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A Review of Story Mapping Instruction for Secondary Students with LD

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The purpose of this article is to provide a review on the effectiveness of story mapping to improve the reading comprehension skills of middle and high school (Grades 6-12) students with learning disabilities (LD). An extensive review of the special education research-base revealed twelve (N = 12) story mapping intervention studies that met our criteria for inclusion from 1975 to 2015. Findings indicated that story mapping instruction is an effective, evidence-based intervention to increase the reading comprehension skills of secondary-level students with LD. Discussion of the limitations and directions for future research are provided.

Keywords: Reading comprehension, interventions, story map, middle & high school, learning disabilities

Introduction

Secondary students, including those with reading or learning disabilities, and others that are identified as poor comprehenders, often lack sufficient reading comprehension skills to be successful learners in the classroom. A recent report published by the National Assessment of Education Progress (NAEP) indicated that over 60% of 8th and 12th grade students' reading skills are *below proficient* on grade level assessments (National Center for Education Statistics, 2014). For students with LD, the data is even more concerning as 88% of these students exhibit low to poor levels of reading comprehension (Wagner, Newman, Cameto, & Levine, 2006). Interestingly, despite these findings, formal reading instruction is oftentimes not taught at the secondary level (Edmonds et al., 2009; National Joint Committee on Learning Disabilities, 2008). Thus, it is critical that general and special education teachers provide evidence-based reading instruction and comprehension-fostering interventions to support secondary students with LD in the classroom.

A large number of reading comprehension interventions have been studied by leading researchers through the years for students with LD (see Berkeley, Scruggs, & Mastropieri, 2010; Gajria, Jitendra, Sood, & Sacks, 2007; Gersten, Fuchs, Williams, & Baker, 2001; Jitendra & Gajria, 2011; Mastropieri & Scruggs, 1997; Mastropieri, Scruggs, Bakken, & Whedon, 1996; Swanson, 1999; Talbott, Lloyd, & Tankersley, 1994 for reviews); however, fewer studies have been conducted with adolescent learners (Edmonds et al., 2009; Solis et al., 2012), who often have problems extracting mean-

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ing from text in secondary classrooms (Flynn & Swanson, 2014; Mastropieri, Scruggs, & Graetz, 2003; Watson, Gable, Gear, & Hughes, 2012).

Research has shown that awareness of text structure contributes to reading comprehension (Gersten et al., 2001). Most students develop an elaborate knowledge of narrative text structures in the early school years (Mandler & Johnson, 1977; Whaley, 1981). Unfortunately, this is not the case for students with LD. Typically, these students are less knowledgeable of story structures than their classmates hindering their ability to identify and recall relevant story information and draw inferences from the text (Montague, Maddux, & Dereshiwsky, 1990). Moreover, students with LD commonly possess poor or limited cognitive and meta-cognitive strategies to compensate for their deficits in reading comprehension (Antoniou & Souvignier, 2007; Roberts, Torgesen, Boardman & Scammacca, 2008), which leaves them less well-prepared to meet the academic demands at the secondary grade levels.

Story mapping is one instructional strategy that can improve students reading comprehension skills of narrative text. A story map is a visual framework, typically presented in the form of a graphic organizer, to facilitate the acquisition of story structure and story elements (Reutzel, 1985). The display and arrangement of the story elements on a story map assists the students to visualize the story structure and to identify the key story components within a story passage. Earlier studies by Idol (1987) and Idol and Croll (1987) showed the effectiveness of story mapping instruction to increase the reading comprehension skills of short, narrative story passages for elementary students with LD. In an effort to bridge the gap in reading comprehension of narrative text for secondary students with LD, research has been conducted to investigate the effects of story mapping on adolescent learners with LD. The purpose of this article is to provide a review on the effectiveness of story mapping to improve the reading comprehension skills of middle and high school (Grades 6-12) students with LD.

Method

Criteria for Inclusion

The following inclusion criteria were set forth to select studies to be included in this review.

1. Story grammar instruction was taught using a story map as the sole intervention or as part of an intervention package;
2. Students were identified with a learning disability or related disorder (e.g., dyslexia);
3. Participants included at least one student enrolled in grades 6 thru 12 (ages 11-21);
4. At least one of the dependent variable(s) focused on reading comprehension;
5. Articles were written in English;
6. Studies were published in peer-reviewed journals from 1975 to 2015; and
7. Research designs included experimental, quasi-experimental, and single-case.

Literature Search Procedures

A complete, systematic search of the literature was conducted to identify studies that met the inclusion criteria for this review. First, a search of the libraries online databases was completed using "*Library Quick Search*" by Summon™, which included Academic Search Complete, Education, ERIC, PsycAbstracts, and PsycInfo using subject descriptors such as *story map**, *learning disab**, *middle or junior and high school*, *secondary*, and *reading comprehension* from 1975 to 2015. Second, a secondary search of three premier, highly-respected learning disabilities journals (i.e., *Journal of Learning Disabilities*, *Learning Disability Quarterly*, and *Learning Disabilities Research & Practice*) using OnlineFirst was conducted to locate articles that were published online (in 2015), but have not yet appeared in the journal. Third, a search of Google Scholar was performed using keywords such as "story map and learning disabilities." Fourth, we searched and identified articles (e.g., literature review sections, citations, and references) from our electronic searches and other literature reviews on story grammar instruction for students with LD (Dimino, Taylor, & Gersten, 1995; Faggella-Luby, Drew, & Schumaker, 2015; Stetter & Hughes, 2010). And finally, a hand search of relevant articles was conducted in journals in the field of special education that include students with LD.

Coding

Upon completion of the search procedures, the first author and a trained coder independently identified the studies from the search pool that met the established inclusion criteria. The studies were then read, summarized, and coded for participants (i.e., total number of participants; number of students with LD or related disorder; age; grade level(s); intelligence quotient (IQ) score; gender; race/ethnicity; reading achievement scores; research design; location; instructional setting/format; interventionist; number, length, and frequency of instructional sessions; procedural reliability; inter-observer agreement (IOA); social validity; maintenance and generalization, and results).

Effect Size Calculations

Effect sizes were computed to quantify the magnitude of intervention effects for both experimental group and single-case studies. For experimental pretest-posttest treatment-control group design studies with pretest and posttest means and standard deviations, effect sizes (ES) were estimated as the difference between the mean change of the treatment group and the control group divided by the pooled pretest standard deviation (Morris, 2008). For studies in which only posttest means and standard deviations were available, Hedges' *g* was used as the effect size and computed as the difference of posttest means between the treatment and control groups, divided by the pooled standard deviation. To correct for bias caused by small sample size, effect sizes were adjusted by Hedges and Olkin's small bias factor (Hedges & Olkin, 1985). Effect sizes for experimental group designs were reported when findings were statistically significant (Faggella-Luby et al., 2015; Kiuhara, Graham, & Hawken, 2009). Interpretation of effect sizes followed Cohen's guidelines, an effect size was considered: (a) large if 0.8 or above; (b) moderate when in the range of 0.2 and 0.8; and (c) small if less than 0.2.

For single-case studies, the percentage of non-overlapping data points (PNDs) (Scruggs, Mastropieri, & Castro, 1987) were computed for dependent measures that included a graph of the data series. PNDs are included in this review despite its significant well-known limitations (Parker, Vannest, & Davis, 2011; Wolery, Busick, Reichow, & Barton, 2010) because it is the most common effect size measure in single-case research and meta-analyses (Beretvas & Chung, 2008; Campbell, 2013). In this review, for multiple baseline and multiple probe designs, PNDs between intervention and baseline phases were calculated as the percentage of intervention data points that were above the highest baseline data point. For alternating treatments designs, PNDs were calculated between each treatment and the baseline, and among treatments as well. PNDs between two treatments were computed as the percentage of data points in one treatment that were higher than their corresponding data points in the other treatment (Richards, Taylor, & Ramasamy, 2013). For each study, a mean PND was computed to estimate the overall effectiveness of the intervention. Based on the recommendations set forth by Scruggs et al. (1987), PND scores above 90% indicate the intervention was highly effective, 70% to 90% effective, 50% to 70% questionable, and below 50% ineffective.

Inter-coder Reliability

For inter-coder reliability purposes, the second author independently read and coded 100% of the studies on all variables, results, and effect sizes. Inter-coder reliability was computed by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. Initial inter-coder agreement was 97%. Disagreements were discussed and resolved to reach a 100% agreement.

Results

Overall Study Characteristics

A summary of the studies are provided in Tables 1-3. The twelve studies that met the criteria for inclusion were published in the following journals: *Education and Treatment of Children*, *International Journal of Special Education*, *Journal of Behavioral Education*, *Journal of Learning Disabilities*, *Learning Disabilities: A Contemporary Journal*, *Learning Disability Quarterly*, *The Elementary School Journal*, and *The Journal of Special Education*.

A total of 204 students participated in the 12 studies, including 95 with LD, 12 identified with LD and either attention deficit disorder (ADD) or dyslexia (Faggella-Luby, Schumaker, & Deshler, 2007), one student with LD and a neurological disorder (Gardill & Jitendra, 1999), and two students were diagnosed with LD and attention deficit hyperactivity disorder (ADHD) (Crabtree, Alber-Morgan, & Konrad, 2010). Participants' age ranged from 9.7 to 18 years old (M = 13.4). Six studies targeted high school students (Crabtree et al., 2010; Dimino, Gersten, Carnine, & Blake, 1990; Faggella-Luby et al., 2007; Fore, Scheiwe, Burke, & Boon, 2007; Gurney, Gersten, Dimino, & Carnine, 1990; Stetter & Hughes, 2011), three studies consisted of middle school students (Gardill & Jitendra, 1999; Onachukwu, Boon, Fore, & Bender, 2007; Vallecorsa & deBettencourt, 1997), and three studies included both middle and elementary students (Grünke, Wilbert, & Stegemann, 2013; Johnson, Graham,

& Harris, 1997; Taylor, Alber, & Walker, 2002). IQ scores ranged from 81 to 114 (*M* = 92.81). In those studies that reported gender information, 101 of the participants were boys and 60 were girls. In those studies that included race and ethnicity information, 53 of the students were African-American, 83 Caucasian, 11 Hispanic, and 5 were identified as Other. All participants in the studies exhibited mild to severe deficits in reading comprehension.

Nine of the twelve studies used single-case research designs. Of these studies, one study used an ABC design with multiple baselines across behaviors (Vallecorsa & deBettencourt, 1997), two studies employed a multiple baseline design across participants (Crabtree et al., 2010; Onachukwu et al., 2007), one used a multiple baseline design across dyads (Gardill & Jitendra, 1999), one utilized a randomized multiple baseline design across participants (Grünke et al., 2013), two studies employed a multiple baseline design across groups (Gurney et al., 1990; Stetter & Hughes, 2011), one study implemented a multiple probe design across participants (Fore et al., 2007), and one study used an alternating treatments design (Taylor et al., 2002). Of the remaining three studies, one employed a pre-posttest treatment-control group design (Dimino et al., 1990) and two studies utilized pre-posttest multiple treatment group designs (Faggella-Luby et al., 2007; Johnson et al., 1997).

In ten of the studies, the participants attended public schools (Crabtree et al., 2010; Dimino et al., 1990; Fore et al., 2007; Gardill & Jitendra, 1999; Grünke et al., 2013; Gurney et al., 1990; Johnson et al., 1997; Onachukwu et al., 2007; Stetter & Hughes, 2011; Taylor et al., 2002), a private school in one study (Faggella-Luby et al., 2007), and one study was conducted in a private afterschool center (Vallecorsa & deBettencourt, 1997). Three of the schools were urban (Faggella-Luby et al., 2007; Grünke et al., 2013; Stetter & Hughes, 2011), two schools were in a suburban area (Crabtree et al., 2010; Johnson et al., 1997), and two in rural areas (Gurney et al., 1990; Taylor et al., 2002).

All studies reported placement settings. Six studies were conducted in-class. Three studies took place in a resource room (Crabtree et al., 2010; Fore et al., 2007; Taylor et al., 2002), one study was carried out in an inclusive classroom (Faggella-Luby et al., 2007), one study was implemented in an English class (Dimino et al., 1990), and another did not indicate the specific in-class setting (Gurney et al., 1990). The remaining six studies were conducted in a pullout format (Gardill & Jitendra, 1999; Grünke et al., 2013; Johnson et al., 1997; Onachukwu et al., 2007; Stetter & Hughes, 2011; Vallecorsa & deBettencourt, 1997). Four studies administered the intervention in a 1:1 format (Crabtree et al., 2010; Grünke et al., 2013; Onachukwu et al., 2007; Vallecorsa & deBettencourt, 1997), one study in a 2:1 format (Gardill & Jitendra, 1999), four studies used a small group format (Fore et al., 2007; Gurney et al., 1990; Johnson et al., 1997; Taylor et al., 2002), one study used a large group format (Faggella-Luby et al., 2007), one study utilized small and large groups (Dimino et al., 1990), and one study used a mix of 1:1 and small group (Stetter & Hughes, 2011).

In five studies, the interventionists were teachers (Dimino et al., 1990; Gurney et al., 1990; Onachukwu et al., 2007; Taylor et al., 2002; Vallecorsa & deBettencourt, 1997), in four studies researchers (Crabtree et al., 2010; Fore et al., 2007; Gardill & Jitendra, 1999; Stetter & Hughes, 2011), in the remaining three studies (Faggella-Luby et al., 2007; Grünke et al., 2013; Johnson et al., 1997) graduate students served as

Table 1. ***Participants' Demographic Information***

Citation	Participants	Age (years-months)	Grade	IQ	Gender	Race/Ethnicity	Reading Achievement Scores
Crabtree et al. (2010)	*N* = 3 *n* = 1 LD *n* = 2 LD, ADHD	17-18	12	NR	*n* = 3 Boys	*n* = 3 Caucasian	WIAT-II Basic Reading 88 SS (Andy) WIAT-II Basic Reading 78 SS (Robert) DAB-2 Basic Reading 80 SS (Troy) WIAT-II Reading Comprehension 75 SS (Andy) WIAT-II Reading Comprehension 73 SS (Robert) DAB-2 Reading Comprehension 80 SS (Troy)
Dimino et al. (1990)	*N* = 32 *n* = 6 LD	NR	9	NR	NR	NR	MAT Reading Comprehension 5.2-10.1 GE
Faggella-Luby et al. (2007)	*N* = 79 *n* = 5 LD, ADD *n* = 1 LD, ADD, D *n* = 2 LD, ADD, D, R *n* = 2 LD, ADD, D *n* = 2 LD, D *n* = 2 LD	*M* = 14.3[cfd]	9	For students with LD: WISC-III 93-114	*n* = 43 Boys *n* = 36 Girls	*n* = 11 African-American *n* = 59 Caucasian *n* = 4 Hispanic *n* = 5 Other	EXPLORE Test Reading Comprehension *M* = 49.35[cfd] percentile
Fore et al. (2007)	*N* = 4 *n* = 4 LD	17.4-18.2	11	WISC-III 90-111	NR	NR	WIAT Reading Comprehension 55-88 SS

Gardill & Jitendra (1999)	*N* = 6 *n* = 5 LD *n* = 1 LD, NI	12.6-14.8	6 & 8	WISC-R 81-109	*n* = 5 Boys *n* = 1 Girl	*n* = 6 Caucasian	WRMT-R Word Identification 4.7-6.3 GE WRMT-R Passage Comprehension 3.4-4.9 GE
Grünke et al. (2013)	*N* = 6 *n* = 3 LD	10-14	5 & 8	ZVT <25% percentile	*n* = 2 Boys *n* = 4 Girls	NR	ELFE 1-6 Reading Comprehension <25% percentile of 4th graders
Gurney et al. (1990)	*N* = 7 *n* = 7 LD	NR	9-10	WISC-R 83-106	NR	NR	MAT Reading Comprehension 3.5-10.4 GE
Johnson et al. (1997)	*N* = 47 *n* = 47 LD	*M* = 11.3	4-6	WISC-R *M* = 91.2	*n* = 34 Boys *n* = 13 Girls	*n* = 36 African-American *n* = 11 Caucasian	WJPEB Reading Achievement *M* = 7.07[cfd] percentile
Onachukwu et al. (2007)	*N* = 3 *n* = 3 LD	12.10-13.2	8	WISC-III 96-99	*n* = 3 Boys	*n* = 2 Caucasian *n* = 1 Hispanic	WJ-III Reading Comprehension 5.2-5.6 GE
Stetter & Hughes (2011)	*N* = 9 *n* = 9 LD	14-15	9	NR	*n* = 4 Boys *n* = 5 Girls	*n* = 3 African-American *n* = 6 Hispanic	GM Reading Comprehension 3.3-4.9 GE
Taylor et al. (2002)	*N* = 5 *n* = 5 LD	9.7-12.6	3-6	NR	*n* = 4 Boys *n* = 1 Girl	*n* = 3 African-American *n* = 2 Caucasian	WIAT Basic Reading 16-29 SS WIAT Reading Comprehension 11-19 SS
Vallecorsa & deBettencourt (1997)	*N* = 3 *n* = 3 LD	13	7	NR	*n* = 3 Boys	NR	WJPEB Reading Comprehension 2.9-3.6 GE

Note. ADD = Attention Deficit Disorder; ADHD = Attention Deficit Hyperactivity Disorder; CFD = Computed from Data; D = Dyslexia; GE = Grade Equivalent; LD = Learning Disability; NI = Neurological Disorder; NR = Not Reported; R = Reading Deficit; SS = Standard Score.

DAB-2 = *Diagnostic Achievement Battery 2*; ELFE 1-6 = *Ein Leseverständnistest für Erst- bis Sechstklässler* (German Reading Comprehension Test for First to Six Graders); GM = *Gates-MacGinitie*; MAT = *Metropolitan Achievement Test*; WIAT = *Wechsler Individual Achievement Test* (1st ed.); WIAT-II = *Wechsler Individual Achievement Test* (2nd ed.); WISC-III = *Wechsler Intelligence Scale for Children* (3rd ed.); WISC-R = *Wechsler Intelligence Scale for Children-Revised*; WJ-III = *Woodcock-Johnson III Tests of Achievement*; WJPEB = *Woodcock-Johnson Psycho-Educational Battery*; WRMT-R = *Woodcock Reading Mastery Test-Revised*; ZVT = *Der Zahlen-Verbindungs-Test* (German Number Combination Test).

Table 2. ***Characteristics of the Studies***

Citation	Research Design	Location	Instructional Setting/ Format	Interventionist	Instructional Sessions	Procedural Reliability (M/S/PR)	IOA (M/S/IOA)	Social Validity	Maintenance/ Generalization
Crabtree et al. (2010)	Multiple baseline design across participants	Suburban	In-class (Resource room)/ 1:1	Researcher	1 session, 30 min	DO/ 25-100%/ 100%	PP/ 21%/ 98.3-100%	Student question-naire	M/-
Dimino et al. (1990)	Experimental pre-posttest treatment-control group design	NR	In-class (English class)/ Small & large group	Teacher	12 sessions, daily, class period	AR & DO/ 21% [cfd]/ NR	PP/ 100%/ 74-91%	Student interview	M/-
Faggella-Luby et al. (2007)	Experimental pre-posttest two-group design	Urban (private)	In-class (Inclusive classroom)/ Large group	Graduate student	9 sessions, daily, 90-120 min	AR/ 22%/ 90-100%	PP/ 20%/ 83-100%	Student survey	M/-
Fore et al. (2007)	Multiple probe design across participants	NR	In-class (Resource room)/ Small group	Researcher	36 days, 3 x week, 30 min	DO/ 36%/ 93%	PP/ 36%/ 95%	Student & teacher ques-tionnaire	M/-
Gardill & Jitendra (1999)	Multiple baseline design across dyads	NR	Pullout/ 2:1	Researcher	28-36 sessions, 14-20 weeks, 40-50 min	DO/ 30%/ 90-100%	PP/ 100%/ 94.5-95.2%	Student question-naire	M/G
Grünke et al. (2013)	Randomized multiple baseline design across participants	Urban	Pullout/ 1:1	Graduate student	18 sessions, daily, 30 min	NR	NR	NR	-/-

Gurney et al. (1990)	Multiple baseline design across groups	Rural	In-class (NR)/ Small group	Teacher	30-36 sessions[cfd], daily, NR	NR	PP/ 91%[cfd]/ 80-95%	Student interview	-/-
Johnson et al. (1997)	Experimental pre-posttest four-group design	Suburban	Pullout/ Small group	Graduate student	4-6 weeks, 2 x week, 45 min	SM/ 100%/ NR	AR & PP/ 100%/ .85-.92, 100%	Student interview	M/G
Onachukwu et al. (2007)	Multiple baseline design across participants	NR	Pullout/ 1:1	Teacher	2 sessions, daily, 50 min	DO/ NR/ 97.24%	PP/ 25%/ 93-100%	Student question-naire	M/-
Stetter & Hughes (2011)	Modified multiple baseline design across groups	Urban	Pullout/ 1:1 & Small group	Researcher	2 sessions, daily, 46 min	NR	NR	Student survey	M/-
Taylor et al. (2002)	Alternating treat-ments design	Rural	In-class (Resource room)/ Small group	Teacher	5 sessions, daily, 40 min	DO/ 21%/ 100%	PP/ 25%/ 98-100%	Student interview	-/-
Vallecorsa & deBetten-court (1997)	ABC design with multiple baselines across behaviors	NR (private)	Pullout/ 1:1	Teacher	6 sessions, 2 x week, 30 min	NR	AR & PP/ 43.55%[cfd]/ 86-94%	NR	-/-

Note. M = Method (AR = Audio-Recording, DO = Direct Observation, PP = Permanent Product, SM = Self-Monitoring); S = % of Sessions; PR = % of Procedural Reliability; IOA = Inter-Observer Agreement; M/G = Maintenance/Generalization.

Table 3. ***Interventions, Reading Outcome Measures, and Overall Findings***

Citation	Intervention	Reading Outcome Measures	Findings
Crabtree et al. (2010)	T: Self-monitoring & active responding + story map	a. Immediate recall correct b. Immediate recall incorrect c. Quiz questions correct	a. PND_I = 100%, PND_{MA} = 100% b. PND_I = 11% (range = 0-17%), PND_{Ma} = 20% (range = 0-60%) c. PND_I = 94% (range = 83-100%), PND_{Ma} = 100%
Dimino et al. (1990)	T: Story grammar instruction (Teacher-directed & teacher-assisted) + story map C: Traditional instruction	a. Story grammar questions correct b. Basal questions correct c. Retell accuracy d. Theme correct	a. T vs C: *ES* = 0.68 b. T vs C: *ES* = 0.51 c. T vs C: *ES* = 1.20 d. T vs C: *ES* = 1.16
Faggella-Luby et al. (2007)	T: Embedded story structure instruction (ESS) C: Comprehension skills instruction (CSI)	a. Unit reading comprehension score	a. T vs C: *ES* = 1.88 For students with LD: T vs C: *ES* = 1.33
Fore et al. (2007)	T: Story map instruction (*Model & Lead*)	a. Percent of reading comprehension questions correct	a. PND_I = 37% (range = 0-92%), PND_{Ma} = 39% (range = 0-100%)

Gardill & Jitendra (1999)	T: Advanced story map instruction (*Model*, *Lead*, & *Independent Practice*)	a. Percent of items correct on story grammar tests b. Percent of items correct on basal comprehension tests c. Percent of literal items correct on basal comprehension tests d. Percent of inferential items correct on basal comprehension tests Pretest-posttest e. Oral retell-Words f. Oral retell-Correct word sequences g. Oral retell-T-units h. Oral retell-Sentences i. Oral retell-Percent of story grammar elements	a. PND_I = 100%, PND_G = 100%, PND_{Ma} = 100% b. PND_I = 50% (13-100%), PND_G = 50% (0-100%), PND_{Ma} = 67% (0-100%) c. M_{BL} = 40.67%, M_I = 71.83%, M_G = 91.67%, M_{Ma} = 58.33% d. M_{BL} = 42.17%, M_I = 58.17%, M_G = 53.17%, M_{Ma} = 61.67% e. M_{pre} = 231.33 (*SD* = 116.79, range = 98-395), M_{post} = 193.67 (*SD* = 82.25, range = 108-351) f. M_{pre} = 223.83 (*SD* = 104.33, range = 101-374), M_{post} = 184.00 (*SD* = 84.24, range = 109-335) g. M_{pre} = 29 (*SD* = 14.87, range = 13-47), M_{post} = 19.67 (*SD* = 7.79, range = 12-33) h. M_{pre} = 17 (*SD* = 7.32, range = 6-24), M_{post} =14.50 (*SD* = 5.39, range = 8-22) i. M_{pre} = 35.83% (*SD* = 14.30, range = 14-57), M_{post} = 56.50% (*SD* = 24.01, range = 23-92)
Grünke et al. (2013)	T: Story map instruction (*Model*, *Lead*, & *Test*)	a. Comprehension questions correct	a. PND_I = 100%
Gurney et al. (1990)	T: Story grammar instruction (*Model, Guided, & Independent Practice*) C: Traditional basal instruction	a. Story grammar deviation score b. Basal deviation score	a. PND_I = 55% (50, 60%) b. PND_I = 33% (25, 40%)

Johnson et al. (1997)	T_1: Strategy instruction T_2: Strategy instruction plus goal setting T_3: Strategy instruction plus self-instruction T_4: Strategy instruction plus both goal setting and self-instruction	a. Oral retell-Percent of main ideas recalled b. Oral retell-Percent of details recalled c. Oral retell-Rating for the recall of story grammar elements d. Comprehension questions correct (Generalization to another setting)	a. Significant gains from pretest to posttest across all treatments. No significant differences among treatments. b. Significant gains from pretest to posttest across all treatments. No significant differences among treatments. c. Significant gains from pretest to posttest across all treatments. No significant differences among treatments. d. Significant gains from pretest to posttest across all treatments. No significant differences among treatments.
Onachukwu et al. (2007)	T: Story map instruction (*Model, Guided, & Independent Practice*)	a. Percent of reading comprehension questions correct b. Percent of story grammar elements correct	a. PND_I = 100%, PND_{Ma} = 100% b. Range M_I = 90-95%, range M_{Ma} = 80-90%
Stetter & Hughes (2011)	T: Computer-based story map instruction	a. Comprehension questions correct Pretest-posttest b. Gates-MacGinitie reading comprehension grade-equivalent score	a. PND_I = 2% (0-10%), PND_{Ma} = 7% (0-20%) M_{Bl} = 11.06 (*SD* = 2.76), M_I = 10.86 (*SD* = 2.55), M_{Ma} = 12.80 (*SD* = 3.06) b. M_{pre} = 3.95 (*SD* = 0.76), M_{post} = 4.62 (*SD* = 1.25)
Taylor et al. (2002)	T_1: Story map instruction T_2: Self-questioning C: No treatment	a. Percent of story map responses correct b. Mean percent of self-questioning responses correct c. Comprehension questions correct	a. T_1: *M* = 85.86% (*SD* = 4.76, range = 80.90-92.80%) b. T_2: *M* = 91.68% (*SD* = 3.26, range = 88.20-94.60%) c. PND T_1 vs C: 89% (range = 82-100%) PND T_2 vs C: 89% (range = 73-100%) PND T_2 vs T_1: 53% (range = 27-73%)

Vallecorsa & deBetten-court (1997)	T: Story map instruction in reading and writing	a. Story recall score	a. PND_{AB} = 83% (range = 67-100%) PND_{AC} = 89% (range = 67-100%)

Note. M_B = Baseline Mean; M_I = Intervention Mean; M_{Ma} = Maintenance Mean; M_G = Generalization Mean; PND_I = Mean PND during Intervention; PND_{Ma} = Mean PND during Maintenance; PND_G = Mean PND during Generalization; PND_{AB} = Mean PND between A and B phases; PND_{AC} = Mean PND between A and C phases; PND_{BC} = Mean PND between B and C phases.

interventionists. Instructional sessions ranged from 1 to 36 sessions and lasted from 30 to 120 minutes.

Of the eight studies that reported procedural reliability measures; five used direct observation (Crabtree et al., 2010; Fore et al., 2007; Gardill & Jitendra, 1999; Onachukwu et al., 2007; Taylor et al., 2002), one employed audio-recording (Faggella-Luby et al., 2007), one utilized both audio-recording and direct observation (Dimino et al., 1990), and one study used self-monitoring measures (Johnson et al., 1997). Of these studies, procedural reliability was assessed in 21% to 100% of the sessions with agreement scores ranging from 90% to 100%. For the ten studies that reported inter-observer agreement measures, eight assessed IOA through permanent products (Crabtree et al., 2010; Dimino et al., 1990; Faggella-Luby et al., 2007; Fore et al., 2007; Gardill & Jitendra, 1999; Gurney et al., 1990; Onachukwu et al., 2007; Taylor et al., 2002) and two used both audio-recording and permanent products (Johnson et al., 1997; Vallercorsa & deBettencourt, 1997). In those studies, IOA was conducted for 20% to 100% of the sessions with agreement scores ranging from 74% to 100%. Ten studies administered social validity measures. Of these, four conducted student interviews (Dimino et al., 1990; Gurney et al., 1990; Johnson et al., 1997; Taylor et al., 2002), three used a student questionnaire (Crabtree et al., 2010; Gardill & Jitendra, 1999; Onachukwu et al., 2007), one administered both a student and teacher questionnaire (Fore et al., 2007), and two employed student surveys (Faggella-Luby et al., 2007; Stetter & Hughes, 2011). Finally, six studies reported maintenance (Crabtree et al., 2010; Dimino et al., 1990; Faggella-Luby et al., 2007; Fore et al., 2007; Onachukwu et al., 2007; Stetter & Hughes, 2011) and two included both maintenance and generalization measures (Gardill & Jitendra, 1999; Johnson et al., 1997).

Story Mapping Instruction: An Overview of the Studies

Using a multiple baseline design across participants, Crabtree et al. (2010) conducted a study investigating the effects of a self-monitoring strategy to teach students story elements (i.e., characters, time and place, conflict, solution, and main idea) of a reading passage. Three high school students with LD, two of which were also diagnosed with ADHD, served as participants. Self-monitoring training included: (a) learning story structure and locating story elements in the different parts of the story, (b) reading a story and completing a story map with story grammar prompting questions, (c) answering a five story grammar question sheet, and (d) answering a comprehension quiz. Stories were split into three parts, with a stopping point mark displayed at the end of each part. Students were instructed to read up to the end of each section and then fill-in the story map with the story elements. Intervention procedures were similar to those used during training, except that students did not receive instruction or teacher assistance. Intervention procedures continued during the maintenance phase, but the stories the students read did not have stopping marks and the story map worksheets were slightly altered. Results indicated a substantial increase on the number of correct story facts immediately recalled from baseline to intervention and maintenance phases across the three students (*M* PND = 100%). Additionally, all of the students markedly improved their comprehension scores during intervention relative to baseline (*M* PND = 94%). Finally, the effects of

the self-monitoring strategy on the students' comprehension scores persisted during the maintenance phase (*M* PND = 100%).

Dimino et al. (1990) using a pre-posttest treatment-control group design, conducted a comparison study examining two conditions: advanced story mapping instruction versus traditional instruction. Thirty-two ninth grade general education and six students identified with LD served as the participants in the study. During the treatment condition, students were taught story grammar elements (i.e., main character or protagonist, character clues, reactions, problems or conflicts, attempts, resolution, twist or complication, and theme) using explicit, direct instruction, including guided and independent practice activities to identify the story grammar components in a story and were asked to write them down on a story map. In the control condition, students received traditional instruction. Findings showed that students in the treatment group significantly outperformed their peers in the control group from pretest to posttest on basal questions (*ES* = 0.51), story grammar questions (*ES* = 0.68), and written retells (*ES* = 1.20). In addition, the ability of the students in the treatment group to identify the stories' theme increased from pretest to posttest compared to the control group. Differences between both groups on theme identification were significant (*ES* = 1.16). Finally, students in the treatment group continued to outperform those in the control group on all measures after a two-week period.

Faggella-Luby et al. (2007) employed a pre-posttest two-group design to compare the effects of two intervention conditions: an embedded story structure (ESS) strategy versus a comprehension skills instruction (CSI) condition. Participants included seventy-nine high school students, fourteen identified with LD. During the ESS condition, students received three instructional strategies: (a) self-questioning strategy where students answered story grammar questions addressing the following story grammar elements (i.e., main character (protagonist and antagonist), central conflict/initiating event, time, place, climax, resolution, and theme), (b) story structure analysis, in which the students filled-in a story map with the aid of pictorial representations of the story grammar elements, and (c) summarizing, where students wrote a summary statement using the story grammar components. In the CSI condition, students were taught and used three research-based reading comprehension interventions: (a) LINCS Vocabulary Strategy, (b) Question-Answer Relationships (QAR), and (c) semantic summary mapping. Results indicated the ESS group was significantly superior from pretest to posttest and maintenance to the CSI group on reading comprehension for all students (*ES* = 1.88), including those with LD (*ES* = 1.33).

Using a multiple probe design across participants, Fore et al. (2007) studied the effects of a story mapping procedure to identify the main story grammar elements (i.e., title, characters, setting, beginning, middle, end, and main idea) implementing a modified version of the *Model*, *Lead*, and *Test* strategy to increase students' reading comprehension skills. Four high school students with LD participated in the study. During the *Model* phase, after the students read a story independently, the teacher prompted and led the students to identify and discuss the story elements in the story and wrote them down on a story map while the students followed along on their own copy. After completion of the story map, the students individually answered comprehension questions. In the *Lead* phase, students read a story, independently, completed a story map, participated in a teacher-led class discussion of

the story elements, and answered comprehension questions. Findings revealed that even though all students' comprehension scores gradually increased from baseline to the intervention phases (*Model* and *Lead*); gains in reading comprehension for three of the four students from baseline to intervention were scant (*M* PND = 37%). Finally, students' comprehension improvement was sustained during maintenance (*M* PND = 39%).

Gardill and Jitendra (1999) examined the effects of an advanced story mapping routine on students' recall and comprehension of story grammar elements and on a basal reading assessment using a multiple baseline design across dyads. Six middle school students, one sixth and five eighth graders, with LD were included in the study. In the intervention phase, a *Model*, *Lead*, and *Independent Practice* strategy was used to teach the story mapping procedure. Students were taught story grammar elements (i.e., main problem/conflict, character information, attempts, twist/complication, resolution, and theme) and learned to complete a story map. Results indicated that all six students increased their story grammar and basal comprehension scores from baseline to the intervention phase (*M* PND = 100% and 50%, respectively). Positive effects of the strategy on story grammar and basal comprehension scores were also observed during maintenance (*M* PND = 100% and 67%, respectively) and generalization probes (*M* PND = 100% and 50%, respectively). Additionally, the intervention positively impacted the number of story elements recalled on oral retells from pre- to post-intervention for five of the six students. However, for four of the six students, the story mapping strategy had a negative effect on the number of words, correct word sequence, T-units, and sentences in oral retells from pre- to post-intervention.

Grünke et al. (2013) using a randomized multiple baseline design across participants, utilized a story map to assist students in identifying and recalling story elements (i.e., title, setting, characters, problem, events, solutions, and conclusion) within a story passage. Six students, three fifth grade general education and three eighth grade students with LD, attending two separate schools in North Rhine-Westphalia, Germany participated in the study. In the intervention phase, students were taught a story mapping procedure to learn the story grammar elements using a *Model*, *Lead*, and *Test* strategy, identical to those outlined in the procedures section of Idol (1987). Following the completion of the story map activity, the students answered comprehension questions. Results indicated that all of the students notably improved their comprehension scores from baseline to intervention (*M* PND = 100%).

Gurney et al. (1990) using a multiple baseline design across groups, investigated the effects of story mapping instruction compared to traditional instruction on student's reading comprehension skills. Seven students with LD were included in the study. In the intervention phase, students were taught story grammar elements (i.e., main character(s), characterization clues, problem/conflict, attempts, resolution, twist or complication, theme, and important events) and used an advanced story map employing similar instructional procedures as in Dimino et al. (1990), to improve students' recall and comprehension of the stories. Findings showed that students slightly increased their story grammar comprehension scores from baseline to intervention (*M* PND = 55%). However, a minimal effect on basal comprehension was observed during intervention compared to baseline (*M* PND = 33%).

Using a pre-posttest four-group design, Johnson et al. (1997) contrasted the effects of four instructional strategies that employed story mapping: (a) strategy instruction (ST), (b) strategy instruction plus goal setting (ST + GS), (c) strategy instruction plus self-instruction (ST + SI), and (d) strategy instruction plus goal setting and self-instruction (ST + GS + SI). Forty-seven students with LD in the fourth thru sixth grade were randomly assigned to one of the treatment conditions, while twelve students without disabilities served as a comparison group. All four intervention groups received strategy instruction in which students learned to identify the story grammar elements (i.e., characters, time, location, problem, goal, events, ending, and reactions) within a reading passage. In all treatment conditions, the students were taught a four-step story grammar intervention (i.e., "Write and say story parts, Read and think, Remember and write, and Look back and check"), which instructed the students to read a story, identify the story elements, record them on a individually student-developed story map, and browse thru the story again to add/modify elements on their story map. The teacher modeled the intervention, provided time for the students to learn and acquire the strategy, and finally, provided guided and independent practice activities. Furthermore, students in the ST + SI and ST + GS + SI groups learned and practiced to generate and use self-statements to apply the reading strategy. Alternatively, students in the ST + GS and ST + GS + SI groups received additional instruction on goal setting and monitoring to use the instructional strategy. Findings revealed that significant gains from pretest to posttest were observed across the four treatment groups on the number of main ideas and details recalled and rating for the recall of story grammar elements during oral retells. However, no significant differences among the four treatment groups were found on these measures, which indicated that the addition of the use of goal setting and self-instruction to the strategy instruction did not have a noticeable impact on the students' oral retell skills. Furthermore, even though the performance of the students in the four treatment groups was significantly lower than a comparison group of normally-achieving peers at pretest on all oral retell measures; no significant differences were found with the comparison group at posttest. On the pretest-posttest generalization measure, significant gains were noted across all treatment groups from pretest to posttest; however, differences among the four treatment groups were not significant.

Onachukwu et al. (2007) assessed the effects of a story map on students' reading comprehension skills using a multiple baseline design across participants. Three eighth grade students with LD served as participants. In the intervention phase, the students read a story and used a story map, with probing questions, to assist them in identifying the story grammar elements (i.e., title, setting and time, main character, other characters, episode(s), problem/conflict, solutions, outcome, theme, and character's reaction) in the story passage. Results indicated that the students' comprehension scores markedly improved from baseline to intervention (*M* PND = 100%), and were sustained during the maintenance phase (*M* PND = 100%). Additionally, all students were able to identify over 80% of the story grammar elements in the stories during intervention and maintenance phases.

Stetter and Hughes (2011) using a modified multiple baseline design across groups, investigated the effects of a computer-based story mapping routine to improve students' reading comprehension skills by identifying story elements (i.e., char-

acter names, description of the characters, setting, time and place, conflict, type of conflict, high point of the story, resolution of the story, story events, and theme) on a computer. Nine high school students with LD were randomly selected to participate in the study. Training was conducted in the first two sessions of the intervention phase. In the first training session, students received instruction on story elements, read a story along with the teacher, discussed and completed a story map as a group, and finally, answered comprehension questions independently. In the second training session, the teacher first reviewed the story elements and story maps on the computer. Then, the students individually, read a story, completed a story map, and answered comprehension questions. Across all phases, introduction of new vocabulary, readings, story maps, and comprehension quizzes were presented and implemented on the students' computers. Findings showed that the intervention did not impact the students' performance on comprehension quizzes during intervention and maintenance phases (*M* PND = 2% and 7%, respectively); however, gains were noted from pretest to posttest comprehension measures for four of the six students who received instruction, which the authors attributed to the effects of daily reading practice.

An alternating treatments design was employed by Taylor et al. (2002) to compare the effects of three instructional conditions: story mapping, self-questioning, and no intervention on students' literal and inferential reading comprehension skills. Five elementary students, including sixth graders, with LD served as participants. In the story mapping condition, students read a story, completed a story map, studied the story grammar elements (i.e., main characters, setting, problem, major events, and outcomes) on their story map, and answered comprehension questions. During the self-questioning condition, students read a story, answered a series of story grammar self-questions (e.g., "Where does the story take place?") on a note card, studied their responses to the questions, and completed comprehension questions. During the no intervention condition, students read a story and either wrote down or orally stated their answers to the comprehension questions to the teacher. Results revealed that on overall comprehension scores in the story mapping and self-questioning conditions students performed significantly better than in the no treatment condition (*M* PND = 89% and 89%, respectively). Even though on average students' reading comprehension was higher in the self-questioning condition than during the story mapping condition (*M* PND = 53%), the differences between both treatments were not significant. Furthermore, students' performance on both literal and inferential comprehension scores were significantly superior to the no treatment condition. Moreover, students' exhibited comparable performance on both the story mapping and self-questioning conditions on literal comprehension questions. On inferential comprehension questions, however, four of the students performed marginally better during the self-questioning condition than during the story mapping condition.

Vallecorsa and deBettencourt (1997), using an ABC design with multiple baselines across behaviors, evaluated the effects of a story map to improve students' reading comprehension and story writing skills. Three middle school students with LD enrolled in a supplemental afterschool program for students with LD were included in the study. During the reading intervention phase, students independently read a story, were provided guided and independent practice activities to locate the story elements (i.e., setting, character(s), time, place and locale, the problem, the goal,

starter event, action(s)/episodes, reaction(s), and outcome/ending) within a story, and used a story map to organize and recall the story elements found in the passage. Afterwards, the students retold the story, with limited prompting back to the classroom teacher, wrote a story based on a picture prompt, and read their story to the entire class. During the writing intervention, procedures in the reading intervention phase continued, except that students received instruction on the use of a story map as a tool to assist them in the story writing process. Results indicated that the use of the story mapping strategy as an aid to organize and recall story grammar elements during the reading intervention was effective across all students to improve their retell skills (*M* PND = 83%); however, it did not have a noticeable impact on the students' story writing skills (*M* PND = 25%). Furthermore, retell scores continued to improve for two of the students during the writing intervention phase (*M* PND = 89%).

Discussion

The purpose of this review was to summarize the results on the effectiveness of story mapping to improve the reading comprehension skills of middle and high school students with LD. Our findings indicated that even though a limited number of studies were found since 1975, the use of a story map was an effective strategy to improve students' ability to recall and comprehend the key story grammar components in short, narrative story passages. Of the twelve studies we reviewed, seven showed story mapping instruction had positive results when used as the sole intervention (Dimino et al., 1990; Gardill & Jitendra, 1999; Grünke et al., 2013; Onachukwu et al., 2007; Vallecorsa & deBettencourt, 1997) or embedded/combined with other strategies (Crabtree et al., 2010; Faggella-Luby et al., 2007). Of the remaining five studies, one study (Johnson et al., 1997) found that story mapping was as effective by itself as combined with goal setting and/or self-instruction strategies, a second study (Taylor et al., 2002) reported moderate effects of story mapping on reading comprehension and no significant differences between story mapping and a self-questioning strategy, two other studies (Fore et al., 2007; Gurney et al., 1990) found slight improvements in reading comprehension, and the last study showed negligible improvements on students' reading comprehension skills (Stetter & Hughes, 2011). However, it is noteworthy to mention that in this last study by Stetter and Hughes (2011), the authors do state a number of confounding factors and explanations why they believe the story mapping intervention was ineffective.

In nine of the twelve studies, a story map was used as the primary intervention to teach story grammar elements and to facilitate students recall and comprehension of a story passage. In four of these studies (Fore et al., 2007; Grünke et al., 2013; Onachukwu et al., 2007; Taylor et el., 2002), instruction consisted of prompting the students to identify the story grammar elements and record them on a story map, while in the other five studies (Dimino et al., 1990; Gardill & Jitendra, 1999; Gurney et al., 1990; Stetter & Hughes, 2011; Vallercosa & DeBettencourt, 1997), story structure and story grammar elements were first presented and explained to the students prior to delivering the story mapping strategy. In the remaining three studies, the story maps were used to deliver story grammar instruction in combination with other strategies or as part of an intervention package (Crabtree et al., 2010; Faggella-Luby et al., 2007; Johnson et al., 1997). Mostly, the stories used in the studies were

simple, short reading passages, and the story maps included basic story grammar elements such as characters, setting, problem, and solution. All of the studies, except four (Crabtree et al., 2010; Fore et al., 2007; Grünke et al., 2013, Taylor et al., 2002), included one or more difficult story elements on the story map that required higher-order thinking skills such as "character clues and reactions" and "theme", among others. However, of these studies, only two provided outcome measures on theme (Dimino et al., 1990; Gardill & Jitendra, 1999).

In terms of the instructional procedures, most of the studies used direct instruction and the *Model*, *Lead*, and *Test* strategy, or an adapted/modified version of this model, to teach the story grammar components as initially outlined by Idol (1987). The vast majority of the interventions were administered in a 1:1, 2:1, or small group format (Crabtree et al., 2010; Fore et al., 2007; Gardill & Jitendra, 1999; Grünke et al., 2013; Gurney et al., 1990; Johnson et al., 1997; Onachukwu et al., 2007; Stetter & Hughes, 2011; Taylor et al., 2002; Vallecorsa & deBettencourt, 1997). One study was implemented with small and large groups (Dimino et al., 1990) and only one study was conducted in a large group in an inclusive classroom (Faggella-Luby et al., 2007). Half of the studies were implemented in a pullout setting outside the students' regular classroom environment (Gardill & Jitendra, 1999; Grünke et al., 2013; Johnson et al., 1997; Onachukwu et al., 2007; Stetter & Hughes, 2011; Vallecorsa & deBettencourt, 1997). Also, instruction was delivered by researchers or graduate students in seven (Crabtree et al., 2010; Faggella-Luby et al., 2007; Fore et al., 2007; Gardill & Jitendra, 1999; Grünke et al., 2013; Johnson et al., 1997; Stetter & Hughes, 2011) of the twelve studies. Finally, only one study explored the use of computer-based instruction to teach the story mapping strategy (Stetter & Hughes, 2011).

Researcher-developed outcome measures were employed primarily across all studies to assess the students reading comprehension skills, which is consistent with previous research in reading comprehension for secondary students with LD (Edmonds et al., 2009). Furthermore, by and large, the studies used written reading comprehension assessments to evaluate students' reading comprehension skills, with two of the studies including a short retell component (Dimino et al., 1990; Gurney et al., 1990). Alternatively, two studies evaluated reading comprehension through oral retells (Johnson et al., 1997; Vallecorsa & deBettencourt, 1997).

Of the studies that reported measures on story elements recalled, five indicated the use of story mapping had a large positive effect on students' recall (Crabtree et al., 2010; Dimino et al., 1990; Gardill & Jitendra, 1999; Johnson et al., 1997, Vallecorsa & deBettencourt, 1997), while only one study (Gurney et al., 1990) reported meager improvements. For studies that reported on main idea measures (Johnson et al., 1997) and theme identification (Dimino et al., 1990; Gardill & Jitendra, 1999), the results indicated the use of the story mapping strategy on these skills were positive compared to the students' pre-intervention skills.

Additionally, although literal and higher-order comprehension was evaluated in eight of the studies (Crabtree et al., 2010; Dimino et al., 1990; Faggella-Luby et al., 2007; Fore et al., 2007; Gardill & Jitendra, 1999; Gurney et al., 1990; Stetter & Hughes, 2011; Taylor et al., 2002), most of these studies stated their findings in terms of overall reading comprehension, but failed to report the effects of story mapping instruction on literal and inferential comprehension skills. Only two studies (Gardill

& Jitendra, 1999; Taylor et al., 2002) stated and compared specific findings on the effects of instruction on students' literal and higher-order comprehension. In both of these studies, the authors' indicated that students' performance on literal and inferential comprehension measures improved with the use of the story mapping strategy. However, when compared to a self-questioning intervention, Taylor et al. (2002) noted students' improvements on inferential comprehension was slightly lower in the story mapping condition compared to self-questioning.

Short-term effects of the instructional strategy on reading comprehension were evaluated in seven studies. Of these, six studies reported that students were able to maintain higher levels of comprehension compared to their pre-intervention levels (Crabtree et al., 2010; Dimino et al., 1990; Fore et al., 2007; Gardill & Jitendra, 1999; Johnson et al., 1997; Onachukwu et al., 2007), while in the remaining study (Stetter & Hughes, 2011), students showed similar comprehension levels to those prior to intervention. One study reported long-term effects on strategy use but did not report long-term effects on reading comprehension (Faggella-Luby et al., 2007). On generalization, one study, Gardill and Jitendra (1999), reported a positive impact on the students' ability to identify and recall story elements on novel story passages, while Johnson et al. (1997) observed a transfer of these skills to other instructional settings.

Limitations

Our review on story mapping instruction shows promising results; however, there are several limitations that need to be mentioned. First, only twelve studies were located that met our inclusion criteria. Second, 75% of the studies used a single-case research design, which included small samples of students with LD. Third, a non-standardized and heterogeneous corpus of narrative stories were used across the studies including stories from adopted literature textbooks, basal reading programs, and other storybooks from the school library. Fourth, a limited number of studies reported disaggregated findings on literal and higher-order comprehension skills, and few included findings on the specific story elements that required inferential skills. Fifth, over half of the studies were conducted by either researchers or graduate students, which may impact the feasibility of the use and implementation of the strategy by classroom teachers. Sixth, likewise, 50% of the studies were implemented in a pullout format and 40% of the studies were delivered in a 1:1 and 2:1 format. Thus, limited research was found on the use of the story mapping strategy in a large group, inclusive classroom setting. Seventh, the majority of the studies used researcher-developed reading comprehension measures, which generally results in stronger effect sizes (Scammacca et al., 2007). Few studies reported generalization measures, and none of the studies assessed long-term effects on reading comprehension. And finally, 50% of the studies either did not report or partially reported fidelity of implementation.

Future Research

In light of the previous limitations, there are a number of future research directions that researchers should consider. First, research should investigate the effectiveness of story mapping instruction, as the primary intervention or as part of an instructional package, for students with LD and other mild disabilities using

large scale treatment-control group designs for middle and high school students. Second, research is needed to assess the specific effects of story maps on more complex story components (e.g., main idea, theme, etc.). Third, research should also address the specific effects of story mapping instruction on narrative versus expository text structures, literal and inferential reading comprehension skills, short and long-term effects on reading comprehension, and its generalization to other instructional settings. And lastly, future research is warranted on the benefits of computer-based story maps (Stetter & Hughes, 2011; Wade, Boon, & Spencer, 2010) and other technological advances to improve the learning and internalization of story elements on the reading comprehension skills for students with LD.

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