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Writing Instruction and Self-Regulation for Students With Autism Spectrum Disorders

A Systematic Review of the Literature

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Children with autism spectrum disorders (ASDs) may struggle to self-regulate their learning, and such difficulty may be especially notable in the area of written expression. One intervention that has explored self-regulation in writing is the self-regulated strategy development (SRSD) approach. In this article, a review of the research using SRSD to teach children with ASD to write is conducted. Investigation yielded 11 studies including 27 participants with ASD. Results of the review indicated that students with ASD taught using an SRSD approach can improve their overall quality of writing, their discourse elements (e.g., persuasive or story) utilized, and the length of their products. Self-regulatory abilities, such as self-monitoring and planning, were also noted to improve. Suggestions for practice and future research are provided. **Key words:** *autism spectrum disorder*, *self-regulated strategy development (SRSD)*, *self-regulation*, *strategy instruction*, *writing instruction*, *written expression*

WRITING is a foundational skill that can support and extend student learning across the curriculum. With added emphasis in the Common Core State Standards on written expression for informing, narration, and sharing opinions (Common Core State Standards Initiative, 2015), writing has become a particularly important focus across curricular areas. To write well, effective writers must coordinate a range of processes, including generating the language to create a message, organizing the cognitive act of presenting the message in a way that best represents their ideas, and performing the physical aspect of forming letters (Graham & Harris, 2005). As a result, it is a difficult skill to master.

Children with autism spectrum disorders (ASDs) are one group of students who often struggle to write well. Compared to their typically developing peers, students with ASD produce briefer, less complex and less cohesive texts (Brown, Johnson, Smyth, & Cardy, 2014). Many children with ASD experience difficulties using language, especially to conduct language-based problem solving (Griswold, Barnhill, Myles, Hagiwara, & Simpson, 2002). Such difficulties may impact their ability to take their ideas, put them into words, and organize them appropriately (Boucher, 2007). Challenges in executive functioning also may make planning and initiating the writing process and generating novel ideas difficult for children with ASD (Constable, Grossi, Moniz, & Ryan, 2013). Potential deficits in theory of mind, which involve reduced ability to understand the mental states of others and to explain and predict behavior in

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terms of those mental states (Baron-Cohen, Tager-Flusberg, & Cohen, 2000), also may impact a student's ability to write. That is because students may not understand how to persuade a particular audience, or write about characters' thoughts and feelings (Siller, Swanson, Serlin, & Teachworth, 2014). Students with ASD also may have difficulties in self-regulation, which can directly impact the writing process in other ways.

SELF-REGULATION

Research has been inconclusive in identifying self-regulatory deficits as a defining characteristic of ASD, but people with ASD have demonstrated impairments in self-regulation when compared with people without disabilities or with other disabilities on tasks of self-regulation (e.g., Bieberich & Morgan, 2004). This finding is concerning because of the importance of self-regulation in life functions across areas such as socialization, academics, and psychological well-being (Murray, Rosanbalm, Christopoulos, & Hamoudi, 2015). Furthermore, self-regulation has the potential to foster independence and self-directed learning in both academic and nonacademic areas (Wilkinson, 2008).

Self-regulation is at times used synonymously with self-management and is frequently considered to be subsumed under the larger category of "executive functioning" (Sansoti, Powell-Smith, & Cowan, 2010). Whereas definitions vary (Reid, Mason, & Asaro-Saddler, 2013), most researchers agree that self-regulation is the degree to which students are actively involved in their learning and modulate their actions and behaviors in order to meet a goal or change a behavior (Sansoti et al., 2010; Zimmerman, 1989). This occurs through specific processes, including cognitive processes, such as planning; metacognitive processes, such as self-talk; and motivational strategies, such as self-efficacy (Zimmerman, 2008, 2013).

Several commonly used self-regulation strategies address these components. The first is goal setting and planning, in which students make statements of goals regarding the organization and completion of their task, generally within a specific time frame (Zimmerman, 2013). Self-instruction is a technique in which the individual uses self-statements to work through a task. The function of self-instructions may include defining the problem, focusing attention to the task, engaging in a strategy, evaluating the strategy, coping with the outcomes, and reinforcing oneself (Graham, Harris, & Reid, 1992). Self-monitoring is a strategy in which an individual self-assesses whether or not a target behavior has occurred, and then records the occurrence, frequency, and duration of the target behavior (Reid et al., 2013). Self-evaluation may follow, occurring when an individual determines whether or not he or she has met the goal (Zimmerman, 2013). Self-consequences, also referred to as self-reinforcement (Graham & Harris, 2005), then may occur when the student provides punishment or reinforcement after the task has been completed (Zimmerman, 2013).

Fortunately, self-regulation outcomes can be improved through targeted intervention addressing these components (Murray et al., 2015). A recent meta-analysis (Carr, Moore, & Anderson, 2014) of single-subject studies using a range of self-management interventions with students with ASD found that participants improved their performance across a variety of areas, including social skills, reduction in undesirable behaviors, daily living skills, academic engagement, and task completion. Improvements were noted for people with ASD considered both high and low functioning; ranging in age from early childhood to adulthood; and in home, community, clinic, and school settings (Carr et al., 2014). The efficacy of self-regulation interventions has been recognized such that they have been identified as an evidence-based practice for individuals with ASD (Wong et al., 2014). Relatively fewer numbers of interventions, however, have focused on the use of self-regulation strategies in academic areas, specifically writing.

Self-regulation in written language

One of the areas in which self-regulation has a direct impact is the ability to write. Skilled writers use self-regulatory procedures, such as goal setting, self-monitoring, and self-evaluation while writing (Graham & Harris, 2005). For example, when developing a message, skilled writers establish goals and then make progress toward those goals through performance self-monitoring and outcome self-evaluation (Harris, Graham, Friedlander, & Mason, 2008). In fact, writing is often considered a "recursive process in which writers monitor the success of activities conducted and continuously modify what they are doing, based on the outcome of this process" (de Milliano, van Gelderen, & Sleegers, 2012, p. 305). During this process, writers employ a range of strategies to improve performance using whatever effort is required without depending on prompts from others (Graham & Harris, 2005). Writers who are better able to self-regulate the process tend to have products of higher quality (de Milliano et al., 2012). Unfortunately, children with ASD may exhibit deficits in self-regulation that hinder effective writing (Myles, 2005). These include difficulty planning (Bieberich & Morgan, 2004), difficulty in self-management (Wilkinson, 2008), and inadequate coping strategies when faced with challenges (Jahromi, Bryce, & Swanson, 2013).

Self-regulated strategy development approach

One approach to teaching writing that directly focuses on self-regulatory processes is the self-regulated strategy development (SRSD) approach. Self-regulated strategy development was developed in the late 1980s by Steve Graham and Karen Harris. They created it based on the expectation that children with special needs, particularly those with learning disabilities and behavioral problems, might benefit from an integrated approach to instruction that addressed their cognitive needs and affective and behavioral strengths and weaknesses simultaneously (Harris & Graham, 1999). Since then, SRSD has been investigated and implemented with a variety of individuals of varying ability levels and with various disabilities (Harris & Graham, in press). The SRSD approach combines instruction in a variety of writing strategies, such as the WWW, What = 2 How = 2 strategy for story writing, with training in self-regulation strategies, such as self-monitoring and self-reinforcement (Graham & Harris, 2005).

Self-regulated strategy development may be viewed as a "meta-script," meaning that it is not itself a strategy, but instead a way of teaching any given strategy (Graham & Harris, 2005). This makes the approach appealing, as it can focus on a variety of strategies that meet a variety of student needs, interests, and learning styles. With SRSD, teachers use explicit, direct instruction and then scaffold the students to independence, promoting ownership and independence of the writing and the self-regulation strategies (Graham & Harris, 2009). Movement through the instruction is criterion-based rather than time-based, which means that teachers can move at a pace that is appropriate for each student, thus allowing for individualization of the strategies.

There are three goals in SRSD. The first is to assist students in mastering higher level processes, such as planning and revising, which are necessary for good writing. This mastery is important for writers who are often troubled by lower level processes, such as spelling; leading to preoccupation that can cause them to "use up" their cognitive energy, not allowing them to learn and engage in higher level processes (Bereiter & Scardamalia, 1987). The second goal of the SRSD approach is to help students monitor and manage their own writing, which is critical because less skilled writers often are unable to monitor themselves throughout the writing process (Harris & Graham, 1999). The third goal is to aid students in developing positive attitudes about themselves and their writing (Graham & Harris, 2005). To meet these goals, Graham and Harris propose six stages of instruction, which are described in Table 1.

Table 1. Stages of self-regulated strategy development

Stage	Description
1. Develop background knowledge	During this stage the teacher helps students develop preskills needed to understand, acquire, and execute the target strategy to allow students to move to the next stage. Self-statements might begin here as well.
2. Discuss it	In this stage the teacher and students examine and discuss prior and current performance and the writing strategies the students presently utilize. Next, the benefits and significance of the proposed strategy instruction are discussed, and any mnemonic device used in the strategy is introduced. Goals for the strategy are discussed here as well. The students are asked to commit to be collaborative partners and apply themselves to learning the strategy. The groundwork for generalization is established as students discuss how and when the strategy can be used.
3. Model it	In this stage the teacher models how the strategy is used, along with modeling helpful self-instructions, including problem definition, planning, strategy use, self-evaluation, coping and error correction, and self-reinforcement statements. The students also generate a list of supportive self-statements.
4. Memorize it	The students memorize the agreed-upon strategy steps, personalized self-statements, and any mnemonic if appropriate. Students can paraphrase the strategy as long as the meaning is retained.
5. Support it	The students practice using the strategy and self-instructions with teacher guidance until the learning objectives are met. Teacher and student evaluation of the strategy are ongoing. At this point the teacher may again choose to use self-regulation procedures, including goal setting, self-assessment, or self-recording. Prompts and support are faded as appropriate.
6. Independent practice	At this point, the students should use the strategy and self-instructions independently and covertly. If self-regulation procedures are in use, the instructor and students may decide to start fading them out.

Self-regulated strategy development has been used in a variety of genres to teach strategies for brainstorming, planning and content generation, goal setting, report writing, revising, and peer revising (Harris & Graham, in press), with a particular focus on the inclusion of self-regulation supports embedded in these writing strategies. Graham and Harris (2003) note that use of these self-regulation supports also results in increased motivation, and as a result, a possible cycle can develop: if the strategy increases motivation, written output can increase. Then, increased written output can increase self-esteem and, in turn, motivation (Harris & Graham, 1999).

There are several reasons the SRSD approach may be beneficial for students with ASD. First, SRSD is a structured approach that might better help to organize the planning and writing of students with ASD. This approach often utilizes a mnemonic device and graphic organizer, which may be appealing to students with ASD, who often benefit from visual supports to learning (Sansoti et al.,

2010). Through explicit instruction, students are taught components of writing and strategy use in higher level writing processes such as planning and revising (Graham & Harris, 2003). This focus on higher level processing may be helpful for students with ASD who sometimes get "stuck" on lower level writing processes such as spelling or handwriting (Boucher & Oehler, 2013). Finally, the self-management strategies taught through an SRSD approach could build skills across multiple areas and increase independence for students with ASD (Sansoti et al., 2010).

Despite the potential usefulness of SRSD with students with ASD, researchers only recently have begun to explore its use with this population. To determine whether the SRSD approach is supported by evidence as effective for increasing writing and self-regulation skills in students with ASD, a systematic review of the literature was conducted. The research questions for this review were as follows: (1) Who were the individuals with ASD that participated in the studies? (2) What strategies were taught to students with ASD using an SRSD approach? (3) What experimental designs were used in the SRSD studies? (4) What were the outcomes for the study participants with ASD when taught using the SRSD approach? (5) Have the studies been of high research quality?

METHODS

A systematic search was conducted to identify studies that implemented the SRSD approach with students with ASD, after which systematic review methods were applied. Databases that were searched include Academic Search Complete, Education Full Text, Education Research Complete, Education Source, ERIC, Psychology and Behavioral Sciences Collection, and Teacher Reference Center. Keywords used in the search were as follows: the term "autism" coupled with "self-regulated strategy development" (11 articles found), with "writing" (729 articles found), and with "written language" (115 articles found). Some of the articles found in the second and third search were duplicate article from those found in previous searches. To be sure that no article was missed, the terms "Asperger" and "pervasive developmental disorder" were then used with each of the same phrases. No new studies that had not been previously identified were found. For reliability, a doctoral student in educational psychology conducted an independent search using the same search criteria; no new studies were located.

Titles and abstracts were read by the author to determine whether the article should be read and considered for inclusion in the study. If the title and the abstract were not sufficient to determine eligibility, the methods section of the article was read. To be included in the study, the articles were required to meet the following four criteria. First, the article was published in a peer-reviewed journal. This criterion was used to ensure that the work had passed through peer review, indicating that the study had demonstrated sound methodological rigor. Second, the article reported on an experimental, quasi-experimental, or single-subject design study that consisted of an intervention using an SRSD approach. Third, the researchers taught at least one writing strategy, and at least one writing outcome was measured. Finally, at least one participant was identified as having an autism spectrum disorder (terms that met previous diagnostic criteria, such as Asperger and pervasive developmental disorder, were acceptable). Studies that focused mostly on students with other disabilities, such as emotional and behavioral disorders, but included at least one student diagnosed with ASD were considered acceptable (e.g., Cramer & Mason, 2014; Hauth, Mastropieri, Scruggs, & Regan, 2013; Mason, Kubina, Valasa, & Cramer, 2010). Eleven studies met these four criteria and were included in the review. These studies were read to confirm that they met the criteria, and ancestry of their references was conducted. No new studies were added after conducting the ancestry review.

Both the author and a doctoral student in Educational Psychology read each of the

11 articles and answered each of the five research questions to determine interrater reliability. The five research questions were as follows: (1) Who were the individuals with ASD that participated in the studies (a description of the sex, age/grade, and diagnosis of the individuals who participated in the studies)? (2) What strategies have been taught to students with ASD using the SRSD approach (a description of the specific strategies that were taught and for which genres)? (3) What experimental designs have been used in the SRSD studies? (Did the researchers use group designs or single-subject methodology? If single-subject, were they multiple baseline across participants, etc.?) (4) What were the outcomes for the study participants with ASD when taught using the SRSD approach? This question examined whether the participants demonstrated an increase in the dependent variables measured in each study; based on the study, this may have included number of words written, number of essay elements written, holistic quality (as measured by a rubric defined in the study; in the studies by Asaro-Saddler and colleagues, the rubric was identified as having been used in previous research; one researcher developed a rubric for the study (Delano, 2007b) and three (Cramer & Mason, 2014; Hauth et al., 2013; Mason et al., 2010) did not indicate), revisions, action/describing words, correctly written word sequences, nonfunctional elements, writing fluency, time spent writing, planning behaviors, and self-regulatory behaviors. (5) Have the studies been of high research quality? To assess this question, the researchers analyzed the articles for inclusion of the following factors: data analysis (study includes a single-subject graph and/or effect size); presence of generalization (assessing the effects of the intervention on a novel task, in a novel setting, or with a novel instructor) and/or maintenance (assessment of the effects after a given period of time) tasks; reliability reported (interobserver agreement or other report of reliability between raters); treatment fidelity reported (reports on how the researchers measured how accurately the intervention was carried out as intended); and reports of social validity (participants' perception of the usefulness of the intervention).

Before coding the articles, the author and the doctoral student defined their variables (as indicated earlier) and then read and discussed other articles utilizing single-subject designs to practice coding the articles. When the doctoral student was confident coding independently, the two researchers completed five article reviews independently and compared their ratings. Interrater reliability was 95%. The differences were discussed for clarification, and agreement was reached.

For the 11 articles in the present study, both researchers independently completed a coding sheet including a space to answer each of the five questions. The author then compared the two rating sheets for each article. The two raters had 100% reliability across all five questions, including each component of the research quality question (i.e., presence or absence of single-subject graph or effect size, generalization and/or maintenance, reliability, treatment fidelity, and social validity).

RESULTS

Results of the review will be described by the research question. The responses to questions 1 through 4 are summarized in Table 2. The results of research question 5 are summarized in Table 3.

Research question 1: Who were the individuals with ASD who participated in the studies?

Of the 27 participants in the reviewed studies, the majority (93%) were male, which is not surprising given that males are diagnosed with ASD to a greater degree than females (Centers for Disease Control and Prevention, 2015). The youngest participant reported was 6 years old and the oldest was 17.4 years old. In two studies (Cramer & Mason, 2014; Schneider, Codding, & Tryon, 2013), students' grade level was reported instead of age. The majority (78%) of students were in the sixth grade or below, with only

Table 2. Descriptive information

Article	Participants With ASD	Skills Taught	Experimental Design	Outcomes
Asaro-Saddler, 2014	Three males with autism; age 7.2–8.0	Persuasive writing	Single subject; multiple baseline across participants	All participants demonstrated increases in number of essay elements (average increase of 4.7), holistic quality points (average increase 4.9), and words (average increase 25); anecdotal evidence of planning and self-regulatory skills noted
Asaro-Saddler & Bak, 2012	Two males and one female with autism; ages 8.2–9.2	Persuasive writing	Single subject; multiple baseline across participants	All participants improved holistic quality score (average increase of 3.7); two participants increased quantity (30.5 words average); anecdotal evidence of planning and self-regulatory skills noted
Asaro-Saddler & Bak, 2014	Five males and one female; three students diagnosed with pervasive developmental disorder—not otherwise specified, two with autism and one with AS; ages 8.2–10.3	Persuasive writing	Single subject; multiple baseline across participants	All participants increased holistic quality (average increase 2.5), number of essay elements (average increase 3.3), and number of words (average increase 22.2). Five of the students increased their planning time (average over 10 min). Number of nonfunctional elements had mixed findings. Anecdotal evidence of planning and self-regulatory skills and increases in peer collaboration were noted

(*continues*)

Table 2. Descriptive information (*Continued*)

Article	Participants With ASD	Skills Taught	Experimental Design	Outcomes
Asaro-Saddler & Saddler, 2009	One male with AS; age 10.0	Story writing	Case study A-B-C-D design	The participant increased number of story writing elements (increase 4.5) and holistic quality (increase 3.1 points) from baseline to posttest. At maintenance increases of 4.5 elements and 1.5 quality points from baseline; anecdotal evidence of planning noted
Asaro-Saddler & Saddler, 2010	Three males; two with autism and one with AS; ages 6–9	Story writing	Single subject; multiple baseline across participants	All three participants increased number of story writing elements (average increases 4.1 and 2.3), holistic quality average increase 2.0 and 2.1), and number of words (average increase 18.2 and 18), and time spent planning (approximately 3 min at all posttesting) from baseline to posttest and maintenance, respectively; anecdotal evidence of planning and self-regulatory skills noted
Cramer & Mason, 2014	One male participant (of eight) with AS; seventh or eighth grade (age not provided)	Persuasive writing and revising	Single subject; multiple baseline alternating treatment (A-B-C-D) design	The participant demonstrated increases from baseline through all conditions for holistic quality (average 3.7-point increase) and primary traits (average increase of 3.5). Number of words remained the same in the persuasive condition but increased in the revision and alternating conditions (average increase 15.6 words). Numbers of revisions made were minimal across both phases

(*continues*)

Table 2. Descriptive information (*Continued*)

Article	Participants With ASD	Skills Taught	Experimental Design	Outcomes
Delano, 2007a	Three males with AS; ages 13.6–17.4	Persuasive writing	Single subject; multiple baseline design across responses; SRSD combined with video modeling	When the intervention targeted words written, all three students improved words written (average increase 121 words). When the intervention targeted functional elements, increases were noted both in functional elements (average 12) and words written for all three students.
Delano, 2007b	One male with AS; 12 years	Action words, describing words and revisions	Single subject; multiple baseline design across responses	Student increased number of action words (increase 7.5), describing words (increase approximately 7) and revisions (increase 3) and quality of writing (2.7 points) from baseline to postintervention. Gains were maintained over 2 weeks
Hauth et al., 2013	One male with autism; age 14.4	Persuasive writing in civics and math	Single subject; multiple baseline across participants	Student increased number of words, number of essay elements, holistic quality, and time spent planning from baseline to postintervention (exact numbers not reported and difficult to determine from figures). Gains were generalized across content areas (math) and maintained over 4 weeks
Mason et al., 2010	One male with autism; age 14.4	Persuasive writing	Single subject; multiple baseline across participants	Increases were noted in all areas at posttest and maintenance, respectively: quality (3.6 and 2.2 points); number of elements (2 and 1.4), number of words (7.6 and 8.8); and fluency (3 points at post-test; maintenance not reported)

(*continues*)

Table 2. Descriptive information (*Continued*)

Article	Participants With ASD	Skills Taught	Experimental Design	Outcomes
Schneider et al., 2013	Four males with AS; grades fourth to sixth (ages not reported)	Story writing	Single-subject; alternating treatment design; combined with SR	SRSD resulted in slight increases in number of story parts (average 1.6) for all four participants and number of words (average 3.1) for three from baseline. Performance was relatively unchanged in correct writing sequences. When combined with SR, all students increased in story parts (average 3.7) and number of words (average 40). Three students increased in correct word sequences (average 7.0). Skills generalized to an untrained (creative writing) task

Note. AS = Asperger syndrome; ASD = autism spectrum disorders; SR = speech recognition; SRSD = self-regulated strategy development.

six of the 27 participants (22%) in the seventh grade or higher. In terms of diagnoses, 12 of the students were diagnosed with autism, 12 with Asperger syndrome, and three with pervasive developmental disorder—not otherwise specified.

Research question 2: What strategies were taught to students with ASD using the SRSD approach?

In seven of the 11 studies, students were taught strategies for persuasive writing. Each of these studies utilized the POW + TREE mnemonics (see Harris et al., 2008) to teach persuasive writing. The first mnemonic, POW, represents a general planning strategy that encourages students to *P*ick an idea, *O*rganize their ideas, and *W*rite and say more by adding and changing the original plan while writing. The second mnemonic, TREE, represents strategies designed to help students include basic elements of persuasion in their writing. This includes *T*opic sentence—tell what you believe; *R*easons (three or more) you feel the way you do; *E*xplanations to support each reason; and *E*nding—wrap it up right! One of the studies (Cramer & Mason, 2014) combined POW + TREE with an additional strategy for revising, which was represented by the mnemonic, LEAF, for *L*isten as the author reads, *E*xplain what you like best, *A*sk evaluation questions, and *F*inalize your comments. Delano (2007b) also taught revising, along with action and describing words. The remaining three studies taught students to write stories using the strategy represented by the mnemonic, WWW, What = 2, How = 2. Using this SRSD approach, students learn to guide their inclusion of the basic elements of a story: *W*ho are the main characters? *W*hen does the story take place? *W*here does the story take place? *What* do the main characters want to do? *What* happens when the main characters try to do it? *How* does the story end? *How* do the main characters feel? (See Harris et al., 2008.) In addition, one of the studies (Schneider et al., 2013) combined story writing taught using the same WWW,

Table 3. Quality of research

Article	Data Analysis	Generalization/ Maintenance	Reliability Reported	Treatment Fidelity Reported	Social Validity Reported
Asaro-Saddler, 2014	Yes	No	Yes	Yes	No
Asaro-Saddler & Bak, 2012	Yes	No	Yes	Yes	No
Asaro-Saddler & Bak, 2014	Yes	No	Yes	Yes	No
Asaro-Saddler & Saddler, 2009	No	Yes	Yes	No	No
Asaro-Saddler & Saddler, 2010	Yes	Yes	Yes	Yes	Yes
Cramer & Mason, 2014	Yes	No	Yes	Yes	Yes
Delano, 2007a	Yes	Yes	Yes	No	No
Delano, 2007b	Yes	Yes	Yes	Yes	No
Hauth et al., 2013	Yes	Yes	Yes	Yes	Yes
Mason et al., 2010	Yes	Yes	Yes	Yes	Yes
Schneider et al., 2013	Yes	Yes	Yes	Yes	Yes (parents)

What = 2, How = 2 mnemonic with the accommodation of speech recognition.

Research question 3: What experimental designs were used in the SRSD studies?

Ten of the 11 studies utilized single-subject methodology, with the majority (60%) using a design involving multiple baselines across participants. This design involved measuring both story writing and persuasive writing, examined improvements in story or essay elements, holistic quality, and quantity. Two studies used an alternating treatment design to show that the SRSD approach improved story writing measured by story elements, correct writing sequences and number of words, both alone and when combined with speech recognition software (Schneider et al., 2013), and persuasive writing and revising behaviors (Cramer & Mason, 2014). Another two used a design involving multiple baselines across responses, used to demonstrate increases in persuasive writing (words written and functional elements; Delano 2007a) and increase in action words, describing words and revisions (Delano, 2007b). The final study (Asaro-Saddler & Saddler, 2009) used a case study, A-B-C-D design. In this design, story writing was examined through the improvement in story elements and holistic quality. None of the studies utilized group experimental or quasi-experimental designs.

Research question 4: What were the outcomes for the study participants with ASD when taught using the SRSD approach?

Writing quality improved for almost every participant in the included studies, as reported based on a holistic quality rubric, with the only exception being one student who improved his quality score from baseline to posttest but decreased slightly at maintenance (Mason et al., 2010). As indicated previously, the rubrics varied by study, but in general an essay that scored well on the quality rubric would be well-organized, with no mechanical and/or spelling errors, with the inclusion of a topic sentence, a minimum of three reasons to support the topic, explanations for each reason, and a strong closing sentence for the persuasive essays, and the inclusion of the seven

story elements for the story writing essays. For studies that taught persuasive or story writing, number of essay elements or story elements improved for all students. In one case (Delano, 2007a), students did not improve their persuasive essay elements when the intervention targeted number of words written; however, when use of functional elements was targeted, all students demonstrated increases.

In terms of writing quantity, students demonstrated a mixed pattern. Of the nine studies that measured writing quantity, 23 of the 25 students (92%) demonstrated an increase in the number of words written after being taught a writing strategy through the SRSD approach. In one study, one of the participants showed a substantial decrease in number of words (Asaro-Saddler & Bak, 2012), and in another (Schneider et al., 2013), one participant showed a slight decrease in the number of words when taught using the SRSD approach alone, but increased his number of words when SRSD was combined with speech recognition. For one student (Cramer & Mason, 2014), the number of words remained the same from baseline to posttest in one condition (persuasive) but increased in the next condition (revision).

Although quality, number of elements, and quantity were the most frequently assessed measures in the reviewed studies, other outcomes also were reported as measures of improvement. In one study (Delano, 2007b), the researcher measured the number of action words and describing words written and revisions made, with the participant demonstrating increases in all areas over time. Revisions were also reported in Cramer and Mason (2014), with the student demonstrating minimal revisions during the independent phase and slightly more during the peer revision phase. One study examined correctly written word sequences as well (CWS; Schneider et al., 2013). Results indicated that students' CWS were relatively unchanged when taught using the SRSD approach alone; however, when combined with speech recognition, 3 of the 4 students increased number of CWS.

Another study (Asaro-Saddler & Bak, 2014) assessed number of nonfunctional elements, defined by Graham (1990) as any unit that was not related to or supportive of the position the student took, or that was repeated without a real purpose. The researchers found that two students decreased and two students increased their number of nonfunctional elements, and two students remained the same. Interestingly, there were surprisingly few nonfunctional elements in the participants' writing overall (range 0–3). Mason and colleagues (2010) found an increase in writing fluency, as measured by the Woodcock-Johnson Writing Fluency subtest, for their participant with ASD. One study (Hauth et al., 2013) measured time spent writing; the researchers reported increases in the group mean for writing time across all sessions, but individual data for their participant with autism were not available.

Planning time was reported for five studies (Asaro-Saddler & Bak, 2012, 2014; Asaro-Saddler & Saddler, 2010; Delano, 2007a; Hauth et al., 2013). Most students (81%) improved time spent planning, with the only exception being one student in Asaro-Saddler and Bak (2012), one in the Asaro-Saddler and Bak (2014) study, and one in Delano (2007a), who did not demonstrate this change. Transformation of plans was reported in Asaro-Saddler and Bak (2014) for the three of the six participants who engaged in planning at baseline. For those students, a combination of additions, deletions, and integrations was noted. No elaborations, inversions, or meaning change transformations were observed.

Anecdotal evidence was reported for planning in several studies (Asaro-Saddler, 2014; Asaro-Saddler & Bak, 2012; Asaro & Saddler, 2009; Asaro-Saddler & Saddler, 2010), which typically consisted of observing the participants' written notes and their behaviors during writing. Researchers reported on ways in which they noted the participants engaging in overt planning. For example, Asaro-Saddler and Saddler (2009) noted that their participant wrote the story elements mnemonic

device in a bullet format on each page and crossed out the corresponding element as he wrote it in his story. Anecdotal evidence also was noted for use of self-regulatory strategies taught (Asaro-Saddler, 2014; Asaro-Saddler & Bak, 2012; Asaro-Saddler & Saddler, 2010), such as increased use of self-statements and self-monitoring, and for instances of peer collaboration (Asaro-Saddler & Bak, 2014). Increased use of self-regulatory strategies was noted for each of the studies that reported anecdotal data, with the exception of Asaro-Saddler (2014) in which the participants had difficulty creating problem definition, self-evaluation, and coping self-statements.

Research question 5: Have the studies been of high research quality?

To answer this question, studies were evaluated to determine whether or not they reported outcomes in five important areas: data analysis, generalization and/or maintenance, reliability, treatment fidelity, and social validity. In terms of data analysis, all but the case study (Asaro & Saddler, 2009) utilized a single-subject design that included a visual representation of the data through a single-subject graph, with six studies (Asaro-Saddler, 2014; Asaro-Saddler & Bak, 2012, 2014; Asaro-Saddler & Saddler, 2010; Hauth et al., 2013; Mason et al., 2010) also including effect sizes. The majority of researchers (64%) assessed the gains for maintenance over time or generalization to another task (Asaro-Saddler, 2009; Delano, 2007b; Mason et al., 2010; Schneider et al., 2013), with three studies (Asaro-Saddler & Saddler, 2010; Delano, 2007a; Hauth et al., 2014) assessing both. Reliability was reported across all 11 studies, and treatment fidelity was reported in all but two (Asaro & Saddler, 2009; Delano, 2007a). Almost half (45%) of the studies assessed social validity outcomes (Asaro-Saddler & Saddler, 2010; Cramer & Mason, 2014; Hauth et al., 2013; Mason et al., 2010; Schneider et al., 2013). Interestingly, one study (Schneider et al., 2013) measured social validity through parent perceptions rather than participant perceptions.

DISCUSSION

This study explored the use of the SRSD approach to teach writing to students with ASD. Results indicated that the participants in the reviewed studies improved their writing ability. Quality of writing improved for all but one participant in the reviewed studies, and each student improved the number of taught elements (story or persuasive, as appropriate). When quantity was measured, most students increased the number of words written after learning the strategy. In addition, most students increased their planning time and planning behaviors, as well as their number of self-regulation behaviors. The majority of the studies were judged to be methodologically sound. These results justify the conclusion that the SRSD approach may be effective in increasing the writing quality of students with ASD.

Most of the reviewed studies measured writing quantity as one of the dependent variables. Although nearly all of the students in the intervention increased their number of words written, it is important to note that number of words written and writing quality are not always related (Mason et al., 2010). For example, in Asaro-Saddler and Bak (2012), one participant decreased his number of words from baseline to posttesting, but his posttest essays were more cohesive and focused on the topic. For him, and other students with ASD who may have difficulty remaining on topic (Losh & Capps, 2003), increased quantity may not be desirable. Therefore, practitioners should be sure to evaluate their students' writing to see whether increased quantity correlates with increased quality; if not, improving overall writing quality should take priority over increasing essay length.

Researchers have indicated that self-regulation is "malleable" and can improve with instruction and support (Murray et al., 2015, p. 4). Anecdotal evidence from several of the reviewed studies indicates that the students who learned a writing strategy through the SRSD approach increased their use of the taught self-regulatory strategies while writing.

For example, students increased their goal-setting and self-reinforcement (Asaro-Saddler, 2014; Asaro-Saddler & Saddler, 2010); self-monitoring was also reported to be used successfully by the students in multiple studies, specifically through the use of a "rocket chart" to record the number of elements included in their writing or writing the mnemonic and then crossing off the items as they were included in the story (Asaro-Saddler & Bak, 2012, 2014; Asaro-Saddler & Saddler, 2010). The finding that students with ASD can learn to self-regulate is positive, particularly because improved self-regulation has the potential to improve independence and more active involvement in students' overall learning (Reid et al., 2013). Teachers and other practitioners have the capacity to work with students with ASD to develop their self-regulation across content areas. Speech pathologists, for example, are encouraged to develop treatment plans and goals for literacy development and for assisting the student with self-regulatory functions to better support inclusive education (American Speech-Language-Hearing Association, 2007).

A caveat is that the ability to demonstrate independent use of self-regulation strategies was inconsistent across studies. For example, some students continued to rely on the statements created and modeled by the teacher or instructor of the intervention (e.g., Asaro-Saddler, 2014). In other studies, students were able to create these self-regulatory statements with support from their teacher (Asaro-Saddler & Bak, 2012; Asaro-Saddler & Saddler 2010) or peer (Asaro-Saddler & Bak, 2014). This finding may represent the variability, perhaps related to cognitive or language ability, across students with ASD with respect to deficits in self-regulation. It also supports the suggestion that some students might need more targeted interventions to help them acquire these, and perhaps other, self-regulation skills (Murray et al., 2015). Further examination of this topic may be warranted to help teachers and speech-language pathologists develop starting points for instruction.

Two of the reviewed studies combined the SRSD approach with other evidence-based practices (video modeling and speech recognition technology). Teachers and other practitioners may wish to combine the SRSD approach with other evidence-based practices that work for their students. For example, in Delano (2007a), each participant watched a video of himself performing the writing strategies taught to help him increase the number of words written and the number of functional essay elements before writing a persuasive essay. In the second study, Schneider and colleagues (2013) combined speech recognition with the SRSD approach and found that overall students increased their number of story writing elements, number of words written and number of correct writing sequences from baseline and from the SRSD-alone condition when using the technology. Because many researchers have identified handwriting as an area of difficulty for individuals with ASD (see Kushiki, Chau, & Anagnostou, 2011, for a review), it would make sense for both researchers and practitioners to consider the use of speech recognition, word processing, and other assistive or instructional technologies in combination with writing strategies for students with ASD. Combining practices may also lead to a greater likelihood of generalization of the self-regulation (and writing) strategies (Reid et al., 2013).

It is interesting to note that no studies reported having to make significant modifications to the traditional SRSD approach for students with ASD. This is an important finding because it has allowed researchers to maintain treatment fidelity by following the intervention exactly as it was intended. In fact, treatment fidelity was noted to be high in the nine studies in which it was reported (range of 91%–100%), indicating that the steps of the strategy were easy to follow. Practitioners might consider making changes to the intervention, however, to suit the special interest areas of their students. For example, instead of using the rocket chart to self-monitor, practitioners may use a train or an animal, something that suits the interests of their students, that has seven (or eight, depending on the genre) boxes to fill in. Practitioners may also use topics of interest to increase

writing quality and quantity. For instance, researchers found that students with autism increased their intelligibility, vocabulary, word order, and syntax when talking about their special interest areas (Winter-Messiers, 2007). Whereas special interest areas of students with autism have not been studied in written narratives, it is possible that these students may similarly increase their writing quantity and quality when writing about preferred topics.

In the SRSD interventions used in the 11 studies, the genre taught was limited. For example, the majority (91%) of the studies taught persuasive (64%) or story (27%) writing. There are several reasons these genres may have been targeted. First, these genres are an important focus of the Common Core State Standards in writing (Common Core State Standards Initiative, 2015), and therefore a goal of instruction. Another reason the studies may have concentrated on these genres is the previous success rate with individuals with and without disabilities utilizing these strategies in such genres (see Harris & Graham, in press). Finally, the availability of the lesson plans and materials for the existing SRSD strategies in story and persuasive writing, both of which are available for free online (Project Write, 2009; see http://kc.vanderbilt.edu/projectwrite/resources-srsd.html), may have encouraged their use. Although these genres are important, practitioners may wish to use the SRSD approach for students with ASD across a wider variety of writing genres that have not yet been explored, including expository writing, journal writing, and poetry. Because SRSD is a "metascript" for teaching varied strategies to guide writing processes (Graham & Harris, 2005), practitioners can select any strategy they wish and teach it through an SRSD approach.

When selecting a strategy to teach, it is important to consider the social validity of the strategy. Because social validity assesses the acceptability of an intervention, researchers should collect this information to ascertain whether participants in a given study view the intervention as effective and helpful. Unfortunately, fewer than half of the studies included in this review measured social validity. Those that did asked the students directly how they felt about the intervention (Asaro-Saddler & Saddler, 2010; Cramer & Mason, 2014; Hauth et al., 2013; Mason et al., 2010) or asked parents about their perceptions (Schneider et al., 2013); none evaluated social validity from the interventionists' perspective. It is important to know whether the instructor perceives the intervention to be helpful, because there is a positive correlation between the instructor rating the intervention positively and implementing it with fidelity (Strain, Barton, & Dunlap, 2012).

If stakeholders do not find an intervention to be socially valid, researchers and teachers should consider reconceptualizing the intervention to make it more in line with the students' or the teachers' needs and interests (Strain et al., 2012). This is especially critical with students with ASD, given their heterogeneity. For example, students with ASD with lower receptive and expressive language, cognitive abilities, or social emotional functioning may not benefit from using the SRSD approach to teach high level writing skills. Such students may benefit more from self-regulation strategies taught through the SRSD approach that focus on decreasing anxiety or improving emotional regulation. It is unknown, whether such strategies would result in the same positive findings, however, because there has been no research in the area.

Limitations and future research

The conclusions drawn from this systematic review should be viewed with caution for several reasons. First, only 11 studies including at least one participant with ASD were located. There may have been other SRSD studies that included students with ASD who were not clearly identified in the participant description. Furthermore, there may have been studies that utilized some aspects of self-regulation not within the structure of SRSD that may not have been identified

using the search criteria. Either of these cases may have limited the number of articles included in the review. In addition, the studies were all single-subject or case study designs. Although single-subject is considered a valid design for students including students with ASD (Simpson, 2005), the numbers of participants in these studies are limited. Therefore, these studies provide limited information on the effectiveness of the intervention on the larger population with ASD.

Most of the participants in the reviewed studies were males. Although a large majority of people diagnosed with ASD are male (Centers for Disease Control and Prevention, 2015), it does limit generalizability to females with ASD. In addition, most of the students were in the sixth grade or below. Future research should explore the effects of the SRSD approach on secondary students, including as many females as possible in their samples. Because the majority of studies focused on planning strategies, future researchers should also expand to focus on other strategies to support writing.

In addition to writing outcomes, several behaviors, such as self-regulation and planning behaviors, were assessed in the reviewed studies. They were assessed anecdotally, however, rather than with quantitative objectivity. Future research should operationally define the behaviors and find methods to collect quantitative data to determine the extent to which changes in these behaviors may occur.

Finally, this review did not apply external standards to conduct a comprehensive methodological evaluation of the studies. Future researchers should utilize some standards, such as those recommended by the Council for Exceptional Children (Council for Exceptional Children, 2014) or the American Speech-Language-Hearing Association (American Speech-Language-Hearing Association, n.d.), to conduct a methodological review on the quality of the studies.

CONCLUSION

This is the first known study to review studies that have used the self-regulated strategy development approach to teach writing to children with ASD. Overall results indicate that SRSD is an effective practice to teach writing, specifically story and persuasive writing, to children with ASD. Although a preliminary conclusion seems to justify the assertion that SRSD instruction has a positive effect on many aspects of writing ability for students with ASD, the findings related to acquisition of independent self-regulation in multiple contexts were equivocal. Teachers should consider the use of such interventions, perhaps in combination with other evidence-based practices, with their students with ASD. In addition, researchers should continue to conduct empirical studies broadening the scope of work in SRSD for children with ASD.

REFERENCES

American Speech-Language-Hearing Association. (n.d.) *Evidence-based practices*. Retrieved from http://www.asha.org/members/ebp/

American Speech-Language-Hearing Association. (2007). *Scope of practice in speech-language pathology [scope of practice]*. Retrieved from www.asha.org/policy

Asaro-Saddler, K. (2014). Self-regulated strategy development: Effects on writers with autism spectrum disorders. *Education and Training in Autism and Developmental Disabilities, 49*, 78–91.

Asaro-Saddler, K., & Bak, N. (2012). Teaching children with autism spectrum disorder to write persuasive essays. *Topics in Language Disorders, 32*, 361–378.

Asaro-Saddler, K., & Bak, N. (2014). Persuasive writing and self-regulation training: Pairing writers with autism spectrum disorder. *Journal of Special Education*, *48*, 92–105.

Asaro-Saddler, K., & Saddler, B. (2009). Effects of planning instruction on a young writer with Asperger syndrome. *Intervention in School and Clinic, 5*(44), 268–275.

Asaro-Saddler, K., & Saddler, B. (2010). Planning instruction and self-regulation training: Effects on writers with autism spectrum disorders. *Exceptional Children, 77*, 107–124.

Baron-Cohen, S., Tager-Flusberg, H., & Cohen, D. J. (2000). *Understanding other minds: Perspectives*

from developmental cognitive neuroscience (2nd ed.). Oxford, England: Oxford University Press.

Bereiter, C., & Scardamalia, M. (1987). *The psychology of written composition*. Hillsdale, NJ: Erlbaum.

Bieberich, A. A., & Morgan, S. B. (2004). Self-regulation and affective expression during play in children with autism or Down syndrome: a short-term longitudinal study. *Journal of Autism and Developmental Disorders, 34*, 439–448.

Boucher, J. (2007). Memory and generativity in very high functioning autism. *Autism, 11*, 255–264.

Boucher, C., & Oehler, K. (2013). *I hate to write*. Shawnee Mission, KS: AAPC Publishing.

Brown, H. M., Johnson, A. M., Smyth, R. E., & Oram Cardy, J. (2014). Exploring the persuasive writing skills of students with high-functioning autism spectrum disorder. *Research in Autism Spectrum Disorders, 8*, 1482–1499.

Carr, M. E., Moore, D. W., & Anderson, C. (2014). Self-management interventions on students with autism: A meta-analysis of single-subject research. *Exceptional Children, 81*, 28–44.

Centers for Disease Control and Prevention. (2015). *Facts about ASD*. Retrieved from http://www.cdc.gov/ncbddd/autism/facts.html

Common Core State Standards Initiative. (2015). *English Language arts standards: Writing*. Retrieved from http://www.corestandards.org/ELA-Literacy/W/2/

Council for Exceptional Children. (2014). *Council for exceptional children standards for evidence-based practices in special education*. Retrieved from https://www.cec.sped.org/Standards/Evidence-Based-Practice-Resources-Original

Constable, S., Grossi, B., Moniz, A., & Ryan, L., (2013). Meeting the common core state standards for students with autism. *Teaching Exceptional Children, 45*, 6–13.

Cramer, A. M., & Mason, L. H. (2014). The effects of strategy instruction for writing and revising persuasive quick writes for middle school students with emotional and behavioral disorders. *Behavioral Disorders, 40*, 37–51.

de Milliano, I., van Gelderen, A., & Sleegers, P. (2012). Patterns of cognitive self-regulation of adolescent struggling writers. *Written Communication, 29*, 303–325.

Delano, M. E. (2007a). Improving written language performance of adolescents with Asperger syndrome. *Journal of Applied Behavior Analysis*, *40*(2), 345–351.

Delano, M. E. (2007b). Use of strategy instruction to improve the story writing skills of a student with Asperger syndrome. *Focus on Autism and Other Developmental Disabilities, 22*, 252–258.

Graham, S. (1990). The role of production factors in learning disabled students' compositions. *Journal of Educational Psychology*, *82*, 781–791.

Graham, S., & Harris, K. R. (2003). Students with learning disabilities and the process of writing: A meta-analysis of SRSD studies. In L. Swanson, K. R. Harris, & S. Graham (Eds.), *Handbook of research on learning disabilities* (pp. 383–402). New York: Guilford.

Graham, S., & Harris, K. (2005). *Writing better*. Baltimore, MD: Brookes.

Graham, S., & Harris, K. (2009). Almost 30 years of writing research: Making sense of it all with The Wrath of Khan. *Learning Disabilities Research & Practice, 24*, 58–68.

Graham, S., Harris, K. R., & Reid, R. (1992). Developing self-regulated learners. *Focus on Exceptional Children, 24*(6), 1–16.

Griswold, D. E., Barnhill, G. P., Myles, B. S., Hagiwara, T., & Simpson, R. (2002). Asperger Syndrome and academic achievement. *Focus on Autism and Other Developmental Disabilities, 17*, 94–102.

Harris, K. R., & Graham, S. (1999). Programmatic intervention research: Illustrations from the evolution of self-regulated strategy development. *Learning Disability Quarterly, 22*, 251–262.

Harris, K. R., & Graham, S. (in press). Self-regulated strategy development: Theoretical bases, critical instructional elements, and future research. In R. Fidalgo, K. R. Harris, & M. Braaksma (Eds.). *Design principles for teaching effective writing: Theoretical and empirical principles*. Hershey, PA: Brill Editions.

Harris, K. R., Graham, S., Mason, L. H., & Friedlander, B. (2008). *Powerful writing strategies for all students*. Baltimore, MD: Brookes Publishing Company.

Hauth, C. M., Mastropieri, M. A., Scruggs, T. E., & Regan, K. (2013). Can students with emotional and behavioral disabilities improve on planning and writing in the content areas of civics and mathematics? *Behavioral Disorders, 38*, 154–170.

Jahromi, L. B., Bryce, C. I., & Swanson, J. (2013). The importance of self-regulation for the school and peer engagement of children with high-functioning autism. *Research in Autism Spectrum Disorders, 7*, 235–246.

Kushki, A., Chau, T., & Anagnostou, E. (2011). Handwriting difficulties in children with autism spectrum disorders: A scoping review. *Journal of Autism and Developmental Disorders, 41*, 1706–1716.

Losh, M., & Capps, L. (2003). Narrative ability in high-functioning children with autism or Asperger's syndrome. *Journal of Autism and Developmental Disorders, 33*, 239–251.

Mason, L. H., Kubina, R. M., Valasa, L. L., & Cramer, A. M. (2010). Evaluating effective writing instruction for adolescent students in an emotional and behavior support setting. *Behavioral Disorders, 35*, 140–156.

Murray, D. W., Rosanbalm, K., Christopoulos, C., & Hamoudi, A. (2015). *Self-Regulation and Toxic Stress: Foundations for Understanding Self-Regulation from an Applied Developmental Perspective*. OPRE Report #2015–21, Washington, DC: Office of Planning, Research and Evaluation, Administration for

Children and Families, U.S. Department of Health and Human Services.

Myles, B. S. (2005). *Children and youth with Asperger syndrome*. Thousand Oaks, CA: Corwin Press.

Project Write. (2009). *SRSD resources*. Retrieved from http://kc.vanderbilt.edu/projectwrite/resources-srsd.html

Reid, R., Mason, L., & Asaro-Saddler, K. (2013). Self-regulation strategies for students with autism spectrum disorder. In S. Goldstein, & J. Naglieri (Eds.), *Interventions for Autism Spectrum Disorders* (pp. 257–282). New York: Springer.

Sansoti, F., Powell-Smith, K., & Cohan, R. (2010). *High-functioning Autism/Asperger syndrome in schools: Assessment and intervention.* New York: Guilford Press.

Schneider, A. B., Codding, R. S., & Tryon, G. S. (2013). Comparing and combining accommodation and remediation interventions to improve the written language performance of children with Asperger syndrome. *Focus on Autism and Other Developmental Disabilities, 28*, 101–114.

Siller, M., Swanson, M. R., Serlin, G., & Teachworth, A. G. (2014). Internal state language in the storybook narratives of children with and without autism spectrum disorders: Investigating relations to theory of mind abilities. *Research in Autism Spectrum Disorders, 8*, 589–596.

Simpson, R. L. (2005). Evidence-based practices and students with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, *20*, 140–149.

Strain, P. S., Barton, E. E., & Dunlap, G. (2012). Lessons learned about the utility of social validity. *Education and Treatment of Children, 35*, 183–200.

Wilkinson, L. A. (2008). Self-management for children with high-functioning autism spectrum disorders. *Intervention in School and Clinic, 43*, 150–157.

Winter-Messiers, M. A. (2007). From tarantulas to toilet brushes: Understanding the special interest areas of children and youth with Asperger syndrome. *Remedial and Special Education, 28*, 140–152.

Wong, C., Odom, S. L., Hume, K., Cox, A. W., Fettig, A., & Kucharczyk, S., . . . Schultz, T. R. (2014). *Evidence-based practices for children, youth, and young adults with autism spectrum disorder*. Chapel Hill: The University of North Carolina, Frank Porter Graham Child Development Institute, Autism Evidence-Based Practice Review Group.

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology, 81*, 329–339.

Zimmerman, B. J. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future prospects. *American Educational Research Journal, 45*, 166–183.

Zimmerman, B. J. (2013). From cognitive modeling to self-regulation: A social cognitive career path. *Educational Psychologist, 48*, 135–147.