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Encouraging our youngest students to think like scientists: Exploring elementary teachers' experiences of teaching disciplinary literacy

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Encouraging Our Youngest Students to Think Like Scientists:

Exploring Elementary Teachers' Experiences of Teaching Disciplinary Literacy

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Elementary teachers today must provide more, and better, instruction in the content areas for their students than ever before. Many argue that the best place to teach comprehension is within the content areas, where literacy and content knowledge can be simultaneously developed (Moje, 2015; NRP, 2000; Pearson, Moje, & Greenleaf, 2010). The Common Core State Standards (NGA Center & CCSSO, 2010) suggest that for all students across all content areas, teachers must know how to provide a bridge for students to access content *through* literacy, while simultaneously supporting meaningful literacy development through rich content-area texts. However, experts in the content areas (e.g., professional scientists, historians, etc.) read and write texts in discipline-specific ways. Thus, researchers and educators have recently suggested that in order to help students eventually reach higher levels of communication expertise, they need deliberate instructional support in discipline-specific ways of reading, writing, and communicating across content areas and grade levels (Ippolito et al., 2013; Jetton & Shanahan, 2012; Nokes, 2008; Shanahan, 2012; Shanahan & Shanahan, 2008, 2014; Shanahan, Shanahan, & Misischia, 2011). Such teaching and learning has been most prominently labeled as "disciplinary literacy" (DL) instruction (Shanahan & Shanahan, 2008). Research is currently providing educators with a more nuanced understanding of how experts in their respective fields approach reading, writing, and communicating in their disciplines (Jetton & Shanahan, 2012; Shanahan, 2012; Shanahan, Shanahan, & Misischia, 2011) and how these practices can inform teachers' pre-service preparation to best support secondary education classrooms (Conley, 2012; Fang, 2014). Yet very little research has addressed how elementary children learn and demonstrate emerging behaviors and practices related to disciplinary literacy and which practices teachers might use to support this development (Shanahan & Shanahan, 2014). Therefore, this article is framed by and addresses three overarching questions:

- In surveying the literature, what do we know about disciplinary literacy teaching and learning for secondary students that might have implications for learners in the earliest grade levels?
- What are we learning about disciplinary literacy from the classrooms of elementary school teachers as they tackle science-based units and lessons?
- What next steps might we take to learn more about promising DL practices in elementary school classrooms?

What We Know About the Disciplinary Literacy Movement That Might Inform DL in Elementary Classrooms

What is disciplinary literacy?

In 2008, prominent disciplinary literacy scholars Tim and Cynthia Shanahan, as well as Elizabeth Moje and others, all began publishing work drawing teachers' and scholars' attention to the need to focus on building secondary students' disciplinary literacy skills. They began by defining what DL is. Shanahan and Shanahan (2008) suggested a three-tiered model of literacy progression to understand DL. The first tier,

"Basic Literacy," includes the fundamentals of reading and writing, such as decoding and print awareness, usually occurring in the early elementary grades. In the next tier, "Intermediate Literacy," upper elementary students use increasingly sophisticated word strategies (e.g., using prefixes and suffixes to determine a word's meaning) and use their expanding vocabulary and knowledge of the world to read more specialized texts. At this tier, generalizable comprehension strategies (e.g., summarizing, questioning, predicting), often associated with content-area literacy, are taught. Shanahan and Shanahan's major contribution comes in the final tier, "Disciplinary Literacy," in which they suggest that middle and high school students might be exposed to and learn how to read, write, and communicate in discipline-specific ways within the content areas, employing tailored literacy strategies related to each discipline. They argued that, "A high school student who can do a reasonably good job of reading a story in an English class might not be able to make much sense of biology or algebra books, and vice versa" (Shanahan & Shanahan, 2008, p. 45). This disciplinary literacy framework is helpful in conceptualizing the "tiers" of literacy, but the Common Core now includes many of the "Intermediate Literacy" strategies and skills for our youngest students. How might younger grade teachers think about and reconcile these distinctions in practice? Later we will share suggestions from recent research about elementary disciplinary literacy to begin to answer this question. First, let us look a bit more closely at what the emerging field of disciplinary literacy research has to say about DL for adolescents.

What do researchers mean by discipline-specific ways of reading and writing? Born from analyses of expert readers in various disciplines, Shanahan and Shanahan (2008) define DL as "the knowledge and abilities possessed by those who create, communicate, and use knowledge within the disciplines" (p. 8). In other words, disciplinary literacy is the way that disciplinarians approach text, which yields the literacy strategies for that discipline. In their study, they asked mathematicians, chemists, and historians (as well as their high school content-area teacher counterparts) to think aloud as they read a text from their discipline. They found while chemists read, they visualized formulas, diagrams, and charts. These scientists were transforming what they read from one form to another. To prepare for experiments, scientists read with an authorless stance and were unlikely to read closely or critically. Instead they read to predict and visualize what would happen and to determine how the new information "fit" with their previous understanding.

Historians, on the other hand, began their reading by considering authorship, looking for and expecting interpretation and bias. They read with "caution in mind" (p. 50) and gained knowledge by synthesizing and analyzing evidence across documents and sources to develop their own perspective and understanding of events.

Mathematicians read closely looking for precise word meanings and relationships (Shanahan & Shanahan, 2008). For example, consider the key words in these mathematical word problems. "I have two apples and two oranges. How many pieces of fruit do I have?" The key word is *and,* which suggests combining quantities. In this fourth-grade word problem—"What is 50% of 100?"—*is* and *of* suggest the relationship between the variables. For mathematicians, "each word must be understood specifically in service to that particular meaning" (p. 49). That is, function words such as *and*, *is*, and, *of* show the relationships. These findings that disciplinary experts, and their secondary content-area teacher counterparts, read and engaged with texts in qualitatively different ways was expanded on in a later report of the full study (Shanahan, Shanahan, & Misischia, 2011). In sum, disciplinary experts approached the texts in their disciplines in unique and specialized ways. While much has been advocated for and learned about disciplinary literacy in secondary school settings (Moje, 2015; Shanahan & Shanahan, 2012), we would argue that much of the DL movement can and should be applied (with adaptations) to earlier elementary classrooms.

What are the historical roots of disciplinary literacy in the elementary grades?

At the outset of the 21st century, a small revolution began taking shape as researchers and teachers looked for new ways to integrate content and literacy instruction in more authentic, discipline-specific ways. After, and at times concurrent with, the skills focus that emerged from the 2001 authorization of No Child Left

Behind, instructional approaches like Concept-Oriented Reading Instruction (CORI; e.g., Guthrie, et al., 1999; Guthrie, et al., 2004) were introduced. In CORI classrooms, teachers built conceptual knowledge on different science topics through teaching strategic reading behaviors while children engaged in real-world explorations. This instruction encouraged the simultaneous learning of science and literacy and in many ways represents a first step toward modern-day DL instruction.

Another step toward robust DL instruction was the emerging research around authentic literacy opportunities, which "replicate or reflect reading and writing activities that occur in the lives of people outside of a learn-to-read-and-write context and purpose" (Duke, Purcell-Gates, Hall, & Tower, 2006, p. 346). In one study, Purcell-Gates, Duke, and Martineau (2007) asked if the explicit teaching of informational text features and text structures and/or the degree of authenticity of literacy activities had any impact on children's ability to read and write informational and procedural texts in science. Results from the study indicated no statistically significant impact of explicit teaching of science texts on students' literacy, with the important exception of degree of authenticity. More authentic reading and writing tasks were related to more literacy growth.

With regard to science instruction, by 2010, Pearson and colleagues were suggesting that an integration of reading, writing, talking, and *doing science* might serve learners, especially young learners, best. They asserted, "When literacy activities are driven by inquiry, students simultaneously learn how to read and write science texts and to do science" (pp. 459–460). This shows what is possible in elementary classrooms as teachers use literacy in service of building content knowledge and the content in service of building literacy knowledge. This supports Neuman and Celano's (2001) argument that comprehension instruction must teach content and process, because learning the processes of proficient readers enables readers to learn the content.

What could disciplinary literacy look like in elementary grades?

While we are learning much about what disciplinary literacy might look like for adolescents, elementary research has largely focused on engaging literacy opportunities (Brock et al., 2014). We need to know a great deal more about what DL might look like for elementary students (and whether it is even an appropriate goal!). Moje (2007) argues that there is little research to identify what should (and should not) be included in elementary DL instruction. Since Moje's chapter, a few researchers have begun to explore this topic. Shanahan and Shanahan (2014) describe the Common Core State Standards' (CCSS) link to elementary disciplinary literacy. They suggest several CCSS-related opportunities for elementary teachers to focus on disciplinary literacy, while acknowledging that some researchers (and teachers) feel like these strategies are not developmentally appropriate. Shanahan and Shanahan, however, believe that early exposure develops the "habits of mind" (p. 639) needed for students to be successful as disciplinary readers and writers as the texts pose increasingly complex demands on the reader.

As the term "disciplinary literacy" has become more widely used, particularly as it becomes more prevalent in earlier elementary grades, the meaning of the term has become a bit muddied. It might be helpful to clarify what some believe DL is *not*. First, DL is not simply a new way of talking about content area literacy; instead, it is fundamentally "a different construct" (Shanahan & Shanahan, 2012, p. 8). Shanahan and Shanahan (2012) provide a thought-provoking discussion of the differences between content-area reading and disciplinary literacy. They define content-area reading, with its emphasis on literacy strategies, as "the teaching of a generalizable set of study skills across content areas for use in subject matter classes" (p. 7). This practice has historically been the way that content-area instruction has been approached in both secondary and elementary classrooms—as the teaching of *intermediate* (Shanahan & Shanahan, 2008) cognitive strategies (e.g., predicting, questioning, summarizing, etc.) with the hope that students would be able to use the strategies equally well across all content-area texts. However, as Schoenbach, Greenleaf, and Hale (2010) have argued, "Years of research on teaching teachers to use such reading comprehension strategies point to meager returns" (p. 39).

Brock and colleagues (2014) also argue that DL is *not* thematic teaching. For years, teacher preparation programs prepared elementary teachers to build units around a related topic. Teachers would focus and integrate their content-area instruction around one theme

at a time (e.g., springtime and butterflies, the building of the great pyramids, etc.), but this instruction was not always standards-based, nor was it necessarily authentic (e.g., in mathematics, adding three pictures of water drops to two pictures of water drops during a thematic unit on the water cycle). DL instruction moves beyond thematic teaching (though doesn't necessarily preclude it) by focusing on discipline-specific ways of thinking and working, always circling back to the question, "How would a historian/literary critic/mathematician/scientist/etc. think about and respond to this text/problem/situation?" Brock et al. (2014) offer multiple cases of recent elementary classrooms focusing on disciplinary literacy work in science and history. For example, in a second-grade science unit focusing on habitats, living things, and environmental stewardship, the classroom teacher, Mary, focused on writing for different audiences across a range of genres and modeling and practicing scientific talk, both scientific habits of mind and ways of working. What did this look like in practice? Students were asked to take observational notes during read alouds and during explorations with a "mini-environment tub" (p. 95). They compared and contrasted biotic and abiotic items in their tubs and discussed the findings and explanations as a class, practicing the specific language and elaboration characteristics of scientific talk. Students revisited their notes many times and expanded ideas as new understandings emerged. To conclude their unit, students worked in small groups to synthesize their notes and to draft a book for kindergartners about living things and their environments. The teacher was engaging students in reading and thinking like scientists throughout her unit. Moreover, when she asked them to create a book, it was not simply copying their notes. Instead, students were encouraged once again to think like scientists and carefully select the vocabulary words, explanations, and graphics that would help the kindergartners understand the concepts. This process required learning specific habits of mind of scientists: writing for a variety of audiences and purposes, gathering information across many resources, and "help[ing] students understand norms (i.e., ways of talking, reasoning, observing, analyzing, reading, and writing) of the scientific community" (Brock et al., 2014, p. 93). These case studies of elementary work are quite powerful in demonstrating how younger learners can begin thinking about and working with content-area material in ways that build disciplinary literacy skills.

While some scholars (e.g., Brock et al., 2014; Shanahan & Shanahan, 2012) are considering what elementary teachers can learn from existing studies of secondary classrooms, others are considering the opposite: What might secondary classrooms learn about disciplinary literacy from the work that is emerging at the elementary level? Cervetti and Pearson (2012) take up this question and suggest three broad goals: lead with inquiry, focus on disciplinary habits of mind and ways of working, and choose texts strategically. While these suggestions may not seem like radical departures from what others in the field of disciplinary literacy are suggesting, Cervetti and Pearson's recommendations are distinctive because they come from analyzing second- through fifth-grade students' work in a science-based curriculum. As part of the experience, students were asked to conduct their own inquiries, read accounts of professional scientists' work, and compare and interpret results of their inquiries with one another and against other scientists' findings. Texts in the curriculum were chosen to foster inquiry, such as "handbooks, field guides, and graphic representations of data" (p. 584), representing texts that professional scientists might consult as they investigate a phenomenon.

While there is much still to learn about disciplinary literacy teaching and learning across all grade levels, we make the case here that there is enough evidence to warrant more classroom-level experimentation and certainly further research about DL practices at the elementary levels. Knowing that some researchers and teachers are justifiably concerned about elementary DL, we proceed optimistically, but cautiously, into further explorations of what DL could look like in elementary grades.

Learning About Elementary Disciplinary Literacy From K–5 Teachers in a Science-Inquiry and Literacy Summer Program

To further the growing conversation about DL teaching and learning across grades, we have begun to explore the structures and content that might encourage young students and teachers to have opportunities

to explore DL practices in science. Specifically, for the past four years we have been learning about teachers' experiences in a summer program designed to incorporate DL science instruction. Our research question was *How and in what ways do elementary teachers learn DL from their experience in this science-inquiry and literacy intervention program*? Below, we provide excerpts of data from this much larger longitudinal study of DL-related work conducted as part of the university-district partnership.

For the last four years, a university in the Northeastern United States has partnered with an urban school district to provide an intensive, four-week summer program for English language learners (ELLs) and low-income students. In designing the program, key elements included incorporating a science-inquiry topic throughout all instruction and providing intensive interventions to target students' individual literacy needs. One mantra drove the teachers' instructional decision making related to DL, namely "We read, write, and learn for authentic purposes."

As part of the partnership, the university sponsored two literacy faculty members as administrators (including the first author here). Funding to support the teachers was split between the university and the district. Many staff returned for multiple years. The two faculty members and four of the teachers participated across all four summers of the project. The district recruited the students and co-sponsored teachers from within their district. Students attending the program were entering first through fifth grades and were selected by their home school to attend this district-wide summer program based on their reading assessments. Students were of particular interest if they did not meet end-of-the-year reading benchmarks.

The summer program has been housed at a district elementary school, capitalizing on its location across the street from the ocean. Teachers were introduced to and used the Pearson et al. (2010) multimodal approach to plan opportunities for students to *do* science (e.g., investigating, collecting, and analyzing data), *talk* science (e.g., creating arguments and presenting information), *read* science (e.g., reading about the lives of scientists), and *write* science (e.g., maintaining science observation notebooks). Each classroom exploration included researching and designing experiments, going on field trips to the ocean, and then supporting these experiences with extensive reading and writing of informational texts related to their topic of study. Students in the upper grades (3rd–5th) participated in individual or partner research projects. Efforts were made to create authentic links between literacy and science (Duke, Purcell-Gates, Hall, & Tower, 2006; Pearson et al., 2010). This program was intended for the teachers and students to begin to experience disciplinary literacy within science.

In one classroom, students entering fourth and fifth grade studied the science of seamanship and shipbuilding. They took field trips to the ocean to write captain's logs of their observations of the tide, wind speed, and temperature. Students created homemade anemometers to measure wind speed. They also researched the attributes of boats and designed ships that would withstand high winds (tested in a fish tank with modeled clay boats and a hairdryer producing the "wind") and ships that could hold the most cargo (tested with aluminum foil boats and pennies). In the cargo experiment, the "winner" was an English language learner who soon became the class engineer, teaching her peers what she had learned as she modeled her boat. As students were experimenting and observing, they discussed their questions; researched answers; provided demonstrations of the anemometers and described the math to support calculating wind speed; and presented reports to other classrooms about tidal calendars, characteristics of ships, and weather considerations for a voyage. Students were supported as they researched a question, designed experiments, tested them out, and shared their findings and conclusions. All classrooms chose their own specific ocean-related focus and followed similar practices of observing, asking questions, answering them, and sharing results.

Data sources and analysis

Data sources included teachers' written surveys and transcriptions of interviews conducted during and after the summer program. During the first two summers—2012 and 2013—26 teachers completed a mid-program and post-program written survey. During the summer of 2014, interviews were added to the data collection. Eighteen teachers participated in the interviews during the program and returned written surveys mid-summer and at the conclusion of the program. During the summer of 2015, 13 teachers participated

in interviews during the program as well as filled out both mid-program and post-program surveys, and 11 teachers participated in follow-up interviews three months after the program concluded. In total, over 125 written surveys were collected and 42 interviews were conducted. Returning teachers were interviewed every summer. All interviews were semi-structured and transcribed verbatim. Interview questions asked teachers to describe what they learned and what they valued from this DL professional learning and teaching experience. They also described one child's growth in the program, as well as identified one problem of practice that they had grappled with and found resolution to as a result of their participation in the program. Their answers revealed their emerging understandings about DL, specifically related to science, and working in new ways with elementary school students.

The transcribed interviews were analyzed using constant comparative analysis (Glaser & Strauss, 1967). Open and axial coding (Strauss & Corbin, 1998) were used to identify major themes within the data while also looking for predetermined codes such as "approximations of DL practices," "descriptions of student growth (e.g,. affective, academic, social)," and "areas of teacher growth." Member checks were conducted throughout the analysis phase of the project, to ensure that we were correctly interpreting teachers' growing understanding of DL work.

Preliminary study findings

Beginning with open coding, then looking for patterns within the open codes, three themes emerged. Across these interviews and surveys, teachers see DL as organic, natural, and relevant both to themselves and to their students. In our case, elementary teachers seem to frame DL as "authentic" and an integration of content and literacy. And, students see themselves as scientists and have begun to use scientific thinking and habits of mind as they read and write. Additionally, these young learners are engaging in reading and writing as scientists, listening and asking questions, doing experiments, and sharing knowledge as scientists. The interconnectedness of reading, writing, and doing was valued and deemed essential by teachers.

Opportunities to Promote Authenticity. Knowing the summer program had different opportunities than regular classroom teaching, teachers began interviews by describing the program in their own words. Almost every teacher used the word *authentic* to describe the instruction within the summer program. One noted: "Using reading and writing as tools to support inquiry-based science learning is effective, efficient, engaging, and authentic. It seems so natural to talk about the world directly around us and read and write about what we saw." By *doing* science, the learning seemed to happen in authentic ways. Another teacher described the program in another way:

> It's a very organic learning process, teaching them things that are relevant to them and their environment as a starting point for them to learn reading, science, math . . . . We just use the world around us. The seashore and the whole area—the outside world around us—to assess, for the curriculum, and for reading and science and vocabulary. It's a very organic process for learning.

For these teachers, the physical setting near the ocean (or taking advantage of it, perhaps more than during the regular school year) was the catalyst, and the content was the "starting point" for the "organic" learning.

Another teacher extended these comments:

> I think this program was about making things more authentic. Everything is for a purpose. Students are not really doing anything literacy-wise without a purpose. . . . Everything was focused on the content that we were teaching. Things weren't random. Like we would suddenly be writing about a rainbow, and if you were to ask them, "So, why are you doing this?" They wouldn't say, "I don't know. That's just what we were told to write about." This way of teaching [in the summer program] gives them a reason to write. Also, it's not a formula. There's no "My favorite holiday is Thanksgiving because—." It was more authentic.

Having a purpose that moved beyond literacy goals seemed to be very important to this teacher. Teachers consistently used words like organic, natural, holistic, and authentic. For these elementary teachers, DL is equated with real tasks for real purposes. Specifically, the purpose was to learn and to share what they learned about the content.

Opportunities to Promote Scientific Thinking and Habits of Mind. Another pattern that emerged from the data was teachers' identification of ways students were showing and developing scientific thinking and habits of mind. One teacher reported:

> The kids are learning about scientists and how they're fearless. They're explorers, and they're inventors. I feel like they're seeing themselves as "This is us. This is our job. This is what we need to do to discover how things work and to take things apart and put them together."

With guidance from the teachers and university partners, these young scientists were beginning to situate themselves within the discovery progress and were focusing on developing their scientific habits of mind. Another teacher reflected:

> We told them they had to draw what they observed. So one of our English learners drew his observation and he started writing right away without being prompted. He wrote three sentences about what he saw. "I see an ocean. The ocean is low tide. It was fun." They got right into the literacy. We've been telling them, "Scientists write. Scientists have to read." And the students just accepted it and do it because they are scientists.

Throughout the program, students embraced practices of scientific inquiry, including recording and researching. Students' growing perceptions of themselves as scientists was reported to be one of the most satisfying aspects of DL instruction for the teachers.

Opportunities to Promote Interconnected Reading, Writing, and Learning. The last major theme in the data was how interconnected reading, writing, and learning were within this summer experience. A first-grade teacher said:

> A lot of observation, a lot of questioning, a lot of inquiry takes place . . . . Students are looking at things and then coming back into the classroom and talking about them. Then, they are reading about them . . . . It was natural to want to write about it. "Write about what you saw. Combine what you saw with what you're learning in the classroom." It just seemed like such a natural process. It wasn't a forced thing for the kids. They wanted to do it . . . . It was so organic and holistic. It made them think about learning and how we learn.

Reflecting the nuanced work of scientific discovery, this teacher repeatedly talked about the process. One of her biggest lessons learned about DL is an appreciation for the "doing" part of scientific learning. Students were learning science through reading, writing, and doing it. These activities were intertwined and interconnected. The classroom reading and writing supported what students were observing, researching, and questioning.

An underlying theme across all of the teachers' comments is that, in their previous experience, science had been taught through all hands-on activities or conversely learned all from books and lectures. Integrating both was reflected in another teacher's description of the impact of this DL instruction on students:

> What the students are reading is so connected to what they are experiencing and doing and that it has this dramatic impact on their reading, because they have to read for this purpose. They need the information, so it's like an authentic experience to utilize all those strategies that you're taught during reading. Instead of . . ., "Okay, we're in this reading group, and I'm teaching you to be a better reader." Sure, kids want to be better readers, and they can do that. But, I feel like it's kind of left there a lot in reading. Kids don't make that independent transfer to say, "Okay, now I'm reading this text, and I'm going to use all those things I used in guided reading." Kids don't automatically make that connection . . . . I feel like as explicit as you try to make that, when they're so invested in what they're doing . . . they do reading and writing because they need it. They pull in those strategies because they so badly want to understand what they're reading and know more about it. If we make their experiences more authentic, we give them purpose.

These two teachers focused on DL's interconnected reading, writing, and learning opportunities. Students used the literacy strategies they were taught because they needed them to answer their science questioning and wonderings. DL instruction, specifically instruction that includes *doing* science, encourages this natural integration and intersection of reading, writing, and learning.

Another teacher commented about the differences she saw in her own teaching between the summer program and her regular position:

> This summer these kids got excited about the stuff we were reading when it was connected to our research outside. Having it all connected, I think, can be very powerful. A lot of times in school you forget about that because you're trying to get so much done with your curriculum and these standards and "We have got to do this and that." You don't have time to think, "Maybe if we put it all together and it is meaningful and it's all connected, then it will really help in motivating students to read about it."

In the end, we were not surprised that DL-focused teaching was motivating for the students. It left both of us, and the teachers in the project, wondering what this kind of instruction might look like as a more regular part of classroom teaching that takes place during the school year, without some of the freedoms of the summer program.

Implications and Future Research

It seems that this DL approach to content-area teaching is engaging to both elementary students and teachers. We are careful to acknowledge that our early findings from this particular research study are situated in a summer program environment, where the typical pressures of time and standards are a bit less prominent. We are also careful to clarify that we are not suggesting a sudden and wide scale push for DL in the elementary grades. Instead, we interpret both the existing literature and our recent study findings as a signal to discover and build clearer understandings of what DL teaching and learning looks like within the parameters of regular classroom teaching with elementary learners. In our initial investigations we have found wonderful and important implications for what we would like to encourage teachers to teach and what opportunities we might provide for elementary students to learn as disciplinarians that will prepare them for future reading and writing in content areas. Like Shanahan and Shanahan (2014), we do believe elementary students are capable of learning the habits of mind related to DL. But, we need to know more, in order to take a developmentally appropriate approach.

Specifically, we have begun investigating the DL practices of some of these summer program teachers in their regular, school-year classrooms. Through video case analyses, we hope to investigate the content-area literacy instruction of elementary teachers who participated in the summer program, documenting the lasting effects of the summer professional learning in teachers' year-long classrooms. These videos will be analyzed for instruction that develops students' emerging disciplinary literacy skills. Videos will be analyzed, tagged, and edited for use both as part of a larger research effort describing disciplinary literacy work at elementary levels, and for use in future professional development efforts for the summer program. In addition, we hope to explore how elementary children display early signs and behaviors, or "approximations" (Bartholomae, 1986, p. 12), related to disciplinary literacy in their talk and work samples. Similar to Clay's emergent literacy (1993), we hope to document early indicators of students' DL. We believe elementary students can and do show the habits of DL in age-appropriate yet sophisticated ways.

We hope our current and future work adds to the conversation about elementary DL and provides teachers with targeted strategies and a better conceptual understanding of what DL might look like for elementary students. Further research into age-appropriate disciplinary literacy instruction is critical as we continue to seek strategies to support young students' reading, writing, and learning in discipline-specific, interconnected, authentic ways.

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