Building a House on Sand
Why Disciplinary Literacy Is Not Sufficient to Replace General Strategies for Adolescent Learners Who Struggle

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There is growing interest in disciplinary literacy instruction as a primary means of improving adolescent literacy outcomes. At times, this disciplinary framework has been represented as a replacement for the more broadly known general strategy instruction. However, disciplinary literacy, a potentially powerful idea, cannot replace general strategy instruction for all adolescent learners because adolescents who struggle with reading and writing do not possess the foundational skills and strategies necessary to learn proficiently. To support this thesis, the authors differentiate between general and discipline-specific strategies, examine the learner characteristics and setting demands that must be addressed in secondary schools, identify trends in the research base for discipline-specific reading comprehension and composition strategies when students who struggle are included in the subject population, and highlight implications from the findings for practitioners related to service delivery that incorporates both disciplinary literacy and general strategy instruction in high schools. **Key words:** *adolescent literacy*, *at-risk learners*, *discipline-specific literacy*, *reading comprehension*, *strategy instruction*, *writing*

THERE is growing interest in disciplinary literacy instruction within the field of adolescent literacy, as evidenced by this spe-

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cial issue of *Topics in Language Disorders*. Disciplinary literacy seeks to uncover and teach the specialized strategies, routines, skills, language, or practices inherent in certain content areas that are not generalizable to other domains (Shanahan & Shanahan, 2008). Conversely, general strategy instruction seeks to uncover and teach strategies, routines, skills, language, and practices that can be applied universally to content area learning and are by definition generalizable to other domains (e.g., Faggella-Luby & Deshler, 2008). For example, a discipline-specific strategy might teach students historical reasoning to reconcile differences in primary sources; whereas a general strategy might teach students to compare and contrast differences between the two sources. An historical reasoning strategy would be appropriate only with social studies content; whereas the compare-contrast strategy could be generalized to any content. In addition, both frameworks contain strategies for students to use (e.g.,

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learning strategies) and approaches for teachers to implement in their classroom (e.g., teaching strategies), yet they are not equal in their utility and robust evidence base to support learning outcomes for all students.

In this article, we argue that disciplinary literacy, although a potentially powerful idea to improve depth of content area knowledge, cannot replace general strategy instruction for adolescent learners who struggle with reading and writing. This is because adolescents who struggle do not possess the foundational skills and strategies necessary to learn proficiently. We believe that such a statement is necessary because, at times (including Fang, 2012, and Shanahan & Shanahan, 2012), disciplinary literacy has been represented as a replacement for the more broadly known general strategy instruction. To suggest that content teachers need only focus on the strategies that will unpack the complexity of specific concepts in certain content areas is a likely recipe for teacher frustration as teachers face the challenge of today's academically diverse students in middle and secondary school classrooms. Moreover, such a linear disciplinary focus implies that content teachers do not bear responsibility for teaching foundational general strategy instruction to all students in their classes.

The academic diversity of most classrooms today is such that they are composed of heterogeneous groups of high-, average-, and low-achieving students. For example, recent National Assessment of Educational Progress (NAEP) data, drawing from a national sample of 12th graders, indicate that roughly one third of students scored at or above the proficient level; whereas approximately two thirds of the remaining students scored at or below the Basic level (National Center for Education Statistics [NCES], 2009). *Basic* denotes only partial mastery of requisite knowledge and skills fundamental to proficient work. Stated alternatively, two of three students who are about to exit American high schools for the world of college or a career may struggle to perform proficiently.

Hence, struggling adolescent learners are now a significant population in content area classrooms and are therefore of critical concern for general education teachers. This issue becomes more complex when approximately 79% of students with disabilities are enrolled in general education classes for at least 40% of their school day (U.S. Department of Education [USDOE], Office of Special Education Programs, 2010). Gone are the days of removing students who struggle and students with disabilities from content area classrooms via tracking or special education identification. Instead, the current climate for educators is one of accountability for the outcomes of all students via federal legislation such as No Child Left Behind Act (USDOE, 2002) and Individuals with Disabilities Education Improvement Act (2004). Moreover, related educational initiatives such as Responsiveness to Intervention ensure that accountability begins with instruction for all students, including students with disabilities, in the Tier 1, or general education, classroom (e.g., Graner, Faggella-Luby, & Fritschmann, 2005). In short, the first point of service delivery for all students, including students who struggle with learning, is in the general education classroom. However, the educators who teach in the content area classrooms often are underprepared to meet the needs of this academically diverse group of students, resulting in a widening achievement gap between the limited outcomes of these students and their typically or high-achieving peers.

Given the reality of academic diversity in the typical secondary school classroom and recommendations by literacy experts to embrace disciplinary literacy as a framework (e.g., Heller & Greenleaf, 2007; Kamil et al., 2008), the current analysis (1) differentiates between general and discipline-specific strategies, (2) examines the learner characteristics and setting demands that must be addressed in secondary schools, (3) identifies trends in the research base for discipline-specific reading comprehension and composition strategies when students who struggle are included in the subject population, and (4) highlights for practitioners implications from the findings related to service delivery.

THE FRAMEWORK OF DISCIPLINE-SPECIFIC LITERACY

One response to the adolescent literacy crisis emerges from the field of disciplinary literacy. The disciplinary literacy movement seeks to meet sophisticated college and career literacy demands with discipline-specific strategies within the content areas of mathematics, science, history/social studies, and literature. Discipline-specific approaches seek to uncover and teach the specialized strategies inherent to certain content areas. A unique characteristic of this approach is that strategies are not intended for generalization from one content area to another, nor even within subjects of a single content area (Shanahan & Shanahan, 2008). For example, students might be asked by a chemistry teacher to "visualize the location of an electron around the atomic nucleus within an s, p, d, or f electron orbital." Such a strategy uses both specialized terminology and specialized grammar unique to chemistry.

Disciplinary literacy acknowledges that literacy demands become more complex and challenging at the secondary level and that students need to learn how to navigate the unique language structures within a given discipline (Fang & Schleppegrell, 2010). Shanahan and Shanahan (2008) identified three levels of literacy: basic, intermediate, and disciplinary. Basic literacy includes decoding and literacy conventions and is typically mastered in early elementary school. Intermediate literacy skills include generic comprehension strategies, common word meanings, and basic fluency; they require cognitive endurance for more sophisticated routines and responses and typically are mastered by the end of middle school. Finally, disciplinary literacy skills are the specialized reading routines and strategies used in history, science, mathematics, or literature; they usually are mastered in high school. For example, historians read historical text to source, corroborate, and contextualize information (Heller & Greenleaf, 2007; Stahl & Shanahan, 2004). Historians compare and contrast multiple sources of information and perspectives to reveal an authentic account. One strategy to help students learn to do this is De La Paz's historical reasoning instruction that helps students reconcile conflicting information from primary and secondary historical accounts (De La Paz, 2005). This strategy is considered discipline specific because it can be applied only to social studies content.

Similarly, scientists are adept at reading the various discourse structures found in scientific textbooks and journals, including: procedure, procedural recount, scientific report, and science explanation (Shanahan, 2004). However, students in secondary science classes need to learn how to navigate these specialized text structures in order to move beyond fact recognition in their reading. Scientists engage deeply with concepts across science genres; whereas more novice readers often ignore, discount, and compartmentalize information (Shanahan, 2004) based on a lack of background knowledge or familiarity with text structure. Therefore, development of a strategy that helps students examine the text structure across various forms of science text dealing with the same concept (e.g., laboratory reports, journal articles, and graphed data) would be helpful for teaching students how to start thinking and reading like a scientist.

However, a key feature of the disciplinary literacy frameworks described earlier is the assumption of prerequisite foundational reading and writing skills. That is, students must be able to use general comprehension strategies effectively to comprehend and compose grade-level text before advancing those strategies within discipline-specific approaches and texts. Our concern is that not all students have this essential foundation.

DISCIPLINARY LITERACY AND ACADEMIC DIVERSITY

Although the disciplinary literacy framework is appealing, regrettably it fails to consider the academic diversity in today's schools in which a majority of students have yet to master the necessary prerequisite skills for discipline-specific instruction. As mentioned

earlier, NAEP data signify a crisis in public schools as more than two thirds of fourth and eighth graders perform at or below the *Basic* level in reading comprehension nationally (NCES, 2009). Consequently, two of three children transitioning from middle school to high school can be considered at risk for failure because they lack foundational skills for secondary curricula success.

What are these foundational skills? Functionally, NAEP results indicate that students scoring below *Basic* may struggle with recognizing literal information from text, explicitly stating reasons for character action, making comparisons, finding the main idea of an article, or describing the central problem faced in a narrative (Lee, Grigg, & Donahue, 2007). Of significance is that these are the skills that are associated with general strategy instruction, which clearly need to be mastered prior to discipline-specific strategy learning.

Two relevant explanations for such widespread struggles with foundational skills can be offered. First, struggling adolescent learners do not apply essential foundational skills and strategies on grade-level associated literacy tasks in the same way as good readers. The "good reader" model of Pressley and Afflerbach (1995) describes skilled readers as those who are extremely active with text, using a recursive process of general strategies that include making and confirming predictions, asking themselves questions, and making a conscious effort to summarize what they have read. Conversely, students at risk struggle to identify the essential from the nonessential information presented in the text (Ehren, 2005), to relate new information to prior knowledge, and to actively monitor comprehension (Gersten, Fuchs, Williams, & Baker, 2001). Moreover, inefficient executive functions related to problems in applying strategic processing and metacognition to manage and self-regulate proficient reading behaviors negatively impact comprehension (Gersten et al., 2001). Clearly, if the skills that aid proficient (good) readers in meeting academic literacy demands are missing or inefficiently applied by struggling learners, further instruction is warranted.

Second, as the academic, social, motivational, and executive demands (i.e., requirements and expectations) associated with secondary school success are dramatically increasing, students without adequate foundational skill and strategy knowledge in each area are placed at an increasing level of risk for failure (e.g., Schumaker & Deshler, 2006). Of the critical demands to be met, content area teachers are likely most familiar with the academic demands associated with the activities of their classrooms. Classically, the demands of the content area classroom require acquisition skills, such as reading, taking notes, identifying and learning information during lectures or discussions; storage skills, such as creating mnemonics and recalling critical content; and expression skills, such as tests, essays, and written responses (Schumaker & Deshler, 2006). Text is more complex at the secondary level, as is the demand for learning more from text, especially expository text, which further complicates the challenge of learning (Duke & Pearson, 2002). Hence, students must become more sophisticated in the breadth, flexibility, and application of comprehension strategies just to maintain, let alone accelerate, their levels of reading proficiency.

Today's Common Core State Standards (CCSS, 2010) movement further heightens the expectations for discipline-specific instruction by expecting content area teachers to teach disciplinary literacy along with their content. CCSS expectations increase curricular demands further by calling for a foundation of college and career readiness that includes (a) independent reading of literary and informational texts of increased range and complexity; (b) integration, analysis, delineation, and evaluation of knowledge and ideas; (c) interpretation and analysis of author craft and structure; and (d) close reading to determine key ideas and details. Such clarity of demands is helpful, but the CCSS do not explicitly identify access skills, including the necessary foundational literacy and learning skills associated with academic and conversational language, prior knowledge, or life experience, which are essential for

Table 1. Sources Used to Identify Reading Comprehension and Composition Studies

Meta-analysis	Topic	Focus	Grade span	No. studies
Edmonds et al. (2009)	Reading	Reading interventions and effects on reading comprehension	6–12	29
Wanzek et al. (2010)	Reading	Reading interventions for struggling readers	4–5	24
Scammacca et al. (2007)	Reading	Practical guide: Interventions for struggling adolescent readers	4–11	31
Graham & Perin (2007)	Writing	Writing instruction studies with adolescents	4–12	123
Rogers & Graham (2008)	Writing	Single subject design writing intervention research	2–12	88
Graham & Hebert (2010)	Writing	Practical guide: Impact of writing on reading	1–12	104

meeting each demand. In addition, students in content area classes are challenged to think transdisciplinarily, generalizing and solving problems by thinking critically across content and settings. Therefore, any move toward disciplinary literacy instruction must consider the breadth of these demands in light of the learner characteristics outlined earlier. The consequence of not doing so is to risk unintentionally widening the achievement gap and frustrating general education professionals.

RESEARCH ON DISCIPLINARY LITERACY AND STRUGGLING ADOLESCENT LEARNERS

To examine the research base supporting the disciplinary literacy movement, we examined several meta-analyses conducted in the last 4 years (Table 1) for the inclusion of discipline-specific strategies with struggling adolescent learners. Specifically, two recent meta-analyses were chosen for both reading strategy instruction (i.e., Edmonds et al., 2009; Wanzek, Wexler, Vaughn, & Ciullo, 2010) and writing strategy instruction (i.e., Graham & Perin, 2007; Rogers & Graham, 2008). In addition, one national practice guide was chosen for each type of strategy instruction to ensure a broad collection of previously

examined articles (e.g., Scammacca et al., 2007 [reading]; Graham & Hebert, 2010 [writing]). Although these documents did not focus on disciplinary literacy research specifically, their broad focus on interventions for struggling learners should capture any discipline-specific interventions studies with this population. From this initial search, 67 reading strategy and 91 writing strategy articles were identified. Articles were then examined for the following inclusionary criteria: (a) appearance in a peer-reviewed journal (no dissertations or book chapters); (b) published in the last 20 years (1990–2006[1]); (c) inclusion of struggling adolescent learners (including students with reading-related disabilities or students at risk for failure who read or write at least two grades below level); (d) students in grades 4–12; and (e) inclusion of at least one reading comprehension or writing quality[2] measure. This resulted in 31 reading strategy articles and 33 writing strategy articles.

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[1]Examination of the six selected meta-analyses and reviews revealed article selection from within these dates.
[2]Oral and written "retell" measures were not included as a measure of reading comprehension in keeping with findings from Pressley, Hilden, and Shankland (2005).

Articles were then coded according to the following criteria: (a) subject population and grade level; (b) type of materials used (e.g., grade level, ability level, disciplinary); (c) type of target measure (e.g., researcher developed or standardized); (d) teacher to student instructional ratio (e.g., small, 1:≤5; medium, 1:6–1:12; moderate, 1:13–1:19; or large, 1:>20); and (e) outcomes (e.g., statistically significant relative to a control, improvements from pre to post).

Interrater reliability was then calculated for all articles (100%) to ensure coding accuracy. Results of the interrater reliability were 49 agreements of 51 opportunities for a total of 96% in reading and 86 agreements of 89 opportunities for a total of 97% in writing. All disagreements (typically related to passage type and number of writing measures) were then reexamined and consensus reached.

DISCIPLINE-SPECIFIC TRENDS

The analysis surfaced 5 of 31 studies that were judged to include discipline-specific strategies in reading comprehension and 7 of 33 with discipline-specific strategies in writing composition (Table 2). Several trends emerge from this analysis. First, all five reading studies that included discipline-specific strategies focused specifically on English Language Arts (ELA) content (e.g., story structure and narrative theme identification). No other content areas (e.g., science, social studies) were represented in practice passages or assessments. Only one of the seven writing studies included a discipline-specific strategy in a content area other than ELA (De La Paz, 2005). In this lone study, the discipline-specific strategy includes a historical reasoning strategy aimed at improving the historical content within a written product.

Second, the studies primarily occurred in the middle grades. This is consistent with Shanahan and Shanahan's (2008) model of beginning to introduce discipline-specific strategies at the middle school level. However, the lack of any disciplinary literacy studies conducted with high school students is troubling, given the persistent nature of the achievement gap with older students. It also highlights the lack of evidence for the efficacy of discipline-specific strategies for any students, let alone those who struggle.

Third, the studies were conducted in small- to medium-size instructional ratios or within small groups in a large classroom setting. Although small- to medium-size instructional ratios are consistent with pullout or resource room instructional models, the point of disciplinary literacy is that the content area teacher expert instructs students within the subject area classroom. Clearly, the small- to medium-size instructional ratios across studies are not representative of the reality of large content area classrooms in which teachers might have 20 to 30 students in each class. In addition, the findings of the medium-sized instructional group (not statistically significantly different from a control group) might indicate a need for more explicit pedagogy with struggling populations, as recently recommended in the literature (see Faggella-Luby & Wardwell, 2011).

Fourth, it is surprising that, given the ELA focus of these strategies, so few used either grade-level texts or disciplinary materials. In truth, the heterogeneity of readability levels within typical ELA curricula may be to blame. The use of ability-level passages for practice is a substantiated method of instruction (see Schumaker & Deshler, 2006; Faggella-Luby & Deshler, 2008). However, typically it is recommended that ability-level (or controlled) practice be followed by grade-level material practice for developing self-regulation during independent practice. The use of both ability-level and grade-level readings offers the potential opportunity to forestall struggling adolescent learners from falling further behind because it allows students to focus on learning the new strategy with controlled text while continuing exposure to discipline-specific content.

Finally, the fact that outcomes between groups were not clearer casts doubt on the

Table 2. Disciplinary Literacy Articles Including Struggling Adolescent Learners

Study	Content	Grade	Design	Results
Reading comprehension				
Gardill & Jitendra (1999)	Story mapping	MS	Multiple baseline	Positive pre to post visual analysis
Taylor et al. (2002)	Self-questioning and story mapping	3–6	Alternating treatments	Statistically significant pre to post and vs. control group
Vallecorsa & de Bettencourt (1997)	Story mapping	7	Multiple baseline	Positive pre to post visual analysis
Wilder & Williams (2001)	Theme identification	MS	Pretest–posttest; 2-factor ANOVA	Statistically significant pre to post
Williams, Brown, Silverstein, & deCani (1994)	Theme identification	5–6	Pretest–posttest; ANOVA	Statistically significant pre to post
Writing quality				
De La Paz (2005)	Historical reasoning and content	8	Pretest–posttest; ANOVA	Statistically significant vs. control group
Danoff, Harris, & Graham (1993)	Story mnemonic strategy	4/5	Multiple baseline	Positive pre to post visual analysis
Martin & Manno (1995)	Story planning and monitoring strategy	7	Multiple baseline	Statistically significant and positive pre to post visual analysis
Montague & Leavell (1994)	Character development	MS	Multiple baseline	Positive pre to post visual analysis
Sawyer, Graham, & Harris (1992)	Story grammar strategy	5/6	Pretest–posttest; Fisher-Hayter	Statistically significant vs. control group
Simmons et al. (1994)	Story grammar; integrated reading/writing instruction	8	Pretest–posttest; MANCOVA; ANOVA	Statistically significant vs. control group
Zipprich (1995)	Story Web strategy	Age 9–12	Multiple baseline	Positive pre to post visual analysis

Note. ANOVA = analysis of variance; MANCOVA = multivariate analysis of covariance; MS = middle school.

efficacy of discipline-specific strategies to improve reading comprehension. As noted by Swanson (1999), researcher-developed measures typically have higher effect sizes. Although all five studies employed researcher-developed outcome measures, only one of the five reading studies targeting discipline-specific strategy instruction could show that this method of instruction outperformed control or "typical practice" instruction (Taylor, Alber, & Walker, 2002). Such findings raise questions about the potential efficacy of discipline-specific strategies.

All seven writing studies that investigated discipline-specific strategies showed evidence for the effectiveness of strategies. However, a few notable qualifications are justified. One study's results showed notable gains for struggling adolescent learners who used a writing strategy to compose well-structured narratives; yet writing quality was not maintained across time or with another teacher (Danoff, Harris, & Graham, 1993). De La Paz's (2005) study, which taught a discipline-specific strategy for composing historical texts, yielded better results for high- and average-achieving students; whereas students at risk for academic failure showed minimal growth in historical accuracy and reasoning.

In summary, of more than 150 articles examined on reading and writing strategy instruction involving struggling adolescent learners, only 12 involved any methods that could be coded as offering discipline-specific strategy instruction. These results support a conclusion that the reasoning for a disciplinary literacy framework as presented in the literature (e.g., Faggella-Luby, Ware, & Capozzoli, 2009; Fang, 2012; Shanahan & Shanahan, 2008, 2012) precedes the necessary evidence base. Moreover, as only 1 of the 12 studies involved content other than reading or writing related to literature, research on outcomes for struggling learners with discipline-specific strategies in core subjects (i.e., science, mathematics, and social studies) is desperately wanting.

IMPLICATIONS FOR A RESEARCH AGENDA

Upon an examination of the current research base of disciplinary literacy with struggling adolescent learners, several critical questions emerge:

a. Are discipline-specific strategies too limiting given the foundational literacy outcomes that struggling adolescent learners are still struggling to meet?

b. Do content teachers have the expertise to teach these discipline-specific strategies successfully to struggling adolescent learners?

c. Do discipline-specific strategies inhibit struggling adolescent learners' ability to develop critical thinking and self-regulation to apply strategies across disciplines?

Such questions pose a research agenda for applied research with diverse populations of learners. For the present, however, given the paucity of discipline-specific strategies and the immediate need to educate current students, an alternative conceptualization of disciplinary literacy and related service delivery is necessary. In the remainder of this article, we present the case for a less radical view of disciplinary literacy that could address some of its goals without extending beyond the reach of diverse and struggling learners, including those with language disorders.

WHY GENERAL STRATEGY INSTRUCTION IS RELEVANT

Learning strategies

In light of the limited amount of evidence available to justify a sole reliance on discipline-specific strategies to improve outcomes for struggling adolescent learners, the potential role of more general strategies needs to be reconsidered. Learning strategies have been defined as " . . . an individual's approach to a task. It includes how a person thinks and acts when planning, executing, and evaluating performance on a task or its outcomes"

(Schumaker & Deshler, 2006, p. 132). In short, learning strategies have been viewed as a general plan that a learner formulates for accomplishing an academic or learning goal.

A relatively long history of research supports the efficacy of instruction in the use of general strategies in approaching and solving problems for students who struggle in learning. General strategy instruction has focused on mnemonics, reading, and composition to improve academic performance. Scruggs and Mastropieri (2000) conducted an important body of research on teaching mnemonic strategies to assist struggling students to learn and remember academic content. These approaches include key word, peg word, and symbolic representation strategies. Moderate to high effects are found when students are taught to implement such strategies to remember content in science and social studies.

Considerable research on general strategy instruction has been conducted in the area of reading comprehension as well. Trabasso and Bouchard (2002) conducted a review of reading comprehension strategies for the National Reading Panel (National Institute of Child Health and Human Development, 2000). They concluded: "The bottom line is that readers who are given cognitive strategy instruction make significant gains on comprehension compared with students who are trained with conventional instruction procedures" (p. 177). The nature of general reading strategies (e.g., visualization, self-questioning, comprehension monitoring, summarizing) have been operationalized in varying ways, including reciprocal teaching (Palincsar & Brown, 1984); transactional strategies (Pressley, El-Dinary, Gaskins, & Schuder, 1992) the self-regulated strategy development (SRSD) model (Harris & Graham, 1999); and the Strategic Instruction Model (SIM; e.g., Schumaker & Deshler, 2006). Each of the teams of investigators cited here has found that struggling learners can learn and effectively apply an array of task-specific strategies, resulting in positive effects on reading comprehension measures and classroom performance (e.g., Edmonds et al., 2009; Graham & Perin, 2007).

Related to these findings, it is general reading strategies that are reviewed and described in the Institute of Education Sciences' Practice Guide published by the What Works Clearinghouse titled *Improving Adolescent Literacy: Effective Classroom and Intervention Practices* (Kamil et al., 2008). Kamil et al. gave general strategies a rating of *strong* (the scale consisting of three options: *strong*, *moderate*, and *low*) in describing the level of evidence supporting their use. No mention is made of discipline-specific strategies in this practice guide.

A sizable body of research in written composition also has shown that struggling learners can be taught general strategic approaches to the writing process. Major bodies of research have included investigations of the SRSD model (e.g., Harris & Graham, 1999), cognitive strategy instruction writing (e.g., Englert & Raphael, 1992), and the SIM writing strategy curriculum (Schumaker & Deshler, 2009). Collectively, these research programs have found results that include improvements in the quantity, quality, knowledge of, and approaches to writing, as well as evidence of improved self-efficacy across a variety of genres (e.g., narratives, persuasion pieces, expository essays, and reports).

Teaching strategies

In its guidance document titled *Academic Literacy Instruction for Adolescents*, the Center on Instruction (Torgesen et al., 2007) lists as one of its five recommendations to "Teach essential content knowledge so that all students master critical concepts" (p. 56). As supporting evidence for this recommendation, the authors cite research conducted at the University of Kansas Center for Research on Learning under the leadership of Bulgren, Deshler, and Lenz (2007) on teaching strategies known as content enhancement routines (CERs), a part of SIM. CERs are based on the following four key principles: (a) content area teachers must select the critical features of the content and then transform that content in a way that promotes learning in academically

diverse groups of students; (b) the instruction must meet the needs of both the group and the individuals in the group; (c) the process must not compromise the integrity of content by watering down important ideas to accommodate the diversity of students; and (d) teachers and students must engage in a co-constructive partnership that honors the role of each in the learning process (Bulgren et al., 2007).

As specified in these four principles, the primary agent of change when CERs are used in the content classroom is the teacher. That is, CERs are routines that content area teachers use to assist them in selecting, planning, and teaching critical content that is judged to be difficult to learn for academically diverse learners. The overriding purpose of CERs is to reduce barriers to learning critical and difficult content in rigorous classes for all learners. Another purpose of CERs is to expose students to multiple, explicit modeling by the teacher of how to think about, organize, and manipulate information to facilitate its comprehension, application, and recall. When students observe these multiple models through teachers' frequent and consistent use of CERs, they have repeated opportunities to learn how to strategically construct, organize, and use content in a given subject area. Thus, students learn a set of high-powered, general strategies for learning content in a content area class while also learning the content of the class (e.g., Bulgren, Deshler, Schumaker, & Lenz, 2000; Bulgren, Lenz, Schumaker, Deshler, & Marquis, 2002).

From a design standpoint, CERs incorporate cognitive scaffolds (e.g., Gersten et al., 2001; Graham & Perin, 2007; Pressley et al., 1992), graphic organizers (e.g., Nesbit & Adesope, 2006), explicit instruction including clear description and expectations, teacher models, feedback, and generalization (e.g., Swanson, 1999), and active student engagement through classroom discourse (e.g., Palincsar & Brown, 1984). Each of these design features serves as a mediating device to facilitate comprehension.

The effectiveness of CERs has been tested in inclusive secondary settings across a variety of content topics and classes (e.g., science, social studies, and ELAs) that include academically diverse students, including students with disabilities. Employing a range of experimental designs, studies have shown that teachers can use CERs and associated graphic organizers to enhance comprehension of conceptual information in Western civilization, civics, and biology (Bulgren, Schumaker, & Deshler, 1988); knowledge of a concept by analogy in environmental science (Bulgren et al., 2000); comparison of critical science concepts at the middle and high school levels (Bulgren et al., 2002); and retention of factual information (e.g., Bulgren, Deshler, & Schumaker, 1997).

For example, nine secondary science and social studies teachers in inclusive settings received 2 hr of instruction in how to use the Recall Enhancement Routine to create mnemonics to enhance students' recall of critical content. Teachers learned to specify the type and most appropriate mnemonic to be used and to explain how to use the device. Effects were determined using a multiple baseline across-teachers design. Student products were examined. Experimental students, including students with learning disabilities, earned significantly more points on the dependent measure test on items presented by their teacher than students in the comparison class. Both teachers and students indicated a high level of satisfaction regarding ease of use, amount of time to prepare, positive impact on student performance, and likelihood of routine implementation in the future.

In addition, the Question Exploration Routine (Bulgren, Marquis, Lenz, Schumaker, & Deshler, 2009) focuses on instructional procedures that teachers can use to help students answer and respond in writing to challenging content questions. In one study, students with and without disabilities ($N = 36$) were assigned randomly to the experimental or control condition to learn about the effectiveness of the routine and its impact on student performance measured as comprehension of science content and the quality of written responses based on the 6-trait model of writing instruction (Northwest Regional

Educational Laboratory, 1999). Analysis of covariance was used for all analyses. In the area of content acquisition, significant differences and moderately large effect sizes were found in favor of the experimental group; however, differences for students with learning difficulties were not significant. Analysis of the writing samples also revealed significant differences and very large effect sizes in favor of the experimental group (including students with learning difficulties). Overall, the study demonstrated that the question exploration routine helped students to perform well on a common measure of written response with minimal additional instructional time on the part of the teacher.

In sum, there is considerable research on general strategy instruction with adolescent learners who struggle. Moreover, as evidenced by the CER research, general strategy instruction has demonstrated significant outcomes in terms of enhanced student learning, including improved content area knowledge, and for academically diverse students.

PRACTICAL SUGGESTIONS FOR MOVING FORWARD

Forwarding collaborative practice

Clearly, there is promise in the research supporting general strategy instruction to improve content area knowledge for academically diverse students. Although the disciplinary literacy framework is well reasoned, the need for additional confirmatory evidence as to its efficacy with at-risk students is considerable. Therefore, the most practical suggestion for moving forward is to consider how both types of strategy instruction are necessary, rather than placing them in competition with each other or advocating for one to replace the other.

Shanahan and Shanahan (2008) detailed a conditional relationship between the necessary foundational learning of intermediate (i.e., general) strategies and more advanced strategies of disciplinary literacy. Such a relationship acknowledges the benefits of general strategy instruction to provide foundational skills and knowledge for learning discipline-specific strategies. However, what must not be forgotten, and a theme at the center of the critical analysis in this article, is that most secondary students, as indicated by NAEP data, demonstrate significant deficits in essential foundational knowledge and skills. Consequently, general strategy instruction continues to be instructionally relevant in high schools, providing the strong foundation upon which discipline-specific strategies can build.

The conditional relationship has considerable implications for secondary school service delivery. First, in the absence of existing research-based discipline-specific strategies (especially in science, mathematics, and history), content area teachers can embed general strategies within their discipline-specific instruction. Embedding strategy instruction provides an axis to leverage the evidence supporting general strategies to learn critical content. Furthermore, it is likely that embedding general strategies will help to build related discipline-specific strategies for unique learning situations. Alternatively, as in the case of research presented earlier on CERs, general strategy instruction may prove robust in improving outcomes for all, requiring no modification.

Second, content teachers are masters of critical content within their disciplines. However, a benefit of embedding general strategies into their classrooms is that content teachers can draw upon the expertise of speech–language pathologists, special educators, and reading specialists. In this way, content teachers who lack the literacy expertise to teach reading per se can rely on educators who do have strong literacy backgrounds as part of their formal preparation. Content teachers, then, can focus on teaching the disciplinary literacy features that can inform students about how to read in their varied disciplines. Such collaboration can expand the capacity of expertise in the content area classroom, when specialists share the responsibility for the education of all students.

Third, partnerships in learning provide for a continuum of service delivery that relies on shared responsibility for literacy instruction according to the expertise of each professional. For example, Ehren, Deshler, and Graner (2010) have described a five-level Content Literacy Continuum that includes core academic classrooms engaging in enhanced content instruction to support learning regardless of students' literacy levels, embedded or intensive learning strategy instruction, and the instruction of basic skills and language. The benefit of this model is that it acknowledges the academic diversity and heterogeneity of American public school students, providing clear roles for all educators to support their learning. Such a continuum of instruction is likely necessary to complete the process of building from general strategy to discipline-specific strategy instruction for students who may initially be struggling.

Finally, the characterization of discipline-specific strategies as not generalizable to other content (e.g., Shanahan & Shanahan, 2008) does surface a significant limitation in disciplinary literacy reasoning that goes beyond the research base and directly impacts service delivery. Namely, true disciplinary learning requires a place for metacognitive reflection on content-specific knowledge. Reflection that analyzes, synthesizes, seeks patterns, and generalizes learning within and across content areas is essential to human learning. True learning requires students to weave critical concepts within a discipline together and explore the relationships between these concepts rather than deal with them in isolation. For example, Diamond (1999) used the patterns of geography, demography, and ecological happenstance to explain societal dominance throughout global history in *Guns, Germs, and Steel*. Such transdisciplinary thinking is a necessity for critical thinkers to generalize and problem solve across paradigms to answer questions of substance because they relate to the human condition. Arguably, it is the foundational skills of general strategy instruction that embody the metacognition, self-regulation, and gener-

alization essential for such transdisciplinary learning.

Forwarding the research base

Instrumental to the current analysis is the paucity of disciplinary literacy research that includes struggling adolescent readers. Future research in the area of discipline-specific strategies is clearly necessary and might take several mutually informative directions. First, research is necessary to confirm the underlying soundness of a disciplinary literacy framework with struggling adolescent readers in the subject population and across all content areas. This research must be informed by existing evidence (see Fang, 2012, and Shanahan & Shanahan, 2012, for reviews) regarding how content experts apply literacy skills in certain professional fields (e.g., reading and writing as chemists, historians, mathematicians, and literary critics) while building from the extensive general strategy research base.

Second, research should examine the efficacy of embedding general comprehension strategies in content area classrooms. Measures of comprehension and writing quality should be supplemented with other outcome measures related to benefits associated with ability-level readings and increases in content knowledge, necessary explicitness of instruction to ensure meaningful learning by *all* students, and teacher satisfaction with general strategy instruction. Evaluation research must be conducted to compare the content knowledge outcomes of general strategy versus discipline strategy instruction. Such studies will likely benefit from generalization measures to truly assess the potential for strategies to impact transdisciplinary learning.

Finally, research on implementation of service delivery models might include exploration of professional collaboration between content area teachers and other support specialists (e.g., speech–language pathologists, special educators, and reading specialists) regarding how to successfully communicate expectations for strategy use, options for discipline-related readings across environments, opportunities to change instructional

ratios, and regular problem solving based on student progress-monitoring data.

CONCLUSION

Using discipline-specific strategy instruction exclusively as the pedagogical instrument to achieve college and career readiness for all adolescents is akin to building a house on sand. That is, although the rationality of developing discipline-specific strategies to improve depth of content area knowledge is clear, replacing general strategy instruction wholly with discipline-specific strategies in high schools at this time is not practical, grounded in a literature base, nor likely to meet the realistic needs of a majority of students. Given NAEP data, it is unlikely that adolescent learners who struggle, who constitute a majority of students, will be able to master disciplinary literacy skills without the necessary prerequisite literacy building blocks that are embodied in general strategy instruction.

Rather, our position is that the preferred path forward is to recognize the necessity of the foundational learning that general strategies provide, build from the research demonstrating improved content area learning through general strategy instruction, explore the importance of deep disciplinary understanding that may be possible through disciplinary literacy, and, ultimately, investigate the need for meta-comprehension and expression skills that would allow readers and writers to step back from content knowledge. Such a path would be more likely to achieve results that would teach students to think in a transdisciplinary manner, to solve problems, and to generalize knowledge across disciplines.

Moreover, continuing to value general strategy instruction in secondary schools expands content teachers' capacity by drawing upon the expertise of support educators. Speech–language pathologists, special educators, and reading specialists working across settings are uniquely positioned to collaborate in identifying strategy needs, co-teach or model strategy use, provide supplemental explicit instruction when needed, identify ability-level reading passages, and cue student use of relevant strategies. Involving all educators provides the opportunity to engage in wraparound services, ensuring teachers are well equipped to instruct students as they move throughout their day and throughout each year of school. In sum, while discipline-specific strategies are under development, educators of all areas of expertise can support students of all ability levels with general strategy instruction now.

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