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Abstract

This study focuses on an examination of the learning-to-learn strategies of seventh-grade students as they highlight, take notes, plan, organize, and write expository texts. Participants consist of 125 students, 41 with disabilities and 84 without disabilities. The results reveal that the students with disabilities have more difficulties in using the learning-to-learn strategies as they read, study, and write expository texts, although neither group is judged to be highly proficient. The implications point to a renewed emphasis on preparing content-area teachers to teach the literacy and learning strategies that support the development of learners who know how to read to learn and how to write to learn.

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The Learning-to-Learn Strategies of Adolescent Students With Disabilities

Highlighting, Note Taking, Planning, and Writing Expository Texts

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This study focuses on an examination of the learning-to-learn strategies of seventh-grade students as they highlight, take notes, plan, organize, and write expository texts. Participants consist of 125 students, 41 with disabilities and 84 without disabilities. The results reveal that the students with disabilities have more difficulties in using the learning-to-learn strategies as they read, study, and write expository texts, although neither group is judged to be highly proficient. The implications point to a renewed emphasis on preparing content-area teachers to teach the literacy and learning strategies that support the development of learners who know how to read to learn and how to write to learn.

Keywords: *written language assessment; learning strategies; expository text; meta-cognitive strategies*

The assessment of adolescent students' literacy skills is a challenging endeavor. Although a number of literacy tests have been designed to evaluate students' reading accuracy, fluency, and comprehension, there is a dearth of assessment tools that provide insight into students' learning-to-learn strategies in the context of the content-area curriculum. Unless students know how to identify, represent, synthesize, and organize expository ideas, they will have difficulties when they are asked to comprehend or write expository texts. Developing assessments that teachers can use to examine students' learning-to-learn performance is an important goal that can improve the teaching–learning process in the content curriculum.

The content-area curriculum is challenging for a number of reasons. First, the conceptual and technical vocabulary in expository texts is often dense and unfamiliar (Jetton & Alexander, 2004; Shanahan, 2004). Students have limited background knowledge for the academic concepts that are found in content-area textbooks (e.g., sound and light waves, weather cycle, latitude and longitude). Second, the text structures that govern informational texts are less familiar and are more variable than the

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story structures that govern narrative texts (Kamberelis, 1999; Meyer, Brandt, & Bluth, 1980). A single expository chapter, for example, is a hybrid of different text structures, including problem and solution, cause and effect, compare and contrast, chronology or sequence, and classification (Anderson & Armbruster, 1984; Gersten, Fuchs, Williams, & Baker, 2001). These text structures shift in a seamless way within the text, which means that students must be able to recognize these text structures given par- tial information and then reassemble the textual information based on their learning purposes and goals. Finally, expository texts are more challenging because many content-area teachers do not think of themselves as literacy teachers (Kamil, 2003). Despite the fact that a high degree of reading and writing underlies successful performance in the disciplinary subjects, teachers often do not know how to support or evaluate students' expository comprehension and composition (Duke, 2000; Jetton & Alexander, 2004; Kamil, 2003). Hence, students too often perform literacy-related tasks in the content areas without explicit instruction, which is beyond the intuitive capabilities of many students.

Literacy assessment in the content areas starts with a fundamental awareness that skillful learners must con- struct meaning at the local and global levels. At the local level, students construct meaning by searching for the main ideas and the related details that confirm or support the main ideas (Williams, 2003, 2005). Similar to a classification task, readers and writers make sense of the expository ideas by asking the questions, "What is this about?" and "What are the related details that support or provide evidence for that main idea?" (Baumann, 1984; Day, 1986; Williams, 2003, 2005). This set of skills is involved when readers comprehend text at the level of paragraphs, and similarly, when readers are asked to highlight, take notes, and retell or summarize textual information (Taylor
& Samuels, 1983). Likewise, writers must categorize and label the ideas they have gathered as part of a process of inquiry, as well as when they seek to transform the ideas into written texts with transitional statements that convey the structural meaning and relationship among the main ideas and details that follow (Englert & Hiebert, 1984; Englert et al., 1991; Englert & Thomas, 1987).

At a global level, text structures play a role in how the local information is assembled, synthesized, ordered, and related (Meyer, 1975). Text structures are organized to address a particular purpose, and the information is assembled to answer the questions that are allied with that text structure purpose, such as problem solution (e.g., What is the problem? What are the solutions?), cause and effect (e.g., What is the critical event? What caused the event? What are the effects?), compare and contrast (e.g.,

What two things are being compared? How are they alike? How are they different?), sequence (e.g., What is the process or event? What materials are needed? What are the steps in the procedure?), and chronology (e.g., What are the events? How are they sequenced? What are the dates? [Anderson & Armbruster, 1984; Englert et al., 1991; Meyer, 1975; Meyer et al., 1980]). Developing an understanding of the relationships among the sets of ideas is critical in expository comprehension and composition (Englert et al., 1991; Taylor & Beach, 1984; Taylor & Samuels, 1983). Likewise, being able to organize disciplinary concepts within and across curriculum units (e.g., percolation, ground water, water cycle, weather patterns, and pollution) is a critical aspect of understanding relationships at the global level. For this reason, teachers often use graphic organizers or text structure maps to help students envision and construct the hierarchical relation- ships among the informational ideas that comprise the expository subject (DiCecco & Gleason, 2002; Englert et al., 1991; Kim, Vaughn, Wanzek, & Wei, 2004). Such devices prompt students to construct the conceptual relations that bind and differentiate the main ideas and details as part of comprehension, composition, and synthesis.

In addition to the organizational strategies, a number of cognitive and meta-cognitive strategies influence performance in the content areas (Deshler, Ellis, & Lenz, 1996; Wong, 1979; Wong & Wilson, 1984). Students must activate background knowledge, preview and predict expository ideas, retell and summarize, ask questions, engage in inferential reasoning, clarify ambiguities and vocabulary, visualize, and monitor performance in the content areas (Chan, 1991; Deshler et al., 1996; Englert & Thomas, 1987; Gersten et al., 2001; Palincsar & Brown, 1984; Wong, 1979; Wong & Wilson, 1984). Students must also possess meta-cognitive knowledge to plan, select, and implement the appropriate learning-to-learn strategies, as well as to self-instruct and self-regulate their reading and writing performance on an ongoing basis (Wong, 1979; Wong & Wilson, 1984). Coordinating the use of multiple learning-to-learn strategies and tools in an inquiry process (planning, searching, gathering, organizing, and compos- ing) creates even more challenges, as students are asked to move beyond isolated strategy use to the orchestrated use of a number of strategies to achieve different purposes and functions (Deshler et al., 1996).

Despite the importance of the learning-to-learn strategies to effective reading and writing performance, many students experience difficulties in many of the aforementioned areas. Students with learning disabilities (LD) have difficulty using and regulating the cognitive strategies that might support text comprehension and composition. Several researchers have noted the difficulties of

students with LD in identifying the main ideas, generating related details that are internally consistent with a main idea or text structure, retelling and summarizing informational texts, engaging in note taking, and composing texts that conform to a given text structure (Englert & Hiebert, 1984; Graves, 1986; Williams, 1984, 1993,
2003, 2005; Williams, Taylor, Jarin, & Milligan, 1983; Wong & Wilson, 1984). Meta-cognitive difficulties complicate matters, inasmuch as students with LD have difficulties in planning, organizing, monitoring, and revising their literacy performance (Deshler et al., 1996; Wong, 1979; Wong & Jones, 1982; Wong & Wilson, 1984). Although content-area teachers expect a high degree of independence in reading, writing, and studying, students with disabilities have difficulties that limit their potential to become self-sufficient in content-area learning.

Although there have been a number of studies that have isolated particular strategies, there have been fewer studies that have sought to examine students' learning-to-learn strategies in the content areas. Many of the learning-to-learn strategies are related by their shared emphases on the strategic processing, rehearsing, organizing, reporting, and synthesizing of expository information at the local and global levels. All of the learning-to-learn strategies require that students think and make decisions about texts in ways that are recorded and represented through the use of writing tools that serve to connect the eye, hand, and mind.

The purpose of this article is to report on some of the assessment tools that we developed as part of the ACCelerating Expository Literacy (ACCEL) project. In this project, we sought to examine students' learning-to-learn skills as they read, highlighted, summarized, took notes, wrote, and represented the information in science and social studies texts. All of these tasks required that students derive and construct meaning at the local and global levels, and we saw these assessments as offering important insights into students' thinking and mental processes.

To evaluate students' performance, we presented students with disabilities and their grade-age peers with a social studies and science passage. Given the social studies passage, students were asked to highlight and take notes on the important information and compose an informational article based on their notes and the passage information. For the science task, students were given two sets of expository facts as well as two tables with information or data, and then students were asked to synthesize the information from the multiple sources into a single map or plan. They then used the plan as a basis for writing an informational article.

The following research questions were addressed in this study:

1. What is the nature of learning-to-learn strategies among seventh-grade students with disabilities?
2. How do students with disabilities perform relative to their grade-level peers on tasks that involve constructing and composing meaning at the local and global levels, given expository texts?

Method

Participants

The data were collected from a suburban school district. Eighty-four seventh-grade, nondisabled students participated in the study, of whom 62% were girls and 38% were boys. Approximately 8% were Black and not Hispanic, 6% were Hispanic, 10% self-identified as multiracial, 2% were Asian or Pacific Islander, and 74% identified as White and not Hispanic. Among this group, 21% participated in the free or reduced lunch program. On the ACT EXPLORE Exam, the nondisabled students achieved at the 68% percentile.

Forty-one students with disabilities were included. Of this group, 80% were students with LD, based on the revised administrative rules for special education from the Michigan Department of Education, Office of Special Education, and Early Intervention Services. An additional 3% and 6%, respectively, were students with emotional impairments and students with cognitive impairments. For this entire group with disabilities, the mean full-scale IQ on the *Wechsler Intelligence Scale for Children–Third Edition* (Wechsler, 1991) was 90. Thirty-one percent of the students with disabilities were girls, and 69% were boys. Approximately 2% of the sample were Asian or Pacific Islander, 7% were Black and not Hispanic, 7% were Hispanic, 9% self-identified as multiracial, and 75% were White and not Hispanic. Thirty-three percent of them participated in the free or reduced-lunch program. On the *Stanford Achievement Test, Ninth Edition* (1996), the group's mean national percentile rank on the Reading Vocabulary subtest was 22%, and the national percentile rank on the Reading Comprehension subtest was 20%. All students received their content-area instruction in general education with their grade-age peers, and they received an average of 4 hours of instruction per week in the special education resource room.

Instrument Development

The assessments described next were designed to measure achievement in an intervention designed to improve students' performance in content-area classes. The assessments were developed to assess the strategic routines that students would use to acquire, rehearse, and represent the essential information in content-area texts. We purposely constructed the instruments to provide information on students' understanding and representation of the content and structure of the expository information on similar but slightly different tasks (e.g., mapping, note taking, highlighting), and that involved students in representing information across literacy domains (e.g., comprehension, composition). Because typical tasks vary in each content area (e.g., persuasive writing is more typical in social studies than science), the two assessments entailed slightly different tasks.

Rubrics were developed to score each assessment (Englert et al., 2005). Rubrics contained the primary traits and essential features that characterized the effective use of the learning-to-learn strategies in the comprehension or composition process. For example, highlighting, note taking, and summarizing depend on the learner's ability to identify the critical content, to construct the hierarchical relationships among the main ideas and details, to paraphrase and reduce the information, and to represent the organizational arrangement among the ideas to support learning and rehearsal. Hence, we incorporated these qualities into the rubrics to evaluate the artifacts produced by students.

We also considered the range of performance. The performance standards were calibrated through a consensual process of social moderation (National Research Council, 1996), in which the research team refined and calibrated the qualities and ratings to reflect the knowledge exhibited by different learners. For each trait, we anchored the high levels of performance based on the standard of a mature adult. Ranges of performances were rated from 1 to 5, with a score of 1 assigned to students whose knowledge was "*undeveloped*," a score of 2 to students who exhibited "*partial knowledge*," a score of 3 to students who exhibited "*developing knowledge*," a score of 4 to students who demonstrated "*satisfactory knowledge*," and a score of 5 to students who displayed "*advanced knowledge*." The rule of thumb in scoring was that students who did not successfully pass on a particular trait were either assigned a 1 or 2. Students who showed a developing knowledge of the trait were assigned a score of 3, whereas students who showed some competence and mastery were scored either 4 or 5, based on their degree of mastery. The specific traits for the rubrics are explained in greater detail in the next section.

Social studies assessment. In September, the students were asked to complete a social studies and science assessment, each of which was printed in two separate booklets. Each assessment was administered over 2 days

to evaluate students' abilities to use the literacy strategies in the context of an expository topic. For the social studies assessment, a 740-word passage was written at the 6.7 readability level. Because of the technical vocabulary of the passage, it was difficult to further reduce the readability level. The passage conveyed information about a Native American culture (e.g., Great Plains Tribes). Each page of the passage was printed on a separate page, with a lined piece of paper facing each page. On the first day, the teachers read the passage aloud as students listened and highlighted the essential main ideas and details. Then students were given 15 minutes to take notes on the important information in the passage using any note- taking format or method that they desired. On the second day, the booklets were returned, and students were told to imagine that they had been a newspaper reporter who had lived with the tribe for 6 months. They were told to write a newspaper article in which they described their experience and provided their readers with rich information and details about how the people of the Native American tribe lived. They were told that they could refer back to their notes and the passage to write the newspaper article.

Science assessment. The science assessment also was given over 2 days. There were three embedded booklets in the science assessment. In one booklet, students were given multiple sources about an animal (e.g., cheetah or Canada lynx). These sources contained two fact sheets with bulleted but unorganized facts about the animal, and two figures. The figures presented information about the animal (e.g., diet, speed) in the form of charts or tables. Together, the total set of facts encompassed at least six informational categories. The expository passages were written at a 4.7 readability level based on the Flesch– Kincaid formula (Flesch, 1948; Kincaid, Fishburn, Rogers, & Chissom, 1975).

Given these multiple sources, students were told to select and gather information for a report that they would write about the wild cat, making a plan or map of the information, and then writing a paper for someone who did not know anything about that topic. The writing instructions emphasized that students should write a paper that contained an introduction, body paragraphs that included main ideas or topic sentences, relevant details, and a conclusion. The assessment was broken down into 2 days encompassing (a) a planning stage (gathering information, making a map or plan) and (b) writing stage (e.g., writing a report).

Social Studies Scoring

Highlighting and note taking. For the social studies measure, students' performance in highlighting and note taking encompassed five primary traits:

1. organizational structure, as measured in terms of students' abilities to highlight or take notes on the major and minor ideas, and to represent their hierarchical arrangement;
2. extent of content coverage, as typified by the breadth of topical coverage corresponding to the main ideas of the passage, as well as the depth of coverage corresponding to the percentage of relevant details;
3. reduction or selectivity, as measured in terms of students' abilities to summarize, paraphrase, or to identify essential phrases; and
4. potential of the resulting artifact to be a useful learning tool, as measured in terms of the meaningfulness and usefulness of the tool to support studying and learning.

Each of these traits was scored from 1 to 5, reflecting the continuum in the mastery levels of students ranging from *undeveloped* (1) to *advanced* (5). An example of the types of scoring criteria and performance continuum that were developed is shown in Figure 1.

Writing. A writing rubric was designed to score students' persuasive writing paper on the social studies assessment. This rubric encompassed four traits or dimensions:

1. introduction to the topic;
2. introduction to the specific category or main idea of each body paragraph;
3. breadth of content coverage represented in the number of categories;
4. depth of content coverage reflected in the details provided in each category;
5. conclusion; and
6. overall organization (e.g., general introduction to the paper, body paragraphs, and conclusion).

These traits were also scored from 1 to 5. Definitions of some of these traits are contained in Figure 2.

Science Scoring

Plans and maps. Rubrics were developed to score students' maps and plans. Like the social studies measure, students' planning performance encompassed five primary traits:

1. organizational structure, as measured in the hierarchical arrangement of major and minor ideas;
2. extent of content coverage, as typified by breadth of topical coverage (e.g., main ideas) combined with depth of coverage in terms of the inclusion of relevant details;

3. reduction or selectivity, as measured in terms of students' abilities to summarize, paraphrase, or to identify essential ideas (rather than copy or use too little of the passage information); and
4. potential of the plan to be useful in support of studying and writing.

Each trait was scored from 1 to 5 (1 = *undeveloped*, 5 = *advanced knowledge*).

Written report. The written report entailed a somewhat different type of organizational structure than required for the persuasive writing in social studies. The primary traits that were scored involved six variables corresponding to the structure of the written text:

1. introduction to the paper (e.g., introduction to the purpose and topic);
2. inclusion of topic sentences;
3. breadth across the categories of information in terms of coverage of the main idea categories;
4. depth within the categories of information in terms of the provision of sufficient details;
5. conclusion to the paper; and
6. overall organization.

Some of these traits aligned most closely with the evaluation of the microstructures that governed students' construction of individual body paragraphs (e.g., topic sentences, breadth of sub-topical coverage, depth of details) and other traits aligned more closely with the macro structures at the global level (e.g., introduction to the paper, conclusion to the paper).

Reliability. Seven raters, who were doctoral students in special education or literacy, were trained to code the students' assessments using the rubrics. Raters were trained to a high degree of reliability, with interrater reliability completed on 20 papers. The interrater reliability ranged from 80% to 95%. The mean reliability was 85%. Once the raters were trained to a high degree of reliability, they scored the students' artifacts in blind grading. Reliability checks were performed midway through the scoring to ensure high reli- ability and to prevent scoring drift. Reliability remained above 85% at the start and midpoint checks.

Results

The data were analyzed using multivariate analysis of variance (MANOVA) to contrast the performance of the seventh-grade students with disabilities and their nondisabled peers on the fall assessments. Each instrument was

Figure 1
Rubric With a Summary of the Primary Traits for Highlighting and Note Taking

Trait	Advanced [5]	Satisfactory [4]	Developing [3]	Partial [2]	Undeveloped [1]
Organization	*All major ideas and related details *Sophisticated *No irrelevant info *Hierarchical notes	*Organizational pattern mostly represented * Most main ideas and details are included *Notes: have labels and/or categories	*Some main ideas and details included *Some decision-making *Notes: Some evidence of hierarchy (2	*Very little organization *Few main ideas, but minor details included *Notes: Bulleted list but no labels	*Everything highlighted in a passage *Or very little highlighted in a passage *Notes: resemble essay or report
Content A. *Breadth*: representation of major ideas from the passage B. *Depth*: representation of supporting details for major ideas C. % Guideline	A. Nearly all of the **major ideas** (breadth) are included B. Virtually all **related details** (depth) are included -OR- C. 90% + of main ideas and details	A. **Breadth** is good (e.g., at least 5 or more of the **main ideas)** B.Depth good but somewhat imperfect (e.g., missing a few key details) C. **About 80% of main ideas** and details included	A. Breadth of coverage is fair, but missing several of the main ideas or details B. Some main ideas and details are included C. **50%-70% of main ideas** and details are in-	A. Missing all of the main ideas B. Spotty or inconsistent coverage of details C. 30% of main ideas (3 main ideas) and corresponding details (~20) are included	A. There is no content discrimination: Includes everything -OR- B. Ideas included with no apparent value or meaning C. Too few or random ideas
Reduction or Selectivity A. Evidence of summarization and reduction; includes key words and phrases B. Recorded ideas make sense	A. Fully selects and paraphrases important ideas & details B. Artifact makes perfect sense; all of the information is condensed	A. Highlights or records phrases but less than perfect in identification and selection of phrases and ideas B. Most, but not all, of the information is condensed, is paraphrased, and makes sense	A. Evidence of selection of ideas at the word, phrase, and sentence levels B. At times, entire sentences included, but not sole strategy. C. Some summaries	A. Evidence that information is selected at the sentence level. B. Selects essential information	A. No evidence of purposeful selection of information B. Not enough reduction C. Too sketchy or incomplete
Potential to be a useful tool A. Artifact is useful in studying learning, & writing A. Uniformly covers the passage and artifact makes sense	A. Artifact covers the key passage information, is well organized and easy to follow B. Artifact is useful as a study and writing tool C. Mature & sophisticated	A. Mostly, the artifact looks like a useful tool, but could be slightly improved	A. Artifact shows some evidence of being a useful tool but fails to sustain the effort B. Artifact succeeds at some levels but may contain some distracting, excessive, extraneous or unorganized info	A. Artifact is generally insufficient in quantity or quality; not especially useful for studying and writing B. Misses too many ideas and details to help student succeed on a test or	A. Artifact is too incomplete to be helpful B. Artifact copies the passage information without transformation

Figure 2
Primary Traits for Scoring Writing

Trait	Advanced [5]	Satisfactory [4]	Developing [3]	Partial [2]	Undeveloped [1]
Intro to Paper	*Introduces topic, subtopics & text structure in paragraph *Precisely names topic & purpose; captures the readers' attention	*Generally names topic & purpose in paragraph *Introduction not powerful, inventive or sophisticated *Could be a "5" with improvement.	*May use a single sentence that introduces the topic & hints at purpose to inform *Introduces the theme topic in some clear way	*Uses simplistic introduction to start report (e.g., My report is about armadillos)	*Topic is not introduced *Paper begins with a detail sentence
Topic Sentences	*All paragraphs have topic sentences *Topic sentences are appropriate to the details that follow	*Most paragraphs have topic sentences *Topic sentences are appropriate to the details *Followed by two or more relevant details	*Some paragraphs have topic sentences -and- *Topic sentences are appropriate to the details that follow	*May have 1–2 introductory sentences for few paragraphs *Subtopics can be inferred from the details in the paragraph	*No topic sentences are used *Topic sentences are not appropriate to the paragraph *Associative details
Development Across Categories (Breadth)	*Clear sub-topical coverage of 4–5 categories with 3 contiguous details *No obvious gaps or associative ideas *Invention, reduction, and construction is	*Good depth of sub-topical coverage with 3 categories that have 23 contiguous details *Invention, reduction, and construction is present (versus copy strategy)	*At least 1 or more definite sub-topical categories with identifiable cluster of ideas and no irrelevant information	*At least 1 inferrable category based on 2 or more facts *Rest might be: Sketchy vague, or confusing	*Entirely or essentially copies original text *Associative (Hard to follow & hard to identify subtopics) *Subtopics are un-developed (e.g., 1 sentence in length)
Development Within Categories (Depth)	*All topics are well developed with 3–4 details	*Most topics are well developed with 2–3 contiguous details per category *No extraneous information	*At least some subtopics are well developed with 2–3 details	*Uneven development of topics *Much extraneous information	*Topic sentences are supported by few to no details *Copies original text *Lists unrelated details *Facts are associative
Conclusion to Paper	*Conclusion indicates that the paper is ending *Summarizes main points	*Conclusion is separated from the preceding text, either physically or with a transition *Could be a "5" with some improvement	*Provides some suggestion of a closure to the paper but is not entirely successful	*Uses a simplistic conclusion to end the paper (e.g., This is the end of my report on armadillos.)	*No conclusion is used; paper ends with the last detail sentence *Associative or random ending

analyzed separately, with the simultaneous consideration of all the dependent variables that comprised the rubrics entered into the overall multivariate analysis. The MANOVA results and the mean scores of students in the two disability groups on the assessments are shown in Table 1.

Social Studies Highlighting

First, the scores of students on the highlighting measure were considered. The MANOVA (see Table 1) revealed significant effects for the disability status of students ($p < .01$). Examination of the univariate F ratios

Table 1
Statistical Results on Disability Factor for Students With Disabilities and Nondisabled Students

Learning-to-Learn Strategy	MANOVA *F* Value	*df*	*p* Value	Effect Size	Univariate *F* Value	*p* Value	Effect Size	Students With Disabilities		Students Without Disabilities	
								M	*SD*	*M*	*SD*
Social studies											
1. Highlighting	4.22	4, 73	.004**	.118							
• Organization					5.599	.021*	.069	2.10	0.788	2.50	0.600
• Content					15.51	.000***	.17	1.80	0.768	2.50	0.686
• Reduction					7.141	.009**	.086	1.95	0.686	2.45	0.73
• Usefulness					9.358	.003**	.110	1.85	0.813	2.43	0.704
2. Note taking	5.00	4, 72	.001**	.217							
• Organization					7.392	.004**	.106	1.32	0.582	2.03	0.991
• Content					15.94	.000***	.175	1.16	0.375	1.93	0.814
• Reduction					14.66	.000***	.164	1.26	0.562	2.12	0.919
• Usefulness					17.02	.003**	1.05	105	0.229	1.88	0.86
3. Writing	2.337	4, 72	.063	.115							
• Introduction					9.707	.003**	.115	1.37	0.684	2.12	0.975
• Breadth					5.017	.028	.063	1.58	0.692	2.12	0.975
• Depth					4.902	.03	.061	1.63	0.761	2.16	0.933
• Organization					4.659	.032	.06	1.47	0.841	1.97	0.875
Science											
1. Plan and map	2.573	5, 119	.022*	.104							
• Organization					6.409	.013*	.05	1.66	0.938	2.15	1.07
• Content					4.389	.038*	.034	1.83	0.946	2.24	1.06
• Reduction					0.706	.402	.006	1.93	0.959	2.07	0.875
• Synthesis					8.416	.004**	.064	2.07	0.959	2.61	0.970
• Usefulness					7.704	.006**	.059	1.68	0.934	2.27	1.20
2. Writing	2.917	6, 117	.011	.130							
• Introduction					6.264	.014*	.049	1.54	0.711	1.93	0.866
• Topic sentence					7.004	.009**	.054	1.63	0.968	2.11	0.924
• Breadth					11.73	.001**	.088	1.76	1.02	2.40	0.962
• Depth					15.38	.000***	.112	1.76	0.888	2.43	0.913
• Conclusion					3.253	.074	.026	1.29	0.642	1.98	2.38
• Organization					13.39	.000***	.099	1.54	0.745	2.07	0.777

*p = .01. **p = .001.

revealed that all four dependent measures contributed to the significant main effect for disability. The greatest contribution was made by the students' content coverage ($p < .001$). Nondisabled students highlighted the important details of the passage in a more effective and selective manner than the students with disabilities. In fact, the mean performance of nondisabled students exceeded the performance of students with disabilities by 1 standard deviation. Nevertheless, nearly 52% of the nondisabled students showed only partial levels of knowledge (e.g., score of 2), largely because they were unsuccessful in highlighting the main ideas; and another 3% showed no evidence (e.g., score of 1) of skills in highlighting the important details. On the other hand, 35% and 55%, respectively, of the students with disabilities showed either no or partial levels of knowledge. Hence, a full 90% of the students with disabilities were judged to be unsuccessful in highlighting the important and essential content of the passage.

Three additional variables contributed to the significant multivariate F ratio, including the potential of students' highlighting to serve as a useful study or writing tool ($p < .01$), their ability to selectively reduce the essential information by highlighting the ideas that reflected the gist of the passage ($p < .01$), and the extent to which the highlighting captured the hierarchical structure and relationship among the main ideas and details ($p < .05$). All of these differences favored the nondisabled students. In fact, 65% of the students with disabilities could not successfully highlight main ideas and

relevant details, 80% could not highlight by selecting essential phrases, and 75% could not highlight texts in a manner that would be conducive to the meaningful and effective learning of the content. Put in concrete terms, a full 75% to 90% of the students with disabilities were unsuccessful on nearly all of the highlighting dimensions.

The difficulties of students with disabilities in highlighting the essential information were evident. Many students with disabilities highlighted entire paragraphs, but they were not strategic or selective about highlighting particular phrases or details. When the highlighted sections of the passage were reread, it was the equivalent of reading the full text of the original passage. Such attempts were not helpful in a learning-to-learn process, because there was no evidence of thoughtful decision making or the selective distinction between the essential main ideas, related details, and unimportant information. Students did not seem to interact with the passage in a conscious way that might help them later to locate or retrieve the important information.

Social Studies Note Taking

A MANOVA was performed on students' note taking, entering the primary trait ratings associated with the quality of their notes' organization, content coverage, reduction, and efficacy scores. The results (see Table 1) revealed a statistically significant MANOVA for the factor associated with the disability groups, with all four dependent variables contributing to the statistical effect, including their content coverage ($p < .001$); their reduction of the information into essential phrases and paraphrases ($p < .001$); ratings of the effectiveness of their notes for studying and learning ($p < .01$); and the organization of their notes ($p < .01$). All of these differences favored the nondisabled students. However, it must be noted that the performance of both groups was poorer on the note-taking task relative to their performance on the highlighting task. Both groups' note-taking scores fell nearly 1 standard deviation below their highlighting scores. This finding was not unexpected, given that Williams (2003) has noted that highlighting and selecting main ideas is an easier task for students than the task of generating and producing main ideas.

Nevertheless, students with disabilities had a particularly difficult time taking notes. In contrast to the average obtained scores of nondisabled students on the note-taking traits (1.88 to 2.12), students with disabilities obtained much lower scores (1.05 to 1.32). In addition, the standard deviations for the students with disabilities (.225 to .582) were substantially lower than the standard deviations obtained by their nondisabled peers (.860 to .991), which indicated a more uniformly depressed and narrower band of performance across the four primary traits. In further support of this conclusion, the cumulative percentage of students with disabilities who received either a score of 1 or 2 on each of the four dimensions ranged from 94% to 100%.

There seemed to be two patterns of performance that characterized the note-taking performance of students with disabilities. One pattern could be characterized as passive copying. This pattern is represented in Figure 3. This student wrote a considerable amount, which suggests that she did not have trouble with the physical act of writing. However, her notes are copied nearly verbatim from the passage. The end result is that her written notes resemble an essay that is the textual equivalent of the passage. Because the student has not represented the information in any succinct or organized fashion, her notes are ineffective for studying and learning. It is probably more efficient to read the original passage. Notes produced in this fashion reveal little thoughtful decision making, and there is no evidence of the learner's strategic selection, reduction, organization, categorization, or grouping of the textual ideas. Looking at her notes as a window into her cognition, this learner's performance suggests that she, like many students with disabilities, is a passive learner, without the strategic processing that would be vital in a read-to-learn or write- to-learn process. Generally, the notes of students with dis- abilities showed few signs of being effective as external memory systems; nor were they useful as written representations that operated independent of the source text.

Another pattern of performance included students with disabilities who produced notes that contained somewhat random or unorganized facts. This type of response is shown in Figure 4. This student has produced notes in an essay-like format, but the details do not belong together in an organized and labeled way, although the student has reproduced two facts that seem to be conceptually related ("Some tribes built round homes called wigwams. They are made out of logs, sticks, and grass"). However, the sparse recording of facts is insufficient, considering that the passage contained 10 categories of information with 77 total facts. Taken together, these two patterns reveal that most students with disabilities had difficulty depicting, coordinating, and representing the meaning and structural relationships among the expository ideas (DiCecco & Gleason, 2002). These students showed a lack of sensitivity to the hierarchical structure and relational meaning of the ideas, and they lacked an awareness of the text structure tools that might be brought to bear to help them comprehend and represent the information.

In contrast, nondisabled students were beginning to show some awareness of note taking as a tool that could help them in the learning process. One example, shown

Figure 3
Passive Copying in Note Taking

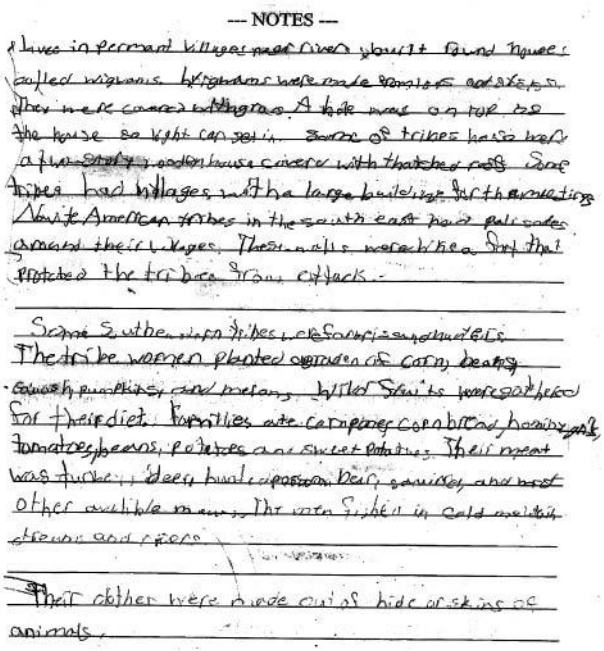
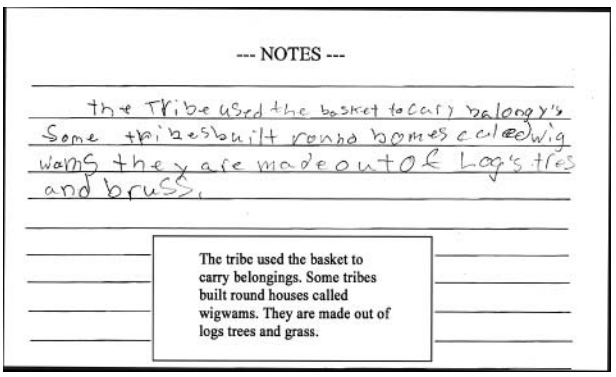
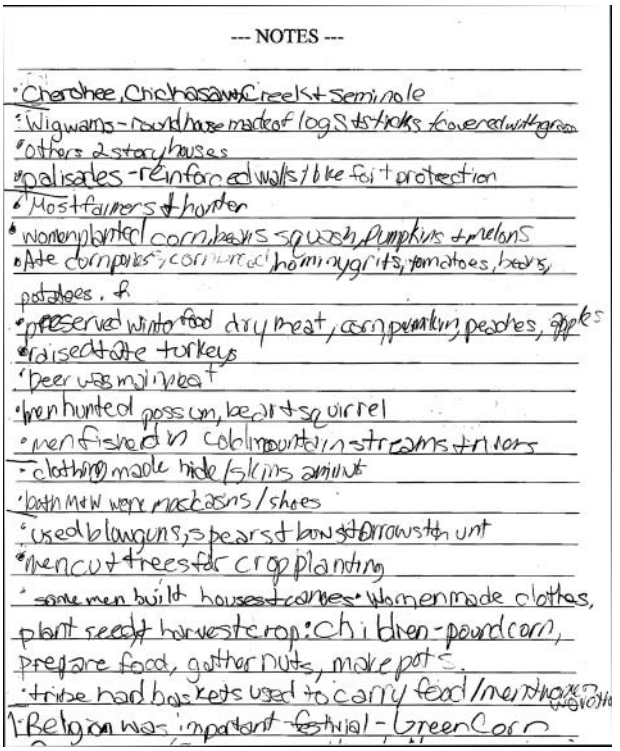


Figure 4
Unstructured Notes of a Student With Learning Disabilities



in Figure 5, typifies a common note-taking pattern. Although not highly proficient, the student shows a developing knowledge that the expository content must be selected, reduced, and transformed to produce a bulleted list of ideas. Fifty percent of the nondisabled students listed or bulleted the facts in their notes. Although the lists did not contain a hierarchy of labeled or grouped sets of main ideas and facts, the format of

Figure 5
Bulleted Notes of a General Education Student



their notes indicated that the students were more actively extracting ideas from the passage. Cognitively, this was a sign of progress in the direction of using tools in support of expository learning and rehearsal.

Social Studies Writing

The final social studies assessment analyzed was the students' informational essays on the social studies topic. Although approaching significance, the MANOVA revealed a nonsignificant main effect for disability group ($p > .05$). Nevertheless, inspection of the univariate F ratios revealed statistically significant results for all four dependent variables, including students' introductions to their topic ($p < .01$), the breadth of their subtopics ($p < .05$), the depth of category or topical development ($p < .05$), and the overall organization of their papers ($p < .05$).

Examination of the means of the two groups revealed that students with disabilities tended to score below their grade-level peers. However, neither group was proficient in their ability to write a newspaper article about an informational topic. The mean scores of both groups fell in the "not evident" or "partial knowledge" ranges, with

the mean scores of students with disabilities placing them nearer the lowest end of the continuum.

As with note taking, the predominant writing strategy of students with disabilities was to copy the passage. It was surprising that students with disabilities often ignored their highlighting or notes to help them plan or write but returned to the original source to write their reports. This finding added further support to the hypothesis that highlighting and note taking did not serve as cognitive tools in a read-to-learn or write-to-learn process. All three assessments suggested that students with disabilities were not independent learners. When they produced organized-looking papers, it was because they had copied the organization and information of another author. However, their written papers showed little awareness of the writing purpose or the presumed audience for their newspaper article, and they did not approach the factual reporting process in a manner that was mature or independent of the source texts.

Science Planning

The strategies that were assessed in social studies were examined in slightly different formats in the science domain. Students were asked to construct a map or plan that organized the information that was contained in the fact sheets, and they wrote an expository report about the information. The MANOVA results, as well as the means and standard deviations for the two disability groups, are shown in Table 1.

The MANOVA on students' plans showed a significant main effect for disability status ($p < .05$). Examination of the univariate F ratios revealed that all but one of the traits contributed to the overall statistically significant multivariate. The two groups were distinguished by the organization of their maps ($p < .05$), their ability to synthesize the information from the multiple sources ($p < .01$), the value of the map or plan as a tool to guide their writing ($p < .01$), and their content coverage, ($p < .05$). All of these differences favored the students without disabilities. On the other hand, the two groups were not distinguished by their ability to reduce the information into the essential ideas, gist, or phrases ($p > .05$).

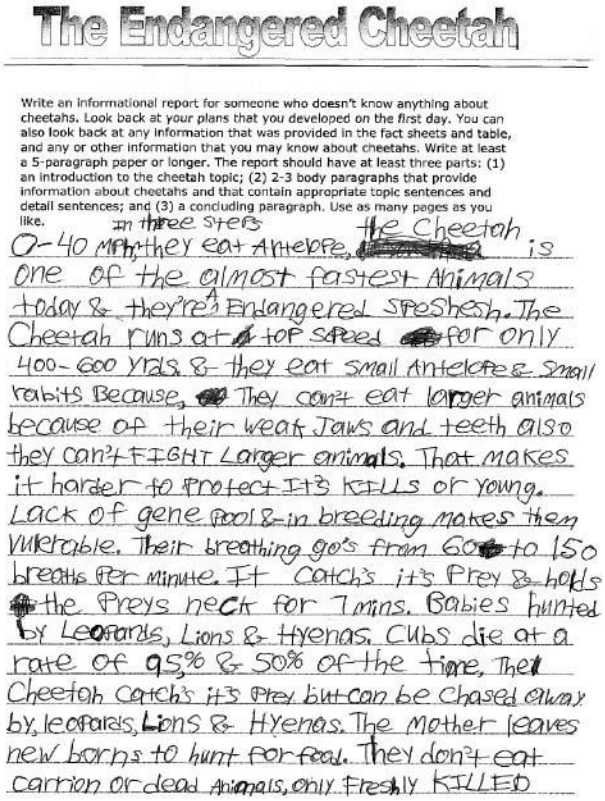
For the majority of the students with disabilities, the organization of their plans was inadequate, although they performed somewhat better on this organizational task than on the note-taking task. Whereas 95% of the students with disabilities received scores that were not satisfactory on the note-taking task (e.g., 1 or 2), only 83% performed at the same unsatisfactory levels on planning in science. Another 13% showed developing knowledge that indicated that they possessed some ability to organize the factual

Figure 6
Map Produced by a Student With Learning Disabilities

information by constructing one or more inferable categories, and another 5% were rated satisfactory. Nevertheless, over three quarters of the students with disabilities did not show any evidence of organizational strategies for chunking or associating the facts into meaningful and hierarchical arrangements.

One example of a web-like plan that was produced by a student with disabilities is shown in Figure 6. The student produced an array of facts that fan out from the topic "cheetahs," and there is fairly extensive coverage of the passage ideas. However, the ideas are not labeled or grouped in any particular arrangement, and instead, ideas are randomly arranged and connected. Although the student incorporates the information from the fact sheets, the facts are not hierarchically assembled to reflect their conceptual relationships and organizational patterns. The student is not imposing any organization on the ideas, and this will inhibit the usefulness of the plan for reading and writing. Sometimes students with disabilities who scored in the unsatisfactory ranges recopied the list of disorganized facts from the fact sheets to create a paper that resembled an associative essay. Both approaches revealed that students with disabilities had difficulties in

Figure 7
Written Report Based on a Plan



The Endangered Cheetah

Write an informational report for someone who doesn't know anything about cheetahs. Look back at your plans that you developed on the first day. You can also look back at any information that was provided in the fact sheets and table, and any or other information that you may know about cheetahs. Write at least a 5-paragraph paper or longer. The report should have at least three parts: (1) an introduction to the cheetah topic; (2) 2-3 body paragraphs that provide information about cheetahs and that contain appropriate topic sentences and detail sentences; and (3) a concluding paragraph. Use as many pages as you like.

In three steps

0-40 mph, they eat Antelope, the Cheetah is One of the almost fastest Animals today & they're Endangered sposhesh. The Cheetah runs at top speed for only 400-600 yrds. & they eat small Antelope & small rabits Because, They can't eat larger animals because of their weak Jaws and teeth also they can't FIGHT Larger animals. That makes it harder to protect it's KILLS or young. Lack of gene pool & in breeding makes them vulnerable. Their breathing go's from 60 to 150 breaths per minute. It catch's it's Prey & holds the Preys neck for 7 mins. Babies hunted by Leopards, Lions & Hyenas. Cubs die at a rate of 95% & 50% of the time, The Cheetah catch's it's Prey but can be chased away by, leopards, Lions & Hyenas. The Mother leaves new borns to hunt for food. They don't eat carrion or dead Animals, only Freshly KILLED

categorizing and labeling expository ideas in a text-construction process.

Science Report

The MANOVA on students' written reports again revealed significant differences for disability ($p < .01$). Examination of the univariate F ratios revealed that all the dependent variables made a significant contribution to the statistically significant MANOVA, with the exception of students' conclusions, which was approaching statistical significance ($p = .074$). Students were distinguished by the quality of their introductions to their topic ($p < .05$), topic sentences ($p < .01$), breadth of topic coverage ($p < .001$), depth of coverage through the provision of details ($p < .000$), and overall organization ($p < .000$). All of these differences favored the group of nondisabled students.

Examination of the mean scores revealed that nondisabled students had more writing strategies that enabled them to achieve a greater breadth of coverage across the categories, as well as a greater depth of coverage through the provision of details. It is likely that their more sophisticated plans provided some organizational support that guided their writing. Neither group was proficient, however, and most of the categories produced by nondisabled students were not signaled by topic sentences and transitional statements. Instead, students loosely coupled two or more details from a conceptual category (e.g., diet, appearance) and relied on the reader to infer the conceptual relationships among the ideas.

On the other hand, students with disabilities tended to produce reports that were even less organized, as shown in Figure 7. Once again, they relied on the original fact sheets, so their written reports were not organized in a systemic way. Although they might be able to present two to three consecutive facts that seemed to be organized in a relational way (diet), the pattern was often interrupted by the presence of random details (cheetah's breathing, catching prey, cub deaths). Hence, both students with disabilities and nondisabled students failed to produce a scientific report that succeeded at a macro level through the provision of an overall introduction to the topic, combined with organized subtopical paragraphs that were coherent and signaled, and a well-written conclusion.

Discussion

The assessments in this study explored how students made sense of expository ideas and whether they transformed the content-area information through higher order processing to support writing in science and social studies. The results suggested that students with disabilities did not construct a mental macrostructure of the information. This became apparent when they were asked to highlight, take notes, map, or write expository reports. Students with disabilities did not know how to organize, classify, and label their expository ideas. They had difficulty identifying the main ideas in passages, as well as constructing superordinate labels and main ideas that might define a particular relationship among a group of ideas.

The results further suggested that students with disabilities were highly dependent on the informational passages. A predominant strategy that they applied to the majority of the learning-to-learn tasks was to recopy the passage. When the source texts were not organized, they showed little awareness that there was anomalous or associative information that they were recording in their notes and plans. Across the various literacy tasks, the artifacts showed few signs that students had reformulated, invented, or extended the information in meaningful or thoughtful ways (Newell, 2006). Their content

understanding remained at a shallow level, and students with disabilities tended to be passive in their use of writing and representational systems as a basis for learning and rehearsal of the expository content.

Extending this research to the content area classroom, the findings suggest that many junior high students lack the necessary writing-to-learn and reading-to-learn strategies. The tools that support learning in the content areas (e.g., highlighting, note taking, writing) are likely to be unfamiliar and beyond the mastery levels of many students. Without a solid grasp of these tools, it is clear that the students will continue to struggle to learn and will underachieve in their content-area subjects. When content-area teachers ask students to read, take notes, highlight, or write a response to an expository topic, it is quite probable that a majority of students will not know what to do or how to perform these tasks effectively. This concern applies to both nondisabled students and students with disabilities.

The solution is simple in its prescription but complex in its execution. What these students require is instruction in the specific learning strategies that will help them to comprehend, compose, study, and learn (Deshler et al., 1996). This instruction is best provided by teachers who are well versed and immersed in the subject matter content. This means that content-area teachers need to offer a cognitive apprenticeship in the literacy practices of their subject. Based on this research, it is apparent that such instruction must include a focus on the organizational and rehearsal strategies that support students as they attempt to read to learn and write to learn. To ensure the development of students' meta-cognitive knowledge, specific instruction needs to be provided that expands the students' declarative, procedural, and conditional knowledge by modeling how to perform the learning strategies that are useful for a particular situation, as well as explaining when and why the strategies should be used (Baker, Gersten, & Graham, 2003; Deshler et al., 1996; Gersten & Baker, 2001; Gersten et al., 2001; Vaughn, Gersten, & Chard, 2000).

Furthermore, this study suggests that the ability to recognize the text structure and to construct the conceptual relationships among ideas is a critical skill that is not mastered by numerous students. Many students are passive learners who lack the skills for processing and organizing textual information. Instructionally, this suggests that teachers must be diligent in providing explanations and graphical models that help students connect the superordinate and subordinate concepts of the curriculum. The use of graphical organizers is an effective learning tool that can be used to advance students' expository comprehension and composition performance (Deshler et al., 1996), but there is one instructional caveat. Teachers must not only present graphic organizers but also teach students to design and construct their own organizers as a basis for planning, comprehending, interpreting, and composing expository texts. Students need to become strategic and flexible in recognizing and arranging the expository information to address the different learning purposes and goals associated with the different text structures (e.g., cause and effect, problem solution, compare and contrast, explanation, chronological sequence, etc.). Otherwise, students will remain dependent on teachers for content guidance.

Finally, the study indicates that assessments can be designed to provide information about students' learning-to-learn strategies. The rubrics that were developed for this research can be used by teachers to examine the strategic performance of their students in the content-area subjects. The tasks and rubrics offer a transparent view into students' learning performance. Knowing how to evaluate students' learning-to-learn strategies through the use of the criterial features of rubrics will be important in helping teachers know what to teach and how to teach the learning-to-learn strategies. Equally important, the criteria features of the rubrics can be used by students to self-evaluate their own literacy and learning performance.

There are several limitations of this study. First, the study focused on seventh-grade students, so the results may not be generalizable to younger or older students. To the extent that the data typify students who are entering high school is a question that remains to be explored. At this point, we are collecting data on eighth-grade students to determine how students' learning-to-learn strategies develop as they matriculate through the junior high school. Second, this study was not an intervention study, because it focused on students' knowledge as they entered seventh grade. However, we are implementing an intervention embedded in the expository curriculum to determine whether content-area teachers can influence students' learning-to-learn strategies. If content-area teachers can affect adolescent students' expository liter- acy, then it may be possible to advance students' literacy achievement in subjects outside the traditional English language arts curriculum. Third, we did not assess students' prior knowledge of the topics covered in the assessments (i.e., Great Plains tribes, endangered species). It is possible that content knowledge interacts with literacy strategies, and this interaction influenced the results. Finally, we attempted to minimize the effects of reading level by reading aloud the assessment passages. However, readability of the two passages differed, and it is possible that the readability of the passages or the reading level of students influenced the results. Further research might replicate this study, systematically varying the readability levels to determine the

effects on students' highlighting, note taking, mapping, reading, and writing performance.

In summary, the results suggest that students were not strategic or meta-cognitive about the expository literacy strategies that might support learning. Seventh-grade students tended to perform at low levels in using the learning tools. However, students with disabilities were decidedly weaker in displaying self-sufficiency and independence in directing their learning-to-learn performance. Although it is quite clear that the demands for learning independence will increase from junior high to high school, adolescent students with disabilities need adult mentors who can help them realize their learning potential. Investing the time to teach the strategic and meta-cognitive facets of the content-area curriculum is likely to be a worthwhile endeavor that will pay dividends when students reach the more challenging content of the secondary and postsecondary curriculum (Deshler et al., 1996). Content-area teachers are vital to reform efforts to improve expository literacy among adolescent readers and writers. Directly teaching learning-to-learn tools as cognitive strategies can help equip all students to access the general education curriculum in strategic ways.

References

Anderson, T. H., & Armbruster, B. B. (1984). Content area textbooks. In R. C. Anderson, Osborn, J., & Tierney, R. J (Eds.), *Learning to read in American schools* (pp. 193–226). Mahwah, NJ: Lawrence Erlbaum.

Baker, S., Gersten, R., & Graham, S. (2003). Teaching expressive writing to students with learning disabilities: Research-based applications and examples. *Journal of Learning Disabilities, 36*, 109–123.

Baumann, J. F. (1984). The effectiveness of a direct instruction paradigm for teaching main idea comprehension. *Reading Research Quarterly, 20*, 93–115.

Chan, L. K. S. (1991). Promoting strategy generalization through self-instructional training in students with reading disabilities. *Journal of Learning Disabilities, 24*, 427–433.

Day, J. (1986). Teaching summarization skills: Influences of students' ability level and strategy difficulty. *Cognition and Instruction, 3*, 193–210.

Deshler, D. D., Ellis, E. S., & Lenz, B. K. (1996). *Teaching adolescents with learning disabilities: Strategies and methods.* Denver, CO: Love Publishing.

DiCecco, V. M., & Gleason, M. M. (2002). Using graphic organizers to attain relational knowledge from expository text. *Journal of Learning Disabilities, 35*, 306–320.

Duke, N. K. (2000). For the rich it's richer: Print experiences and environments offered to children in very low- and very high-SES first grade classrooms. *American Educational Research Journal, 37*, 441–478.

Englert, C., S., & Hiebert, E. H. (1984). Children's developing awareness of text structures in expository materials. *Journal of Educational Psychology, 76*, 65–75.

Englert, C. S., Mariage, T. V., Okolo, C. M., Shankland, R. Moxley, K., Courtad, C. A. (2005). *Rubrics for evaluating students' highlighting, notetaking, retelling, and composing expository texts.* East Lansing: Michigan State University, Literacy Achievement Research Center.

Englert, C. S., Raphael, T. E., Anderson, L. M., Anthony, H. M., Stevens, D. D., & Fear, K. L. (1991). Making writing strategies and self-talk visible: Cognitive strategy instruction in writing in regular and special education classrooms. *American Educational Research Journal, 28*, 337–372.

Englert, C. S., & Thomas, C. C. (1987). Sensitivity to text structure in reading and writing: A comparison between learning disabled and non-learning disabled students. *Learning Disability Quarterly, 10*, 93–105.

Flesch, R. F. (1948). A new readability yardstick. *Journal of Applied Psychology, 32*, 221–224.

Gersten, R., & Baker, S. (2001). Teaching expressive writing to students with learning disabilities: A meta-analysis. *Elementary School Journal, 101*, 251–272.

Gersten, R., Fuchs, L. S., Williams, J. P., & Baker, S. (2001). Teaching reading comprehension strategies to students with learning disabilities: A review of research. *Review of Educational Research, 71*, 279–320.

Graves, A. W. (1986). Effects of direct instruction and metacomprehension training on finding main ideas. *Learning Disability Research, 1*, 90–100.

Jetton, T. L., & Alexander, P. A. (2004). Domains, teaching, and literacy. In T. L. Jetton & J. A. Dole (Eds.), *Adolescent literacy research and practice* (pp. 15–39). New York: Guilford.

Kamberelis, G. (1999). Genre development: Children writing stories, science reports and poems. *Research in the Teaching of English, 33*, 403–460.

Kamil, M. L. (2003). *Adolescents and literacy: Reading for the 21st century*. Washington, DC: Alliance for Excellent Education.

Kim, A., Vaughn, S., Wanzek, J., & Wei, S. (2004). Graphic organizers and their reading comprehension of students with LD: A synthesis of research. *Journal of Learning Disabilities, 37*, 105–118.

Kincaid, J., Fishburn, J., Rogers, R., & Chissom, B. (1975). *Derivation of new readability formulas for Navy enlisted personnel* (CNTECHTRA Research Branch Report). Millington, TN: Memphis Naval Air Station.

Meyer, B. J. F. (1975). *The organization of prose and its effects on memory*. Amsterdam, the Netherlands: North-Holland.

Meyer, B. J. F., Brandt, D. M., & Bluth, G. J. (1980). Use of top-level structure in text: Key for reading comprehension of ninth-grade students. *Reading Research Quarterly, 16*, 72–103.

National Research Council. (1996). *National science education standards and assessment.* Washington, DC: National Academy Press.

Newell, G. (2006). Writing to learn: How alternative theories of school writing account for student performance. In C. A. MacArthur, S. Graham, & J. Fitzgerald (Eds.), *Handbook of writing research* (pp. 235–247). New York: Guilford.

Palincsar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction, 1*, 117–175.

Shanahan, T. (2004). Overcoming the dominance of communication: Writing to think and to learn. In T. L. Jetton & J. A. Dole (Eds.), *Adolescent literacy research and practice* (pp. 59–74). New York: Guilford.

Stanford Achievement Test. (1996). San Antonio, TX: Harcourt Educational Measurement.

Taylor, B. M., & Beach, R. W. (1984). The effects of text structure instruction on middle-grade student's comprehension and production of expository text. *Reading Research Quarterly, 19*, 134–146.

Taylor, B. M., & Samuels, S. J. (1983). Children's use of text structure in the recall of expository material. *American Educational Research Journal, 20*, 517–528.

Vaughn, S., Gersten, R., & Chard, D. J. (2000). The underlying message in LD intervention research: Findings from research syntheses. *Exceptional Children, 67*, 99–114.

Wechsler, D. (1991). *Wechsler intelligence scale for children* (3rd ed.). San Antonio, TX: Harcourt Assessment.

Williams, J. P. (1984). Categorization, macrostructure, and finding the main idea. *Journal of Educational Psychology, 76*, 874–879.

Williams, J. P. (1993). Comprehension of students with and without learning disabilities: Identification of narrative themes and idiosyncratic text representations. *Journal of Educational Psychology, 85*, 631–641.

Williams, J. P. (2003). Teaching text structure to improve reading comprehension. In H. Swanson, K. R. Harris, & S. Graham (Eds.), *Handbook of learning disabilities* (pp. 293–305). New York: Guilford.

Williams, J. P. (2005). Instruction in reading comprehension for primary-grade students: A focus on text structure. *The Journal of Special Education, 39*, 6–18.

Williams, J. P., Taylor, B. M., Jarin, D. C., & Milligan, E. S. (1983). *Determining the main idea of expository paragraphs: An instructional program for the learning-disabled and its evaluation* (Technical Report No. 25). New York: Columbia University, Teachers College.

Wong, B. Y. L. (1979). Increasing retention of main ideas through questioning strategies. *Learning Disability Quarterly, 2*, 42–47.

Wong, B. Y. L., & Jones, W. (1982). Increasing metacomprehension in learning disabled and normally achieving students through self-questioning training. *Learning Disability Quarterly, 5*, 409–414.

Wong, B. Y. L., & Wilson, M. (1984). Investigating awareness of and teaching passage organization in learning disabled children. *Learning Disability Quarterly, 5*, 228–238.

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