DISCIPLINARY LITERACY IN THE MIDDLE SCHOOL Exploring Pedagogical Tensions

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The present study examined middle school teachers' perceptions of literacy demands in their disciplines and specific literacy strategies they used to teach their disciplines. The eight participants in this multiple case study included 2 middle school teachers from each of 4 disciplines (i.e., English/language arts, science, social studies, and mathematics) who had completed 6 weeks of online professional development on disciplinary literacy. Data sources comprised 2 classroom observations and 2 semistructured interviews following observations for each of the 8 teachers, as well as classroom and school artifacts. Qualitative analyses included within-case and cross-case themes. Findings indicated participants used a range of content area literacy and discipline-specific literacy instruction. Based on cross-case analysis, 4 themes emerged from the 4 discipline-based cases: (a) interdisciplinary literacy, (b) power in disciplinary language, (c) pedagogical tensions related to end of grade exams, and (d) individualized access. Two pedagogical tensions emerged from the data: the tension between content area literacy and disciplinary literacy and the tension between disciplinary-based instruction and interdisciplinarity, which permeates the middle school curriculum. Future research should explore how middle school teachers navigate the pedagogical tensions of disciplinary literacy within interdisciplinarity in light of Common Core State Standards and other current policy initiatives.

The literacy field is shifting toward a focus on disciplinary literacy. The shift has been prompted by recent policy and standards reports. For example, the Carnegie Council on Advancing Adolescent Literacy (Lee & Spratley, 2010), Common Core State Standards (National Governors Association & Council of Chief State School Officers, 2010), Next Generation Science Standards (2013), and 3C Framework for Social Studies (National Council for Social Studies, 2013) advocate for content area teachers to support students' reading of complex texts and production of writing within their disciplines. Supporting students' disciplinary literacy promotes both the content knowledge and the process of constructing knowledge of a discipline (Moje, 2008). McConachie and Petrosky (2010) defined

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disciplinary literacy as "the use of reading, reasoning, investigating, speaking, and writing required to learn and form complex content knowledge appropriate to a particular discipline" (p. 6). Disciplinary literacy has been slow to be recognized by middle grades researchers (e.g., Beck, Beuhl, & Barber, 2015); perhaps because, on the surface, disciplinary literacy seems counter to the interdisciplinary nature of middle grades curriculum (Yoon, Malu, Schaefer, Reyes, & Brinegar, 2015).

CURRENT CONCEPTIONS OF DISCIPLINARY LITERACY

Disciplinary literacy assumes that the reading, writing, speaking, listening, and inquiry tasks that students encounter are different across the major disciplines (Shanahan & Shanahan, 2008). Disciplinary literacy is different from its counterpart—content area literacy—in that disciplinary literacy emphasizes thinking and understanding like an "insider" or an expert in the disciplinary field (Hynd-Shanahan, 2013). For example, in English/language arts [ELA] students analyze and deconstruct literary devices while reading fictional texts such as poems and novels in order to construct claims through both personal and intertextual connections. In comparison, a middle grades social studies teacher would ask students to contextualize various sources in the cultural, political, and social zeitgeist of a particular time period and then synthesize across multiple sources in order to construct their arguments. The purpose of disciplinary literacy is not to assert that every teacher should be a teacher of reading; instead disciplinary literacy is a way to emphasize and embrace the different demands a text places on readers and writers in the various disciplines.

Zygouris-Coe (2012) proposed that disciplinary literacy is the core of understanding the disciplines, and not a set of tools superimposed on disciplines to help students with reading and writing skills. Disciplinary literacy is tied to texts' unique structures and the "habits of mind associated with each discipline" (Zygouris-Coe, 2012, p. 42). Thus, a disciplinary insider must be able to engage in the cognitive, social, and semiotic processes specific to their disciplines (Coatoam & Fang, 2014). The cognitive processes include the skills disciplinary experts use while reading. Specifically, a literary critic relies on contextualizing the text in certain literary periods, in addition to close reading (Warren, 2011); in comparison a scientist may select certain texts based on his/her background knowledge, and then skim the text for pertinent information (Bazerman, 1985). The social processes—how disciplinary experts work together—range from being highly collaborative in disciplines such as history and science, to more individual in their pursuits for ELA and mathematics. Finally, how disciplinary experts create language and meaning—the semiotic processes—vary as well. In general, semiotics for scientists and mathematicians include technical language, visuals, and symbols, which differs from the archaic vocabulary and complicated syntax employed by historians. Accordingly, different disciplines have their own discourse community and norms associated with their fields. Students need to gain an understanding of the goals and values of the different disciplines in order to be "apprenticed" toward disciplinary literacy.

Research on disciplinary literacy has been conducted in the areas of expert practices (e.g., Shanahan, Shanahan, & Misischia, 2011) and high school students' (i.e., novice-level) practices (e.g., Rainey & Moje, 2012; Reisman, 2012). Research that specifically addresses middle grades teachers' disciplinary literacy instructional practices has been slower to evolve than research on content area literacy, which focuses more on strategies for comprehending and remembering content (Gilles, Wang, Smith, & Johnson, 2013).

PURPOSE AND RESEARCH QUESTIONS

We conducted the present qualitative study in order to address the need, as identified in the

research literature, for more research on teachers' practices relative to disciplinary literacy. The aim was to explore middle school teachers' uses of disciplinary literacy strategies in the classroom after they received online professional development related to disciplinary literacy. Specifically, our research questions were: (a) how do middle school teachers perceive the literacy demands within their discipline; and (b) what disciplinary literacy strategies (e.g., reading, writing, speaking, listening, and inquiry) do middle school teachers use when teaching within their disciplines?

METHOD

Research Context and Participants

For this multiple case study, we employed purposive sampling (Stake, 1995) to select teachers from one middle school. In order to qualify for participation in the study, teachers had to teach one of the core disciplines (ELA, science, social studies, or mathematics), and have participated in a specified 6-week massive open online course for educators (MOOC-Ed) as part of their professional learning communities during the fall semester. The *Disciplinary Literacy for Deeper Learning MOOC-Ed* (Spires, 2014), focused on disciplinary literacy strategies within the four core disciplines and invited participants to design and apply discipline-specific inquiry processes within their classes. Teachers were required to complete assignments from the six units while attending weekly PLC sessions by disciplines at their school. Each week teachers followed the PLC protocol of discussing disciplinary literacy strategies learned in the MOOC-Ed and then practicing targeted strategies within their classrooms. The following week, teachers would report on what worked well and what did not work well, using the PLC group as a sounding board as they continued to revise lessons and try new strategies. Additionally, the teachers used the online discussion boards as part of the MOOC-Ed to share and exchange ideas about the various strategies they were implementing. Data were collected during the spring semester following teachers' participation in the MOOC-Ed.

Participants in the present study included eight middle school teachers from a local middle school in a large metropolitan city in the southeastern United States (see Table 1). The school houses approximately 590 students and functions on a modified year-round schedule. According to the district and school websites, the school focuses on inquiry-based learning and active engagement, as well as on preparing students for global and technological environments.

Data Sources

Guided by our research questions, data sources included: (1) field notes from two classroom observations of each participant, (2) two semistructured interviews with each

TABLE 1
Overview of Teacher Participants

Pseudonym	*Content Area*	*Grade*	*Teaching Experience*
Lisa	ELA	8th	6 years
George	ELA	7th	18 years
Suzy	Science	7th	6 years
Sandy	Science	8th	2 years
Tavin	Social Science	7th	2 years
Lexie	Social Science	8th	10 years
Rachel	Math	8th	12 years
Dana	Math	8th	11 years

participant following observations (both of which were audio-recorded and transcribed verbatim), and (3) classroom and school artifacts.

Observations and Field Notes. Each classroom observation lasted for the entire class period, which was 50 minutes for the seventh-grade class, and 1 hour and 50 minutes for the eighth-grade class. During observations, the researcher assumed the stance of a nonparticipant observer, in which she sat in a chair by the door at the back of the classroom with the focus of her observations on the teacher, as well as the types of reading, writing, and inquiry activities the students engaged in during each lesson. Field notes and observations were recorded using an observation protocol (see Appendix A).

Semistructured Postobservation Teacher Interviews. After the classroom observations, semistructured interviews were conducted with each teacher about the observed lesson, their general instructional practices, their participation in the MOOC-Ed, as well as their understanding of disciplinary literacy (see Appendix B for interview protocol). Specifically, questions about disciplinary literacy probed teachers about what reading, writing, inquiry, and discourse looked like in their classroom, and how these literacy practices were similar or different to the other disciplines. The purpose of the interviews was to gather factual information, validate observational data, as well as to gain a deeper understanding into the teacher's familiarity with disciplinary literacy.

Classroom and School Artifacts. Collected artifacts included pictures taken throughout the school (see Figure 1), as well as of each participants' classroom, in addition to copies of student handouts, teachers' lesson plans, and documents from the teachers' and school's website. These documents were used to add to the overall context of the research site, as well as help verify evidence discovered in other data sources (Bowen, 2009).

Following Yin's (2014) multiple-case study procedure, our first step was to develop theory—in this case theory regarding disciplinary literacy. Due to the nature of the construct of disciplinary literacy, it was predicted that we would find contrasting results among teachers in the different disciplines according to their content areas. Thus, the different disciplines were treated as separate units of analysis in this multiple case study.

Data were initially coded using open coding (Creswell, 2013). Two of the researchers individually coded interviews, observations, and artifacts to develop an initial list of codes (Stake, 2006) that represented teachers' disciplinary literacy perceptions and expectations, classroom activities, instructional and literacy practices by discipline. These codes were general and intended to capture different disciplinary literacy strategies in the middle school classroom (e.g., "reading," "writing," "speaking," "thinking," "listening," and "inquiry"). These codes were used as a topic coding to "merely allocate passages to topics" (Richards, 2005, p. 95) and initially involved little interpretation. This topic coding helped to reduce information without losing significant information (Miles, Huberman, & Saldaña, 2014). After all data had been coded once, they were reanalyzed and recoded at a more microlevel. This was particularly helpful since the codes were initially so broad and employed more for lumping similar topics and data reduction (Miles et al., 2014). Table 2 shows how "reading," which started as a larger code, was revised and specified during the second round of coding to include more specific subcodes.

Stake (2006) cautioned researchers about jumping to cross-case analysis too quickly because it may cause them to lose sight of a given case's atypicality; thus, it is extremely important to ensure that each case is thoroughly represented before comparisons are made across cases (Merriam, 1998; Stake, 2006). Therefore, embedded units of analysis (teachers) were thoroughly analyzed before conducting a cross-unit analysis. In the final phase of the analysis—after all data had been coded—codes were aggregated and collapsed into thematic statements to capture each

FIGURE 1
Artifact Displaying Propaganda Posters Created by Tavin's
Seventh-Grade Social Studies Class in Which Students Were Asked to "Be A Historian"

teacher's perception and practice of disciplinary literacy (Creswell, 2013).

FINDINGS

The research questions asked how middle school teachers perceived literacy within their discipline and what disciplinary literacy strategies they asked students to utilize. The next section describes the disciplinary literacy perceptions and instructional practices of the eight teacher participants by discipline followed by cross-case findings.

Disciplinary Literacy in ELA

Both ELA teachers talked about how texts in ELA are an "art" and how students needed to understand the entirety of a text in order to fully understand the art of language. Likewise, both teachers said they used fictional texts to help encourage students to find (or retain) their intrinsic desire for reading, as well as expose students to viewpoints different from their own, different topics, and different genres of reading. An important aspect of disciplinary literacy in the ELA classroom was close reading, in which students were asked to reread texts to more fully understand the meaning. Annotation served as the basis for close reading and accessing various texts. This physical process of highlighting for vocabulary, ideas, and theme provided students with what Lisa called "stop and think time," or the physical break necessary for students to mentally process the text. During one observation, George, the seventh-grade teacher, reminded students,

"You have to read poetry carefully! Every single word is full of meaning. You have to think about the underlying meaning that the poet wants you to get." Thus, George reiterated the importance of vocabulary, imagery, and word choice involved in reading poetry, as well as discussing the author's intentions. Similarly, Lisa, the eighth-grade teacher, explained to her students that different people will get different themes from literature, yet multiple themes can be correct. In both Lisa and George's classes, any interpretation and opinion was considered valid if it was thoroughly supported with textual evidence (i.e., direct quotes).

Additionally, grammar had a prime spot in both classes as a way to strengthen basic skills in writing. George expressed a desire to teach grammar as a separate subject because grammar and writing have become so "atrocious." Likewise, grammar and diagramming sentences was the object of observation in Lisa's classroom. Essentially grammar is a unique language to ELA (Johnson, Watson, Delahunty, McSwiggen, & Smith, 2011) and not something that is taught interdisciplinarily. Nevertheless, teachers generally expect grammar skills to transfer across content areas.

Lisa: Preparing Students for High School Using Reader Response and Formulaic Writing. Lisa embraced fictional literature in her class due to the multifaceted goals she had for reading beyond comprehension: to develop students' inner love for reading, to expose students to literature outside of what they would normally encounter, and to enable students to evaluate an author's choices and make connections across texts and content areas. For Lisa, disciplinary literacy meant repetition and rigor. She stated that "the skills [in ELA] are not really changing from third grade to 12th grade.… I don't think that in language arts you see a huge difference between the skills of the discipline and the content." From Lisa's perspective, students needed multiple chances to grow and be successful, which could be accomplished by pushing them and providing them with practice through consistency, routines, and formulas for writing.

According to Lisa, when students are provided a formula for writing, they can replicate it. Even though writing was not tested on the eighth grade end of grade exams (EOGs), focusing on writing using the formula of "State, Explain, Support, and Connect" came from her belief behind students writing:

> So many students are just all over the place. They don't have a formula, and they are not able to articulate their reasons why they think something, or formulate their argument or their opinion at all.... So I really try to give them a super concrete formula that they can replicate for essays as they move forward.

Additionally, creative and narrative writing was something Lisa viewed as unique to ELA, more of an outlet to help students be individuals, even though realistically, people are "probably not going to do a lot of creative writing in [their] profession."

In Lisa's classroom, fictional texts served as the basis for instruction, and nonfiction texts (i.e., Kelly Gallagher's article of the week) were used to supplement skill areas such as persuasive techniques, to make a connection between disciplines, or to pique students' interest. Lisa not only selected texts she believed students would find interesting and compelling in order to eliminate boredom and classroom management issues, but she also considered the text's level of difficulty using Lexile and vocabulary analyses. Lisa selected texts that were not too difficult that they became discouraging for students, but still complex enough to stimulate deep analysis through deconstruction of literary devices and author's choices. A dominant theme in Lisa's disciplinary teaching was the interpretive nature of literature and how meaning can vary by different groups of students. The primary consideration when interpreting literature was analysis of the author's craft by examining how the author's choices "impact" the reader. This open ended analysis was geared toward a reader's response to the text, which allowed students the opportunity to defend their per-

TABLE 2
Reading Code Family With Subcodes and Definitions

Individual Codes	*Definition of Individual Codes*	*Subcodes*	*Definition of Subcodes*
R: Purpose	The various reasons why teachers choose texts, and the goals for reading in their classroom	Comprehension	Goal of understanding a concept
		Enjoyment	Goal of reading is to enjoy and want to read more in the future
		Exposure	Goal of reading texts to expose students to different ideas, viewpoints, and topics
		Meet a deficit	Goal of reading to build up specific skills students are lacking
		Extract information	Goal of reading is to take away factual information and do something with it
		Increase stamina	Goal of being able to get through longer and more difficult pieces when they hit roadblocks
		Engagement	Goal of reading texts that will capture students attention
		Relevance	Goal of reading things students will find relevant in their own lives
		Connections	Goal of reading to make connections between content areas
R: Strategies	Things teachers say students do in order to access a text during class	Annotation	Students circle, highlight, and physically write on what they are reading
		Skim	Students searching the text for relevant facts and information instead of reading every single word
		Text features	Students look at text features to indicate where to focus their attention
		Rereading	Students go back to small portions of the text for a second or third time
		Test taking strategies	Students practice specific strategies to help them on multiple choice EOGs
R: Limitations	Factors that limit how much reading or what types of reading teachers use in their classrooms	Limited vocabulary	Students have limited vocabulary and cannot access the text
		Low reading levels	Students are unable to read at the level of text, and therefore have difficulty comprehending
		EOG preparation	Instructional time is limited because the end goal is getting students to pass high stakes assessments
		Disciplinary perceptions	Teacher's belief that this is a skill central to another discipline

sonal interpretation of stories using textual evidence.

George: Viewing Literacy as a Foundation to All Disciplines and a Successful Life. George reiterated various times that he regarded literacy skills as *inter*disciplinary. He viewed reading as basically the same across content areas because students use the same processes regardless of the content area; disciplinary reading only differs in the language, vocabulary, and purpose behind reading. Similarly, George perceived the goals for writing as

identical because no matter which disciplines students are writing in, they are writing to convey their points with clarity and to support their claims with textual evidence.

One of the key ways to make sense of ideas in his classroom was through discussion, which encouraged students to clarify their confusion, as well as seek consensus with their peers. Multiple viewpoints were not only encouraged, but considered valid if they could be supported with supplementary research and facts. Consequently, the goal of discussion was to promote open mindedness. In addition to valuing multiple viewpoints, George also provided students with multiple opportunities and modes to present their ideas.

George reported using an equal split of informational and fictional texts in his classroom. However, this varied per year and was based on students' assessments from the beginning of the year. Due to "limited time and a whole lot of material to cover, we try to focus on where [students] deficiencies are." George said that he articulated to his students the difference between reading informational texts and fictional texts predominantly based on one's purpose for reading. Informational texts are used to answer a question and search for information, which makes the reading process slow and tedious. Conversely, fictional texts in ELA are viewed as "a piece of art. And a work of art has to be understood in its entirety." George promoted reading fiction as a pleasurable habit where texts can be consumed much more quickly than informational texts. Students in his classroom completed a "40 book challenge" throughout the year not only to encourage students' success and enjoyment with reading, but also ultimately to increase their desire to read: "I fully believe that anybody who says they [*sic*] don't like reading is … reading the wrong stuff. Or it's because they haven't had success at it." George participated alongside students in the 40 book challenge and could frequently be seen reading a book in the hallway before commencement of the school day.

Disciplinary Literacy in Science

Based on interviews and observations, two strong themes in science disciplinary literacy were vocabulary and classification skills. Sandy, the eighth-grade teacher, described prefixes and suffixes to be very "crucial" in science. Another literacy strategy for building discipline-specific vocabulary mirrored the need for classification skills. Suzy, the seventh-grade teacher, utilized the Frayer Model graphic organizer (Frayer, Fredrick, & Klausmeier, 1969) where students list examples and nonexamples. Suzy said that she had students read articles with a focus on learning new vocabulary. She explained, "In the article analysis I have them look up vocabulary, define the words, and ask questions." When asked why vocabulary is so important to science literacy, Sandy replied, "So much of what we do relies on their ability to read graphs and charts which they get from math and their ability to deconstruct a sentence, which they typically get in language arts, but knowing that [science] vocabulary is [also] so necessary."

Both Suzy and Sandy were cognizant of involving students in scientific inquiry and experimental process; however, this looked different in both classes. In eighth grade, the students were engaged in hands-on inquiry through planting a garden outside; when they were done planting, the students used field guides to identify bugs, trees, and animals. Conversely, in seventh grade, students used virtual labs, or computer games, to engage in scientific inquiry. Through video games, students could test out scientific processes that they could not complete in a lab (i.e., processes in the human body). Although scientific inquiry was strongly utilized in both teachers' classrooms, authentic literacy was at times part of, and at times removed from the inquiry process. Students kept a lab notebook, consistent with writing in the sciences, but admittedly not often. When students did keep a lab notebook, the teacher instructed them to write with details and look for patterns. In addition, creative projects and multiple-choice tests

dominated assessment, rather than research papers or other written products.

Suzy: Connecting Students to Science Using Digital Literacy. The majority of reading, writing, speaking, listening, and inquiry in Suzy's classroom took place online. Outside of building scientific vocabulary, Suzy described categorizing and summarizing as important disciplinary reading skills for science. Suzy stated that she regularly emphasized the importance of reading. Additionally, she curated a space online for literacy using a web 2.0 bookmarking tool. In this way, gathering and reading content online were replaced with listening to articles, lectures, and videos, which were bookmarked online by the teacher. Students were able to choose the articles from the teacher's collection, which she handpicked from educational outlets for children (e.g., *Kids Health*, *Discovery Education,* and *NewsELA*), and included a range of text complexity levels as well as the option to listen to the articles. Suzy explained, "I use Symbaloo as a literacy bookmark … and I've broken it down from AG to my lower level kids and I've read every article. I've broken it down to TED talks and videos." Suzy perceived that reading articles and watching videos were more pertinent than reading textbooks in this science classroom. In general, she considered note-taking using guided notes during video lectures to be a typical writing component of the classroom. Students typically completed a creative project as a culmination to inquiry in this class.

In addition to online sources, Suzy reads an article from a scientific journal every year with her students. She described how she teaches the process of reading specific to scientific journals:

> If we're reading a journal article, we'll read the abstract, and then we'll skim over the procedures [and then] over to the conclusion. So you kind of glance over the procedures but then you go to the conclusion and then backtrack.… If they try to read every detail, it gets kind of convoluted in their mind, and it's too much.

Skimming, summarizing, and taking notes were literacy strategies specific to reading scientific articles that Suzy taught students. Summarization was taught as both a reading and a writing skill. Suzy asked students to write an abstract for an article that would align with a type of text consistently utilized in scientific fields.

At other times, students utilized comparing and contrasting as a literacy strategy. Comparing and contrasting established a foundation for categorizing, an important cognitive process of scientists. In addition to providing examples and nonexamples of vocabulary words in order to learn new scientific concepts, students compared and contrasted articles in small groups, as described earlier.

Sandy: Preparing Students for High School With Current Event Articles and Position Papers. Sandy perceived disciplinary literacy as especially important for reading in science. She perceived that students had an easier time reading fiction than science texts. She stated, "I want my kids to … feel [science] is accessible to them." To meet this goal, Sandy curated articles from scientific outlets (e.g., *Popular Science*, *National Geographic*, *Smithsonian Magazine*) and educational outlets for children (e.g., *Discovery Education* and *NewsELA*), as well as excerpts from fictional novels (e.g., *The Hot Zone, Strange Fruit,* and *Calpurnia Tate)*. Sandy's focus for reading was for students to identify the problem, the scientific discovery, and future research—thus teaching students to think like a scientist. She expressed how often the problem is not stated directly in articles, stressing the importance of helping students to infer what the problem is:

> I want them to define the problem.… A lot of our kids will come to me and be like "there's not a problem, it's a new discovery." And I'm like "there's always a problem. What happened that lead to that discovery?" And then I want them to think forward. So I want them to describe what they think is going to happen to the future of science and if any controversies could arise.

In this manner, Sandy's students used inference and prediction, which are general reading skills, but in a discipline specific manner through inferring the scientific problem and predicting future research.

Sandy taught her students how to write both informational and persuasive texts in a scientific manner. For example, students designed and wrote an informational website on dinosaurs, consistent with authentic science writing. Students were instructed that writing in science is concise. Sandy asked her students to write position papers in order to prepare them for the type of argumentative writing required in high school and the Common Core State Standards.

Disciplinary Literacy in Social Studies

Both social studies teachers included in the present study acknowledged the necessity of approaching social studies from multiple perspectives and showing students both sides of an issue when they were reading. The goals for reading included being able to contextualize the text historically, find the message, make connections to other texts and historical events, and finally make assertions that are drawn from the text. In this way, texts in social studies were approached as arguments rather than facts. Writing strategies in social studies also focused on supporting arguments. One participant stated the most important writing strategy in social studies is "being able to make claims and use evidence to support it."

Texts in social studies included primary sources, such as letters, journals, pictures, political cartoons, maps, and, as one participant noted, "a heck of a lot of speeches." The participants also used online articles, literature, and videos to make the classes "fun." Reading strategies in social studies included analyzing the source and the content of a text, as well as contextualizing when it was written. A key part of reading was finding the central message, as well as acknowledging how the author is trying to manipulate the audience. When asked what the most important literacy skill is in social studies, one participant stated that "analyzing a source is probably the biggest one." Participants said they taught students to identify whether a source is a primary or secondary source. They also said they incorporate fictional texts to engage students in understanding of more difficult concepts.

Tavin: Conducting Inquiry to Avoid Boredom and Build Literacy. Tavin's classroom was driven by technology, small group work, and project-based inquiry not only to make the learning more fun and interactive through doing "cool projects," but also to purposely avoid teacher and student boredom. "I never try to do one thing too much. So if you just keep giving them article after article after article they are going to become bored and they are going to go crazy; and I am going to go crazy with them." He emphasized the importance of incorporating creative projects through which students could build their higher order thinking skills and overall literacy skills, through more authentic means than a PowerPoint lecture. During one class observation, students were observed creating Public Service Announcements using VoiceThread, where Tavin reminded students that the purpose of the assignment was to persuade their audience to do something about the issue. These projects would later be put on public display for students' peers and school to see via their class website. Other student inquiry projects included informational flyers, soldiers' journals from WWI, and propaganda posters from WWII, all which were on public display in the hallway.

Writing in Tavin's class took a more formulaic approach through "state, explain, support." Tavin reported the students to have "poor writing, and a lot of the time they will just give you a sentence and that's it." However, through the state, explain, support method, Tavin perceived that he could help move students writing from one to two sentences to full paragraphs with textual evidence incorporated. Writing that was not based around historical facts and did not utilize

quotes to back up the argument was considered invalid in his classroom.

Tavin chose a variety of texts for students to read in his classroom to include primary and secondary sources, as well as fictional texts such as Dr. Seuss books and poems. The fictional texts were creative ways to "spice up the class so you're not doing primary sources over and over again because kids are going to get bored of that." Other readings included online sources to teach students perspective, guide them to see both sides of an event and argument, and fully grasp the context and conflict. When reading, students were directed to analyze the text through annotating, reading a text several times, answering reading question, and considering the author's perspective.

Lexie: Filling in Gaps and Challenging Students to Question Everything. Because eighth-grade social studies is free from the restraints of EOGs, and because of her perception that writing is noticeably absent from other content areas aside from ELA, Lexie viewed the course as primarily a writing course. The focus for writing was primarily argumentative writing and position papers because she was "seeing a deficit in [students'] being able to write argument, being able to make claims, and use evidence to support it." Rather than seeing this as "the most important skill; it's just that [she felt] a responsibility as an eighth-grade teacher" to prepare her students with the skills necessary for high school. Another literacy goal for her social studies class was to build up students' reading stamina especially with long and difficult documents. The texts used in the classroom can be antiquated and difficult to comprehend due to vocabulary and writing styles; therefore she tried to "fight their sense of overwhelm and fight their—you know, lack of reading stamina, and fight their lack of focus [through] constant exposure and constant sense of confidence."

Lexie self-reported that 75% of students' time is spent working with primary documents. She openly admitted to being the gatekeeper who chose reading and documents to fulfill her purposes. "I have an agenda and it would be ridiculous for me to pretend that I don't." She chose documents that forced students to draw a conclusion for themselves rather than telling them which side of the argument to believe. For example, in one lesson she purposefully chose documents that would lead students to "the conclusion that the New Deal wasn't equitable." She repeatedly reiterated how the author's purpose can prove to be the most difficult aspect of a text, yet the most crucial, especially when identifying how readers can be manipulated by the author for a specific purpose. There are some times "when I really don't have an agenda and I just want them to see that there is a broader story." Here Lexie brought in other texts and artifacts such as photographs, poetry, songs, political cartoons, letters, and short fictional stories in order to aid students' access to more difficult concepts, rather than simply to identify different literary devices and promote a pleasurable reading experience. It is through exploring the sources themselves that students can come to understand a text's credibility and authenticity. Lexie noted that the social studies require readers to "connect [a source] more to the events surrounding it."

Disciplinary Literacy in Mathematics

Both math teachers included in the present study were eighth-grade teachers. During their interviews, they discussed how an overarching goal in their teaching was for students not to see math as an isolated discipline. Both participants discussed purposefully trying to make connections to other subject areas while teaching; however, most of the connections were primarily through science related topics. Word problems in both classes were geared to be relevant to students lives and included topics such as cell phone plans, speeding tickets, and babysitting money to make mathematics more authentic for students. Rachel referred to this as moving away from "naked math" where abstract variables equal numbers, and making

it that variables represent something in the world.

For both participants, "evidence" in mathematics meant arriving at the correct solution, which in turn provides teachers confirmation of students' understanding or not. Because one correct answer is valued in mathematics, revision necessitates "students to identify their mistakes and then explain what they did wrong." Consequently, both participants voiced how math was a subject that should be completed in paper and pencil. However, doing math correctly did not mean that students had to arrive at the correct answer in the same way. For Dana,

> Some students manage to find the shorter and most efficient solution to the problem and I think they are more pragmatic. Students who tend to be more imaginative will look for more creative solutions, but those sometimes tend to be more complicated than they should be.

On the other hand, Rachel encouraged divergent routes toward the same solution because it fostered authentic discussion between students.

Rachel: Emphasizing authentic vocabulary as a primary path for understanding. Rachel continually stressed the importance of mathematics vocabulary being used deliberately by both teachers and students, but also needing to be authentic. She was concerned that many teachers "dumb down the vocabulary," use "cutsey" words, or "slide over vocabulary because of the time crunch" in order to help students to grasp the mathematics concepts; however, in doing so, students "can't make the connection when they get to the next level because they learned on this really basic level." For Rachel, proper vocabulary was fundamental to being able to understand math and do the problems correctly. Problematically, she noted that "a lot of students, when they come to you from the year before, they don't understand why they are doing what they are doing." In order for students to develop a true—and automatic—understanding of math, she emphasizes rote memorization in order to make basic skills automatic. Once skills become automatic, then students are taught to understand the purposes underlying mathematical concepts, which is central to her disciplinary teaching. Further, Rachel referred to mathematics as application-based rather than project-based, where students focus on applying their understanding of math concepts to various math problems. Rachel encouraged students to see "there's so many different ways you can solve a problem," in hopes encouraging authentic discourse between students and changing their perceptions of math.

In terms of reading and writing, Rachel explained that "math is one of the areas—that I will honestly say—most teachers don't spend a lot of time on reading … also I think the writing that we do in math is minimal compared to the writing we do in other disciplines." However, she did notice that students would "automatically start to highlight, underline, circle things because they've been prepared through other classes to do that." The skill of annotation was being carried over from other classes. She described the goal of reading in her classroom as "tearing apart questions," reading for specific words related to math, understanding how the mathematical concept applies, and solving a problem. Even though Rachel described reading in math as technical reading, "from the kids' perspective I would say everything is fictional text, because even the real world applications, they don't have the maturity to see where they're going to use it."

Dana: Teaching Mathematics as Its Own Language. For Dana, learning the language of mathematics was the key for student success in this particular discipline. Not only did she convey how math "builds on itself" in a hierarchical fashion, but also noted that students cannot have gaps in their knowledge year to year. She would tell her students they "have to treat it seriously in order to be successful from right now. So I tell them, you cannot take a break in mathematics." For Dana, the language of mathematics was very specialized:

> You have to use the words, you have to use them correctly, you have to know where to use them, and how to use them. [Students] need to know the definitions, they need to know the vocabularies, they need to know the formulas, they need to know when to use them.

To reiterate the importance of knowing vocabulary and definitions, the review for their final exam only contained words and definitions, not a single formula, example, or math problem. Even though some words may overlap with the science disciplines—which Dana referred to as a branch of mathematics—she viewed the majority of mathematics to be terms and symbols specialized only to math, ones that "you don't meet anywhere else. You don't talk about them in other contexts other than mathematical contexts."

Dana described disciplinary literacy as being a natural process, one that occurs unconsciously. She reiterated how she believed that "humans are born mathematically inclined. The first thing you actually perceive are numbers … so the first quantities, the first relation you have with the world are mathematical, and I think kids are actually naturally inclined for mathematics." Despite this natural inclination she could not understand how "very few of her students are actually loving mathematics" but merely "tolerate it" much like they would tolerate having their teeth cleaned at the dentist.

As far as reading was concerned, Dana did not read with her students in class because "we are not a language arts class." Even though students used annotation skills such as highlighting when reading word problems, this was a skill brought in from ELA, and not something she directly taught them. Additionally, she viewed students' reading levels as directly related to their understanding of mathematics. Those who were able to read more fluently with higher Lexiles and better reading comprehension, also were "able to separate what is really important to get them to the solution" within their word problems.

Cross-Case Analysis

Using cross-case analysis, four themes emerged from the initial four discipline-based cases: (a) Interdisciplinary Literacy, (b) Power in Disciplinary Language, (c) Pedagogical Tensions Related to EOGs, and (d) Individualized Access. Each theme is presented with supporting data. See Table 3 for definitions of the four themes.

Interdisciplinary Literacy. An emerging theme in the cross-case analysis of the four disciplines was the interdisciplinary culture of middle school teams. All eight teachers spoke more about literacy being "interdisciplinary" rather than disciplinary, or mistook disciplinary to mean interdisciplinary. For example, one participant said, "What I understand about disciplinary literacy is just the incorporation of using same techniques in different classes to help support each other." Reading and writing strategies such as annotation and state, explain, support were used across the board to facilitate students' abilities to strengthen their writing in every subject. Participants perceived that consistency was important for students in order to build confidence with strategies, as well as prepare students for high school. According to George, literacy is the key to a successful life with "reading [being] the most important skill that you learn in school because it impacts all disciplines." Therefore, he viewed disciplinary literacy as a way to get all teachers on board because "now everybody realizes that if a kid is more literate, more fluent in reading, understands reading and writing, then they are better at every single aspect of their lives. It's not just school; it's a life skill." Participants reported that grade level teams purposefully used the exact same literacy strategies, with the goal of vertically aligning literacy skills and academic language to create consistency for students among different disciplines and grade levels. Ultimately, students could make connections between classes through this repetition of both strategies as well as terminology, ultimately empowering individual learning habits.

TABLE 3
Definitions and Examples of the Four Cross Case Themes

Cross Case Theme	*Definitions*	*Examples*
Interdisciplinary literacy	General literacy strategies that are horizontally and vertically aligned between grade levels and subject areas and that serve to direct and focus students' attention.	• "If we're breaking down a word problem in math, then they are going to do the same exact strategies that they do in language arts, math, and social studies, and once they see it, repetitively, then they can see the connection, they can learn for themselves. It's, ah, awesome." (George) • "You guys keep saying disciplinary, but I just don't think you can separate the idea.… It's just impossible to not read in social studies. It is impossible to not write in social studies as far as I am concerned." (Leslie)
Power in disciplinary language	Teachers' perceptions about literacy in the disciplines expanded due to their participation in the MOOC-Ed and professional learning teams.	• "I did my master's thesis on student led inquiry, and yet I got away from using that word. And [the MOOC] reminded me of the power of that word and … to use the correct terminology." (Leslie) • "Never do [disciplinary literacy] as an island because if you do it as an island it's not as effective because the kids don't carry those strategies over." (Suzy)
Pedagogical tensions related to EOGs	Curriculum and instructional choices focused around particular tips and tricks students can employ that are explicitly linked to EOG test preparation rather than student engagement or authentic learning.	• "We do a lot of pulling textual evidence and explain the impact. "Impact" is like a buzz word for the EOG right now, um, and so we talk about a lot of what does impact, explain the impact." (Lisa) • "It would be nice to have the time to dig into something and really get kids excited about coming up with and solving problems. Right now, we are just doing a bunch of practice, and that's unfortunate." (Rachel)
Individualized access	Choice in accessing information as well as presenting learning. relative to the unique demands of the discipline and real world application.	• "A lot of the kids that I teach are below grade level, so I have to take that into consideration as we start to build up their strength in reading and vocabulary … I always try to incorporate some kind of real world in the unit that allows them to see it." (Rachel) • "I try to give the kids several different ways of displaying knowledge, displaying learning, displaying growth. And I try to make sure I never pigeonhole." (George)

Consequently, the goal in seventh and eighth grade was not to create disciplinary experts, but promote a continuity of generic literacy skills that students could use in all the different subject areas (Brozo, Moorman, Meyer, & Steward, 2013; Faggella-Luby, Graner, Deshler, & Drew, 2012; Moje, 2008). Participants also believed that making connections across content areas was important. A participant stated, "The ideal in any classroom is to try and do interdisciplinary, so that you're making connections from everything else you're learning." This interdisciplinary focus of the teams made some of the participants resistant to talking about their content area in a distinctive manner. However, it is important to consider that the nature of middle school "teams" are naturally interdisciplinary; thus it would make sense that teachers are not necessarily training their students to be disciplinary experts in middle school. Rather, they were teaching students content area literacy skills, which are necessary for comprehension in all subject areas and future success in school.

Power of Disciplinary Language. A second theme from the cross-case analysis was

participants' recognition of the power of disciplinary language. Specifically, participants noted that through the MOOC-Ed, they were provided with access to "fresh ideas," resources, and understanding about the literacy demands in other subject areas. This access allowed them to see what literacy looks like in the different disciplines, and become more self-aware of the literacy demands within their own discipline. For example, after participating in the MOOC-Ed, Sandy realized that "science literacy is so much more" than current events articles.

In addition to the MOOC-Ed providing teachers access to new ideas and resources, they also described their professional learning teams as supporting their disciplinary literacy strategies in planning units, classroom activities, and assessments together "based on [materials] that use the disciplinary language, like the content specific language that is helpful for students." Both of the newer teacher participants (i.e., Tavin and Sandy) spoke of how their teammates had different styles of teaching and different teaching philosophies, yet relished these collaborative meetings where they could exchange ideas, merge perspectives, and for Sandy helped her to "make sure that the literacy I was picking was going to meet our standards and our objectives and everything." Because many of the English and social studies teachers had to teach both content areas, they found it particularly helpful to have collaborative time between content area experts. Lisa acknowledged, "I am not an expert in social studies, and the other teacher who is my partner, she is, and I am an expert in Language arts, so we are helping one another." Both the MOOC and the teachers' professional learning teams made Tavin feel like "you're not just stuck by yourself and your ideas."

Through this collaboration, participants began to see that literacy is not merely the content of ELA utilized in creative ways in other classes, but that literacy is foundational to all disciplines and that each discipline has its own text types, processes, and literacy practices. The process of looking at claims in different content areas may be different due to structure. For example, in math students may be looking more at trends, in science they may be looking at problem-solution, and in social studies they may focus more on cause and effect. For Lexie, the goal for approaching a text in all content areas should be to understand "how people can manipulate their message, and be aware of that so … I'm not going to be duped as a citizen. I'm going to be a responsible citizen." As students changed physical spaces in middle school to attend different classes throughout the day, the participants could see how students' approach to a text would change depending on the class content. While in ELA, the focus was on writer's craft, in science the focus was on scientific inquiry and discovery, and in history the focus was on the specific events detailed. One participant explained, "I think just by where they are [in history class], they are going to read it differently. So I think that has more to do with it, than how they attack it as a reader."

Pedagogical Tensions Related to EOGs. A pervasive theme throughout the interviews and observations was the importance of EOG testing, and how this influenced teachers' decision on curriculum choices, including text types, the amount and type of creative projects, the goal for classroom activities, and instruction of specific reading and writing strategies that would prepare students for these tests. Lexie was able to treat her eighth-grade social studies class more as a writing class because these students did not have to take the EOG. Conversely, both ELA teachers spoke of how they were encouraged to use district-mandated guides that directed which genres and topics they taught. In some cases, this not only meant having to teach a text they were not passionate about, but also being restricted by district guidelines for instructional time split equally between informational and fictional texts. Pressure surrounding EOGs also restricted the amount of time teachers perceived was available for creative projects, and revision of students writing.

The teachers who had an EOG coming up at the end of the year explicitly incorporated practice tests and test taking strategies in their classroom. Teachers used practice tests to give students more exposure to the academic language of the disciplines since that is how they would be tested (Johnson et al., 2011), but they also said they used these activities as a way to remove the pressure and anxiety that many students face when taking tests. Test taking strategies included skimming the text for key words and reading the questions and answers first on practice multiple choice tests, which George referred to as a way to "focus" the students. Additionally, the drive toward common academic language and formulaic writing strategies was present since this would provide students a solid basis for the tests. Despite these restrictions, one participant voiced EOG practice as "effective. Every year I've seen growth."

Individualized Access. A fourth theme was the importance of giving students multiple ways to access and comprehend disciplinary texts. One participant gave students the option to "read with their cooperative learning team, or they can read individual[ly] and then discuss with their cooperative learning team." Participants knew their students' Lexile levels and curated multiple texts of varying Lexile levels, as well as digital resources that included audio and Spanish-language options.

Teachers stressed the importance of letting students express their understanding in multiple ways. Participants reiterated how through inquiry and application to the real word, students would be able to discover information on their own. Through this, teachers hoped that students would see the underlying value in each respective discipline. Some participants focused more on technology and inquiry projects where students worked collaboratively in groups to cocreate projects. For assessment purposes, students created learning products to demonstrate their new knowledge in print and digital modes, including, but not limited to writing traditional papers. Participants described having students create VoiceThreads, screenplays, posters, websites, and public service announcements to conclude research projects.

DISCUSSION AND CONCLUSION

The purpose of the present study was to examine middle school teachers' (a) perceptions of literacy demands in their disciplines and (b) specific literacy strategies they used to teach their disciplines. The discussion centers on two pedagogical tensions that emerged from the data. The first issue discussed is the tension between content area literacy, or generalized literacy instruction, and disciplinary literacy, or discipline-specific literacy instruction. The second is the tension between disciplinary-based instruction and interdisciplinarity, which permeates the middle school curriculum.

First, the findings suggest that middle school teachers employed both content area literacy and disciplinary literacy strategies but were not always aware of the distinct nature of the literacy demands of their disciplines or that they were using disciplinary literacy strategies. Both Moje (2008) and Brozo et al. (2013) called for a middle ground between disciplinary literacy instruction and content area literacy, asserting that the goal of disciplinary literacy instruction is not to make every student a disciplinary expert. Rather the goal is to introduce students to the different habits of mind associated with the different disciplines. This is important as the participants were mindful of their role in preparing students to navigate the literacy demands and complexities of high school. Students need to know the goals and values of the different disciplines in order to be apprenticed toward disciplinary reading skills. Once students understand how each discipline has a unique language with similar or different practices, they will be able to move between the disciplines more effectively (Johnson et al., 2011). Hence, Shanahan and Shanahan (2008) proposed that middle school is a time of transition between learning

general content area literacy strategies and discipline-specific literacy strategies.

Second, the findings suggest that the middle school context creates a pedagogical tension between disciplinary-based instruction and interdisciplinarity. Situated in the disciplines, students *learn* ELA, science, history and social studies, and mathematics *by doing* ELA, science, history and social studies, and mathematics. When students solve real world problems that interest them, they interact with information inquisitively and curiously leading to authentic learning outcomes. In the present study, participants embraced interdisciplinarity and tended to resist the perception of disciplinary-based instruction. Past research, however, does not advocate for siloed teaching but does emphasize the importance of disciplinary depth. Emerging research on disciplinary literacy with participants ranging from third to seventh grade suggests deeper discussions resulting from disciplinary literacy focused reading (Juel, Hebard, Haubner, & Moran, 2012). In fact, some have argued that deep disciplinary knowledge is prerequisite for quality interdisciplinary work (Spires, Kerkhoff, & Graham, 2016). Ultimately, middle school can provide a dynamic learning space for students to think in disciplinary ways in service of solving complex problems on interdisciplinary teams. Future research could explore how middle school teachers navigate the pedagogical tensions of disciplinary literacy within the context of general interdisciplinarity in light of the Common Core State Standards and other current policy initiatives.

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APPENDIX A: SUPPORTING STUDENTS' DEVELOPMENT OF DISCIPLINARY LITERACY OBSERVATIONAL PROTOCOL

Observational Context

Today's Date:	
Participants Name:	
Grade Level:	
Subject:	
Start Time of Lesson: End Time of Lesson:	
# of boys: # of girls:	
Any other adults in the room? (If so, who?)	

Observation	**Personal Response/Reaction**

Postobservation Reflections:

1. Describe anything that struck you as particularly interesting or noteworthy from today's observation and interview

Classroom Environment:

1. What did you notice about the school culture and environment upon entering the building and making your way to the classroom? (e.g., general atmosphere, student behavior or academic focus, etc.)
2. What were the teacher and students doing when you arrived? Anything special to note that may influence the lesson to be observed (e.g., fire drill, student misbehavior, intercom announcement)?
3. Record a brief description of the classroom (e.g., how are the desks/tables arranged, what do you notice on the walls)

Activities:

1. What resources do you notice (e.g., computers, tablets, books, etc.) in the classroom? Which resources were used during this class period and how?
2. Describe the nature of the dialogue in the classroom, (e.g., teacher-to-student)
3. What types of reading activities were the students' engaged in during the lesson?
4. What types of writing activities were the students' engaged in during the lesson?
5. What types of inquiry activities were the students' engaged in during the lesson?

APPENDIX B: SUPPORTING STUDENTS' DEVELOPMENT OF DISCIPLINARY LITERACY

Interview Protocol #1

Introduction Question:

1. Tell me a little about yourself as a teacher.

Instruction:

2. How do you structure your daily lessons?
3. Tell me about the assignments you typically give in your class.
4. What kinds of materials do you use most often in your classroom?
5. What are the most common reading and writing strategies you use in your classroom? Why do you use them? What are their objectives?
6. How do you choose what your students read in your classroom?
7. How do you help students access the text when they are reading?
8. Describe how you attended to your own use of disciplinary language AND to your students' use of disciplinary language in your classroom.

Teacher Beliefs:

1. Describe what you know about disciplinary literacy.
2. What literacy skills do your students need in [your content area] class?
3. Do you think teachers in [your content area] should teach discipline specific literacy practices in the class? Why or why not?
4. What do you think is the main responsibility of teachers in [your content area]?

MOOC-Ed:

1. What aspects of the DLDL MOOC-Ed did you find the most helpful? Can you give a specific example?
2. How has your PLC supported your DL practices in your classroom? Can you give a specific example?
3. Suppose I was a new teacher, what advice would you give me about teaching [in your discipline]?

Conclusion:

1. What would other teachers say about you in the building and your teaching style/classroom/et cetera?
2. Is there anything you feel I should have asked you that I didn't already?

SUPPORTING STUDENTS' DEVELOPMENT OF DISCIPLINARY LITERACY

Interview Protocol #2

Texts and Reading:

1. How do you choose the texts you use in your classroom/discipline?
2. What types of texts do students read in your classroom/discipline?
3. How do you make use informational and fictional texts in your classroom? (Which one do you use more often and why? How do students read when reading a fictional text? How do they approach reading an informational text?)
4. From your own experience, describe how a [literary critic/mathematician/scientist/historian] READS in their discipline.
5. In your opinion, how is reading in [your content area] similar to reading in the other disciplines (i.e., Social studies, science, math, ELA)? How is it different?

Writing:

6. How do you decide what, how, and for what purposes students will write in your classroom?
7. Describe how a [literary critic/mathematician/historian/scientist] WRITES in their discipline.
8. How do students synthesize claims and evidences (or synthesize information) in their writing in [your content area]?
9. In your classroom, what is the primary goal of revision in [your content area] classroom? (What should students focus on?)
10. In your opinion, how is writing in [your content area] similar to writing in the other disciplines (i.e., Social studies, science, math, ELA)? How is it different?

Inquiry Cycle:

11. How important is inquiry in your disciplinary teaching? Can you describe what inquiry looks like in [your content area]?
12. How do students analyze information in [your content area]?
13. In your opinion, what types of evidence are considered most valuable in [your content area]? How is this similar or different to the other disciplines?

Other:

14. How would you describe the nature of discourse in [your content area] classroom?
15. How would you describe your primary role in supporting students' literacy development?
16. According to Shanahan and Shanahan, if disciplinary literacy is how experts read, write, think, and speak in the different disciplines, what does this mean for struggling readers?

Conclusion:

17. In your opinion, how would you describe the differences between disciplinary literacy and content area literacy?
18. Are there any other insights about disciplinary literacy that you would like to share with me today?