Education Project](#).

Students are asked to read diverse texts ranging from standards documents, curriculum units, and teaching guides to practitioner-based journal articles and children's books. I introduce students to state history and social science frameworks as well as to the [Social Justice Standards](#) developed by Teaching Tolerance. During the last week of the class, when we meet in person, students work in grade-level teaching teams to develop a "seed" for an inquiry-based unit that integrates social justice standards and social studies content

with one or more disciplines. A required component of the seed is a diverse set of texts, including various genres, reading levels, formats, and modes.

As I prepared to teach the course in summer 2019, I discovered that the Zinn Education Project (ZEP) had launched a new campaign called **Teach Climate Justice**. ZEP argued convincingly that “the climate crisis threatens our students’ lives, and yet, throughout the United States, schools have failed to put the climate at the center of the curriculum” (para. 1). The purpose of the ZEP campaign is “to address this gulf between the climate emergency and schools’ inadequate response” (para. 2).

I wondered if this was the right resource for my students. After all, this was a course on social studies methods, not a science class, and my students were learning to be teachers of elementary-aged students. Still, I eagerly opened and read the launch article entitled, **“Our House is on Fire—Time to Teach Climate Justice” (2019)**, by well-known social studies educator Bill Bigelow. The article begins with a description of a young climate activist named Greta Thunberg, who was skipping school each Friday in order to protest inaction on the climate crisis and imploring students around the world to join her. In his article, Bigelow argues that climate change is a social justice issue and invites all educators to commit to teaching climate justice.

That summer climate change was in the news and on my mind. June 2019 was the hottest month ever recorded, glaciers were melting rapidly in the Arctic, a record-breaking heat wave gripped Europe, and the United Nations Intergovernmental Panel on Climate Change (IPCC) had just released an alarming report declaring a climate emergency. At the same time, millions of people all over the world, including my own two children, had joined 16-year-old activist Greta Thunberg in skipping school to protest inaction on climate change. Greta Thunberg’s efforts and influence were being recognized: she was nominated for a Nobel Peace Prize, named *Time’s* person of the year, and listed as one of Forbes 100 most powerful women.

I decided to take up Bigelow’s challenge and opted to replace a previous social studies module with a newly designed Teaching Climate Justice module. The new module focused on talking about books on climate change with children and specifically on teaching climate justice. Students explored the Rethinking Schools and Zinn Education Project websites, where they learned about the work of Howard Zinn and the idea of “a people’s pedagogy.” They also read articles demonstrating ways that teachers had taught or might teach about climate change and justice, including “The (Young) People’s Climate Conference: Teaching Global Warming to 3rd Graders” (Shafer, 2017), a Climate Mixer lesson plan (Bigelow & Swinehart, 2014), and an article titled, “8 Ways to Teach Climate Change in Almost Any Classroom” (Kamenetz, 2019). Students viewed three short videos: a TED talk by Greta Thunberg (2018), *The Story of Stuff* (Priggen & Fox, 2007), and *The Green New Deal, Explained* (Vox, 2019), and read the children’s books: *A River Ran Wild: An Environmental History* (Cherry, 2002), *The Great Kapok Tree: A Tale of the Amazon Rainforest* (Cherry, 2000), and *The Magic School Bus and the Climate Challenge* (Cole, 2010).

I was curious what my students would make of the Climate Justice module. I expected some students would be skeptical about the idea of teaching the topic to young children, viewing it as too scary or complex for elementary students. I imagined others might see climate change as too politically sensitive. As part of the module, students discussed the following: Where does climate change belong in the curriculum? In their responses, students overwhelmingly commented that they were surprised and disheartened to read in the “8 Ways” article that so few teachers were teaching climate change. They felt “with the current state of the world” the topic was very important, and for some, it was a personal passion. A few students admitted they were surprised by the big push for climate justice education, saying they thought it was frowned upon or

not allowed. Nonetheless, the consensus among my students was that climate change can and should be taught to young students, especially by integrating subject areas and centering on community engagement and activism.

The following semester I had the same students in my English Language Arts methods class. I asked them to develop a literature focus unit and was thrilled to learn that Rachel was already in the process of developing a unit for her practicum featuring a recently published book about Greta Thunberg, *Our House is on Fire: Greta Thunberg's Call to Save the Planet* (Winter, 2019). Rachel shared her unit plans and text set with me and together we talked through her unit activities. We discussed what background knowledge students might need, how to scaffold her young student's learning, and which texts would be used for which purposes. Conversations about the unit spilled across other course boundaries, too, as Ysaaca, in the child development class, prompted Rachel to tend to not just the scientific but also the emotional and developmental component of learning about a tough topic.

The Climate Change Unit (Rachel)

In the fall I was assigned to a first-grade classroom. Every month my mentor teacher used books, videos, and other materials to introduce the children to a different important figure, with the goal of celebrating diversity and ensuring that students were seeing a leader who represented them. Looking over the roster I noticed a lack of young heroes, and inspired by my coursework where we learned about climate justice and youth advocates, I decided to teach about Greta Thunberg and climate change. I purchased *Our House is on Fire* (Winter, 2019) and decided to use it as a focal text. While previewing the book, I realized there were many elements (strong language, audience, use of metaphor) that I had to address and scaffold before reading the book aloud. As in any classroom, there was a wide range of academic levels, social skills, and socio-emotional skills across my first-grade students. The first week of the unit consisted of creating scaffolds to prepare students to understand the text, and given the developmental range within the classroom, I needed to focus on how to meet the diverse needs of students across different domains.

There was concern among my fellow pre-service classmates and students in my mentor teacher's graduate course on children's literature that *Our House is on Fire* (Winter, 2019) was a picture book written for adults. While I understood the concerns, I valued the book for telling Greta Thunberg's story in a way that encompassed both positive and negative realities: though Greta Thunberg is an influential activist, she also faced an internal struggle with the reality of climate change (an emotional component that is sometimes omitted in children's environmental/climate change literature). The book also quotes Greta Thunberg directly and reveals a truth that is often not shared with children: our planet is in crisis. For these reasons, I chose this book as the focal text for the unit. Having made this choice, it became clear that as I discussed the complex and at times devastating truth, I would need to help the children to identify and process their emotional responses.

Drawing on elements of backwards design (Wiggins & McTighe, 2005), I identified my main goal: to help children learn how people can come together to make a change. I wanted to use Greta Thunberg as an example of how to help and inspire others; Greta Thunberg would also serve as a means to teach students about climate change and the reasons why activists are passionate about reform. I created a two-week unit centering on Greta Thunberg, climate change, and social justice education.

Each lesson included children's books that addressed various aspects of climate change to provide students with scientific knowledge and understanding of climate change, as well as the role of humans in tackling climate change. After each read-aloud, conversations about both the content and students' emotional responses were encouraged. Students were provided with continuous opportunities to share their feelings and thoughts surrounding climate change, and the educators in the classroom were able to monitor children's emotional responses and processing. The culminating project of this unit was for students to decide on a collective effort that would have a positive impact.

Students began the unit with a scientific exploration of the Arctic and the effects of our warming global temperature. This activity was prefaced with two read-alouds: *Michael Recycle* (Bethel, 2008) and *A Planet Called Home: Eco-Pig's Animal Protection* (French, 2009). Both of these books allowed students to gain and build background knowledge about caring for the environment and our changing climate. This theme of generating background knowledge that introduces and elaborates scientific content was essential in this lesson plan; students gained shared experiences that they were able to reference and use as building blocks to engage in deep, critical conversations.

I was surprised by the amount of background knowledge about climate change that students themselves brought into the classroom. Each child had at least one experience or bit of information they were excited to contribute to the conversation. These ranged from experiences at climate protests to recycling in the classroom. Many students also had a sophisticated understanding of the stress that climate change causes our planet, with a handful of students noting that human activity is causing harm on a global level. There were several moments throughout the unit where I felt as though the information I was providing was not new, but rather an opportunity to discuss this information in the classroom. My role then focused more on clarifying information and misinformation and emotionally assisting students as they discussed and processed their feelings.

Students were given opportunities to engage independently with the topic of climate change via morning choice stations and exploratory stations during reading workshop. In morning choice, students had access to the literary text set (see References for the selected books on climate change included in the classroom library). During reading workshop, students were directed to fill out exploratory sheets that prompted them to look closely at their books and share what they were learning. These small invitations to build upon/create background knowledge and engage in unstructured conversation with peers promoted critical thinking and engagement throughout the unit. Small stations such as these were able to assist me in developing a multi-pronged approach to teaching climate change, as students were given opportunities to engage with the topic across their school day.

Another component of the unit involved collaborating with a parent who works on green building alternatives and has a background working with soil and soil policies. She led the students through several experiments and discussions about the impact of changes in soil in our lives. I then read the book *Not For Me Please, I Choose to Act Green* (Godsey, 2018), which highlights cause and effect about our interactions with the environment. After this, I read aloud the focal text, *Our House is on Fire* (Winter, 2019), introducing students to Greta Thunberg and her movement.

Students responded in a variety of ways to the read-aloud. Some walked away with a deep understanding that our world is threatened and we need to step up and hold the people in charge responsible; some took

away the message that one young girl created a large movement to help the earth; others took away a story in which the earth was on fire and a girl helped by not going to school. These takeaways were reflective of children's understanding of the text, their experiences, and prior knowledge. They support the idea that children are able to engage with complex ideas and texts.

After reading *Our House is on Fire*, I showed students a presentation that depicted children from around the world protesting global inaction on climate change. We discussed and analyzed some of the posters that children were holding—foreshadowing work to be done later in the unit. The students were engrossed in the discussion of the posters. Specifically, the class seemed to have an admiration for the slogan “There is no planet B.” During snack one day students talked about what the phrase meant to them. Many students used the phrase to decorate their own posters, as they came to realize that having only one planet places a responsibility on humans to ensure that the planet is well, because it is a collective home for all.

The next read-aloud was *My Wounded Island* (Pasquet, 2009/2017), which led to a conversation about the impact of climate change on human life. A note from my reflections on teaching that day:

This book has been the most thought-provoking one thus far and it prompted an admirable amount of critical thinking. I was blown away by the class's ability to piece together what the “creature” harming the environment was. When we were still assessing what this creature was, one student analyzed the illustration and made a profound connection. They said, “I think the creature is a jellyfish because jellyfish are dangerous to a lot of animals and we are also really dangerous to a lot of animals so maybe it's a mix of us [humans] and the jellyfish.”

Students were making connections between the fictional story and the lessons about climate change and the role of humans. Another remarkable comment came up when we were discussing how Greta Thunberg had addressed this monster—she demanded that fossil fuels must stay in the ground. Focusing on the page in the book where the creature is seen in the emissions (of what are presumably factory buildings) we were talking about how fossil fuels are what we use for energy. In response to that statement, one student noted that “without energy we won't be able to have lights or drive cars to go help people”—a brilliant observation. I complimented their scientific thinking and emphasized that this is a problem that many scientists are trying to solve. I then brought over several non-fiction books that explore energy derived from other sources. It was a great way to cement that very important realization/connection.

The unit concluded with students creating their own posters depicting what they had learned about climate change, what humans can do, and the consequential environmental impact. Finally, students marched around the school to educate others about climate change and the actions that can be taken to combat it.

Throughout this unit there was ample support not just from faculty and peers in my program, but from families. Besides involving a parent in presenting information to the class, there were several other ways in which families were engaged and responded to the curriculum. At the beginning of the unit, families were sent an email that discussed the goals and purpose of the lessons being taught, along with a few resources suggesting how to continue conversations at home. Families were also engaged at the end of the unit via a questionnaire for both caregivers and students. Caregivers were able to express their feelings and thoughts about climate change, report what their first-grader took away from the unit, and share information on the conversations they were engaging in. When asked what their personal thoughts were on climate change,

those who responded reported that they felt climate change was an urgent issue that needed to be discussed in the classroom.

Reflections on the Climate Change Unit

Children's books and media were used as an entry to many of our conversations about climate change. Background knowledge was prompted with a book about recycling (Bethel, 2008); dislocation and interconnectedness were discussed using a book that showed animals losing their habitat and needing to relocate (French, 2009); Greta Thunberg and the idea of climate activism were introduced with illustrated biographies (Winter, 2019; Tucker, 2019); and the effect of climate change on human life was introduced via a story book about an islander who faces a monster that is consuming her home (Pasquet, 2009/2017). Fiction and narrative non-fiction texts provided context and starting points for conversations about the issues of social justice surrounding climate change. Non-fiction books and dual-purpose books, that contain a story and present information (Boggs et al., 2016), provided me with resources to access the scientific content behind the issues and to present students with concrete evidence of how climate change is impacting the world and who and what is being impacted.

Throughout the unit students were engaged and contributed to classroom conversations by continuously sharing and asking questions. They were using their background knowledge and experiences to build a schema about climate change, human impact, and activism. Students referenced previous classroom experiences, readings, and conversations, indicating the recursive nature of child development and the ways in which they were making sense of climate change in their own lives. After each read-aloud, a conversation followed where students were breaking apart larger ideas and emotions, analyzing with a critical lens, and diving deeper into understanding the phenomenon of climate change. Independently, students worked with literature of all levels. Many students gravitated to spending their exploratory time flipping through and discussing encyclopedias, while others chose to reread or explore new picture books.

One of the challenges of designing this unit around picture books was that in our town's resources (including a municipal library system, the school library, and a teacher's library) there were few books targeted at younger learners. Of the literature available, several had to be scaffolded over a few days prior to a read-aloud and/or needed to be critically consumed. For example, in one of the *Eco-Pig* books (French, 2009) there is a page depicting a polar bear standing in front of Earth. The planet has a thermostat with two ends, one labeled "cool," the other "hot." The polar bear, with a smile on its face, is turning the thermostat to "cool." This page presents a simplistic view of global climate change. The book as a whole is an excellent way to introduce several consequences of human activity, although all of them are animal focused. However, this one page requires a pause. I modeled critical thinking, and asked my class if they thought climate change came down to such a simple issue with such a simple solution. For the most part the students understood that the issue is more complex, but walking them through questioning the text and images is key to developing their skills as critical readers.

Many books on environmental issues that are written for younger students reiterate the ideas of reduce, reuse, and recycle. Some venture into cause and effect, but there's a lack of severity, alarm, and gravity. Books that are written for older children dive in deeper, often presenting wider scientific and political issues that relate to climate change. Non-fiction books that look at renewable energy are often difficult to use with early elementary students. Although illustrations provide an invitation for conversation ("What is that?" "How is this wind used?") there are many ideas that are not broken up into digestible concepts for young children.

There's also a lack of discussion of human consequences in the literature for young children. Most of the books presented problems that are affecting someone/something, but not the reader. This lack of grounding makes global warming appear to be an external threat, not something that all citizens of the world need to combat. I found it challenging to "ground my teaching," in the words of Bill Bigelow (2014). He talks about the importance of bringing the climate message home. Allowing students to see that they can have an impact on a local scale is a powerful way for them to *feel* our interconnectedness across the planet. Building this empathy is essential. While I found it easy to ignite children's empathy when the subject is a cute animal hundreds of miles away, it was harder for students to extend this empathy to everyone in the world, particularly those who are most affected. I found it challenging to bring the message home to the children's own lives and the ways that their community is feeling the impact of climate change.

Moving Forward

As we reflect on the process of incorporating climate change into our teacher preparation program, supporting and designing this unit, and implementing the unit itself, we realized how much we ourselves had to learn. As educators we take an inquiry stance and position ourselves as learners (Cochran-Smith, 2003). However, delving into climate change and how to teach children about the topic was a steep learning curve for us. We faced the limitations of our understanding of the scientific concepts and then the challenge of how to communicate these complex concepts to children. We also struggled with keeping up with the ever-changing shifts in impact of climate change and the magnitude of the impact. And finally, and most important, was the emotional component of this work: how to reconcile the impact of climate change on our lives, the lives of children and future generations, and how to support children's emotional responses, particularly as these might be different from our own. Children might not respond immediately to the information given, instead they might react to it at a later point, and we need to be able to address their questions and concerns when they are ready. Additionally, their fears or concerns might be different than what we expect, however, we need to honor and support their own understanding, as they engage with the topic and make sense of the complexity of climate change.

As we reflected on the unit, we acknowledge that lessons on difficult topics are never over, but require ongoing conversations. We thought about the way that children's literature, particularly a diverse set of texts like the ones used by Denise and Rachel in their lessons, allowed for multiple points of entry into the conversation. Allowing students to access information in different ways meant that each child was able to join at their own level, building from where they were at in the process of understanding climate change, acknowledging differences in understanding, experiences, and prior knowledge of the topic.

Although the unit was taught to first graders, Rachel brought in books geared towards a range of audiences that allowed children to engage in the conversation on multiple levels (Boggs et al., 2016). We wondered what it might look like to have this conversation with children across an entire school year, where students could engage more deeply and revisit the conversations over time. Thinking about our work as teacher educators, how might we prepare teachers to teach climate change and climate justice? What kinds of books would invite conversations about climate change and climate justice? And how do we support teachers to scaffold children's learning around this complex topic, one that we adults are still learning about and trying to understand ourselves?

We envision that we might prepare our students, future teachers, to engage in the topic of climate change across the entire school year, allowing elementary students to delve more deeply into the topic, discuss how it impacts their communities, and come up with ways to address the issues locally. Depending on the

context of the school and community, lessons on climate change and climate justice might take on new meanings and directions.

In her two-week unit, Rachel focused on Greta Thunberg and the role of youth activists to inspire her own students. However, in her reflections she noted that this unit might have looked very different if she had focused on the impact of climate change on the rural community where the school is located. In many of the schools where our students teach, there is a large migration of students from Puerto Rico, climate refugees, whose lives were uprooted by hurricane María in 2017. What might lessons that focus on their experiences look like, and how might teaching about the impact of climate change on our own lives be a powerful tool for change?

As we think about how to support future teachers in engaging in this work, we must collaborate with faculty across discipline areas and connect to organizations, global and local, that are actively engaging in work around climate change and climate justice. The continuity of developing students' understanding across several courses provides opportunities to engage in the work and develop interdisciplinary units and lessons that address the multiple prongs needed to tackle the various aspects and impacts of climate change (Pizmony-Levy & Pallas, 2019). Literature and media provide opportunities for teaching about climate change across discipline areas.

Denise used children's literature in her class to model how students might use books to design a unit, but these texts also served as guides for us as educators to learn about climate change and think about how these books are approaching the topic for children. What are the choices the authors are making and why, and how do the texts themselves support children's understanding of the topic? Lastly, how do we connect ourselves and our students with organizations that are focused on climate change and climate action, to model for our own students what it means to be a lifelong learner, to create connections for them once they have left the teacher education program, and most importantly, to help support their commitments to teaching about climate change and climate justice.

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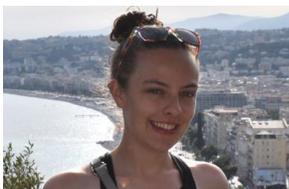
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