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Impact of Self-Regulated Strategy Instruction Integrated with SOLO® Literacy Suite

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Abstract

Writing is a complex process with multiple components that require concurrent consideration. Self-regulated strategy development (SRSD) is an empirically supported approach for teaching students strategies for planning, generating and/or revising their writing. The current study investigated whether SRSD integrated with the use of SOLO® Literacy Suite would lead to gains in writing skills for students in grades 3 and 4. Paired samples t-tests were conducted to determine if there was a significant increase in student performance on subtests of the Test of Written Language–3 (TOWL; Hammill & Larsen, 1996). On average, students performed significantly better at posttest on a paper-pencil test when they had access to the SOLO® Literacy Suite during instruction than when they did not.

Keywords: self-regulated reading strategy, writing skills, SOLO® Literacy Suite

Introduction

Writing is a complex process that requires attention to the mechanics of transcription as well as the composition, organization, and presentation of

ideas (De Smedt & Van Keer, 2014; Harris, Graham, Mason, & Saddler, 2002). Writers must attend to spelling, grammar, and punctuation while simultaneously considering the content, form, purpose, and audience for which they are writing (Graham, McKeown, Kiuvara, & Harris, 2012). Skilled writers accomplish these tasks by taking time to plan, compose, and revise their work, applying strategies to manage these steps as they write (Baker, Gersten, & Graham, 2003; Santangelo, Harris & Graham, 2008). They also engage in self-regulation to monitor and direct their individual efforts while composing (Lane, Harris, Graham, Weisenbach, Brindle, & Morphy, 2008; Mason, Harris, & Graham, 2002).

Students who have difficulty writing, including those with disabilities, often lack knowledge about the characteristics and processes required for successful writing (MacArthur, 2000; Zumbrunn & Bruning, 2012). These struggling writers frequently approach writing tasks as knowledge telling exercises as opposed to composition processes (McCutchen, 2000; Santangelo et al., 2008; Troia & Graham, 2002; Zumbrunn & Bruning, 2012). Rather than taking time to plan, struggling writers write down everything they know about a topic using few

strategies (Baker et al., 2003; Harris & Graham, 2013; Santangelo et al., 2008). Additional difficulties with mechanics often place a heavy focus on the transcription process or the act of putting words on the page. This combination of difficulties taxes the writer's working memory capacity and compromises a writer's ability to attend to the higher order skills used for quality composition and revision (MacArthur, 2000). The typical result is writing that is lower in both quality and quantity than that produced by students who do not struggle to write (Gersten & Baker, 2001; MacArthur, 2000; Zumbrunn & Bruning, 2013).

As they progress through elementary school, struggling writers, who may have initially been enthusiastic about writing, begin to develop negative attitudes toward writing (Harris & Graham, 2013; Mason et al., 2002). Their difficulties with writing can lead to reciprocal relationships between repeated academic failures, a poor self-image as a writer, low motivation, limited task engagement and persistence, devaluation of learning, and low productivity (Harris & Graham, 2013; Mason et al., 2002; Sturm & Rankin-Erickson, 2002). Adding to these problems, students who struggle with writing have a tendency to overestimate their abilities and approach writing tasks with unrealistic expectations (Harris & Graham, 2013; Harris et al., 2003; Mason et al., 2002). Students who face these challenges need explicit instruction that addresses the writing process through skill development, strategies for composition, and a positive view of themselves as writers: self-regulated strategy development is one evidence-based approach that meets this recommendation (Harris & Graham, 2013; Mason, Harris, & Graham, 2011).

Self-Regulated Strategy Development

Graham, Harris, and their colleagues began developing and studying self-regulated strategy development (SRSD) more than 20 years ago. The aim of SRSD is to teach students strategies for planning and/or revising their compositions (De La Paz & Graham, 1997; Graham, Gillespie, & McKeown,

2013). The approach has been empirically validated in more than 25 studies involving a variety of individual, small group, and classroom settings (e.g., Graham, 2006; Graham et al., 2012; Harris & Graham, 2013; Harris et al., 2003; Mason et al., 2002; Santangelo, et al., 2008; Troia & Graham, 2002). Recent meta-analyses (Graham, 2006; Graham, et al., 2012; Graham & Perin, 2007) found that SRSD is one of the most effective approaches to writing instruction. Of the 20 studies related to strategy instruction that Graham et al. (2012) reviewed, the 14 SRSD studies had larger average weighted effect sizes (1.17) than the 6 non-SRSD studies (0.59). Graham and Perin (2007) reported the largest average weighted effect size for SRSD relative to all other writing interventions included in their investigation.

SRSD has been used in multiple academic areas. When applied to writing, SRSD is intended to help students become more fluent, independent, goal-oriented, self-regulated, and reflective writers. The underlying premise of SRSD is that students who struggle to write need an integrated instructional approach that explicitly targets their affective, behavioral, and cognitive strengths and weaknesses (Harris & Graham, 2013; Harris et al., 2003). The three primary goals of SRSD are to help students develop knowledge about the writing process through the use of strategies, to use self-regulation procedures to monitor and manage writing, and to develop positive attitudes about writing and their ability to write (Harris & Graham, 2013; Harris et al., 2003; Troia & Graham, 2002).

These goals are important given that many students in the US, both with and without diagnosed disabilities, struggle with writing. According to national reports, approximately 15% of 4th grade students (National Center for Education Statistics, 2003, 2012a), 20% of 8th grade students, and 21% of 12th grade students are unable to produce writing at a basic level (National Center for Educational Statistics, 2012b). Moreover, 74% of 8th grade students and 73% of 12th grade students failed to demonstrate proficiency on national assessments of

writing (National Center for Educational Statistics, 2012). Given these deficits, it is alarming to find that teachers often dedicate only 15 minutes per day to teaching writing and infrequently use evidence-based writing instructional strategies when they do teach writing (Gilbert & Graham, 2010). Given the flexibility of SRSD to be modified to meet the needs of both students and teachers, it is possible to integrate it with other literacy instructional approaches, including less explicit process approaches such as Writer's Workshop (Graham & Harris, 2003; Graham & Sandmel, 2011). The explicit instruction in specific self-regulation strategies and instructional components of SRSD can support the needs of individual students while being integrated into the framework of the whole class (Harris et al., 2003).

Removing Barriers

The difficulties struggling writers with and without disabilities often have with the mechanics of transcription typically result in too much concentration on spelling, handwriting, capitalization, and punctuation, as well as reduced attention to planning and evaluating the overall quality of the writing (Graham, 1999). Revisions are often focused on error correction rather than qualitative improvements, and students sometimes inadvertently produce additional mechanical errors during the revision process (MacArthur, 2000). These issues result in mechanical barriers that make writing more challenging.

Removing the mechanical barriers struggling writers face related to spelling, grammar, punctuation and rate (Santangelo et al., 2008) is just one component of improving outcomes (De La Paz & Graham, 1997). For example, to eliminate barriers, De La Paz and Graham (1997) combined dictation with SRSD instruction focused on planning to improve results for middle grade students with learning disabilities. De La Paz and Graham assigned the students to four groups. Two received SRSD for planning and two learned about the characteristics of good essays with opportunities to read and revise model essays and write and share their work with peers. Half of

the students in each instructional approach wrote their work while the other half of the students dictated, thus eliminating the challenge of transcription. The results of the study indicated that simply removing the mechanical barriers did not result in the highest quality writing. Instead, the most complete and highest quality writing came from the students who had the benefit of using dictation to reduce mechanical barriers combined with SRSD instruction in advance planning. The current study builds on this finding by combining SRSD with assistive technology that is designed to reduce mechanical barriers.

Outcomes and Benefits: Computer Technology Support

Computers can provide important supports to writers (Cutler & Graham, 2008) and reduce many mechanical barriers that struggling writers face (De Smedt & Van Keer, 2014; Lewis, 1998; MacArthur, 2000). Students whose teachers regularly suggest the use of computers for drafting and revising work score higher on assessments of writing than those with teachers who suggest the use of computers less frequently or not at all (National Center for Education Statistics, 2012); yet reported use of computers in writing instruction remains low, with one random sample of 178 primary educators revealing that 42% never used computers in writing instruction (Cutler & Graham, 2008).

Word processing is a specific example of a use of computers that removes handwriting barriers and results in positive effects on the overall quality of writing (De Smedt & Van Keer, 2014; Graham et al., 2012; Morphy & Graham, 2012). However, there is variability in the effects of word processing alone as a support for writing (Graham & Perin, 2007; Morphy & Graham, 2012). Graham and Perin (2007) reported that the variability is not related to the specific interventions, characteristics of the students, length of the intervention, or other factors that would typically explain variations in the impact of educational interventions. They concluded that while word processors have an overall positive

effect on writing, the impact of word processors alone varies based on factors yet to be determined.

While typing removes one obvious set of mechanical barriers, software programs can include supports geared specifically toward removing barriers associated with planning, outlining, and revision processes (Morphy & Graham, 2012). For example, Sturm and Rankin-Erickson (2002) investigated the effect of concept mapping on the expository writing skills of 20 middle school students with learning disabilities. All students received SRSD instruction for concept mapping, and the authors compared the effects of drawing maps by hand to using a computer software program. Both conditions yielded significant increases in quantity and quality of writing as well as carry-over effects to writing without the use of a concept map. An important additional finding indicated that students had a significantly more positive attitude toward writing when creating concept maps on the computer than when hand-drawing or not using concept maps. The combination of technology with SRSD resulted in both better writing and more positive attitudes toward the process.

Spell checkers may improve the revision process, particularly with respect to the identification and correction of minor errors, but there is a paucity of research providing clear guidance on use (Graham & Perin, 2007; Morphy & Graham, 2012). Furthermore, spell checkers have limitations with respect to target vocabulary not being presented on lists of suggestions to students, and misspellings of intended words not reliably detected, particularly for homonyms or typing errors that result in real words (MacArthur, 2000). Limitations aside, some students can improve their use of spell checkers by learning strategies to generate the target word with phonetic spelling, and proofreading their writing to see if the spell checker missed any errors (McNaughton, Hughes, & Ofiesh, 1997). For students with severe spelling problems, word prediction software may provide more support than spell checkers by improving spelling accuracy and increasing motivation, particularly when the

available vocabulary is matched to the writing task (MacArthur, 2000). Similarly, speech synthesis capabilities that translate text into computerized speech can provide students with supports for listening to how their writing sounds to guide revision and editing work, but sufficient research is lacking to understand the full benefits of this technology (Graham & Perin, 2007).

Target Audience and Relevance

Writing is a complex process that can pose multiple challenges for struggling writers across the grades (Harris et al., 2003; MacArthur, 2000; Zumbrunn & Bruning, 2012). Interventions intended to improve writing can focus on single components of the complex process such as using concept mapping during planning (Sturm & Rankin-Erickson, 2002) or multiple components simultaneously such as writing a story or an expository essay (Graham & Harris, 2005). When instruction involves SRSD, these interventions are more successful (Graham & Perin, 2007), and combining the SRSD interventions with technology (Cutler & Graham, 2008) or other approaches intended to remove barriers (De La Paz & Graham, 1997) improves student outcomes. The current study contributes to this growing area by investigating the combined benefits of SRSD and the SOLO[®] Literacy Suite (Don Johnston Inc., 2007), a suite of literacy software tools including text-to-speech, graphic organizer, and word prediction programs, with struggling writers in grades 3 and 4. Ultimately, the target audience includes educators, clinicians, and families striving to support students in grades 3-12 who are struggling or otherwise need to improve their ability to write paragraphs and/or narrative texts. The primary research question addressed was, *Does SRSD integrated with use of SOLO[®] Literacy Suite lead to gains in writing skills for students in grades 3 and 4?*

Methods

Four teachers, two each in grades 3 and 4, were recruited for participation in the project. Once teacher volunteers were secured, all of the students in their

classes were recruited to participate in the investigation. The original plan was to improve our understanding of the ways teachers used the tools in SOLO[®] to create assignments to support the implementation of the SRSD with their students. The original design was a quasi-experimental group design comparing researcher-made SOLO[®] assignments that integrated the tools in SOLO and teacher-made SOLO[®] assignments that may or may not have integrated the tools. As such, one teacher at each grade level was randomly assigned to a condition that would provide researcher created assignments in the SOLO[®] software. The other teachers, one at each grade level, were assigned to a condition that required the teacher to create the assignments. During the first week of the study the teachers in the SOLO[®] group with researcher created assignments shared the assignments with the other teachers. This was not part of the research plan, but the team did not learn about the sharing until the end of the second week when another round of ready-made assignments had been shared. As a result, the two groups were merged into one

and are reported here as a single-group, pre-experimental, pretest-posttest design investigating whether or not SOLO[®] with ready-made assignments created by the research team to the specifications of the classroom teachers led to gains in writing performance for students in grades 3 and 4.

Teacher Training

The teachers all received training during a 90-minute after-school session on SRSD and the various writing strategies that can be taught using the SRSD approach. Each grade level then selected the specific strategy they wanted to address in the SRSD instruction with their students. The two teachers at each grade level taught the same strategy using the SOLO[®] assignments created by the research team. The two different strategies are described in Figure 1.

The four teachers had an average of 12 years of teaching experience (range = 3-30 years). All of the

Figure 1.
Description of Writing Strategies Addressed at Each Grade Level

3rd Grade: Summary Writing Strategy

1. Read the text.
2. Identify and write down the main idea.
3. Identify and write down the important things about the main idea.
4. Reread the text to make sure all of the important ideas are in the list.
5. Write a topic sentence.
6. Number the important ideas using 1 for the most important.
7. Turn the topic sentence and list of important ideas into a paragraph.
8. Reread the summary paragraph to make sure it makes sense.
9. Ask yourself, "Have I left anything out?"

4th Grade: Narrative Writing Strategy

SSCARE

Situation
Setting
Characters
Action
Reaction
Ending

teachers had a master's degree. None of the teachers identified themselves as "very comfortable" with using computers in their teaching prior to the investigation. One teacher indicated that she was "very uncomfortable" using computers for personal use or with her students. The remaining three teachers reported that they were comfortable using computers for personal use and with their students.

Teachers also participated in a second 90-minute training focused on SOLO[®]. A member of the research team, who is an experienced school-based assistive technology service provider and who holds professional certification in assistive technology, conducted the training in the school's computer lab. During the 6 weeks of the intervention, members of the research team met weekly with the teachers (in the first two weeks it was with only one teacher at each grade level) to understand how they wanted to use SOLO[®] and create necessary assignments. The researchers then managed the distribution of all SOLO[®] assignments to the 26 computers in the school's computer lab and the 28 computers on the laptop cart for the teachers to use with their students. This research was conducted using a version of SOLO[®] that did not support network distribution of assignments or sharing of student files.

Participants

All students in the classrooms of the four teachers were recruited for participation regardless of writing ability, English language status, or disability. A total of 40 children (22 girls) participated in the study. Nineteen of the children were in 3rd grade and the remaining 21 were in 4th grade. Four of the children had identified disabilities, nine were identified as gifted, and thirteen received free or reduced price lunch. Thirty of the children were white, nine were African American, and one was Asian.

Procedures

The entire investigation lasted ten weeks. During weeks 1 and 2, children who were participating in

the research completed pretests and teachers participated in the training sessions. During weeks 3 through 8, teachers completed eighteen 45-minute SRSD lessons with all of the children in their class whether or not they were participating in the research (see Appendix A for example lesson plans as provided for teachers). During weeks 9 and 10, children who were participating in the research completed posttests.

The Test of Written Language - 3 (TOWL; Hammill & Larsen, 1996) Form A was administered to all participants at pretest and Form B was administered at posttest. This assessment is a pencil and paper assessment, and all students completed the assessment without access to a computer or the kinds of software supports found in the SOLO[®] Literacy Suite. While some students may have benefited from access to accommodations while taking the TOWL, no accommodations or supports were provided at pretest or posttest for any of the students. The assessments were administered to small groups of students by members of the research team.

The two forms of the TOWL are reported to be equivalent (Hammill & Larsen, 1996). The difference in mean scores across the two forms was less than 0.5 of a raw score point across the two forms when they were administered in one testing session. The correlation coefficients across the two forms with immediate administration exceeded .80. As reported in the TOWL manual (Hammill & Larsen, 1996) test-retest reliability for the two forms also resulted in coefficients exceeding .80 for the Contrived Writing Composite Score ($r = .88$), the Spontaneous Writing Composite Score ($r = .86$), and the Overall Writing Score ($r = .89$).

The SOLO[®] Literacy Suite

There are four separate software applications included in the SOLO[®] Literacy Suite. They are integrated in SOLO[®] to address the barriers and challenges faced by developing and struggling writers. For example, the first of the four applications is *Draft:Builder*[®]. This application

supports outlining, note-taking, and draft writing. It has the potential to benefit struggling writers who rarely take the time to plan before writing down everything they know about a topic (Baker et al., 2003; Harris & Graham, 2013; Santangelo et al., 2008). Another application is *Co:Writer*[®], which offers word prediction that supports spelling of individual words and the construction of grammatically correct sentences. This word prediction software has the potential to remove the mechanical barriers struggling writers face related to spelling and grammar (Santangelo et al., 2008). *Write:OutLoud*[®] the talking word processor included in the SOLO[®] Literacy Suite, has a spell-checker and easily accessible menus to change font size, foreground and background colors, and the synthesized voice that is used. This software has features that make it potentially useful as students work to identify and correct minor errors in their writing (Graham & Perin, 2007; Morphy & Graham, 2012). Finally, the suite includes an application called *Read:OutLoud*, which is a text reader.

There are several other software packages that include many of the features offered by SOLO[®]; however, the fact that SOLO[®] supported whole-class use and the type of ready-made assignments the teachers used to implement SRSD made it a good choice for this project.

The Intervention

All four teachers were provided with a sequence of 18 lessons that outlined the implementation of the writing strategy they were implementing at their grade level. The 18 lessons did not provide information regarding the implementation of SOLO[®], but they did provide teachers with a framework to guide their implementation of SRSD. The research team provided the lesson sequence in the interest of maximizing the fidelity of implementation of the SRSD approach while studying the impact of the addition of SOLO[®].

SRSD Instruction. The six stages of the SRSD instruction were built into the lessons. The first step

emphasized building background knowledge and teaching pre-skills needed for learning and using the writing strategy at each grade level. In the case of the current study, lessons focused on building background taught vocabulary specific to the strategy (e.g., topic sentence, topic, main idea) and skills embedded in the strategy (e.g., writing a topic sentence, determining the main idea). The second step helped students learn self-statements intended to regulate strategy use, the writing task, or interfering behaviors. Self-statements supported problem definition (e.g., “What do I have to do here?”), focus and attention (e.g., “I need to concentrate.”), encouraged self-evaluation and error correction (e.g., “Have I used all my parts?”), supported coping and self-control (e.g., “I can do this. Slow down.”), and guided self-reinforcement (e.g., “I like my ending.”). Self-statements also included statements related to a step in the strategy (e.g., “I need to write down my strategy reminder.”).

The third step in the 18-lesson sequence required discussion of the strategy. As detailed in Figure 1, this step required discussing the summary writing strategy in both third grade classes and the narrative writing strategy in both fourth grade classrooms. The teacher explained the new strategy and each step. The teacher also defined the purpose of the strategy, the benefits of its use, as well as how and when to use it. Discussion also examined current writing performance and strategies used to accomplish specific writing tasks. These discussions served to encourage students to make a commitment to learning the strategy and working as a collaborative partner in accomplishing their goal.

The next step in the lessons required teachers to model the strategy and appropriate self-statements. The models teachers provided showed the students how to use self-instruction that included defining the problem, planning, applying the strategy, evaluating and correcting errors as needed. After building background, discussing, and modeling the strategy, teachers supported students in memorizing the strategy itself using the mnemonic as a support. Finally, the lessons guided

teachers in supporting students in applying the strategy until students could apply it independently in their own writing.

Integrating SOLO[®]. Members of the research team met with teachers on a weekly basis, after the teachers had a chance to review the lessons and determine what materials they would use. During these meetings, teachers told researchers what they wanted to accomplish with SOLO[®]. For example, a third grade teacher wanted students to be able to use Write:Outloud, the talking word processor component of SOLO[®], to support students in reading a short text they were going to summarize as a group. A fourth grade teacher wanted students to use Co:Writer, the word prediction component of SOLO[®], to support her students' selection of "big" words that "they usually don't try to write because they can't spell." To support the third grade teacher, the research team typed the text provided by the teacher and loaded it onto all of the computers in the lab and on the laptop cart. To support the fourth grade teacher, the research team created a Topic Dictionary in Co:Writer that included all of the words with three or more syllables in the text they were reading and changed the user dictionary from beginner to advanced to ensure that the "big" words students were trying to write would be available. In this way, teachers had access to the ready-made supports they wanted in SOLO[®] without having to create the supports themselves.

Fidelity. Members of the research team observed teachers implementing the SRSD to ensure that teachers were implementing the lessons in the way they were designed. The emphasis was on the implementation of the steps of effective SRSD as outlined in the lesson plans and consistent use of the strategy selected for each grade level. Observation forms were created from the lesson plans and each step was marked as teachers completed it. Across 100% of the observations (at least three per classroom conducted by two separate members of the research team), teachers implemented the targeted steps of SRSD and

focused on the strategy selected for the grade level with 100% fidelity.

Results

A paired samples t-test was conducted to determine if there was a significant increase in student performance on the Total Writing score of the TOWL from pretest to posttest. On average, students performed significantly better on the posttest ($M = 66.75, SE = 3.096$), than the pretest ($M = 58.95 SE = 3.03, t(39) = -4.137, p < .001, r = .55$). This increase in raw score corresponds with an increase in overall percentile rank from the 12th percentile to the 23rd percentile and an increase in quotient from 82 to 89. Importantly, these gains on a paper and pencil test of writing were found across the two subtests of the TOWL, the Contrived and Spontaneous subtests. Paired samples t-tests were also run on these individual subtests. On average, students performed significantly better on the posttest administration of the Contrived subtest ($M = 39.43 SE = 2.05$) than the pretest ($M = 36.00 SE = 1.77, t(39) = -3.425, p < .002, r = .48$). This increase in raw score on the subtests that comprise the Contrived subtest corresponds with an increase in overall percentile rank from the 10th percentile to the 16th percentile and an increase in quotient from 81 to 85. Similarly, on average, students performed significantly better on the posttest administration of the Spontaneous subtest ($M = 27.33, SE = 1.31$) than the pretest ($M = 22.95, SE = 1.62, t(39) = -4.375, p = .002, r = .57$). This increase in raw score on the Spontaneous subtest corresponds with an increase in overall percentile rank from the 13th percentile to the 35th percentile and an increase in quotient from 83 to 94.

Descriptive statistics from the four students with identified disabilities suggests that they benefitted from the use of SOLO[®] with SRSD in a way that mirrored the whole group. For example, the mean Total Writing raw score for these students increased from 63.50 ($SD = 17.098$) at pretest to 72.75 ($SD = 21.469$) at posttest. Their scores on the Contrived subtest increased from 39.00 ($SD = 13.342$) at

pretest to 42.75 ($SD = 13.226$) at posttest, and their scores on the Spontaneous subtest increased from 24.50 ($SD = 4.123$) at pretest to 30.00 ($SD = 8.287$) at posttest. Each of the four students made gains from pretest to posttest on the Total Writing raw score. Furthermore, the increase in raw score on the subtests that comprise the Contrived subtest corresponds with an increase in overall percentile rank from the 16th to the 25th percentile and an increase in quotient from 85 to 90. On the Spontaneous subtest, the increase in raw scores corresponds with an increase in overall percentile rank from the 20th to the 50th percentile and an increase in quotient from 88 to 100.

Discussion

The evidence base supporting the use of SRSD with populations of students with and without disabilities is quite strong, but the evidence base for the use of software to support effective writing instruction remains limited. This study does not provide definitive evidence that using SOLO[®] improved outcomes students would have achieved after 6 weeks of instruction with SRSD, but it does suggest that SRSD resulted in positive writing outcomes even when teachers took the time to teach students to use software while they were learning strategies. Equally important, students made significant improvements on a standardized paper and pencil writing assessment even when they used a computer to write during the six weeks of instruction.

With the rapidly expanding availability of durable, portable and inexpensive mobile platforms, now is an optimal time to leverage the use of software to maximize the effectiveness of writing instruction. Given the reported underutilization of computers in writing instruction (Cutler & Graham, 2008), it is relevant to note that the teachers involved in the current study did not have advanced skills in using technology prior to implementing SOLO[®] in the classroom. None of the participating teachers reported being “very comfortable” using technology with their students prior to the investigation, yet

with a 90-minute overview training and occasional consultation with the research team, they were successful in using computers as part of their everyday writing instruction.

The findings of this study do not provide information regarding which applications or features in the SOLO[®] Literacy Suite were most important to the teachers and students in the current investigation. It is possible that a different combination of applications or more emphasis on particular features would have resulted in even greater gains for the participants. Future research should employ designs that control for the use of each of the software applications and more directly measure their independent and collective impact.

This study adds to the literature by demonstrating that six weeks of instruction combining SRSD with the SOLO[®] Literacy Suite and custom-made assignments is associated with significant growth across the contrived (mechanical) aspects of writing as well as those required for spontaneous writing (organization, composition and presentation of ideas) when students do not have access to the computer. Although the current study is limited to a single-group, pre-experimental, pretest-posttest design, and does not allow for causal claims regarding the added benefits of the technology with SRSD, the outcomes data support that students demonstrated improved writing on a standardized test of writing as a result of instruction focused on a single strategy, delivered through an instructional approach built on SRSD that integrated the use of the SOLO[®] Literacy Suite.

Declarations

This content is solely the responsibility of the authors and does not necessarily represent the official views of ATIA. The authors disclosed financial relationships with the National Center for Technology Innovation, Technology in the Works Competition, and Don Johnston, Inc. No non-financial disclosures were reported by the authors of this paper.

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Appendix A

Sample Lesson Plan Provided for the Teachers

Lesson 13. Model It

Purpose: Identifying the Main Idea and Important Ideas

a. Mini-lesson

- i. Read a short story to the students.
- ii. Think aloud while you show them how to write the main idea.
- iii. Reread the story, the main idea and other important ideas you've listed. Think aloud while you model the **self-statement**, "Have I written the main idea and all the important ideas?"

b. Student Writing Idea:

- i. Ask students to read a short story or portion of a story
- ii. Ask students to write the main idea and other important ideas about the story they read.
- iii. Encourage them to check what they've done and ask themselves, "Have I written all of the important ideas?"