

Chapter 1

Developing Socially Just Subject-Matter Instruction: A Review of the Literature on Disciplinary Literacy Teaching

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In a 1996 *American Educational Research Journal (AERJ)* article, Deborah Ball and Suzanne Wilson (Ball & Wilson, 1996) made an argument for “integrity in teaching,” in which they framed integrity as the commitment to “fusing” the moral aspects of teaching with the intellectual. The central question they explored was how to deal with conflicts between the intellectual work of teaching content concepts and the moral work of teaching those content concepts to human beings, that is, to people with varying perspectives on the value of the content, varying skill sets and ways of knowing that they brought to their learning, and rich and full lives that might or might not intersect with the content under study. Ball and Wilson argued that these tensions produced constant dilemmas for teachers who must negotiate a desire to meet content learning objectives with their respect for students’ backgrounds and beliefs, which sometimes contradict or dismiss targeted content. Ten years later, I would like to draw from and spin that argument by suggesting that a corollary of Ball and Wilson’s teaching with integrity is the concept of teaching with and for social justice. Teaching in socially just ways and in ways that produce social justice requires the recognition that learners need access to the knowledge deemed valuable by the content domains, even as the knowledge they bring to their learning must not only be recognized but valued. In this review, I revisit that notion of teaching as the fusion of the intellectual and the moral and ask a slightly different question: What does current research tell us about attempts to fuse the moral and intellectual in a way that produces socially just subject-matter instruction at the secondary and postsecondary levels? Furthermore, what would it look like to fuse the moral and intellectual to produce a subject-matter instruction that is not only socially just but also produces social justice?

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The review takes this path: I briefly define what I mean by socially just pedagogy, contrasting it with the idea of pedagogy for social justice. I then lay out the range of thinking on socially just subject-matter instruction, including some perspectives that claim to focus on literacy within the disciplines. I distinguish these perspectives from each other, focusing on perspectives that revolve around language and texts within disciplinary instruction (i.e., what I am labeling disciplinary literacy theory) because these language and text-based disciplinary perspectives offer potential for developing socially just subject-matter instruction. What's more, these perspectives offer potential for subject-matter instruction that produces social justice, a distinction I clarify in a latter section of the chapter.

Within the area of disciplinary literacy, however, one also finds a range of perspectives, highlighting the different disciplinary traditions, theoretical stances, and research foci that undergird current work on disciplinary literacy pedagogy. I present both theory and research related to four types of disciplinary literacy pedagogy. For each type, I offer a broad scan of the disciplinary traditions and theoretical stances of those who write about disciplinary literacy from that particular framework and present a brief synopsis of findings in relation to any empirical research conducted from that particular approach to disciplinary literacy teaching. In addition, I provide details of two to three studies for each area that serve as exemplars of the work currently being done in that area. I then raise questions about what those stances might mean for the development of socially just subject-matter pedagogy. I do not advance one set of approaches over another but rather seek to uncover what it would take to produce disciplinary literacy pedagogy that produces socially just subject-matter pedagogy for a wide range of youth.

Given the scope of the review, I am not able to do justice to specifics of all studies available for review. Keyword searches on ERIC alone using the search terms *disciplinary literacy*, *mathematical literacy*, *scientific literacy*, and *historical/social science literacy* yielded 31 disciplinary literacy articles, 648 science and scientific literacy articles, 180 historical literacy articles, and 75 and 103 articles for mathematical literacy and math literacy, respectively. Many of the pieces uncovered in such a search were not relevant for this review, but the numbers give a snapshot of the scope of possibility for review using these identifiers. I also incorporated books and edited volumes as well as pieces that I deemed a form of disciplinary literacy, even when the authors did not identify their research as such, thus providing a massive corpus of potential studies. My interest here, however, is less on providing details of particular studies and more on showing how different perspectives on disciplinary literacy contribute to our understanding of how to develop socially just subject-matter instruction, particularly in secondary school settings.

As a result, I have chosen to highlight studies that are part of extended programs of research and/or single studies that have made a particular impact on the field in this area. Moreover, even within any one research program, I may only highlight one or two aspects of a larger body of work. This review, then, should be seen as a springboard for further study and conversation rather than as a definitive representation of the state of the field.

Furthermore, as might be suggested by my repeated use of the word *youth*, the review focuses primarily on subject-matter approaches for secondary and postsecondary educational settings. My rationale for delimiting in this way is in part pragmatic (this is the age group I know best) and in part substantive. In terms of substance, it is the case that sharp divisions among the subject-matter areas are most obvious when children leave elementary school settings and enter secondary (middle, high school, college, and university) settings. Although some scholars have demonstrated that the discursive practices of the subject matters begin to slip implicitly into the texts and teacher talk of elementary school at early ages (see Ciechanowski, 2006; McKeown & Beck, 1994), the slicing up of the secondary school day into neatly bounded subject-matter bites dramatically heightens disciplinary divisions. The disciplinary slices of middle school, high school, and university both underscore differences that exist in disciplinary practices and reify differences that are not as normative as the divisions may suggest. Ironically, these divisions also may hide the fact that much of what happens in subject-matter areas is an artifact of disciplinary thinking and cultural practices engaged in the service of knowledge production in those disciplines. Because students move from class to class and subject matter to subject matter, the practices of each area may appear to be artifacts of particular teachers, classroom spaces, or groups of students rather than artifacts of disciplinary thinking or cultural practice. For all of these reasons, the bulk of the review will examine studies of secondary and postsecondary settings, youth, and teachers, although I may refer to studies conducted among elementary-age youth when findings or perspectives warrant attention.

DEFINITIONS AND DELIMITERS

Socially Just Pedagogy or Social Justice Pedagogy?

The concept of socially just pedagogy covers a vast territory to which I am not able to do justice in this review. However, I do wish to set out the parameters for my thinking about subject-matter instruction and, particularly, disciplinary literacy pedagogy as a form of socially just/social justice pedagogy. In this regard, at least three aspects of social justice teaching seem relevant. One lies in the controversial distinction between the phrases socially just pedagogy and social justice pedagogy. These subtle differences in wording signal important differences in epistemological and practical orientations. The call for socially just pedagogy is a call to ensure that all youth have equitable opportunities to learn. In many cases, this view seeks to provide equal resources for learning, although the socially just pedagogue cannot always control access to material resources. It also can refer to ensuring that all youth learn conventional or academic literacy practices. Some would argue that this stance, although it equalizes skill and provides opportunities for all to achieve social and economic success (Moses & Cobb, 2001), risks reproducing the status quo in terms of cultural dominance. That is, it risks assimilating all people into a dominant, White mainstream rather than opening spaces for many different cultural practices to coexist and even nurture one another. By contrast, social justice pedagogy, or teaching to

produce social justice, involves more than providing equitable learning opportunities implied in the phrase “socially just pedagogy,” although such opportunities are necessary ingredients of social justice pedagogy. From a social justice perspective, opportunities to learn must not only provide access to mainstream knowledge and practices but also provide opportunities to question, challenge, and reconstruct knowledge (Ladson-Billings & Tate, 1995). Social justice pedagogy should, in other words, offer possibilities for transformation, not only of the learner but also of the social and political contexts in which learning and other social action take place (Saunders, 2006). Social justice pedagogy offers these transformative opportunities for all youth, even those who are privileged under current epistemological, social, and political structures. In other words, social justice pedagogy is not restricted to schools populated by youth of color or youth from low-income communities.

In relation to disciplinary teaching, then, both socially just and social justice pedagogies require that teachers provide all students with equitable opportunities to engage currently valued forms of disciplinary knowledge (Moses & Cobb, 2001). Social justice pedagogy takes an additional step and demands that youth learn to question and perhaps even offer changes to established knowledge. In more straightforward terms, this requires that educators teach students not only knowledge but also how to critique knowledge. It is important to note, however, that teaching the skill of critique without providing access to information and/or skills for accessing information (e.g., conventional literacy practices) is no more an example of teaching for social justice than is the act of teaching discrete bits of information to be memorized as taken-for-granted truths (C. D. Lee, 1993, 2005; Morrell & Duncan-Andrade, 2003; Moses & Cobb, 2001). For example, some forms of critical literacy teaching start with critique, and in so doing overlook the need to be able to communicate with proficiency across multiple audiences or to read and take information from multiple types of texts (see Wade & Moje, 2000, for more detailed analysis). Other critical literacy practices suggest that teachers should work only with the knowledge and practices youth already value, arguing that requiring youth to learn mainstream knowledge devalues their own knowledge and practices. As Delpit (1988) argued, such pedagogy is not necessarily socially just in the sense that it reproduces differential access to the culture of power that produces and labels knowledge as mainstream or marginal by not providing access to that culture (see also Ladson-Billings, 1999).

A second principle is that what counts as equitable opportunity is not straightforward. Equity is not a stable function whose parameters can be decided a priori but is rather a function of what people bring to an activity and the kinds of resources the activity can provide. Thus, prescription for either socially just pedagogy or social justice pedagogy cannot be offered, although broad principles of practice can guide pedagogy. Some students, for example, might need teaching that is explicit about taken-for-granted conventions (here again, see Delpit, 1988), whereas others might require pedagogy that encourages inductive reasoning and construction of knowledge over time. Some students might require a (temporary) focus on basic skill development,

whereas others may need to learn how to hone and communicate critique to multiple audiences. Moreover, the same student may require different pedagogical practices at different points in development or, apropos of secondary school settings, in different subject-matter areas, depending on students' backgrounds, skills, and interests. In other words, there are not particular practices that are more socially just or that teach social justice better than others; those practices must be generated in response to actual learners, a point that links social justice/socially just pedagogy to the concept of culturally responsive pedagogy.

Culturally Responsive Pedagogy

In briefly defining the construct of culturally responsive pedagogy, I draw heavily from a chapter I previously coauthored with Kathleen Hinchman (Moje & Hinchman, 2004). In that chapter, we argued that all educational practice needs to be culturally responsive to be best practice. As cultural beings, young people deserve to experience pedagogy and curricula that respond to and extend their cultural experiences. Thus, culturally responsive practice attends to the funds of knowledge (Moll, Veléz-Ibañez, & Greenberg, 1989) and discourses (Gee, 1996) of the youths' home; ethnic, racial, or geographic communities; youth culture; and popular culture, school culture, classroom culture, or discipline-specific culture (Ladson-Billings, 1994; C. D. Lee, 2001; C. D. Lee & Majors, 2003). These ways of knowing and "ways with words" (Heath, 1983) are present in school and also influence how people teach and learn in school. Such teaching also recognizes that needs and interests are always mediated by memberships in many different groups of people and by activities engaged in many different times, spaces, and relationships. However, the cultural knowledge and practices of some students—most often, students of color, English language learners and recent arrivals to the United States, or students from low-income homes and communities—are often unrecognized or dismissed in teaching practice, especially at the secondary level (Gonzalez, Moll, & Amanti, 2005; Heath, 1983; Ladson-Billings, 1994; C. D. Lee & Majors, 2003; Moll & Gonzalez, 1994; Nieto, 1994; Valdes, 1998; Valenzuela, 1999). As part of our review, Hinchman and I suggested that culturally responsive, or socially just/social justice, subject-matter pedagogy could be thought of in three—not mutually exclusive—ways (Moje & Hinchman, 2004, p. 323): (a) as a bridge from everyday knowledge and practice to conventional content learning (Gutiérrez, Baquedano-López, Alvarez, & Chiu, 1999), (b) as a way to teach skills for navigating cultural and discursive communities (Moje, Ciechanowski, et al., 2004), and (c) as a way to teach students how to challenge and reshape the academic content knowledge of the curriculum (Collatos, Morrell, Nuno, & Lara, 2004; Gutiérrez, Baquedano-Lopez, & Alvarez, 2001).

Subject-Matter Instruction

By subject-matter instruction, I refer primarily to the practices typically engaged for the purpose of teaching knowledge associated with different disciplines. Although

subject-matter instruction can cover disciplines from English literature to physics, visual arts to mathematics, and social studies to music, in this review I confine my discussion to what are commonly considered the four academic subject areas: English language arts, mathematics, the social sciences, and the natural sciences. These domains represent the four subject areas for which most U.S. school districts prescribe core requirements and that largely define life (for both students and teachers) in modern U.S. middle and high school settings. In addition, these domains encompass many disciplines (e.g., the social sciences draw from the disciplines of history, political science, psychology, anthropology, sociology, philosophy, and economics).

The question of what counts as socially just subject-matter pedagogy—and thus socially just pedagogical content knowledge and disciplinary literacy pedagogy—is answered in different ways by different subject-matter specialists. Although any perspective on socially just/social justice pedagogy involves providing students access, one of the most important differences revolves around the question of access to what. That is, to what does a socially just/social justice perspective provide access? Is access to knowledge the key, or is access to skills and strategies more central to socially just pedagogy? These questions are answered in different ways across perspectives, depending in large part on whether the goal is to provide equitable instruction for all or to provide instruction that might enable youth to change society. I uncovered at least four distinct perspectives that frame socially just subject-matter pedagogy as providing students access to (a) expert subject-matter knowledge; (b) disciplinary knowledge they care about, generated in response to their own everyday concerns and interests; (c) disciplinary knowledge and ways of knowing that are useable in everyday life; and (d) disciplinary ways of producing knowledge via oral and written texts. I detail each of these perspectives in what follows and then zoom in on the final perspective, that of ways of producing knowledge, which I refer to as disciplinary literacy.

Social Justice as Access to Expert Subject-Matter Knowledge

This perspective suggests that the goal of subject-matter instruction should be to produce youth who are equipped with the content knowledge assumed necessary to work in disciplinary professions (i.e., training all students to be historians), regardless of whether they plan to do so. This perspective, well represented in college preparatory curricula, has largely fallen by the wayside in most education research, although lingering tenets of this perspective may remain. In general, however, this stance is typically considered unrealistic and even elitist; in fact, the only representation of this stance that I could locate in published research or theory was in the move of education researchers to dismiss it as valid (see, e.g., Duschl, 2005; Leinhardt, 1994). Indeed, in practice, few secondary schools attempt to prepare all students with elite knowledge. Most schools focus on educating some students to work in the disciplines or to prepare for college, whereas other students learn cursory applications of disciplinary knowledge (e.g., honors courses designed to foster the beginnings of disciplinary expertise compared to general courses designed to fulfill state

graduation requirements). At times, even whole schools or districts are divided along these lines (Anyon, 1981, 1997).

Social Justice as the Foregrounding of Everyday Knowledge

A second widely held perspective on socially just/social justice subject-matter pedagogy eschews the development of expert knowledge as a goal of subject-area instruction on the grounds that expert knowledge derives from mainstream perspectives on the world. This mainstream knowledge—whether historical or scientific, mathematical or literary—is thought to shut down possibilities for other forms of knowledge to be generated or to send implicit messages to students about the value of their community or home knowledge (Roth & Lee, 2005). Researchers and theorists working from this perspective do not necessarily dismiss expert knowledge but they take the stance that disciplinary learning should begin with youth and/or community concerns, knowledge, and practice as a way of making the learning of disciplinary knowledge more accessible to youth (Alvermann & Hagood, 2000; Alvermann, Moon, & Hagood, 1999; Barton, 2001; Civil & Bernier, 2006; Elmesky, 2001; Gutiérrez, Rymes, & Larson, 1995; Gutstein, 2006; O. Lee, 1999; O. Lee & Fradd, 1998; Moje, Ciecchanowski, et al., 2004; Seiler, 2001; Yerrick, 2000), relevant or responsive to youth interests (Ladson-Billings, 1994; C. D. Lee, 2001; C. D. Lee & Majors, 2003; Moje & Hinchman, 2004), or equal in value to disciplinary knowledge (Gee, 2005; Hull & Schultz, 2002; Mahiri, 2003).

Social Justice as Access to Useable Disciplinary Knowledge and Ways of Knowing

A third perspective is that of socially just/social justice education in the subject-matter areas as providing students with access to useable, everyday knowledge about the disciplines, knowledge that allows young people to evaluate ideas and act as informed citizens in the world. Although this perspective perhaps seems similar to the perspective on starting with youth knowledge, in fact, this perspective does not necessarily situate disciplinary learning in what youth already know and do. The goal of this perspective is, first and foremost, to teach disciplinary knowledge; researchers operating from this perspective, however, distinguish themselves from those who hold the perspective that socially just subject-matter instruction provides access for all students to expert knowledge.

This perspective is often referred to as providing youth with a type of literacy, despite the fact that such studies only minimally make specific reference to the processes and practices associated with making sense of or producing disciplinary (or other) texts. For example, the Association for the Advancement of Science (AAAS) developed benchmarks for what they refer to as “scientific literacy,” which they defined as

Being familiar with the natural world and respect for its unity; being aware of some of the important ways in which mathematics, technology, and the sciences depend upon one another; understanding some of

the key concepts and principles of science; having a capacity for scientific ways of thinking; knowing that science, mathematics, and technology are human enterprises, and knowing what that implies about their strengths and limitations; and being able to use scientific knowledge and ways of thinking for personal social purposes. (Rutherford & Ahlgren, 1990, p. x)

Norris and Phillips (2002) referred to this sense of subject-matter literacy as the “derived” sense of literacy, a focus on useable knowledge that does not attend to the role of language and texts in developing this useable and applied knowledge of a given discipline. Some scholars, however, argue that such a focus diminishes the power of this construct as a form of socially just pedagogy (Eisenhart, Finkel, & Marion, 1996; Leinhardt, 1994; Norris & Phillips, 2002, 2003; Wineburg & Martin, 2004). Although a focus on usable disciplinary knowledge may provide opportunities for all students to learn something about the discipline, and is thus socially just, such a focus alone may not provide opportunities for the development of informed citizens who understand how arguments are made and challenged in and through oral and written language of the disciplines and who can take action against societal injustices (or even on their own behalf; Wineburg & Martin, 2004). Norris and Phillips (2002) are most persuasive in this regard, citing theoretical and empirical studies to argue,

If scientific literacy is conceived only as knowledge of the substantive content of science, there is a risk that striving to learn the elements of that content will define our goals without any appreciation for the interconnection among the elements of content, their sources, and their implications. . . . When it is also recognized that science is in part constituted by text and the resources that text makes available, and that the primary access to scientific knowledge is through the read of texts, then it is easy to see that in learning how to read such texts a great deal will be learned about both substantive science content and the epistemology of science. (pp. 236–237)

Social Justice as Access to Knowledge Via Access to Ways of Producing Knowledge

The final perspective that I will address in this review argues for a view of subject-matter instruction in which access to ways of producing knowledge is at the heart of social justice. The focus on ways of producing knowledge is distinct from ways of knowing, in that ways of producing knowledge evokes the need for a tool of some type, namely, the tool of language. Both oral and written language are the focus of this perspective, with a particular emphasis on how young people might be apprenticed into the nuanced differences in producing knowledge via written language across multiple disciplines. To be sure, this perspective recognizes the importance of understanding the accumulated knowledge of each discipline but also argues that knowing how to produce knowledge—and thereby how to critique its production—is where power in the disciplines lies, in part because it provides access to content knowledge and in part because it provides access to the discourse communities of the disciplines who produce that knowledge. In other words, some of the power of knowledge comes from being an active part of its production rather than from merely possessing it. Some theorists and researchers would even argue that a student of discipline does not really know the discipline unless she or he knows how to

produce knowledge—with some facility—in it. Of the study of history, for example, Leinhardt (1994) argued,

History is layered, and the teaching of it, like other subjects, involves not only a process of acquiring the stuff of the discipline but acquiring a particular rhetorical stance toward it. The artifacts of any given course (multiple texts, documents, discussions, and required essays) and the roles of the teachers and students are unique. (p. 218).

These same theorists will acknowledge that this awareness is not always at a conscious, or metacognitive, level but that it is employed in the common acts of disciplinary knowledge production, nonetheless (Wineburg, 2003; Yore, Hand, & Prain, 2002). As Wineburg (2003) illustrated, he had the opportunity to observe an English literature scholar reading a narrative account before an audience of historians. The literature scholar gave the text a dramatic reading, imbuing historical figures with character attributes. Historians in the audience, Wineburg observed, were disturbed by the lack of information about authorship, or attribution. Wineburg argued that historians were disturbed by the reading because their disciplinary processes require that the first step in reading historical narratives is to determine who wrote the text or provided the account (i.e., determining attribution) and then to situate the text in a particular historical context. So enculturated were the historians in their disciplinary practices and processes of text reading that they could not bear to listen to what they viewed as an inappropriate reading.

From this perspective, then, subject-matter instruction depends as much on teaching the ways of engaging with disciplinary language and text as it does on teaching mainstream disciplinary knowledge or even habits of mind. It does not ignore either disciplinary knowledge or habits of mind but argues that a primary tool for accessing both lies in language. In addition, texts—especially written texts—inscribe disciplines with particular types of knowledge. Moreover, the acts of reading and writing—even in the most generic sense (i.e., apart from the unique work of reading and writing within disciplines)—involve complex cognitive processes that are mediated by largely taken-for-granted cultural practices. Reading, for example, is more than the simple process of decoding words and assigning meaning; reading involves decoding, to be sure, but also requires knowledge of semantics, syntax, text structures, linguistic features, purposes for reading, and rhetorical devices. Reading depends heavily on the content knowledge one brings to a text. Reading depends on one's motivation, and the outcomes of reading include more than just comprehension or extraction of information but also interpretation, analysis, critique, and application. The intricacies of learning to encode and decode, interpret and apply, and comprehend and critique specialized symbol systems demand particular attention in subject-matter instruction.

Thus, in what follows, I examine studies that use the fundamental sense of literacy (Norris & Phillips, 2002) to refer to acts of and practices surrounding the reading and writing of disciplinary written texts. However, the view of disciplinary

literacy is a complicated one, and thus I review the variety of forms of disciplinary literacy theory and pedagogy, outlining strengths, areas for development, and ultimately, possible contributions to a conception of socially just subject-matter instruction that produces social justice.

DISCIPLINARY LITERACY THEORY AND RESEARCH

Often, when examining subject-matter instruction, education theorists and researchers explore concepts such as content knowledge, pedagogical knowledge, and of course, pedagogical content knowledge (Shulman, 1986), a construct that brings together a focus on the content of the subject-matter area, with methods and practices for teaching that content. In this review, the pedagogical content knowledge (PCK) of interest is that which revolves around how teachers develop practices for teaching and learning from texts in their disciplines, as well as how teachers develop practices for teaching youth to read, write, navigate across, and critique multiple texts of the disciplines. In this case, the construct of pedagogical content knowledge might well be expanded to include not only pedagogical practices for teaching content but also pedagogical practices for teaching the linguistic, cognitive, and cultural text-based practices and processes associated with a discipline. In a sense, then, teachers need not only to develop pedagogical content knowledge but also pedagogical process/practice knowledge. For many scholars (including Shulman, who proposed the idea of PCK), the notion of processes and practices is likely to be subsumed or understood within the term “content,” but I want to tease out this idea here to underscore a particular point: Subject-matter learning is not merely about learning the stuff of the disciplines, it is also about the processes and practices by which that stuff is produced. Rather than use the cumbersome, if appropriate, phrase “pedagogical content/practice/process knowledge,” however, I refer to this construct as disciplinary literacy pedagogy.

What does that phrase “disciplinary literacy pedagogy” mean? A number of variations on the phrase exist. One definition, for example, can be found on The Institute for Learning website (<http://www.instituteforlearning.org/dl.html>) of the Learning Research and Development Center at the University of Pittsburgh:

This approach to teaching and learning integrates academically rigorous content with discipline-appropriate habits of thinking. The driving idea is that knowledge and thinking must go hand in hand. To develop deep conceptual knowledge in a discipline, one needs to use the habits of thinking that are valued and used by that discipline. To develop strategic and powerful discipline-specific habits of thinking, one needs to be directed by one’s content knowledge. For students to become literate in a particular discipline, they must grow in both dimensions simultaneously. The ultimate goal of Disciplinary Literacy is that all students will develop deep content knowledge and literate habits of thinking in the context of academically rigorous learning in individual disciplines.

A number of empirical studies have offered warrant for the idea that readers approach texts in different ways depending on the reader’s purpose or goals for reading them, the reader’s disciplinary commitments and practices, the nature of the text (its structure, its genre, etc.), the context in which the texts were generated, and the context in which the texts are being read. For example, as illustrated in a previous section, the

same piece of historical narrative could be approached in different ways depending on the disciplinary (or other) context in which the text is being read or written. Wineburg's analysis suggests, in fact, that a text identified as a historical narrative may even lose that identity if read by someone other than a historian. Historical narrative—a primary source perhaps—could be data in the hands of a historian, literary narrative to be performed in the hands of a dramatist, literary narrative to be critiqued in the hands of a literary theorist, and interesting background information that provides context for explaining natural phenomena in the hands of a chemist (or other natural scientist).

Consequently, history educators who work from disciplinary literacy perspectives argue that deep subject-matter learning in historical studies requires students to think analytically and critically about the contexts in which texts or ideas were produced. Readers must examine texts for attribution, that is, the reader must ask such questions as, "Who wrote the text? What was the writer's background? What was the writer's perspective or standpoint?" Next, they ask what other sources corroborate or challenge the evidence provided from the first source (Wineburg, 2003). Leinhardt, Stainton, and Virji (1994) argue that producing historical accounts revolves around engaging in a dialogue that considers "surviving evidence about the past and existing analytical, theoretical, and political concerns in the present" (p. 14) with the work of production depending heavily on explanation and reasoning, both of which require attention to questions of purpose, evidence, chronology, causality, and contexts. The historical process, according to Leinhardt (1994), revolves around building a compelling case or narrative that integrates evidence, chronology, and cause to both support and generate hypotheses.

Scientific literacy theorists argue, by contrast, that school science typically requires students to bring practices of prediction, observation, analysis, summarization, and presentation to their science reading (as well as to writing and oral language practices; O. Lee & Fradd, 1998; Lemke, 1990). To learn science well, argue many science educators, students of science must learn to predict explanations for natural events or phenomena; hypothesize about those predictions based on the best available information (often found in written texts); design, carry out, and record results of investigations; draw conclusions about those results in relation to their hypotheses and the existing literature; and communicate their findings to others (Blumenfeld, Marx, Patrick, & Krajcik, 1997; Hand, Wallace, & Yang, 2004; Palincsar & Magnusson, 2001). Moreover, Lemke (1990) illustrated ways in which the discourse of science as inscribed in both oral and written language represents a specialized system of language that rests heavily on themes and concepts that are not immediately apparent to a novice science learner (see also Eisenhart et al., 1996). Learning science, then, means learning those themes and how to recognize the themes in oral and written language about the phenomenon of interest.

The study of English literature, which often appears to draw from everyday language and generic literacy processes, actually requires yet again another set of reading skills. Typically, the task of reading literature revolves around interpreting figurative language, recognizing symbols, irony, and satire (C. D. Lee, 2001) in texts that are situated in historical contexts, contexts of different social, cultural, and political

systems. In addition to recognizing and interpreting symbols and themes in texts, students of English literature also must identify literary devices that signal emotions, motives, or goals and develop and demonstrate an understanding of how an author constructs a world that the reader simultaneously enters and stands apart from through various narrative devices (C. D. Lee & Spratley, 2006).

Finally, in examining the literate demands in mathematics, Bass (2006) writes,

Mathematics does involve substantial amounts of conventional text, not least in the form of dreaded word problems, but also in its extensive use of ordinary language, in both informal and technical ways. Further, mathematical relations and equations, even when expressed with technical notation (symbols, diagrams, etc.), are themselves a form of text, meaningful and articulable propositions, and their comprehension demands skills of literacy not entirely unlike those required for other kinds of textual sense making. Indeed, literacy for the student of mathematics entails being able to navigate flexibly back and forth between two or more language systems—academic mathematics language, school language, and common out-of-school languages (including one’s home language). (p. 3)

Bass goes on to articulate an even more nuanced point about text in mathematics; he argues that “truth in mathematics resides not in the outside world, but in the very concepts of mathematics itself and *in the language used to express and manipulate them* [italics added] (Bass, 2006, p. 3). Thus, the texts of mathematics depend heavily on accuracy and precision in both their production and consumption. The words, terms, symbols, and diagrams (the heart of a mathematical symbol system, according to Bass) of mathematics must be used with precision to generate new knowledge. According to Bass, “The practices of doing mathematics are in significant measure the practices of precise and supple use of language, in a variety of forms” (p. 3). Similar to Bass, Lemke (2003) argued that mathematics is composed of multiple semiotic systems that both convey and produce meaning. Each of these systems can be read independently, but in mathematical reasoning, these systems are typically interdependent.

This range of definitions of disciplinary literacy presents a number of important differences in the practices and processes of the disciplines, but each perspective shares a focus on text, language, and other symbol systems. Some of the perspectives explicitly attend to cognition, others to culture and cultural practices of the disciplines and of the learners. Given this range of definitions of, or related to, disciplinary literacy, it seems worth exploring how disciplinary literacy pedagogy is conceptualized in the literature in relation to text, language, culture, and cognition and how, if at all, the different conceptualizations might contribute to teaching for social justice in the subject-matter areas of secondary schools.

ANOTHER WAY TO SLICE IT

The Role of Language, Cognition, and Culture in Disciplinary Literacy Pedagogy

An important distinction among the studies reviewed is that some studies appeared to conceptualize literacy as cognitive processes, whereas others were grounded in

notions of disciplinary literacy as cultural practices. These categories, although useful for analytic purposes, are of course, much messier in real life. In many cases, the authors blur those boundaries, sometimes without explicitly situating their work within one or the other foci. Wineburg's (1991) work is a classic example; although Wineburg situates his work as studying the cognitive or epistemological processes of historians and adolescent students of history, his research reveals a way in which cognitive processes of both groups are culturally mediated. The discomfort he noted among the historians he studied as they listened to a culturally inappropriate reading of history text, for example, provides evidence of the cultural, that is, shared, normed, and taken-for-granted, nature of the work that historians do when they read. Their lack of metacognition about their reading habits suggests that these practices were culturally instantiated, supporting the sociocultural perspective that cognition is culturally mediated.

The same messiness of categorization could be noted for the line between work that focuses on cognitive processes and that which focuses on rhetorical strategies or between the work focusing on rhetorical strategies and cultural practices. That is, where does cognition stop and rhetorical strategizing start? Is the practice of rhetoric mediated by culture or cognition? Similarly, any focus on language analysis raises the same questions: Are the language differences analyzed in texts functions of epistemology or culture, and where is the line between the two?

Finally, it should be noted that many scholars are represented in more than one category. The work of Annemarie Palincsar is a good example of movement across categories due to Palincsar's evolving perspectives over time. Her early work focused on cognitive strategy instruction, specifically reciprocal teaching (Palincsar & Brown, 1984), as a way of supporting comprehension of content area (and other) texts. As she pursued her research agenda, Palincsar became interested in the role of discourse in cognitive strategy instruction in the content area of science (Collins, Palincsar, & Magnusson, 2005). Palincsar's recent work has focused on developing science texts for students to read and respond to as a way of enculturating elementary and secondary students into scientific ways of thinking (Palincsar & Magnusson, 2001) and on the development of technology tools that scaffold reading and writing in science. Such shifts in perspective can be detected in the work of several of the scholars; hence, the same scholars may be represented in several categories of disciplinary literacy research and theory.

These categories, although not tidy or stable, can be useful in highlighting different aspects of disciplinary literacy. Examining the points of convergence and divergence may generate possibilities for productively merging the pedagogical implications of disciplinary literacy theory and research and thus producing socially just and social justice subject-matter instruction. Thus, in what follows, I review four distinct patterns I noted in my review across disciplinary, literacy, and subject-matter studies. These include disciplinary literacy conceived as (a) teaching cognitive literacy processes, (b) teaching epistemological processes of the disciplines, (c) teaching linguistic processes of the disciplines, and (d) teaching linguistic and discursive navigation across cultural boundaries.

Disciplinary Literacy Pedagogy as Teaching Cognitive Literacy Processes

This category, labeled Cognitive Literacy Processes, has a long history of research, stemming from the content-area literacy work of Harold Herber (1970), who promoted the idea of teaching cognitive strategies for making sense of text to adolescents as they progressed through middle and high school. Herber and his students fought an uphill battle of convincing other literacy researchers, the secondary school teaching force, and education policymakers that reading skill continues to develop throughout adolescence. For some education researchers, this idea was understood as reading to learn, and it was argued that literacy instruction needed to shift from learning to read (or write) in the lower grades to reading (or writing) to learn in the upper grades. In practice, however, the strategies developed and tested by content area reading researchers were focused on continued development in learning to read, premised on the argument that the texts of secondary school content areas such as science, social studies, and mathematics required different kinds of reading skills from those young people had learned in earlier grades, where narrative texts dominated. Thus, a host of cognitive strategies were developed, applied, and tested in a variety of secondary school settings, such as Ogle's K-W-L (What I Know, What I Want to Know, and What I Learned; Ogle, 1986) to Palincsar and Brown's (1984) reciprocal teaching and Guthrie, Wigfield, and Perencevich's (2004) Concept-Oriented Reading Instruction. These various strategies have been reviewed by a number of scholars (Alvermann & Moore, 1991; Bean, 2000; Moore & Readence, 2001; Phelps, 2005) but are not always thought of as disciplinary literacy strategies. Instead, they are conceived of as cognitive strategies for text processing, with the assumption that they can be applied to any text, whether rooted in the disciplines or found in everyday life.

For example, Palincsar and Brown's (1984) Reciprocal Teaching is a classic and oft-cited example of a cognitive strategy designed to model for students how to ask questions of text in a way that supports comprehension of the text while also drawing from what students might be interested in as they read. The strategy builds on four activities that encompass the range of skills—or functions, as Palincsar and Brown label them—mature readers engage in as they read any kind of text. These skills or functions include understanding the purposes of reading, activating background knowledge, allocating attention, evaluating content, self-monitoring, and drawing and testing inferences. The particular activities Palincsar and Brown identified as critical were summarizing, questioning, clarifying, and predicting. Through extensive teacher modeling and student practice, students learn how to engage in these activities and take ownership for asking and answering their own questions of text.

This teaching-learning strategy stands out among cognitive literacy strategies because the authors have emphasized several key aspects of instruction that move the process from one of intensive teacher scaffolding to learner self-regulation. These aspects include explicit modeling, guided practice, and sustained enactment of the strategy. In effect, the strategy was conceptualized as a teacher practice rather than as a stand-alone

strategy to be inserted into otherwise stable curriculum (Sutherland, Moje, Cleveland, & Heitzman, 2006). In addition, the strategy embeds possibilities for building on student interest and on being responsive to students' ideas about texts because in allowing students to generate questions of texts, their interests are not only uncovered but also are addressed. Thus, Reciprocal Teaching can be considered an early form of responsive teaching; although it is not specific about responding across culture or disciplinary difference, it does, nevertheless, make a place for student interest in the process of learning to develop and articulate questions about texts.

Finally, Reciprocal Teaching, when tested in controlled settings, showed positive effects on student learning (Brown & Palincsar, 1982; Palincsar & Brown, 1984). A number of interrelated studies, albeit conducted with small sample sizes, showed the possibilities for student reading and learning growth when reading and thinking strategies were modeled and scaffolded (Palincsar & Brown, 1984). Specifically, the results of the original studies of reciprocal teaching demonstrated significant progress among students in the Reciprocal Teaching treatment condition in producing accurate main idea questions and summaries and in constructing summaries in their own words rather than simply reading verbatim from texts. Students also appeared to be able to transfer these skills to different classroom reading tasks, although transfer across different kinds of disciplinary texts is not addressed by the Reciprocal Teaching studies.

In addition, working from cognitive literacy strategy perspectives, but motivated by the question of how to guide literacy strategy development while also engaging student readers, Guthrie and colleagues (Guthrie et al., 2004) have developed and tested a teaching practice that builds on cognitive literacy strategies and students' interests and engagement while also connecting to disciplinary content. Concept-Oriented Reading Instruction (CORI) was designed specifically to capitalize on and build student engagement in both reading and disciplinary learning by engaging students in text-based research around phenomena of interest in their everyday lives. CORI is enacted routinely with four stages during which the students (a) observe a phenomenon and then personalize it, or connect to their own lives or questions; (b) search for and retrieve information (thus necessitating text search strategies as well as scientific research strategies); (c) comprehend and integrate the information across multiple sources, both textual and human; and finally, (d) communicate what they have learned to others, thus necessitating literacy strategies to scaffold the development of summary and report writing skills.

Most of the CORI work published to date has been developed and tested at the elementary level and, as such, the disciplinary aspects remain at basic levels (Guthrie et al., 1996; Guthrie et al., 2004). Nonetheless, CORI is unique among cognitive literacy strategies because it does connect the practices of literate engagement to the content of particular disciplines. More important, the findings of CORI in terms of literacy skill development are positive, with students showing both increased engagement in learning content concepts and improved reading and writing skills.

As should be obvious from these two exemplar studies, the primary focus of the cognitive literacy strategy research has been on the application of cognitive literacy

strategies designed for primary grades' learners to the range of subject areas present in middle grades and secondary school settings (see, e.g., Biancarosa & Snow, 2004). Many of these strategies have demonstrated promise for supporting secondary school students' comprehension of texts and have been widely cited among recent reviews of useful secondary school literacy teaching strategies (Alvermann & Moore, 1991; Phelps, 2005).

In particular, one notable aspect of work in cognitive literacy strategies that has not been as well recognized is the potential in many of these strategies to support efforts to teach subject matter in socially just ways. Cognitive literacy strategies, while not explicitly attentive to cultural difference and responsiveness, are based in reading theories that recognize—and indeed highlight—the role of the reader and, to a lesser extent, the context of the reading situation. Interactive models of reading (Rumelhart, 1994) argue explicitly for the interaction of the reader and text, and more recent conceptions of comprehension processes put forward by the RAND Comprehension Study Group (Snow, 2002) include attention to the specific reading activity and to context. Given the attention placed by these perspectives on readers' prior knowledge, perspective, and bias, it is appropriate to claim that, in theory, these strategies both support cognitive skill development and recognize and build on who students are as people. With more attention to how these strategies and practices should acknowledge cultural experiences and differences among readers and writers, these strategies could be leveraged to produce socially just subject-matter pedagogy in the sense that they can provide opportunities for youth to learn to independently access and evaluate texts.

What is missing, however, from the cognitive strategies work is attention to the specific demands of the practices—and thus, the texts—of the disciplines. Recent work among content-area literacy researchers has begun to attend to disciplinary-specific demands (Bulgren, Deshler, & Lenz, in press; Conley, in press; Guthrie et al., 2004; Hynd-Shanahan & Shanahan, in press; Schoenbach, Greenleaf, Cziko, & Hurwitz, 1999; Yore, Bisanz, & Hand, 2003; Yore & Treagust, 2006), but a focus remains on how to develop cognitive text processing strategies as a means of enhancing subject-area learning. In addition, a number of these studies are conducted at the upper elementary and middle-school levels, leaving the difficult question of what it means to offer subject-matter instruction that supports reading and writing of the increasingly complex texts demanded for subject-matter learning in the upper secondary-school grades.

The research program of Rafaella Borasi and Majorie Siegel (Borasi & Siegel, 2000; Borasi, Siegel, Fonzi, & Smith 1998; Siegel, Borasi, & Fonzi, 1998) represents an interesting bridge between the Cognitive Literacy Strategies category of disciplinary literacy research and the next disciplinary literacy category I present, that of Disciplinary Epistemologies. Borasi and Siegel (2000) describe the goal of their Reading to Learn Mathematics for Critical Thinking (RLM) study as the analysis of how and to what degree mathematics teaching and learning could be supported by the use of “rich math texts” (p. 9) that were scaffolded through the use of cognitive reading strategies

designed to support students' sense-making of texts. Thus, the RLM approach was specifically embedded in a particular type of disciplinary text but was not designed to foster specific reading strategies related to mathematics texts. What Borasi and Siegel (2000) learned, however, was that multiple texts make up mathematics classrooms, above and beyond the planned rich math texts. Such texts might include student journals, textbooks, charts and graphs, class notes, and the like. These texts serve a variety of purposes, or "functions" (Siegel et al., 1998), including to (a) make thinking public, (b) get or provide models and other tools for conducting inquiry or producing representations of thinking, (c) obtain information necessary for informed decision making, (d) complicate thinking or raise new questions for exploration, and (e) push student inquiry. Based on their findings of extended analysis of classroom narratives, Borasi and Siegel make two strong claims: First, students' readings of the rich math texts provided, as well as of other classroom texts, were bolstered by the specific cognitive strategies they taught. Second, how students read in mathematics classrooms depended largely on the functions or purposes for which they read, suggesting that cognitive literacy strategies, although valuable, cannot be applied in generic ways across all forms of texts. This finding ties directly to work represented in the next category, which focuses on how the epistemological underpinnings of a given discipline shape acts of reading, writing, and communication.

Disciplinary Literacy Pedagogy as Teaching Epistemological Processes of the Disciplines

This second group of disciplinary literacy researchers and theorists¹ reverses, in some sense, the cognitive/subject-matter relationship, working within the disciplines to assess the cognition or thinking processes necessary for making sense of disciplinary texts (Bain, 2006; Goldman, 1997; Leinhardt & Young, 1996; VanSledright & Kelly, 1998; Wilson & Wineburg, 1988; Wineburg, 1991; Yore et al., 2002). Following Wineburg (1991), I label this perspective the Disciplinary Epistemological perspective, although the focus on epistemology seems to me to be largely cognitive, with the cultural norms and practices of the disciplines only an implicit thread in much of the work. These research programs are less interested in generic cognitive strategies and more interested in one or more of three foci: (a) specifying the cognition of members of the disciplines as they either comprehend or produce oral and written texts (Leinhardt, 1989; VanSledright & Kelly, 1998; Wineburg, 1991; Young & Leinhardt, 1998), (b) comparing those cognitive processes of members of the disciplines to learners in the subject-matter areas (Collins et al., 2005; Hand, Hohenshell, & Prain, 2004; Hand, Pain, Lawrence, & Yore, 1999; Hand, Wallace, et al., 2004; Palincsar & Magnusson, 2001), and (c) applying those cognitive processes to educational practice (Hynd-Shanahan, Holschuh, & Hubbard, 2004; C. D. Lee, 2005; Moje, 2006).

What is highlighted in any of those three strands is how members of a discipline think and how that thinking shapes the texts they produce or how they access the texts of others for disciplinary purposes. This line of work, in fact, has at times been

critiqued as focusing too heavily on the work of disciplinarians, suggesting that the pedagogical goal is to turn every student into little historians, scientists, or mathematicians (little work has been conducted in this area in either mathematics or English language arts). In point of fact, very little evidence in the actual writing of these scholars supports that claim; in general, these scholars argue for studying and teaching the cognitive processes by which members of the discipline produce knowledge to more deeply learn the concepts of the discipline and to learn to reason through. Leinhardt (1994) commented specifically on this critique:

Mindfulness in teaching and learning is an important goal of education in the United States. It should be the goal of history education as well. However, the movement to teach more than rote memorization to everyone, not just the elite, is a relatively new concept, dating from around 1900, when educators turned their attention from goals of teaching basic facts to goals of reasoning with facts. (p. 253)

Thus, the argument from this perspective on disciplinary literacy is that learning disciplinary concepts via learning how knowledge is produced and consumed within the disciplines can be applied to life as a citizen of the world. As citizens, these scholars argue, we all need critical listening and reading skills to make informed decisions and critical speaking and writing skills to communicate our decisions. Critical reading, however, cannot be conceived in generic terms; one must understand not only the concepts of disciplines but also how evidence is used to arrive at and warrant those concepts. Informed participation in society, they argue, demands knowledge of how knowledge is produced in many domains of study.

Work on the role of disciplinary epistemologies in reading texts of the disciplines tends to be situated in studies of history learning. Wineburg's (1991) study launched this line of work by illustrating the "breach" that exists between how practicing historians read and how high school students of history. Specifically, Wineburg employed think-aloud protocols as eight historians and eight high school students read historical documents (not textbooks and not historical analyses) from the Battle of Lexington, which marks the start of combat in the Revolutionary War. The protocols revealed distinct differences in the ways historians and students of history approached the texts, with historians "sourcing," or seeking attribution as a way of previewing a text, highlighting subtexts and intertextual connections, and revisiting perspective and context of the written document as they monitored their comprehension. Students, by contrast, engaged in few of those practices, even as they enacted what might be considered appropriate comprehension strategies from the Cognitive Literacy Strategies perspective. In other words, historians applied ways of knowing—or epistemological stances—to their text reading; high school students of history did not. Wineburg also studied each group's reading of history classroom textbooks and found that although the students accepted the history textbooks without much critique, the historians rated them as less trustworthy than a piece of historical fiction. As a result of his analysis, Wineburg wrote, "If we ask, 'What does it mean to comprehend a historical text?' and rely exclusively on what generic comprehension tests tell us, we may learn a great deal about reading, but not much about

history” (p. 516). Since then, Wineburg’s argument has been extended by a number of adolescent literacy scholars to suggest that we may not even know much about reading at the secondary school level (e.g., Leinhardt et al., 1994; e.g., Wineburg, 1998; Yore et al., 2002) because the act of reading in adolescence is typically situated in specialized domains, both in and out of school. Moreover, it can be argued that Wineburg’s argument is one of producing socially just pedagogy. Near the conclusion of his piece—and in several subsequent articles (e.g., Wineburg & Martin, 2004)—Wineburg articulated a view of critical reading that could emanate from close study of how members of disciplines (or any specialized domain) read and produce the texts they care about:

The view of text described here is not limited to history. Language is not a garden tool for acting on inanimate objects but a medium for swaying minds and changing opinions, for rousing passions or allaying them. This is a crucial understanding for reading the newspaper, for listening to the radio, for evaluating campaign promises, or for making a decision to drink a Nutrasweet product based on research conducted by the Searle Company. If students never learn to see the difference between the “Contras” and the “freedom fighters,” between “Star Wars” and the “Strategic Defense Initiative,” between “terrorists” and “members of the PLO,” if they think of these terms as neutral appellations rather than charge symbols tapping different meaning systems, they become easy marks for sellers of snake oil of all persuasions. (p. 519)

This study, and a number of others, documented the practices and knowledge of practicing members of the disciplines (Leinhardt, 1989, 1993; Leinhardt & Smith, 1984; Wilson & Wineburg, 1988; Wineburg & Wilson, 1991), of expert teachers of different subject matters (Bain, 2000), and of children and youth (Afflerbach & VanSledright, 2001; VanSledright & Kelly, 1998).

Wineburg’s (1991) point is especially critical when considering the critique of history and other disciplinary textbooks offered by a number of scholars. Paxton (1999), for example, has argued that the lack of authorial voice in most history textbooks produced in the United States contributes to a lack of critical reading skill on the part of adolescent (and child) history learners. These youth learn to take up history as a series of undisputed facts rather than as a practice of constructing an evidence-based account of events shaped by the author’s perspective, background, and temporal location, among other factors. The “deafening silence” to which Paxton refers implicates not only an explanation for lack of student engagement in upper-level disciplinary learning but also a serious social justice concern. As J. D. Anderson (1986) has argued, U.S. history textbooks present a particular perspective on Black history in the United States, a perspective that can be challenged through close reading of multiple primary source documents. Without, however, access both to multiple and varied texts and to opportunities to learn to read those texts critically—as a historian or other disciplinarian might—the goal of socially just subject-matter pedagogy is threatened, regardless of how many opportunities one provides to learn expert or everyday content knowledge.

Robert Bain’s (2006) work takes up these analyses of students’ and historians’ different reading and writing processes for application in classroom and teacher education

practice. As a historian and 25-year veteran of high school history teaching, Bain studied his own world history teaching (Bain & Ellenbogen, 2001) as he attempted to jump “into the breach” by teaching students the practices of historians as they engaged with classroom texts. In presenting his findings, Bain was careful to point out that his analysis of 76 ninth-grade students’ processes in learning to analyze and question classroom and historical texts should be not be read as causal claims regarding the impact of his instruction. Nevertheless, he offered student reflections on their learning as evidence of learning and changes in their thinking, as in this interview excerpt:

This class taught me not to just believe something is right just because the teacher says it or if it’s in a textbook. I now think and even perhaps act like a historian. If I disagree with something the teacher or the book says I can listen carefully or read through to check for internal consistency. Internal consistency is important especially when I’m listening to a teacher because if he/she contradicts themselves, it would be hard for me to know what is correct. Also, if a teacher says something which I think is wrong, I can corroborate with other sources to check which was correct. By far the most important thing I learned was not just to accept what is being said but check to see if it corresponds with what I had previously learned. Honestly, through this course, I have become a better thinker. (pp. 2106–2107)

In work beyond his own classroom, Bain (2000) has developed a classroom digital tool—the Virtual Curator and Virtual Expedition—that guides Detroit high school students as they explore museum text resources and locate relevant information. The digital tool frames their reading and research in questions of the discipline of history (specifically in the history of the great migration and urbanization of the 20th century) and provides scaffolds that push students to pose questions and to corroborate, contextualize, and analyze the sources and information they uncover at disciplinarily appropriate points in their reading and narrative construction process.

Leinhardt (1993) also has studied the implications for pedagogy of the breach between the text-based practices of historians and the text-based practices of students of history but has focused her analyses on how teachers construct explanations in practice that serve as models for students of the kinds of thinking required to make sense of and produce historical texts. Leinhardt argued that the two main tasks of students of history are learning to explain and learning to reason and specifically distinguishes between explaining in a discipline such as mathematics and explaining in history, claiming that both the questions that prompt explanations and the explanations that answer them are distinct in terms of form. In classroom-based studies, Leinhardt and colleagues (T. H. Anderson & Armbruster, 1984; Schleppegrell, Achugar, & Oteiza, 2004) traced two different kinds of explanations teachers made, what they referred to as “blocked” and “ikat” explanations. Blocked explanations are those that refer to particular events and have an initiation and conclusion that is relatively simple to identify. Ikat explanations, by contrast, are those that are woven throughout a discussion of ideas and that ebb and flow with new information added as that information is uncovered in the process of study.

What makes Leinhardt’s analysis of how explanations occur in the history classroom especially interesting is the model that they serve—or do not serve—for the

development of student explanations in historical writing. As a number of scholars of text note (Leinhardt et al., 1994), the textbooks students typically have at their disposal do not always display the most precise explanations by disciplinary standards. If much of even expert history teaching follows the ikat model of explaining, then how is it that students learn to read and produce the concise, data-based explanations that are accepted in the disciplines (and demanded on many state assessments)?

Leinhardt's (1994) analysis traced how expert teachers (who work from different stances) modeled over time the structures, forms, themes, and devices necessary for explaining. In addition, these teachers also modeled the particular features of reasoning in history. Most important, perhaps, is that Leinhardt documented these expert teachers making opportunities for students to take over much of the oral discourse of the classroom, thus providing scaffolded opportunities for students to practice these features of reasoning, which according to Leinhardt's analysis of historians' thinking (Hand et al., 1999; Hand, Wallace, et al., 2004), include strong narrative skill, evidential exhaustivity, hypotheses generation and assessment, and the ability to contextualize hypotheses and claims. One of the most critical findings of this work is the role that oral explaining—with both teachers and students participating—played in the development of what Leinhardt refers to as mindfulness among the students of history she observed.

In terms of disciplinary text production, the work of Brian Hand and colleagues in science stand as exemplars of the Disciplinary Epistemology perspective (see also Palincsar & Magnusson, 2001). Hand and colleagues began from a largely cognitive stance of applying writing strategies to the production of science texts, developing what they termed the Science Writing Heuristic (SWH; Akkus, Gunel, & Hand, in press). According to Hand and colleagues, the SWH is more than a cognitive literacy tool; rather, it structures the work of writing and reasoning so that it parallels the writing and reasoning of scientists. In particular, the SWH both builds on and supports a number of features of scientific work—such as the collaborative and constructive nature of science research—as students are led through a cycle of investigation, communication of initial results, revising and clarifying claims and reasoning, and refining explanations for phenomena. In this sense, the SWH is similar to other scientific and historical explanation writing rubrics (Moje, Peek-Brown, et al., 2004; Young & Leinhardt, 1998), although Hand and colleagues argue that the SWH makes a link from the “informal, expressive writing modes that foster personally constructed science understandings and more formal, public writing modes that focus on canonical forms of reasoning in science” by guiding students through the writing of scientific reports on inquiry done in classrooms (Akkus et al., in press). Perhaps most salient, the SWH offers students the following categories, which reflect a disciplinary attitude toward text production that is markedly different from those highlighted in historical text production: (a) Beginning ideas: What are my questions? (b) Tests: What did I do? (c) Observations: What did I do? (d) Claims: What can I claim? (e) Evidence: How do I know? Why am I making these claims? (f) Reading: How do my ideas compare with other ideas? and (g) Reflection: How have my ideas changed? Thus, the

SWH, with roots in Cognitive Literacy perspectives, has developed over time to represent the Disciplinary Epistemologies of science and to scaffold student writing by making explicit those epistemologies.

In multiple studies of various configurations of the SWH and other writing-to-learn strategies (e.g., SWH used in comparison to traditional instruction, rhetorical writing strategies used to guide informal science writing) with different age groups and in different fields of scientific study (i.e., chemistry, general science, biology), Hand and colleagues have documented that when offered the SWH and supported by teacher instruction in the process of science inquiry activities, students across a range of ages produce more complex and effective science texts than do students in traditional science instructional settings (Hand et al., 1999; Hand, Prain, & Yore, 2001; Hand, Wallace, et al., 2004; Hand, Yang, & Bruxvoort, in press). In one recent study, Hand et al. (in press) produced both quantitative analyses demonstrating that students' writing and science learning had improved from pre- to postinstruction and qualitative analyses that found students' understanding of rhetorical strategies for communicating science to be more developed than that of students who had not received the science-writing-to-learn instruction the researchers had offered.

Another version of the Disciplinary Epistemological perspective work draws heavily from work in the field of rhetoric and composition. This branch of work examines how writers in the disciplines and students of the disciplines make sense of their writing tasks, considering concepts such as purpose, goals, audience, and resulting form in the production of disciplinary writing (e.g., Greene, 1994; e.g., Johns & Swales, 2002; Parkinson & Adendorff, 2004). In many ways, this work closely represents that of Hand's work in disciplinary epistemology and writing. However, work informed by rhetorical perspectives operates less from a perspective that the production of disciplinary text requires knowing how members of the discipline think and more from the perspective that regardless of discipline, a writer must understand the goals of the writing task, the perspectives and interests of the target audience, and strategies for persuasive writing to write a piece of text effectively. Greene's (1994) analysis of student writers of history texts, for example, demonstrates a rhetorical take on the writing of history texts.

Using think-aloud protocols, Greene examined how 15 junior- and senior-level undergraduate students, 4 of whom were history majors, interpreted and enacted the writing tasks assigned to them in a university history course. Students were randomly assigned to one of two conditions: report writing or problem-based writing. Prior knowledge assessments were used as a covariate in analyzing the qualitative changes in knowledge displayed by the students, and observations for the course of an entire semester, interviews with the course professor, and think-aloud protocols conducted with three other practicing historians provided background for analyzing the students' responses. Greene's analyses demonstrated that students who wrote reports interpreted the assignment as required them to draw from the sources provided for them. They rarely included references to outside knowledge. Those

who wrote problem-based essays attempted to integrate prior knowledge with the source material provided.

Greene's major finding, however, was that the context of the course shaped the students' rhetorical moves in key ways, that is, students unsurprisingly wrote for the professor as audience, whereas the practicing historians, despite recognizing that they were playing a role in a research study, wrote for other historians in the field. With these findings, Greene underscored the importance of considering the rhetorical strategies of students in a disciplinary setting and, in particular, of attending to how those strategies are shaped by students' interpretation of context and audience. From a disciplinary literacy perspective, Greene's work raises an important question: Just how does a teacher—whether secondary or postsecondary—engage novices to the discipline in understanding the disciplinary context and assumptions to which they are writing (or that shape their reading)? It is one thing to teach students the cognitive processes of reading and writing like historians, but what is the role of context and cultural practice, especially those of the classroom as context and working for grades as academic cultural practices?

Overall, one fairly common element of the Disciplinary Epistemological perspective of disciplinary literacy research is a focus on bringing to consciousness the cognitive work of the disciplines. In other words, this work connects to the more generic content-area literacy focus on teaching youth strategies and on teaching them to be metacognitive about their reading processes. The focus on developing metacognition about one's disciplinary reading and writing processes—although advocated by all four of the different perspectives outlined here—represents a curious irony. Specifically, the studies that examined the reading or writing processes of members of the disciplines typically represented them as having little conscious awareness of their ways of knowing and, particularly, of approaching texts (Wineburg, 1991; Yore et al., 2002, provide the most obvious example of this point). When thinking aloud with a text or when interviewed about their approaches to writing, the processes of the members of the discipline became clear, but these disciplinary scholars were not necessarily conscious of their approaches to texts. This point raises the question about the role of explicitness in any of these approaches, a point particularly relevant when considering the question of how to build both socially just pedagogical approaches and approaches that produce social justice in society. A reasonable argument could be made that the explicitness, or the making of such epistemology public (see C. D. Lee, 2001), is not the means by which such processes or practices are learned. It could be argued that such learning requires apprenticeship in text practices of the disciplines over time. By contrast, it also could be argued that such explicit, conscious attention is necessary to enable youth from many different backgrounds and experiences to navigate discourse communities and to make decisions about the value and worth of claims made from various disciplinary perspectives and that making the thinking and text practices of the disciplines public is necessary for socially just subject-matter pedagogy.

The question of explicitness is especially important because at times the focus on the cognitive or epistemological processes of the disciplines has the effect of reifying

these ways of knowing as the only means for sense-making in particular disciplines, suggesting that it is somehow natural or innate for people who study a particular subject to think in particular ways. A number of these theorists and researchers do, in fact, acknowledge the role that the disciplinary community has in shaping how people think inside the community, thus suggesting that these processes are artifacts of cultural practices, and yet, the links from culture to cognition and back again often tend to be left implicit. Students are encouraged to think, talk, read, and write as members of the discipline might, but they are not explicitly asked to examine how those cognitive processes for navigating texts are artifacts of the discipline as a group of people, oriented toward a particular purpose. As a result, students often articulate beliefs such as those of the sophomore chemistry students interviewed in an ethnography of literacy practice in the chemistry classroom (Moje, 1995). Their views on the differences between literacy in chemistry and literacy in English class (which they offered unprompted except for the question, “What do you think of when you think of literacy?”) included comments such as,

You’re basically taking out main ideas of the paragraphs and just putting it in, just writing it in your own words. What they’ve said, you’re just writing it. . . . In English [class] you’re using more of your head. You’re not really necessarily summarizing, except for books for something. Usually in English you’re using your own creativity and imagination. (cited in Moje, 1995, pp. 362–363)

In sum, the students in my study talked about the subject area differences as if these distinctions were normative and to be questioned. Building on this point, it seems critical to mention that few, if any, of the Disciplinary Epistemology studies name their pedagogical starting place as resting in the knowledge and text practices that young people bring to classrooms. Instead, the work, by and large, operates from the stance of uncovering the text processes of members of the disciplines.

A final point about this category of disciplinary literacy pedagogy is that, by and large, work in this category does not highlight the role of language except insofar as it is necessary to learn to process the different language cues (e.g., subtexts, technical vocabulary, contextual or temporal cues, place names) demanded by the discipline. The work of linguistic analysis is reserved for another category of disciplinary literacy pedagogy, which I review in the next section.

Disciplinary Literacy Pedagogy as Teaching Linguistic Processes of the Disciplines

This branch of disciplinary literacy pedagogy focuses squarely on language processes, at times, but not always, tied to specific disciplinary processes. One line of language-based research, that of systemic functional linguistics (Halliday & Matthiessen, 2004), has gained prominence in subject-matter instructional research because of its precision in clarifying how subject-matter learning is dependent on language. Coffin (2006) writes that a basic goal of a functional linguistic model of language and learning is that it provide student with “access to, and control of, the

written texts of mainstream education, for example, a persuasive essay, a laboratory report, or a critical review of an artwork of literary text” (pp. 413–414). Similar to the cognitive research done in content literacy processes and in disciplinary learning, Coffin argues that functional linguistics seeks to “bring to consciousness (both for teachers and students) the way in which such texts are linguistically structured and shaped and the way in which writers draw on grammar and lexis (i.e., vocabulary) to create different communicative effects” (p. 414). In one study, Coffin (2006) examined the linguistic features of secondary school history texts read and written by students and found three dominant genres demanded for successful writing in the classes: recording, explaining, and arguing genre. She also found that students were expected to use more technical language, to engage in more abstract writing, and to use linguistic processes such as nominalization (the translation of verb forms into noun forms through the process of collapsing actions, results, and logical connectors, much as I have done in this clause).

As a result of her analyses, Coffin (2006) developed a professional development intervention in which 17 history teachers worked with Coffin and other linguistic specialists to integrate the teaching of these genre-specific language practices to secondary school students. The teaching-learning cycle they developed included three phases: deconstruction, in which students analyze model texts for unique linguistic features; joint construction, in which teacher and students produce a prototypical history text according to the uncovered linguistic features they analyzed in phase one; and independent construction, during which students work individually or in small groups. Coffin and colleagues then examined the results in an observational, pre-/postdesign intervention, in which the 17 teachers carried out the procedures they had collaboratively developed during professional development. Although not a controlled experiment or quasi-experiment, the results of the study suggest some promise for the approach, with students’ abilities to recontextualize information increasing. However, Coffin notes that the gains were seen at the level of whole text rather than at the grammatical level. What’s more, without more specific information about the measures by which gains were assessed, these results should be considered with caution.

Schleppegrell and colleagues (Schleppegrell & Achugar, 2003; Schleppegrell et al., 2004) also have studied the linguistic features of academic language learning and argue that academic language (oral or written), in general, is different from everyday language in terms of (a) the density of information presented, (b) the level of abstraction of concepts, (c) the technical nature of concept presentation, (d) the use of multiple semiotic systems, (e) the structural conventions, and (f) the type of voice that dominates. In discipline-specific study, Schleppegrell and colleagues (2004), for example, analyze textbook passages to demonstrate to history teachers how they can support students in making sense of the abstractions, multiple semiotic systems, and organizational expectations unique to history texts. According to Schleppegrell and Achugar (2003), these pedagogical moves result in increased critical reading and text comprehension among students, although specific effects are not described. Findings

from a large-scale study of professional development around these linguistic techniques are in development (Schleppegrell et al., 2004).

Similar to the Cognitive Literacy and Disciplinary Epistemology stances, the Functional Linguistics stance is extremely useful for highlighting the challenges of language embedded in all academic texts and the specific challenges and expectations unique to particular disciplines. SFL may, however, be currently missing some important opportunities to develop youth language. Because functional linguistics, as applied to subject-matter learning, has tended to focus on the abstraction, density, organization, and semiotic systems of academic language, it has not attended as closely to the abstractions, density, and multiple semiotic systems of everyday language and texts young people routinely use to make meaning and claim spaces and identities (Moje, 2000). Consider, for example, this text example drawn from the web magazine *Performance Auto & Sound* (<http://www.pasmag.com/>), read by young men (middle- and high-school age) in a study of youth literacy and culture in Detroit, Michigan:

The Touring exhaust is a single straight-through design specifically tuned for the 2.4L engine. It is made in the USA with 304 100% mandrel-bent Stainless Steel and features Corsas' patented Reflective Sound Cancellation (RSC) technology. What RSC means is that the muffler is designed with a paper running straight through the muffler that incorporates a full 360-degree air gap that allows sound pressure waves to escape. The waves are channeled and then returned to the gap 180 degrees out of phase, canceling specific unwanted sound frequencies, commonly referred to as drone.

From a linguistic standpoint, the lexical, grammatical, and structural demands of this everyday text are many. From the first sentence, which refers to a "Touring exhaust" (which one assumes to be a particular type, cued only by the use of the upper-case T) and a "straight-through" design (which remains undefined, although may be a concept that is easily visualized) for a "2.4L engine." Those not versed in the lexis of the automotive domain would, no doubt, appreciate the considerateness of the author in defining phrases such as "Reflective Sound Cancellation" and "drone," but even these definitions depend on a relatively abstract conceptualization of sound waves, pressure, phase, and frequencies. The text also provides multiple semiotic cues, with images of exhaust systems that are, in the full text, cued to particular aspects of the article. The text, of course, could be considered to represent a specialized domain, which underscores the idea that specialization is not only the purview of the academy and, by extension, that generality, concreteness, and personal voice also may be found in texts of the academy. This point suggests the important possible work that remains to be done from a Functional Linguistic disciplinary literacy perspective in analyzing a wide range of both everyday and academic texts. Attention to the linguistic features and demands of texts young people read and write in homes, peer groups, families, and other settings outside of school via a Functional Linguistics perspective could provide an opportunity to build on young people's existing prowess with language as a way of learning academic language and text processing. Scaffolding—perhaps via cognitive literacy strategies—helps students understand the different assumptions brought to bear on different texts by different audiences and authors, particularly disciplinary audiences and authors. Parkinson and Adendorff (2004) attempt to

bridge this gap from the Functional Linguistics perspective by suggesting that students of physics analyze the linguistic features of popular science articles that, the authors claim, offer a hybrid of everyday and popular language and resist the reification of scientific findings that the authors suggest are features of both science textbooks and scientific research reports. Parkinson and Adendorff's suggestion represents one text-based possibility for drawing from the texts of youths' everyday lives. Research represented in the next category of disciplinary literacy research, however, attempts to take the cultural practices and cognitive processes of young people's everyday lives into account by more explicitly drawing from and expanding those practices and processes as a way of constructing bridging, navigational, and changed-oriented, subject-matter, instructional practices.

Disciplinary Literacy Pedagogy as Navigation Across Cultural Boundaries

As previously indicated, one view of socially just secondary school subject-matter instruction is that subject-matter instruction should begin with students' interests, knowledge, and practice as a way to teach them content knowledge (e.g., Alvermann et al., 1999; Alvermann & Hagood, 2000; Barton, 2001; Edwards & Eisenhart, 2002; C. D. Lee, in press; S. Lee & Roth, 2003; e.g., Mahiri, 1998; Moje, 2000; Morrell & Duncan-Andrade, 2003; Roth & Lee, 2005; Yerrick, 2000). The Cultural Navigation perspective on disciplinary literacy builds on such work but adds the important emphasis on both oral and written language, although this category of work does not always take language study to the degree offered by functional linguistics or rhetoricians, and neither does the Cultural Navigation perspective routinely situate academic learning in the cognitive processes and practices of the disciplines. Although many, but not all, of the theorists/researchers in this group reflect the link between the cultural and the cognitive, most start with young people's knowledge, text practices, and interests as a basis for teaching disciplinary text processes, emphasizing how these processes are shaped by the purposes, norms, and conventions of making knowledge in the disciplines. An additional important aspect of the Cultural Navigation perspective on disciplinary literacy revolves around providing opportunities for youth to practice navigating across the different cultural, discursive, or linguistic communities of secondary schooling and of their everyday lives. Thus, many of the Cultural Navigation studies are either interdisciplinary in nature or situate student learning in classroom and community projects with heavy text demands.

The focus in this area, then, tends to be on the linking of everyday to academic cultural text practices and cognitive text processes, but at more global levels than in the disciplinary literacy perspectives previously reviewed. An important additional focus tends to be on the critiquing of mainstream academic knowledge and of prying open a space for young people's everyday knowledge to be used to inform and expand mainstream academic knowledge.

The theoretical basis for this work stems from the argument that the subject-matter areas, or disciplines, can be viewed as spaces in which knowledge is produced or constructed rather than as repositories of content knowledge or information

(Foucault, 1972; Halliday & Martin, 1996; Luke, 2001). Even more important, knowledge production in the content areas needs to be understood as the result of human interaction. As such, knowledge production of the disciplines operates according to particular norms for everyday practice, conventions for communicating and representing knowledge and ideas, and ways of interacting, defending ideas, and challenging the deeply held ideas of others in the discipline. Disciplines, then, are no different as discourse communities than are students' everyday home discourse communities or peer group discourse communities. They are not immutable, they are not unchangeable, and they are not simply bodies of knowledge to be handed down from expert to novice.

Researchers working from the Cultural Navigation perspective argue that part of learning in the subject-matter area involves coming to understand the norms of practice for producing and communicating knowledge in the disciplines. Part of that learning also involves examining how subject-matter norms for practice are similar to and different from everyday norms for practice and that such practices are artifacts of human interaction rather than innate tendencies or processes inherent in the nature of the work. Such learning requires understanding deeply held assumptions or themes of the discipline (Lemke, 1990) as well as the ways of knowing, doing, and communicating in other discourse communities. More to the point, perhaps, this perspective argues that deep subject-matter learning is fostered by learning to be metadiscursive (see New London Group, 1996).

Another crucial task of subject-matter education from the Cultural Navigation version of disciplinary literacy pedagogy is one of teaching students not only the privileged discourses (see Delpit, 1988) but also when and why such discourses are useful, and how these discourses and practices came to be valued. For example, in Detroit middle-school science classrooms, teachers emphasize the scientific practices of data representation, analysis, and interpretation as they teach students how to write clear scientific explanations of phenomena (Moje, Peek-Brown, et al., 2004). Even as they engage in inquiry around the phenomena, these teachers help students learn the literate practices required to make scientific investigation meaningful. Together with students, for example, they have constructed criteria for producing scientific explanations, criteria that include (a) making a claim; (b) providing multiple pieces of evidence, drawn from experimentation or the past research of others; (c) reasoning through the evidence back to the claim; and (d) writing the explanation in precise and accurate language that "anyone interested in science should be able to understand." From the Cultural Navigation perspective, however, what we need to continue to develop is the scaffolding of students' understanding of when and why they would write in "precise and accurate language" (i.e., why precision matters in the cultural practices of science) and why those explanations are not the same explanations they might give to a friend on the street (i.e., why different kinds of precision, as well as different kinds of warrant, are valued among peers in everyday interaction; Moje, Peek-Brown, et al., 2004).

In other words, what is equally important to subject-matter learning and disciplinary literacy, from the Cultural Navigation perspective, is the act of providing opportunities for young people to examine how the norms of knowing, doing, and

communicating are constructed. Each of these norms is not only an important aspect of doing the discipline but each norm also is socially constructed. That is, the norms are constructed, practiced, and enforced by people; they are not a set of immutable rules that can be questioned or changed. Indeed, members of the different disciplines and profession often reconstruct rules, especially in their day-to-day practices.

Many scholars have produced Cultural Navigation projects focused on disciplinary literacy with young students in classrooms across the United States (Fradd, Lee, Sutman, & Saxton, 2001; Gutiérrez et al., 1995; Gutiérrez et al., 1999; Gutiérrez et al., 2001; Gutiérrez & Rogoff, 2003; Heath, 1983; O. Lee & Fradd, 1998; Moll, 1992; Moll & Gonzalez, 1994; Moll & Greenberg, 1990; Warren, Ballenger, Ogonowski, Roseberry, & Hudicourt-Barnes, 2001; Warren, Rosebery, & Conant, 1989, 1994). These are important studies that have laid the groundwork for similar work at the secondary school subject-matter levels. The challenge for building on youth knowledge and connecting it to upper-grades disciplinary literacy learning, however, is not one to be underestimated. To date, the majority of the work done on connecting youth language and literacy practices to disciplinary language and literacy practices (not, I should underscore, connecting knowledge to knowledge but literacy to literacy) has been done in secondary English language arts and social studies (history or political science classrooms).

For example, Carol Lee (2001) is actively pursuing such pedagogical and curricular developments in her research program. Lee's construct of cultural modeling situates subject areas as cultures and seeks to tease out the demands of discourse in subject areas such as English. She then looks for spaces to link students' everyday discourses and practices specifically for the purpose of enhancing academic discourse and literate development. Studying in her own classroom, Lee demonstrated how a teacher with deep knowledge of students' backgrounds and ways with words could link those experiences and ways to the practices valued in the discipline.

C. D. Lee's earliest work (1993) documented gains in student learning when experimental groups whose everyday discursive practices (e.g., signifying, among other discourse practices) were leveraged to scaffold their learning of literary devices (e.g., metaphor, metonym, simile, irony) necessary for interpretation of canonical literature. These groups were compared to youth who were taught by learning the literary devices with no connection to their everyday means of interpreting and sense making, and Lee found that both the discursive skill and the abilities to interpret literature using mainstream literary devices of the experimental group were significantly superior to those of the control group.

In work that built on these findings, C. D. Lee (1995) analyzed the particular features of students' everyday discourse practices, examining how they mapped onto the discourse practices demanded for the reading of English literature, whether canonical or popular, and argued that drawing from students' existing discursive skill to scaffold the learning of disciplinary discursive and textual skill served as a form of "cognitive apprenticeship."

In more recent work (C. D. Lee, 2001, in press; C. D. Lee & Majors, 2003), Lee has argued that such work is actually "cultural modeling" in the sense that it serves as

a way of mapping for students the connections and disjunctures between the discourse and text practices they know and value and those of another discourse community. In her work with Yolanda Majors (C. D. Lee & Majors, 2003), Lee maps the links between the discourse practices of a community hair salon and those of English classrooms to illustrate the possibilities for drawing on students' everyday culturally situated language, discourse, and text practices to produce socially just subject-matter pedagogy. Although Lee's applications of cultural modeling have been predominantly based in the English language arts disciplines, she argues that cultural modeling—or what I am calling disciplinary literacy as Cultural Navigation—can be applied to any subject-matter area but will first require a mapping of both youth cultural, text-based practices and disciplinary cultural, text-based practices.

Similarly, Ernest Morrell and colleagues (Morrell, 2002; Morrell & Collatos, 2003; Morrell & Duncan-Andrade, 2003) have demonstrated methods for enhancing what might be thought of as traditional print literacy and discursive skills while building critical literacy skills among adolescent learners. Morrell's work draws primarily from students' interests in and proficiencies with hip hop, popular film, and television and other available media texts to produce critical research projects. According to Morrell (2002), students who participated in his interventions around popular film "honed critical research skills, understood the relationship between literature, popular culture, and their everyday lives, and . . . translated their experiences in quality oral debates and expository pieces" (p. 75).

When engaging with television and media text, Morrell's research participants developed projects to examine mainstream media sources, completing interviews with representative mainstream media outlets. Morrell does not report findings in terms of standardized literacy or subject-matter gains but offers qualitative assessments of the students' developing agency and ability to think critically and take action, as well as their developing prowess with both popular everyday texts and the texts demanded by their secondary school classrooms. Morrell's work is situated primarily in the subject areas of English language arts and social studies.

Gutiérrez and colleagues (e.g., Gutiérrez, 2005) also have developed a prominent research agenda that revolves around developing third spaces that provide discursive bridges for young people to move back and forth from what Gutiérrez and colleagues refer to as the counterscripts of their everyday lives and funds of knowledge to the official scripts of the oral and written texts of their content classrooms. This research program has demonstrated that master teachers who can hear, understand, respect, and incorporate the counterscripts of youth can use those everyday language practices as resources for bridging and navigating the discourses of different disciplines to support student learning (Gutiérrez et al., 1995; Gutiérrez et al., 1999; Gutiérrez et al., 2001; Gutiérrez & Rogoff, 2003). Much of Gutiérrez's work, similar to Morrell's, is situated in the subject areas of the social studies and emphasizes critical action projects embedded in everyday life.

Very little work from a disciplinary literacy as Cultural Navigation perspective has been developed in upper-level science or mathematics. A number of important studies of cultural navigation from students' everyday knowledge to science knowledge

have been conducted (e.g., Barton, 2001; Roth & Lee, 2005; Seiler, 2001; Yerrick, 2000), but these are not studies of making connections across text-based practices and processes. My own work offers a start at tracing the science-related everyday knowledge text practices of one group of youth in one large, urban area (Moje, Ciechanowski, et al., 2004), but our research explicitly notes the difficulty in making sustained connections from youth everyday knowledge to advanced science subject-matter learning and text practices in classrooms. Although my colleagues and I have offered a number of suggestions from our classroom and community-based research for providing opportunities to learn science text practices while also drawing on youth knowledge and text practices (Moje, Ciechanowski, et al., 2004; Moje, Collazo, Carrillo, & Marx, 2001; Moje & Hinchman, 2004; Moje, Peek-Brown, et al., 2004), these implications have yet to be tested in large-scale applications and the work of cultural navigation often takes a back seat to the work of learning science or specific disciplinary practices such as explanation writing.

The work of Greenleaf and colleagues in WestEd (Greenleaf, Schoenbach, Cziko, & Mueller, 2001) has been promising in that regard and is especially notable because it began with a focus on cognitive literacy strategies instruction and has begun to develop practices for cultural navigation as well. Similarly, although focused on younger groups of students, Warren, Rosebery, and colleagues at TERC (Rosebery, Warren, & Conant, 1992; Warren et al., 1989; Warren et al., 2001) have developed a number of culturally responsive, language-based science teaching practices that are compelling in regard to student engagement.

One notable exception to the focus on English language arts and social studies in connecting everyday to disciplinary literacy practices is the Algebra Project of Robert Moses and colleagues (Davis & West, 2000; Moses & Cobb, 2001; West & Davis, 2004). Moses uses the term “mathematical literacy” in what Norris and Phillips (2003) refer to as its derived sense, that is, in terms of building useable knowledge for the average citizen (rather than the elite knowledge of the mathematician). However, the work that Moses engages in with youth in the project draws on the mathematical symbol systems described by Bass (2006). The Algebra Project is unique, however, in its ability to provide students opportunities to navigate from multiple everyday semiotic forms to multiple mathematical forms. Consider, for example, this dynamic systems problem, described in West and Davis (2004):

Students construct a period-by-period record, in written and symbolic form, of the amounts of the drug taken, and the amounts of the drug in the body, then construct a symbolic form for the basic recursive relationship. Using graphing calculators, they plot the amount of the drug in the body at a particular interval compared to a previous interval (resulting in points that lie on a straight line) and plot the amount of the drug in the body over a sequence of intervals (resulting in points that approach a constant amount.) These activities are used to deepen students’ understanding of linear relationship and introduce students to dynamic functions that reach steady state. (pp. 4–5)

According to Moses and Cobb (2001), the approach is situated in the idea that arithmetic, logic, and set theory are based in “regimentation of ordinary discourse.” The curriculum follows what Moses refers to as a five-step process, much like that of

the Language Experience Approach (Stauffer, 1965) in the sense that students are provided with group experiences and then discuss these experiences in ordinary language. These discussions often are bolstered by access to pictures, diagrams, and essays. Next, students' language is restructured into observational statements that can be tested for truth value and precision. These statements are eventually translated into the structures and symbolic representations used in conventional mathematics.

The variety of projects—and the routine application of such projects—allows Moses and teachers trained in the Algebra Project to mine students' experiences; to allow for ambiguity in language use as students develop the precision necessary for mathematical language use (Street, 2005); and to, over time, apprentice students into mathematical discourse and mathematically literate practice. The words *over time* are significant here; to date, the Algebra Project results are positive, with Jackson, Mississippi, Algebra Project students' pass rate on the mathematics portion of the state test improving from 33% to 55% when using the new materials and performing significantly better than non-Algebra Project students in the same school (West & Davis, 2005). Moses and colleagues predict that, with time, more students will perform at even higher levels.

Although each of these projects varies in important ways in theoretical and methodological orientations, the goals of the work are similar: to provide opportunities for children and youth to bridge, navigate, and/or reconstruct both everyday and academic discourses in ways that allow them to learn disciplinary concepts and literacy skills and practices, to achieve in school settings, and to make contributions to and changes in society. Just as with each of the other disciplinary literacy perspectives, Cultural Text Navigation has much to offer, but it also suffers from some weaknesses. Not surprisingly, these weaknesses are represented as strengths in the other perspectives. Specifically, Cultural Text Navigation perspectives tend to focus more on documenting and analyzing youth text and cultural practices and leave the text practices of the disciplines a bit more vague (Cultural Modeling and The Algebra Project stand as exceptions to this critique). The disciplines are clearly acknowledged in each perspective but close analyses are not typically offered as ways of clarifying for teachers and teacher educators how connections can be made from the everyday text practices of youth to the text practices they must engage in to learn at advanced levels in the disciplines. In addition, the focus on linguistic features of the discourse communities tends to be absent across these studies, with attention to language rendered in terms of discourse practices, or common ways of speaking, performing, reading, and writing, as opposed to specific examinations of the functional linguistic features of the text work done by youth and members of the disciplines.

DISCIPLINARY LITERACY PEDAGOGY

Toward Socially Just Subject-Matter Teaching for Social Justice

What can we conclude about the role that disciplinary literacy theory and research might play in developing subject-matter instruction that is not only socially just but

also produces social justice? Based on this review, I would argue that the various forms of disciplinary literacy theory suggest implications for offering socially just, social justice subject-matter pedagogy. Disciplinary literacy theory and research—regardless of particular perspective—suggests possibilities for the development of rigorous subject-matter knowledge. This subject-matter knowledge is developed as a function of the development of ability to produce and represent knowledge in multiple forms, the ability to analyze how others have represented knowledge and therefore to assess truth claims, and with that analytic power in hand, the ability to challenge long-standing—even mainstream—claims to knowledge and, ultimately, to produce new knowledge that will benefit society. Moreover, certain forms of disciplinary literacy pedagogy bring together the focus on the tools for producing knowledge, expert subject-matter knowledge, and the knowledge that youth from a variety of backgrounds bring to their learning. But several issues need to be further examined for disciplinary literacy theory and research to inform the development of socially just, social justice subject-matter instruction.

First, subject-matter instruction that does not focus on the processes and practices involved in reading and writing disciplinary texts will not go far enough in developing a citizenry that can participate in decision making and in new knowledge production. It is not enough to talk about developing disciplinary literacy as useable knowledge for the average citizen. Producing and assessing knowledge in the disciplines and in everyday life relies heavily on one's ability to access, interpret, critique, and produce texts, both oral and written, on both paper and electronic media. Those youth who come to school with high levels of fundamental literacy skill (see Norris & Phillips, 2002) across a range of textual media will be more likely to participate not only in advanced disciplinary study but also in civic conversations and activities driven by the natural and social sciences, by mathematical processes, and by themes and concepts informed via the study of literature (not to mention the domains of visual arts, music, and sports and fitness). Across these different perspectives, scholars agree that knowing how to connect disciplinary knowledge to everyday knowledge is necessary but not sufficient for full societal access. People need to be able to navigate across disciplinary and everyday forms of representation, including print, numerals, and other inscribed symbols.

Second, disciplinary literacy pedagogy is not uniformly conceived; there are many different approaches to disciplinary literacy theory, research, and concomitant pedagogy, including a focus on (a) offering youth cognitive strategies to support comprehension and composition of complex texts; (b) uncovering and apprenticing youth to epistemological or cognitive processes of members of a given discipline; (c) teaching rhetorical and linguistic analysis and practices, with an emphasis on how language and thinking work within disciplinary traditions; and (d) revealing the cultural practices—or conventions and norms of the discipline—that mediate the cognitive processing work of disciplinary knowledge production and apprenticing youth to those practices by linking youth cultural practices and cognitive processes to those of the discipline.

Each of these four perspectives is represented by a burgeoning theoretical and research literature (of which I have barely scratched the surface). Yet, a number of questions remain for disciplinary literacy theorists and researchers, questions that represent promising areas for further study. The first question to consider is whether these four perspectives could be productively merged to afford the greatest possibility for socially just, social justice subject-matter (and literacy) learning. Consider an analysis made by one 16-year-old youth, Yolanda, when asked what made reading her school science text difficult, as part of an interview on literacy practices in and out of school:

- Y: School books are really boring. They don't make sense. Like the biology book. You read the whole section and you're like, okay, you gotta read it four times just to understand it a little bit. It's confusing.
- E: You can imagine everything and just fill in the blanks when you read [those] novels. But why can't you imagine what's going on when you're reading a school text?
- Y: It's just written **the way adults read it**. . . . And they have the **knowledge** to do that And they write it in **their own little language**. Like you said, there's different ways to write a sentence. . . . Well, they write it in **their language that only them can understand** because they graduated they have a diploma and everything. And we don't get that. The **words are big** that you're like, "Okay." You gotta go look it up. . . . You read the word and you try to **translate it in Spanish**. . . . And you try to translate it and you can't. . . . It's like, oh, it gives you a head ache . . . so it gets you brain dead. (Moje, 2006, p. 12)

This young woman was able to acknowledge the role that a number of factors play in her struggle to read—and be motivated by—school science texts: She named prior and expert knowledge, the linguistic and rhetorical styles of disciplinary experts (“the way adults read it”; “in their language that only them can understand”), the technical vocabulary of texts, the challenges of crossing two national languages, and motivation and interest, each a factor considered separately by the different research traditions reviewed here. Even more interesting, in earlier comments this same young woman offered a contrasting view of her out-of-school reading of texts steeped in topics she cared about and understood, written in language conventions she could access. She acknowledged the important role her mother played in her out-of-school reading, stating that her mother helped her read “words soooo big” (Moje, 2006, p. 12), underscoring the importance of the kind of social relationships and cultural (and linguistic) modeling Carol Lee refers to in her cultural modeling framework.

Just as Yolanda has done, disciplinary literacy researchers might consider weaving these foci together to contribute to deep subject-matter learning for social justice. By deep subject-matter learning, I refer to the kind of learning that not only provides opportunities for youth to learn with proficiency the established knowledge of a given field or disciplines but that also encourages youth to question, critique, and produce new knowledge within the disciplines. In addition, a socially just social justice pedagogy provides opportunities for such knowledge development without dismissing the value of students' everyday processes and practices.

A third question revolves around the effects of these different approaches to disciplinary literacy/subject-matter teaching. As illustrated in the review of the different approaches, although the theoretical and research literature on disciplinary literacy is extensive, it is scattered. In addition, although the studies are empirical, much of the writing is largely theoretical, making arguments for why the field should focus on literacy learning in the disciplines. What's more, within each of the four perspectives reviewed here, different (and sometimes multiple) methods and practices were studied. Finally, with the exception of the cognitive literacy strategies perspectives (studied mainly among primary grade children), very few studies of applications of these perspectives with young people in classrooms demonstrated learning gains in any standard way. In fact, a number of studies did not provide in-depth description of research methods, instruments, or procedures for measuring effects or of sample sizes. Thus, it is difficult to make definitive claims about the effects on student learning (across multiple dimensions) as a result of the research on disciplinary literacy. Although I was able to document exceptions to this concern (e.g., most of the cognitive literacy studies, Brian Hand's studies, Carol Lee's 1993 study, and the work of the Algebra Project), more work needs to be done to study effects, whether effects on the learning of mainstream conceptions of subject matter, critical stances on subject matter, conventional literacy skills, or critical literacy skills.

Unfortunately, the lack of studies of effects is most notable in the Cultural Navigation perspective; if, as many scholars who work from Cultural Navigation perspectives would be likely to argue, this perspective has the most power for developing the literacy skills and subject-matter learning of marginalized youth, then those of us who work from this perspective need to find ways to document the effects of Cultural Navigation practices. This is a challenging call because standard assessments typically do not measure the kinds of learning that Cultural Navigation purports to develop. Yet, these perspectives will not gain traction if researchers cannot document their positive impact in some way. In other words, disciplinary literacy researchers face a serious challenge to develop methods for documenting growth in innovative ways. In doing so, across all the disciplinary literacy perspectives, care needs to be taken to document the methods of research, including participant populations, temporal contexts of the work (was the study for a unit, a lesson, a year?), and instrumentation for analyzing student learning. In short, the field needs more studies that report studies and effects in precise and systematic ways.

A final question to consider is whether we really know enough about the literate processes and practices of the disciplines and of youth and their cultural groups to teach disciplinary literacy and to study the effects of such practice. The work of a number of literacy and disciplinary scholars reviewed here has paved the way for thinking about the literacy processes and practices of the disciplines; however, we need a more carefully detailed archaeology of the disciplinary practices, one that mines both the cognitive processes and the cultural practices that mediate those processes. Carol Lee (2005) has begun to develop such a framework for English literature as a discipline. However, the scope of such an enterprise suggests that this is

not work for one scholar alone. The work that needs to be done is not only theoretical; empirical studies of how members of the disciplines communicate and think about their communication—similar to the work of Yore et al. (2002)—would do much to advance this field for developing work related to preservice teacher education (see also Hynd-Shanahan & Shanahan, in press). Drawing from this review and from similar questions posed to historians by Leinhardt (1994), some questions to consider posing to members of the disciplines in such studies might include how language is used in the work of the disciplines (e.g., as a mathematician, a historian, a literary theorist or writer, a chemist), the types of texts used or produced as part of their work, and the purposes for using or producing such texts. Questions also should examine audiences for disciplinary work; standards for warrant; and taboo words, phrases, or writing styles. Finally, it would be useful to ask what disciplinarians consider critical for novices to learn about the discipline.

Another valuable direction in empirical studies would revolve around how secondary subject-matter teachers, subject-matter teacher educators, and even youth themselves conceive of literate processes and practices in the subject-matter areas they teach. Similar questions to those offered for members of the discipline could guide survey, interview, or observational studies of what teachers, students, and teacher educators think about when they think of literacy teaching and learning in the discipline. In particular, it would be important to probe teachers regarding the kinds of texts they turn to or produce when teaching in their content areas and regarding their purposes for turning to or producing such texts. Such interviews also could raise questions about establishing purposes for disciplinary reading or writing for students and discussion of the teacher's role and responsibility, as well as challenges, in supporting student learning about disciplinary literacy and in developing students' literacy skills.

Finally, a parallel study might involve posing virtually the same set of questions—modified appropriately—to youth in relation to particular aspects of their everyday lives. That is, even as we need an archaeology of the disciplines, we also need deeper and broader understandings of youth cultures if disciplinary literacy pedagogy is to be both just and transformative. Although a number of excellent studies of youth culture are offered in the literature, most work on youth cultural practices is ethnographic in orientation and thus focuses on small groups of young people. Youth culture and youth literacy researchers are in danger of essentializing all young people on the basis of deep studies of a few. We thus need to continue to conduct youth cultural research using ethnography, focusing on practices and texts of ethnic and racial groups, families and communities, youth or peer groups, and popular culture, so that we can better link youth practices, content knowledge, and interest to those of the disciplines to produce deep, just, and transformative subject-matter instruction. But we need to develop connections among those ethnographic studies, seeking to understand how the local can be understood globally (Brandt & Clinton, 2002) and how such understandings—without essentializing—might inform practice in secondary school subject-matter areas. Modeled on the questions for members of the disciplines, questions for youth would ask how and why youth use reading and

writing in their daily lives, how they set purposes for everyday reading, who are the audiences for their writing, if certain words or practices are considered taboo, and when and how they know to code switch across discourse boundaries. Sharing similar questions across ethnographic studies will enable the field to build strong youth cultural and literacy theories that can inform practice.

Documenting the points of departure and similarity in how language and text practices are engaged for a range of purposes across a range of contexts and a range of young people could move the field closer to implications for developing subject-matter pedagogy that builds on youth knowledge and their motivation to engage in text practices while also moving them forward to learning the ways of engaging with texts in other discourse communities and learning ways to change the texts and knowledge of their own and other communities. Such practice is not only socially just but also produces social justice as youth learn to navigate boundaries and question taken-for-granted knowledge, processes, and practices of different discourse communities.

In sum, scholars operating from any one of the disciplinary literacy perspectives work from the stance that to learn deeply in a subject matter, young people need to have access to the way that conventions of disciplinary knowledge production and communication can be routinely or more explicitly challenged and reshaped by other forms or practices of knowing; such knowledge gives young people the power to read critically across various texts and various disciplines. Such knowledge also gives them the power to draw from other funds of knowledge and discourse to raise challenges to what they learn in the disciplines. The more they interrogate their practices across all the funds, networks, or discourse communities they encounter in and out of school, the more youth can become critical readers and thinkers. It seems equally likely that the more the field can integrate the findings and pedagogical implications from the range of disciplinary literacy perspectives reviewed here, the better our chances of teaching with integrity. In this case, teaching with integrity involves developing secondary school subject-matter pedagogy that is socially just in its provision of opportunities to learn how to make sense of and produce the texts of different subject areas and teaches social justice as teachers guide youth in critiquing, challenging, and constructing knowledge in those disciplines and in everyday life.

NOTE

¹ These scholars do not necessarily identify as disciplinary literacy researchers. Indeed, they tend to operate as disciplinary specialists or as psychologists of learning. I have taken the liberty of identifying them as disciplinary literacy specialists because of their sustained attention to the texts and literate processes of the disciplines.

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