
Explicit Prewriting Instruction: Effect on Writing Quality of Adolescents with Learning Disabilities

Todd H. Sundeen

Many students with learning disabilities struggle with the writing process throughout their school years. As students approach graduation, effective communication through writing becomes more critical. Writing is a skill that can directly impact the quality of life for older students preparing to graduate and progress to college, a career, or simply the world of work. This study examined the effects of an explicitly taught organizational strategy on the writing of high school students with learning disabilities. A multiple-baseline across-subjects design was used to observe changes in student writing. Eleven students in three subject groups participated. Findings indicate that the intervention had limited success in improving students' written products when measured by the multiple-baseline across-subjects design. Pre- and post-test data, however, indicate that writing quality improved. Interviews were conducted with both students and their teacher and themes were developed. The participant interviews revealed themes that indicate students felt that using the strategy and the explicit strategy instruction helped improve their writing. Their teacher believed that the strategy helped them tremendously and described improvements in how students planned before writing.

Written expression is a complex process that is especially daunting for students with learning disabilities. Recent findings of the National Assessment of Educational Progress show that most secondary students' writing is considered to be at less than the mastery levels necessary for success in school and at work (Persky, Danne, & Jin, 2003; Salah-Din, Persky, & Miller, 2008). For students with mild disabilities, producing cohesive written products can be especially difficult (Mason, Harris, & Graham, 2011; Monroe & Troia, 2006). Consistently, the investigations of a number of researchers have indicated that students with learning disabilities write poorly compared with their non-disabled peers (e.g., Gersten & Baker, 2001; Graham & Perin, 2007). In fact, students with disabilities struggle with not only basic writing skills such as spelling, sentence formation, capitalization, and handwriting, but also with cognitive processes such as planning, organization, and composing (Schumaker & Deshler, 2003).

Explicit Strategy Instruction

Improved student outcomes have been demonstrated through explicitly teaching writing skills and strategies to students with learning disabilities (De La Paz & Graham, 2002; Taft & Mason, 2010). However, recent research suggests that the writing instruction delivered in most inclusive classrooms may not adequately prepare students with learning disabilities for a strategic approach to the writing process (Mason & Graham, 2008). Without a strategic approach, *children do not effectively orchestrate, monitor, or adapt the cognitive, linguistic, and physical operations inherent in composing texts for a variety of purposes and audiences* (Troia, 2002, p. 250).

It has been shown that the performance of students who have learning disabilities can be positively impacted through the use of well designed, explicitly taught, instructional methods (Graham & Perin, 2007; Mason & Graham, 2008; Schumaker & Deshler, 2003). Thus, research efforts to increase the understanding and impact of explicitly taught specific writing strategies are necessary to help improve the outcomes of older students with learning disabilities.

Prewriting

One explicitly taught strategy is prewriting. Prewriting is a strategy for planning the components of a written product (Silver & Lee, 2007). Planning for writing provides a strategic framework for generating ideas and their organization: an external memory, which students can call upon while completing their writing. When a memory aid is utilized, working memory is freed to allow space for phrases, sentences, images, or other information critical to the process (Flower & Hayes, 1980; Kellogg, 1990). Researchers have shown that overburdening the working memory inhibits writing effectiveness (Benton, Kraft, Glover, & Plake, 1984; Torrance & Galbraith, 2006). Thus, reducing potential cognitive overload for students with disabilities through the use of prewriting strategies may positively impact their writing performance.

Students with learning disabilities, however, often spend little or no time planning before beginning to write (Graham, Harris, & Troia, 2000). They frequently view the planning process as worthless and do not use planning strategies (Chalk, Hagan-Burke, & Burke, 2005). MacArthur and

Graham (1987) studied fifth- and sixth-grade students with mild learning disabilities and found that they averaged less than one minute of advance planning time before beginning their writing. Rather than spending time planning, student writers with learning disabilities often rely on the generation of written content by using a relevant idea generated from memory.

Mind-mapping

Mind-mapping is the intervention examined by the current study. It is a prewriting strategy that enables writers to plan by visualizing the organization of their composition prior to and during drafting. Mind-mapping also serves as a reference or organizational reminder during writing to reduce cognitive overload often present in the writing process. Mind-mapping is a non-linear brainstorming technique yielding a visual representation of the task in graphic form. Using a non-linear strategy corresponds to established models for written expression planning (Hayes & Flower, 1980; Kellogg, 1994) and researchers have demonstrated that writing is a recursive process rather than a linear progression of steps (Hidi & Boscolo, 2006; Pritchard & Honeycutt, 2006). The visual organizer provides a format by which an initial concept is written in the center of the paper and expanded upon by physically connecting ideas to each other in a web-like pattern. Key words are placed in a manner to suggest a relationship with the main idea. Branches emanating from the main idea are developed which allow the expansion of the concept and visualization of the components so that the relationships become visible (Boyle, 1996). Mind-mapping, with slight variances, is also known as cognitive mapping, flowcharting, semantic mapping, and graphic organizers (Sturm & Rankin-Erickson, 2002). Previous studies have shown that explicitly teaching the use of graphic organizers to be an effective tool for planning student writing (e.g., Graham & Perin, 2007; MacArthur & Philippakos, 2010; Sturm & Rankin-Erickson, 2002).

Current Educational Climate

The field of education has found itself immersed in an era of accountability. The 2004 Reauthorization of the Individuals with Disabilities Education Improvement Act (IDEA) mandates that students with disabilities be included in district and state assessments. As a result, writing instruction has become an essential element in the success of students at the secondary level. State and district assessments often determine whether students pass on to the next grade level or are retained (Marchant, 2004). In fact, ten states require that their students pass a minimum-competency test to be promoted to the next grade (Snyder & Dillow, 2010). Currently, twenty-three states require students to pass an exam in order to receive a high school diploma and three additional states are expected

to phase in exit examinations by 2012 (Center on Education Policy, 2008). Nineteen states require students to respond to a writing prompt as part of the exit exam requirements (Kober et al., 2006).

Testing also frequently determines which college a student will attend (Marchant, 2004). Writing components are now included in the three most commonly used college admission tests include the SAT Reasoning Test (SAT), the ACT, and the Graduate Record Examinations (GRE) (ACT, 2011; Educational Testing Service, 2011; The College Board, 2011).

Concurrently, in an effort to improve student outcomes in public schools, greater emphasis has been placed on including students with learning disabilities in general education classrooms. Specifically, the 2004 Reauthorization of the Individuals with Disabilities Education Improvement Act (IDEIA) mandates that students with disabilities participate in the general education curriculum. While the movement towards providing positive outcomes for students has led to increased emphasis upon improving skills in literacy (Hall & Kennedy, 2006), students with learning disabilities are at significant risk without a firm grasp on the writing process. Moreover, to succeed in the information age in which we live, older students must have skills for effective communication through writing (Hall & Kennedy, 2006).

Written Expression for Secondary Students

The expectations for the written expression products of secondary students are significantly different than for students in elementary grades. Not only is a greater volume of expressive writing expected of students at the secondary level, but there is an increase in the level of abstraction (Indrisano & Squire, 2000) and sophistication (Harris & Graham, 1996) required in written products. To communicate their knowledge of content, secondary students are also required to compose longer documents with more complexity and incorporate information from a variety of sources into their written products (Sturm & Rankin-Erickson, 2002). Writing across the curriculum also is more prevalent. Subject areas once devoid of written expression such as math, science, and social studies now require students to use their writing skills more effectively (Applebee, 2000).

Another difference for students in secondary classrooms is the change in instructional focus for written expression. Writing at the elementary level is taught as a core subject while at the secondary level writing is used for demonstrating knowledge. By the time students reach middle or high school, effective utilization of written expression skills is critical, though the act of teaching writing has diminished (Applebee, 2000).

Rationale

Students with disabilities make up approximately 9% of the school-age population. Nearly half (2,557,020) of the nearly 6 million students with disabilities who receive services are students with learning disabilities (U.S. Department of Education, 2007). Students with learning disabilities frequently enter high school with an achievement level equivalent to the 4th or 5th grade which translates into a performance gap of at least five years (Deshler et al., 2001). A performance gap of this magnitude necessitates that high school students with learning disabilities be taught specific strategies to assist them to become successful in reducing or eliminating the deficits in their achievement levels.

Though a rich undergirding of research has been accumulated over the last three decades related to written expression strategy instruction (Gersten & Baker, 2001), there has been a dearth of studies analyzing strategies and interventions presented to students at the high school level. The emphasis of the majority of research dealing with written expression has studied young writers in both elementary and middle school (e.g., Englert et al., 1995; Englert, Wu, & Zhao, 2005; Graham, Harris, & Mason, 2005; Hudson, Lane, & Mercer, 2005).

The present study investigated the impact of prewriting strategy instruction on the written products of high school students with learning disabilities. The study examined the research question: What are the effects of mind-mapping strategy instruction on the writing quality of high school students with learning disabilities? Perceptions of students and their teacher were examined regarding the use of mind-mapping as a strategy for improving written expression through personal interviews.

Method

Participants

Participants were chosen from a group of 11th grade students with learning disabilities who attended general education classes for the majority (three or more classes) of the school day and who received specialized strategy instruction in a learning strategies resource room for one period daily. To be eligible for participation, students had to (a) be in grade 11, (b) have a diagnosis of learning disability, (c) demonstrate a deficit in written expression (i.e., as measured by the Story Construction subtest the Test of Written Language (TOWL-3) (Hammill & Larsen, 1996) and the writing portion of the Florida Comprehensive Achievement Test (FCAT). Individual student IQ scores were not available.

Students from each of three separate learning strategies classes were designated as a group. Each class was assigned a group letter for identification purposes. Four students were in groups A and B. Group C included only three students due to

the attrition of one member. Group C also included a student whose FCAT scores were within the criteria range, but whose TOWL-3 scores were somewhat higher than the standard score criteria. The student was selected to participant due to the small number of students in the class. Table 1 displays demographic information, FCAT scores, and TOWL-3 pre-test scores given as raw, standard scores, and percentiles.

Table 1

Participants Characteristics and Assessment Scores

Group	Gender	Race/ Ethnicity	FCAT Scores	TOWL-3 Pre-test Scores		
				Raw Scores	Standard Scores	Percentile
A	M	A	3.5	1	1	1
A	M	C	3.5	6	6	9
A	M	C	3.0	6	6	9
A	F	C	4.5	6	6	9
B	M	C	4.0	5	5	5
B	F	C	4.0	5.5	5	5
B	M	H	4.5	7	7	16
B	F	A	3.0	6	6	9
C	F	H	3.5	12	10	50
C	F	H	2.5	1.5	1	1
C	F	C	4.0	8.5	8	25

Note. A = African American, C = Caucasian, H = Hispanic.

Setting

The study took place at a suburban public high school with an enrollment of 4,137 students. The ethnicity of the school included a population represented as 56% Caucasian, 28% Hispanic, 10% African American, and 6% classified as other. Fourteen percent (576 students) of the total school population received special education services; 387 students were classified as learning disabled.

Design and Analysis

For the purpose of examining the effects of the mind-mapping strategy for planning narrative writing, a multiple-baseline across-subjects design was implemented. The specific intervention studied was a mind-mapping strategy used for planning to generate ideas and organize thoughts during prewriting and drafting.

Quality of student writing was measured. Elements of quality included Focus, Organization, and Support. These elements were closely related to the objective of the mind-mapping intervention for increasing writing quality through improved planning for writing.

To measure student writing quality and maintain concurrent validity, the Written Expression Rubric (WER) was developed based on the holistic rubric for the writing portion of the FCAT. The FCAT is the annual Florida state assessment (Florida Department of Education, 2011). Total points possible on the WER were 6. Only rubric domains corresponding to focus, clarity of the organizational pattern, and development of supporting details were used for scoring. Focus was characterized as *how clearly the writing presents and maintains a main idea, theme, or unifying point and staying on topic*. Organization was described as *the structure or plan (beginning, middle, and end) and the relationship of one point to another*. The third element, Support, was presented to the students as *the quality of details used to explain, clarify, or define*.

Measures

Daily writing. All students in each of three learning strategies classes were required to write a response to a prompt presented daily by their teacher at the beginning of the class period. Students utilized the first 15 minutes of each class period for writing in response to a prompt written on the board. Due to the limited time for organizing and writing each day, the length of student writing samples were approximately three to five paragraphs.

Writing prompts. The type of narrative writing examined in this study was a descriptive essay wherein the prompts addressed general knowledge topics. (e.g., Describe your favorite vacation.). General knowledge prompts were utilized to minimize the need for student curriculum content knowledge. Personal narratives of this sort are a key component of most types of writing and are generalizable to other kinds of writing (Hillocks, 1995). In fact, personal narrative is the form of writing most commonly addressed in state standards (Isaacson, 2004).

Scoring procedures for daily writing. Scoring procedures during data collection used the following procedural guidelines. Written products received a single score. Two raters, a doctoral student majoring in education and a nationally certified special education teacher also state certified in English, scored each paper independently. Raters were trained to use the WER during an initial two hour training session presented by the researcher and retrained six times over the course of the study. The degree to which raters agree in their interpretation of rubric scores is referred to as a consensus estimate (Stemler, 2004). Rater's scores were averaged and recorded as the final score for each essay. Averaging raters scores provides an accurate measurement for reliability and the overall score is closer to the measure of true proficiency and reduces the possibility of random measurement error (Brown, Glasswell, & Harland, 2004; Penny, Johnson, & Gordon, 2000).

Independent and dependent variables. The independent variable for this study was an explicitly taught mind-mapping

strategy for planning descriptive writing. Timing of the introduction of the intervention was actively manipulated to determine a functional relationship upon changes in the dependent variable (Horner, Carr, Halle, McGee, & Wolery, 2005). In other words, each participant group received the mind-mapping intervention only after stability had been established for the group who had previously received mind-mapping instruction.

WER scores for each group were the dependent variable. The establishment of stable baseline required that a non-substantive trend or a trend opposite from that predicted by the intervention be observed (Horner et al., 2005). When WER scores for a group did not vary more than two points over five days they were considered stable.

Pre- post-testing. Participants were administered pre- and post-tests. Story Construction, Subtest 8 of the TOWL-3 was administered prior to the baseline phase of data collection and again after daily writing had ceased. The test measured the participants' ability to write a logical and organized story that included a theme or plot. Twenty-one points was the total possible TOWL-3 score.

Procedures

The pre-test was administered to students prior to beginning daily writing during the pre-baseline phase. As noted previously, daily writing consisted of students responding to a prompt written on the board during the first 15 minutes of each class period. Within the context of a multiple-baseline across-subjects design, four phases were introduced: pre-baseline, baseline, intervention, and post-intervention. Phases were introduced at staggered intervals. Groups were assigned letters A, B, and C and each group represented a single subject. The first group (A) whose baseline stabilized was the initial group to receive the intervention. When the WER scores for a group stabilized following their intervention phase, the next group began the intervention phase. This sequence continued until each group completed the intervention phase. The cycle was complete when data from the final group (group C) stabilized during the post-intervention phase.

Pre-baseline. To observe any possible effects of introducing the WER, a pre-baseline phase was included. During pre-baseline, student daily writing commenced. Three days of pre-baseline writing occurred prior to the WER instruction day.

WER instruction. Students were introduced to the WER after the pre-baseline phase. Teaching students the WER provided learners with an understanding of the expectations for the writing assignments. Throughout the study, students kept a copy of the rubric in their spiral notebooks to allow them consistent access to the scoring criterion.

Baseline. Following the pre-baseline phase after which the WER was introduced, baseline for each group was recorded as daily writing continued. The group baseline data

were recorded for nine days after the introduction of the WER before score stability was observed; the group was designated A.

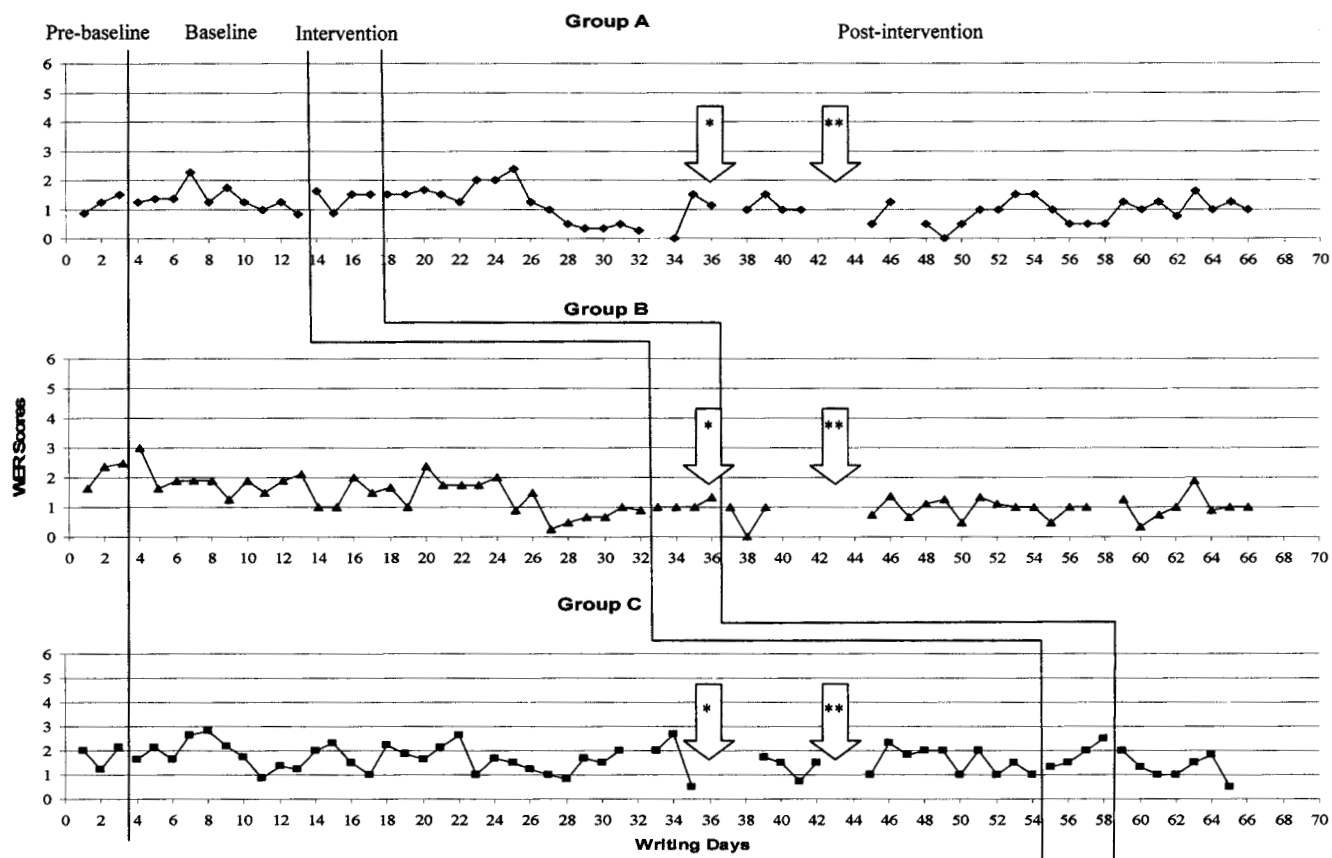
Intervention. As daily writing continued during the intervention phase, the independent variable (mind-mapping strategy) was taught to all students. Study participants remained with the whole class and were not singled out for individualized instruction. Students received explicit strategy instruction during the intervention phase (e.g., Chalk et al., 2005; De La Paz & Graham, 2002; Englert et al., 2005; Graham, Harris, & Mason, 2005). The instruction consisted of four 50-minute classroom sessions encompassing each whole class period. To improve the treatment fidelity, the researcher delivered the intervention instruction. To maintain treatment validity, an outline used as a checklist for each lesson was developed as a guide for instruction during the intervention phase (independent variable); the researcher closely followed the checklist while teaching each lesson (Chalk et al., 2005; Graham et al., 2005; Sturm & Rankin-Erickson, 2002). An

audio recording was made of each lesson. An independent rater reviewed each recording using the checklists to examine consistency in completing all steps of each lesson for each group.

The rationale for using mind-mapping to plan for writing was explained first. Students were next taught specific elements of the strategy (De La Paz, 2005; De La Paz & Graham, 2002) through modeling of the strategy (Chalk et al., 2005; De La Paz & Graham, 2002), modeling of metacognitive processes, guided practice of the strategy, and independent practice. Students practiced each step by developing a series of mind-maps in response to a variety of writing prompts.

Mind-mapping. The instructor demonstrated the steps for developing a mind-map using the mnemonic MIND (M-Main; I-Idea; N-Numbered subtopics; D-Details). Steps included: (a) look for key words in the prompt, (b) write the main idea in the center of the page and circle it, (c) write details (subtopics) around the main idea, (d) circle and link the subtopics to the main idea, (e) number the subtopics in the order that they are

Figure 1
Writing Scores by Group for All Study Phases



Note. * = End of spring break; ** = Regular teacher returned to class

to be put into the response, add and number details for each subtopic and (g) write the narrative response to the prompt using the mind-map as a guide.

Post-intervention. The post-intervention phase followed the intervention. During this period, students continued to write in response to daily prompts with no feedback or intervention. No instruction took place though writing scores were recorded for each group. The post-intervention phase length was different for each group as it commenced immediately following the intervention.

Results

Daily Writing

The study was conducted in four phases and spanned 17 weeks during the spring semester. Students wrote in response to prompts on a total of 66 school days during their learning strategies class period. Scores recorded for visual inspection can be found in Figure 1. Visual inspection shows a summary of the mean WER scores by experimental phase for each group.

Note that writing day 35 was the last day before spring break. The classroom teacher was also out of the classroom for eight writing days following spring break. Her absence included writing days 36 to 43 during which substitute teachers were in charge of the classroom. The teacher’s absence from the classroom coincided with a period of unstable data and inconsistent writing. There were days when no writing took place. The following phase discussion refers to Figure 1 for visual inspection.

Phase one: Pre-baseline. Scores for the group A pre-baseline phase shown in ascended from .9 to 1.5. Pre-baseline for group B ascended from 1.6 to 2.5. The group C pre-baseline scores declined on day two and exhibited a trend that ascended very slightly. Overall, each group exhibited an ascending trend during the pre-baseline phase.

Phase Two: Baseline. Scores during baseline were 0.2 higher than during the pre-baseline phase. Writing quality during baseline ascended somewhat and gradually descended. Group A scores during the baseline phase reached a high point of 2.4 on the 7th writing day. After the day nine score of 1.8, the trend declined culminating at 0.8 on the 13th writing day.

Overall writing quality declined slightly during the baseline phase for group B as evidenced by a downward trend. Scores observed during the baseline phase declined to 1.4 from the pre-baseline of 2.4. The highest baseline score occurred on the fourth writing day immediately after the WER was taught.

The baseline group C maintained a narrow range of scores during baseline ranging between 1 point and 2 points. Scores during the baseline phase were lower by 0.1 point than the scores observed during the pre-baseline phase.

The group C maximum score of 2.8 was observed on the eighth writing day and minimum of 0.5 on the 35th writing day. The 35th writing day was the day before spring break. Student baseline scores exhibited a slight downward trend. See Table 2 for trend summaries by phase.

Table 2

Trends - Average Writing Quality by Phase

Group	Pre-baseline	Baseline	Intervention	Post-intervention
A	Ascending	Descending	Descending	Descending
B	Ascending	Descending	Ascending	Descending
C	Ascending	Descending	Ascending	Descending

Phase Three: Intervention. Each group was taught the mind-mapping strategy intervention. After a stable baseline was observed, group A received strategy instruction. The subsequent student groups (B and C) received strategy instruction after the data stabilized for the prior group who received the intervention.

The intervention phase for group A began on the 14th writing day. Group A score on the first writing day was the highest during the intervention phase. It was recorded at 1.6. The score for the second intervention day dipped to 0.9, the lowest group A score of the intervention phase. Scores on the final two days of instruction remained stable at 1.5. Group A was the only group to experience a descending trend during the intervention phase.

Group B intervention commenced following the observation of stable post-intervention phase data for group A. Group B wrote for 33 days prior to the intervention phase. The intervention phase was broken into two periods of two days each. One period occurred just before the students’ spring break. The second set of two intervention lessons took place on the students’ first two days back from their spring break. Mean intervention scores for group B were the lowest of all three groups at 1.1.

Group C scores increased steadily during the intervention phase starting at 1.3 and increasing to 2.5 yielding an ascending trend. Group C realized an increase of 1.2 points over the four day intervention.

Phase Four: Post-intervention. Following the intervention phase, a post-intervention phase occurred for each group. Daily writing continued; no instruction was provided. Writing performance for group A remained high immediately following the intervention phase. Group A scores declined dramatically after the 25th writing day to a low score of 0 on day 34. On writing days 33 through 41, gaps in writing

performance existed. The post-intervention phase trend for scores group A descended.

The post-intervention phase began while the teacher was out of the classroom and a substitute teacher was present. Scores dropped for the first three days of the post-intervention phase and were followed by five days during which no writing took place. Consistent writing began again on the 45th day. A descending trend during the post-intervention phase was observed. Post-intervention for group C began on the 59th writing day and continued for eight days. Scores declined immediately after the intervention phase for three days to a low of 1.0.

Pre- Post-test results. Pre-tests were administered the day before the students began writing to the first prompt. Post-testing occurred the day immediately following the last writing day. Twenty-one points were the total possible on the TOWL-3. Mean scores and standard deviations for pre- and post-tests are compared in Table 3. Scores for group A averaged 4.8 for the pre-test and 9.5 for the post-test. The score change represents an improvement of 4.7 points. Group B mean scores increased by 6 points from 5.9 to 11.9. Post-test scores also were higher for group C; an increase of 6.6 points was observed from an average pre-test of 9.2 to a post-test mean of 15.8. Note that group score improvements ranged from 72 to 102 percent.

Table 3
Pre- and Post-test Scores Compared

	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	Score Increase	Percent Increase
Group A	4.8	2.5	9.5	5.4	4.7	98
Group B	5.9	0.9	11.9	11.9	6	102
Group C	9.2	8.0	15.8	0.8	6.6	72

Note. * = End of spring break; ** = Regular teacher returned to class

Standard deviations varied considerably by group and from pre- to post-test indicating that the variance of scores from the mean were not consistent. For example, the standard deviation for the group C pre-test was 8.0, the largest standard deviation recorded for this study. The group C post-test standard deviation, however, was only 0.8 indicating that the post-test scores were tightly clustered about the mean.

Reliability

Reliability was measured for rater concurrence on the daily written products as well as the TOWL-3. Training materials from the TOWL-3 were used to train raters for pre-

post-tests. Interrater-reliability remained above the .85 for pre- and post-tests. Rater concurrence steadily increased from .85 to .95 agreement as measured at six intervals during the study

Interviews

Semi-structured interviews with the teacher and participants were recorded and analyzed. Content analysis allowed the researcher to identify themes that developed during the interviews (Stemler, 2001). To maintain reliability, data were reviewed by three evaluators who verified consistency between the audio recordings and content analysis tables.

Teacher Interview

The teacher interview revealed eight primary themes. Themes were coded for student abilities, planning, organization, practicality of the strategy, strategy effectiveness, plans to teach mind-mapping, students' understanding the importance of writing, implementation issues, and suggested improvements. Her interview revealed that she was very aware of the students' need for writing strategy instruction stating, *Students have a difficult time arranging their thoughts.* She also felt that the mind-mapping instruction was a very practical strategy to teach and that she planned to include it in her instruction, *It is something that can be used and even transferred into older grades; I will certainly teach this in my classes.* The teacher was enthusiastic about the strategy for its potential in helping her visual learners due to its graphic nature. The teacher also indicated that her students really did get the concept and that she *saw them grasp it.* She expressed that her students, *made connections to the real world about the importance of writing.*

Student Interviews

Participants were interviewed following the last writing day and the administration of the post-test. Content analysis revealed 10 themes that included overall assessment, helped me become a better writer, planning to write helped, planning time increased, organization improved, ease of use, plan to use on tests, plan to use on writing assignments, have used a similar strategy, did not like the strategy, and prompts were good. Most students expressed that learning mind-mapping helped them become better writers. One student remarked, *I believe that it will help me graduate from high school and to move on to college or university.* Students felt that the strategy helped them stay organized and get their work done quickly by stating, *It helps me draw out what I am already going to write.* Participants also found mind-mapping easy to use. Students expressed that they plan to use the strategy to help them with tests and on writing assignments. One student recalled that the strategy helped her, *not to go off topic and start talking about different things.* Another writer found

that mind-mapping allowed him to, *look back and see what I wanted to talk about*. One student said that, *it was hard at first. I had to think a lot but then it was easier to plan*.

Treatment Fidelity

Four lessons were taught to each student group. To improve treatment fidelity, the researcher taught each lesson. Lesson plan outlines were followed (Chalk et al., 2005; Graham et al., 2005; Sturm & Rankin-Erickson, 2002). Lessons were audio recorded and compared by an independent rater for consistency with the lesson plan outline. No inconsistencies were noted.

Discussion

Results of this study suggest that explicitly teaching planning strategies may benefit students with learning disabilities who struggle with writing. Visual inspection of daily writing scores (Figure 1) revealed an improvement in student writing quality during the intervention phase for two of three groups. While overall findings indicate that student writing quality improved over the course of the study, the intervention phase did not yield substantial differences in the organization of written products when compared with group baselines. However, Kazdin (1982) emphasized that *the results may not be dramatic by visual inspection criteria. However, small changes, when accrued over several different persons and an extended period of time, may be very important* (p. 244-245). Comparison of pre- and post-test scores indicated a marked improvement in writing quality. Each group experienced gains in writing quality as demonstrated by changes in their scores.

Findings support the use of explicit strategy instruction for teaching writing strategies. Gains were evident in the quality of student writing as indicated by improvements in quality scores by two of the three groups during the intervention phase. This study extends the findings of previous research (Chalk et al., 2005; De La Paz & Graham, 1997; Saddler, Moran, Graham, & Harris, 2004; Troia & Graham, 2002) by demonstrating that improvements in student writing quality can be observed after explicit strategy instruction.

This study has also expanded the research on writing strategy instruction for older students. While the majority of research has been conducted with younger students who struggle with composing, studies that include high school participants with learning disabilities are few. It is critical that we provide specific strategy instruction to students who will be required to demonstrate their ability to plan and compose for a variety of high-stakes tests leading to grade advancement and graduation. Skills learned by older students may also be transferred to the world of work or post-secondary settings. Perhaps the most important consideration from observing the data for the current study and the pre- and post-test is

that writing quality improved over the course of the study. However, the results may show simply that students who are required to practice writing daily will inevitably improve their compositional skills.

Limitations and Future Research

Limitations

In addition to the small sample size, the present study had several noteworthy limitations that restrict the ability for firm conclusions to be drawn. First, there is no assurance that the introduction of the independent variable as the intervention was exclusively responsible for the changes in writing quality. It was predicted that the determination of a functional relationship between the introduction of the mind-mapping strategy (independent variable) and the quality of written products (dependent variable) would be possible (Horner et al., 2005). Though slight changes are evident, visual inspection of the data is inconclusive. History effects are *events that occur outside of the experimental situation but can potentially influence behavior during the study* (Kennedy, 2005, p. 33). Second, history effects for the current investigation included the school district spring schedule. Administration of the state assessment, spring break, and teacher absences interrupted writing for several days. Developmental changes in the participants may have impacted this investigation. The study spanned nearly the whole spring semester of the school year. Increases in age or experience from daily writing were expected to improve student writing quality. Third, the opportunity for daily practice likely impacted writing performance. Fourth, reduction in participant performance due to boredom is a risk of extended baselines in multiple-baseline across-subject designs (Kazdin, 1982). Lack of motivation due to boredom with daily writing may have substantially influenced student performance and contributed to the declining trends observed.

Future Research

The current study can serve as a catalyst for future research involving graphic organizer strategy instruction such as mind-mapping for secondary students who struggle with writing. Limitations of the present investigation are guideposts to additional research. Multiple-baseline across-subject research can be designed with considerations for avoiding prolonged baselines. Additionally, individuals in a single class rather than groups in different classes may more effectively demonstrate a functional relationship between dependent and independent variables. Intervening in a single class would also reduce the risk of threats to internal validity that may be associated with introducing the independent variable in different settings.

Implications for Practice

Well planned and effectively organized writing is an important part of the repertoire of skills necessary for success both in school and employment. Teaching secondary students strategies for crafting written products is necessary for expanding their skills to a level of competency necessary for passing required assessments, communicating curricular knowledge, advancing to college, gaining meaningful employment, and promotion or advancement in the workplace. Writing well then becomes a survival skill, a necessity for life in the 21st century.

Effectively communicating through writing requires planning and a level of organization that allows the reader to glean the intended meaning from the text. Mind-mapping is one strategy that can be used to improve planning and organizational skills of secondary students with learning disabilities.

Teachers of secondary students with learning disabilities should teach the mind-mapping strategy with the following recommendations in mind: (a) provide explicit strategy instruction, (b) demonstrate the strategy and model the metacognition necessary for carrying out mind-mapping, (c) provide opportunities for specific feedback, and (d) allow sufficient time for practice to achieve mastery of the strategy. Requiring students to write daily over an extended period of time will potentially evoke improvement in compositional skills.

As a result of explicit mind-mapping instruction, students with learning disabilities may gain access to the general education curriculum in a more meaningful way. Mind-mapping may reduce the cognitive load for students who struggle with composition and allow them to develop written products that more effectively demonstrate their understanding of content.

Writing is a critical life skill that can improve the opportunities for success of older students preparing to graduate and their readiness for college, career, the world of work. Continued research and replication is necessary to provide rigor to explicit strategy instruction for improving writing skills. Priority for future research must be given to investigations of strategies for improving the writing skills of older students with learning disabilities.

References

- ACT. (2011). About ACT. Retrieved from <http://www.act.org>
- Applebee, A. (2000). Alternative models of writing development. In R. Indrisano & J. Squire (Eds.), *Perspectives on writing: Research, theory, and practice* (pp.90-111). Newark, DE: International Reading Association.
- Benton, S., Kraft, R., Glover, J., & Plake, B. (1984). Cognitive capacity differences among writers. *Journal of Educational Psychology, 76*, 820-834.
- Boyle, J. R. (1996). The effects of a cognitive mapping strategy on the literal and inferential comprehension of students with mild disabilities. *Learning Disability Quarterly, 19*(2), 86-98.
- Brown, G. T. L., Glasswell, K., & Harland, D. (2004). Accuracy in the scoring of writing: Studies off reliability and validity using a New Zealand writing assessment system. *Assessing Writing, 9*, 105-121.
- Center on Education Policy. (2008). *State high school exit exams: A move toward end-of-course exams*. Washington: Center on Education Policy. Retrieved from <http://www.cep-dec.org>.
- Chalk, J. C., Hagan-Burke, S., & Burke, M. D. (2005). The effects of self-regulated strategy development on the writing process for high school students with learning disabilities. *Learning Disability Quarterly, 28*(1), 75-87.
- De La Paz, S. (2005). Effects of historical reasoning instruction and writing strategy mastery in culturally and academically diverse middle school classrooms. *Journal of Educational Psychology, 97*(2), 139-156.
- De La Paz, S. & Graham, S. (1997). Effects of dictation and advanced planning instruction on the composing of students with writing and learning problems. *Journal of Educational Psychology, 89*(2), 203-222.
- De La Paz, S. & Graham, S. (2002). Explicitly teaching strategies, skills, and knowledge: Writing instruction in middle school classrooms. *Journal of Educational Psychology, 94*(4), 687-698.
- Deshler, D. D., Schumaker, J. B., Lenz, B. K., Bulgren, J. A., Hock, M. F., Knight, J., & Ehren, B. J. (2001). Ensuring content-area learning by secondary students with learning disabilities. *Learning Disabilities Research & Practice, 16*(2), 96-109.
- Educational Testing Service. (2011). GRE details: Test takers. Retrieved from <http://www.ets.org>
- Englert, C., Garmon, A., Mariage, T., Rozendal, M., Tarrant, K., & Urba, J. (1995). The early literacy project: Connecting across the literacy curriculum. *Learning Disability Quarterly, 18*(4), 253-275.
- Englert, C., Wu, X., & Zhao, Y. (2005). Cognitive tools for writing: Scaffolding the performance of students through technology. *Learning Disabilities Research & Practice (Blackwell Publishing Limited), 20*(3), 184-198.
- Florida Department of Education. (2011). Your Florida Department of Education. Retrieved from <http://www.firn.edu/doe/eeop/notebook/r10x041.html>
- Flower, L. S. & Hayes, J. R. (1980). The dynamics of composing: Making plans and juggling constraints. In L. W. Gregg & E. R. Steinberg (Eds.), *Cognitive processes*

- in writing (pp. 31-50). Hillsdale, NJ: Erlbaum.
- Gersten, R. & Baker, S. (2001). Teaching expressive writing to students with learning disabilities: A meta-analysis. *Elementary School Journal, 101*(3), 251-272.
- Graham, S., Harris, K., & Troia, G. (2000). Self-regulated strategy development revisited: Teaching writing strategies to struggling writers. *Topics in Language Disorders, 20*(4), 1-15.
- Graham, S., Harris, K. R., & Mason, L. (2005). Improving the writing performance, knowledge, and self-efficacy of struggling young writers: The effects of self-regulated strategy development. *Contemporary Educational Psychology, 30*(2), 207-241.
- Graham, S. & Perin, D. (2007). *Writing next: Effective strategies to improve writing of adolescents in middle and high schools - a report to Carnegie Corporation of New York*. Washington, DC: Alliance for Excellent Education.
- Hall, D. & Kennedy, S. (2006). *Primary progress, secondary challenge: A state-by-state look at student achievement patterns*. Washington, DC: The Education Trust.
- Hammill, D. D. & Larsen, S. C. (1996). *Test of written language* (3rd ed.). Austin, TX: PRO-ED.
- Harris, K. R. & Graham, S. (1996). *Making the writing process work: Strategies for composition and self-regulation*. Cambridge, MA: Brookline.
- Hayes, J. R. & Flower, L. S. (1980). Identifying the organization process of writing processes. In L. W. Gregg & E. R. Steinberg (Eds.), *Cognitive processes in writing* (pp.3-30). Hillsdale, NJ: Erlbaum.
- Hidi, S. & Boscolo, P. (2006). Motivation and writing. In C. A. MacArthur, S. Graham & J. Fitzgerald (Eds.), *Handbook of writing research* (pp.144-157). New York: Guilford Press.
- Hillocks, G. (1995). *Teaching writing as a reflective practice*. New York: Teachers College Press.
- Horner, R., Carr, E. G., Halle, J., McGee, G., & Wolery, M. (2005). The use of single-subject research to identify evidence-based practice in special education. *Exceptional Children, 71*(2), 165-179.
- Hudson, R. F., Lane, H. B., & Mercer, C. D. (2005). Writing prompts: The role of various priming conditions on the compositional fluency of developing writers. *Reading and Writing, 18*, 473-495.
- Indrisano, R. & Squire, J. (2000). *Writing research: Research, theory, and practice*. (pp.79-91) Newark, DE: International Reading Association.
- Isacson, S. (2004). Instruction that helps students meet state standards in writing. *Exceptionality, 12*(1), 39-54.
- Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings*. New York: Oxford University Press.
- Kellogg, R. (1990). Effectiveness of prewriting strategies as a function of task demands. *American Journal of Psychology, 103*(3), 327-342.
- Kellogg, R. (1994). *The psychology of writing*. New York: Oxford University Press.
- Kennedy, C. (2005). *Single-case designs for educational research*. Boston, MA: Allyn and Bacon.
- Kober, N., Zabala, D., Chudowsky, N., Chudowsky, V., Gayler, K., & McMurrer, J. (2006). *State high school exit exams: A challenging year*. Washington, DC: Center on Education Policy.
- MacArthur, C. & Graham, S. (1987). Learning disabled students' composing with three methods: Handwriting, dictation, and word processing. *Journal of Special Education, 21*, 22-42.
- MacArthur, C. & Philippakos, Z. (2010). Instruction in a strategy for compare-contrast writing. *Exceptional Children, 76*(4), 438-456.
- Marchant, G. (2004). What is at stake with high stakes testing? A discussion of issues and research. *Ohio Journal of Science, 104*(2), 2-7.
- Mason, L. & Graham, S. (2008). Writing instruction for adolescents with learning disabilities: Programs of intervention research. *Learning Disabilities Research & Practice, 23*(2), 103-112.
- Mason, L., Harris, K. R., & Graham, S. (2011). Self-regulated strategy development for students with writing difficulties. *Theory Into Practice, 50*(1), 20-27.
- Monroe, B. & Troia, G. (2006). Teaching writing to middle school students with disabilities. *Journal of Educational Research 100*(1), 21-33.
- Penny, J., Johnson, R. L., & Gordon, B. (2000). The effect of rating augmentation on inter-rater reliability: An empirical study of a holistic rubric. *Assessing Writing, 7*(2), 143-164.
- Persky, H., Danne, M., & Jin, Y. (2003). *The nation's report card: Writing 2002*. Washington, DC: U.S. Department of Education, Institute of Educational Services, National Center for Education Statistics 2003-529.
- Pritchard, R. J. & Honeycutt, R. L. (2006). The process approach to writing instruction. In C.A. MacArthur, S. Graham & J. Fitzgerald (Eds.), *Handbook of writing research*. (pp. 275-290) New York: Guilford Press.
- Saddler, B., Moran, S., Graham, S., & Harris, K. R. (2004). Preventing writing difficulties: The effects of planning strategy instruction on the writing performance of struggling writers. *Exceptionality, 12*(1), 3-17.
- Salahu-Din, D., Persky, H., & Miller, J. (2008). *The nation's report card: Writing 2007*. (NCES 2008-468). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education, Washington, DC.

- Schumaker, J. B. & Deshler, D. D. (2003). Can students with learning disabilities become competent writers? *Learning Disability Quarterly*, 26(2), 129-141.
- Silver, R. & Lee, S. (2007). What does it take to make a change? Teacher feedback and student revisions. *English Teaching: Practice and Critique*, 6(1), 25-49.
- Snyder, T. & Dillow, S. (2010). *Digest of education statistics 2009 (NCES 2010-013)*. Washington, DC: National Center for Educational Statistics, Institute of Education Sciences, U.S. Department of Education.
- Stemler, S. E. (2001). *An introduction to content analysis*. College Park, MD: ERIC Clearinghouse on Assessment and Evaluation. (ERIC Document Reproduction Service No. ED458218).
- Stemler, S. E. (2004). A comparison of consensus, consistency, and measurement approaches to estimating interrater reliability. *Journal*, 9(4). Retrieved from <http://PAREonlin.net/getvn.asp?v=9&n=4>
- Sturm, J. & Rankin-Erickson, J. (2002). Effects of hand-drawn and computer-generated concept mapping on the expository writing of middle school students with learning disabilities. *Learning Disabilities Research & Practice*, 17(2), 124-139.
- Taft, R. J. & Mason, L. H. (2010). Examining effects of writing interventions: Highlighting results for students with primary disabilities other than learning disabilities. *Remedial and Special Education*, 32, 359-370. doi:10.1177/0741932510362242
- The College Board. (2011). New SAT for the press. Retrieved from http://www.collegeboard.com/about/news_info/sat
- Torrance, M. & Galbraith, D. (2006). The processing demands of writing. In C. A. MacArthur, S. Graham & J. Fitzgerald (Eds.), *Handbook of writing research* (pp. 67-80). New York, NY: Guilford Press.
- Troia, G. A. (2002). Teaching writing strategies to children with disabilities: Setting generalization as the goal. *Exceptionality*, 10(4), 249-269.
- Troia, G. A. & Graham, S. (2002). The effectiveness of a highly explicit, teacher-directed strategy instruction routine. *Journal of Learning Disabilities*, 35(4), 290-306.
- U.S. Department of Education. (2007). Individuals with disabilities education act (IDEA) data table b3b Publication. Retrieved from <http://www.ideadata.org/PartBTrendDataFiles.asp>

Todd Sundeen, PhD, is an assistant professor at the University of Northern Colorado. His research focuses on strategy instruction and assessment for struggling writers with mild disabilities.