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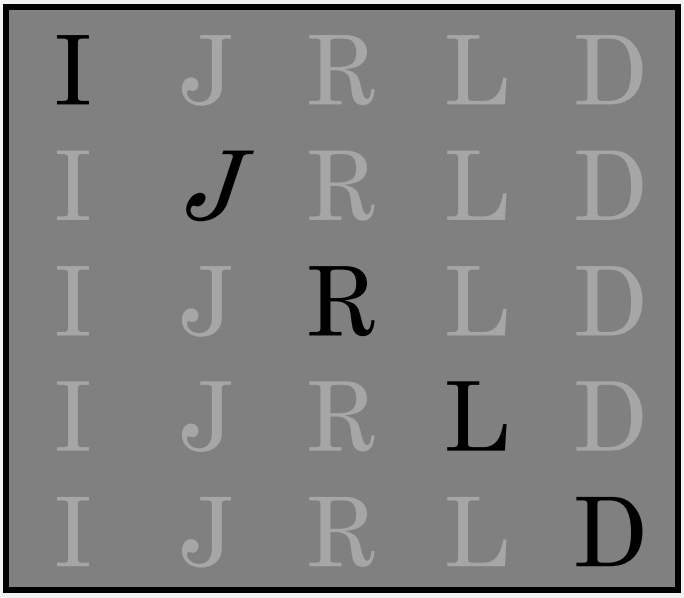

Journal of the
International Academy for Research in Learning Disabilities

Editor: David Scanlon, Boston College, United States

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Research in Learning Disabilities

International Journal for Research in Learning Disabilities

International ***J***ournal for **R**esearch in **L**earning **D**isabilities

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From the Editor

Welcome. Welcome to our new journal. Over the long course of preparing this first issue of the IJRLD I had imagined beginning this introduction by writing *welcome* in the languages of each of our members. But how many languages do our members have? what constitutes having a language? are there official languages and should they be privileged? what languages will members be learning, what languages will not be represented, and don't we want to "speak" with speakers of those languages as well? what of those who don't speak? and shouldn't we welcome in ways that go beyond merely speaking? If you imagine the complexity of the possible ways of welcoming, you will have a sense of the planned scope of our new journal. *Welcoming* across languages implies more than just communicating to be understood; the task is also to understand, anticipate, be open to and, sometimes, translate. That is the mission and task of the International Academy for Research in Learning Disabilities for the better understanding of learning disabilities, and it is the same for our new journal.

One may think our fields do not need another learning disabilities journal. But this journal is needed. We need to speak with one another across languages, cultures, regions and nations, and continents. We need to speak with each other across knowledge bases and perspectives, across scientific traditions, and across the many topics of relevance for advancing knowledge of learning disabilities. The IJRLD is a new platform for doing that. By writing in, reading, and discussing the IJRLD you will participate in an international sharing of what you know and what we all need to know. Of course, strictly speaking, the IJRLD is not a "new" journal. The IJRLD is a proud continuation of *Thalamus*. Our new name merely speaks of our reinvigoration and keeping up with the times. Through these pages we will continue the dialogue the Academy has led since its inception.

One of the complexities of language is that you could read *Welcome to our new journal* as either a welcome to you or to it. In the spirit of comprehensive communications, I mean it both ways. So, whatever your languages or traditions for welcoming, please translate "welcome to our new journal" in a way that means optimism and high expectations and please do welcome our renewed international dialogue by feeling welcome to join in.

Thank You

Our "new" journal is the product of the visions and efforts of many. My thanks to so many who have shared their input and talents. In particular, thanks to the members of the

Executive Committee for committing to revitalizing *Thalamus* and for their trust in me to lead the venture. Great thanks to fellow Publications Committee members, Judith Weiner and Carol Goldfus, who collaborated in numerous decisions. Thanks too to our fellow members who have volunteered their scholarship and goodwill as members of the Editorial Board; and of course thanks to those who have already submitted their scholarship to be considered for these pages.

-David Scanlon, Editor

Scruggs, T.E. (2012). Differential Facilitation of Learning Outcomes: What Does It Tell Us About Learning Disabilities and Instructional Programming? *The International Journal for Research in Learning Disabilities, 1*(1), 4-20.

William M. Cruickshank Memorial Lecture Delivered at the 2012 Conference of the International Academy for Research in Learning Disabilities

Differential Facilitation of Learning Outcomes: What Does It Tell Us About Learning Disabilities and Instructional Programming?[1]

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Abstract

Differential facilitation refers to interventions that influence sample subgroups in different ways. This article discusses the concept of differential facilitation in special education and how it has influenced our characterizations of learning disabilities, from the historical search for disordinal aptitude treatment interactions to the present day. I will review a number of recent investigations undertaken by myself and colleagues involving students with learning disabilities in inclusive classrooms, and re-examine the evidence for differential facilitation of academic outcomes. I will argue that specific psycho-educational treatments, at least in some cases, differentially promote learning for students with learning disabilities. Further, the results of these treatments offer information on the characteristics of learning disabilities, and provide opportunities as well as challenges for inclusive education.

[1]This article is based on the William Cruickshank Memorial Lecture presented at the Bo Palace, University of Padua, Italy, at the annual meeting of the International Academy for Research in Learning Disabilities, June, 2012. The author dedicates his presentation, and this article, to the memory of Marjorie Montague, a great teacher, researcher, and friend; and strong international advocate for students with learning disabilities.

The field of learning disabilities has had a rich and varied history, led and developed in part by researchers and clinicians such as Hinshelwood, Orton, Cruickshank, Gillingham, Fernald, Strauss, Kirk, and Kephart (see Hallahan & Mercer, 2002). Although these earlier efforts, including perceptual and motor training, multi-sensory instruction, and psycholinguistic training, failed to consistently produce reliable learning gains, many of these advocates agreed that intensive, systematic, individualized instruction was an important component for learning success. Hinshelwood (1917, p. 99), for example, maintained, "The first condition of successful instruction in such cases…is that the child must have personal instruction and be taught alone." Individualized instruction appears sensible for this population, and appears to lead to increased learning; it nevertheless may strongly contrast with later efforts for students with disabilities, including learning disabilities, to receive their instruction in more inclusive settings.

What Type of Instruction is Effective for Students with Learning Disabilities?

The varied approaches that have been taken over the years to improve outcomes for students with learning disabilities have provided considerable evidence for the relative effectiveness of these approaches, and provide insights into the nature of learning disabilities. Forness (2001) reviewed a number of "meta-analyses" (quantitative research summaries) of special education treatments that have been conducted over the years. Considering the meta-analyses of most direct interest to learning disabilities, his analysis of the findings is interesting, revealing the following "effect sizes" (standardized experimental-control mean differences):

- Perceptual motor training = .08
- Diet modifications = .12
- Modality training = .14
- Direct instruction = .84
- Reading comprehension strategies = .94
- Mnemonic (memory-enhancing) instruction = 1.16

As can be seen from Forness' summary, interventions that were oriented toward general constitutional functioning of students with learning disabilities (i.e., perceptual-motor, diet, modality training) were associated with modest effect sizes; on the other hand, interventions that were directed toward specific skill or strategy deficits were associated with very substantial effect sizes. These conclusions suggest that learning disabilities can be more profitably characterized by one or more relative deficits (e.g., verbal memory, reading comprehension) responsive to specific skill or strategy training, than as a deficit in one or more generalized processes (e.g., perceptual-motor skills) less responsive to general training

Content Area Learning and Learning Disabilities

Over much of my career, I (along with my colleague Margo Mastropieri) have been interested in facilitating the content area learning (particularly, science and social studies) of students with learning disabilities, and have implemented a number of different interventions to promote learning of academic content. Content area learning including such topics as science, history, geography, citizenship, literature, and humanities—is of interest simply because it comprises such a significant component of schooling; however, it is also of interest for other reasons. Much school content requires verbal learning paradigms, and allows researchers to use what we know about verbal learning in planning interventions. Learning in these domains largely requires declarative, purposeful, deliberative processing, rather than skill development requiring automaticity, as in much skill acquisition. Intervention research in these areas also may offer insights into the characteristics of learning disabilities, addressing such questions as, "What types of interventions are effective in this area?" and, "What do outcomes of content area learning research tell us about the nature of learning disabilities?"

Recently, we (Scruggs, Mastropieri, Berkeley, & Graetz, 2010) conducted a meta-analysis of content area instruction of students with special needs. We identified 68 investigations, including a total of 2,514 students, 80% of whom had learning disabilities. We identified a number of effective treatments for students with learning disabilities. Effect sizes for these treatments ranged from .48 to 1.68; this also represents substantial variability, but all effects were in the moderate (e.g., .40 - .70) to high (e.g., > .80) range:

- Peer mediated learning = .48
- Hands-on learning = .58
- Computer-assisted instruction = .62
- Spatial learning strategies, using tables and charts = .83
- Study aids, such as highlighting, framed outlines, guided notes = .94
- Learning strategy instruction, including study skills and note-taking skills = 1.09
- Mnemonic instruction, including the use of keywords, pegwords, and letter strategies to facilitate memory = 1.39
- Systematic, explicit instruction in specific contexts = 1.68

Similar to the positive outcomes in the Forness (2001) summary, substantial positive effects in this meta-analysis were associated with enhancing skills and cognitive processes associated with specific learning tasks, and were focused directly on outcome measures. Collectively, these interventions could be said to help students with learning disabilities *attend more carefully* or *think more systematically* about the content to be learned. These strategies serve to reduce demands on purposive information processing, increase capacity for working memory, and provide direct links and retrieval routes to the target information. At the same time, all have sought to maximize academic engagement.

The outcomes of these interventions provide us with some insights on the nature of learning disabilities, in that they interact with both relative strengths and relative weaknesses of students with learning disabilities. Relative strengths which supported these interventions include general intelligence and capacity for understanding, memory for pictures, and memory for relevant activities (or enactments, see Cohen, 1989). Relative weaknesses addressed directly in these interventions include limitations in areas such as attention and focus, semantic memory, organizational skill, purposive information processing, and spontaneous strategy use (see Lerner & Johns, 2012). Such an analysis provides important insights into learning disabilities, and allows us to predict interventions that are likely to be effective in other domains.

Interactions in Special Education Research: Is "Effective" Good Enough?

Research to date has identified a number of important treatments that have been successful in substantially increasing learning of students with learning disabilities. But is this sufficient to justify the existence of a sometimes controversial category (see Scruggs & Mastropieri, 2002), as well as specialized treatment programs? Many, if not most, of the treatments identified by Scruggs, Mastropieri, Berkeley, & Graetz (2010) could conceivably be of benefit to general education students. In the earlier days of the development of special education, much thinking was influenced by contemporaneous investigations into "aptitude-treatment interactions," that is, the search for differential outcomes based upon alternate treatments and personological variables (Aptitude-treatment interaction, 2002).

Ysseldyke (1973) expressed the orientation of many researchers of the time when he argued: "The very existence of 'special' education is literally dependent on the identification of specific disordinal interactions between learning characteristics (specific personological variables) and the relative educational payoff of differential educational curricula or approaches" (p. 1). In other words, educational treatments cannot be said to be "special" unless they differentially facilitate learning. In this case, as with aptitude treatment interaction research in general, a disordinal interaction was considered to be necessary to validate a different educational treatment system. To illustrate, Figure 1 demonstrates three types of "interactions." Figure 1a represents a disordinal interaction, where Treatment A improves learning for one group, and inhibits learning for another group; Treatment B is associated with the opposite effect. In Figure 1b, the lines are parallel, indicating no group x treatment interaction has occurred. This suggests treatments outcomes are similar, although one group uniformly performs less well than the other. Even in this case, however, the treatment may be of significance, for example if the treatment raised both groups above an established criterion for mastery. Finally, Figure 1c indicates an ordinal interaction, in this case benefiting both groups, but benefiting the lower functioning group differentially. This example of differential facilitation could also be said to represent significant "special" treatments, in that students with learning disabilities perform similar to the level of general education students after treatment. Such an interaction may be of even greater benefit, because it could conceivably lead to greater success of students with learning disabilities in

inclusive classrooms. Disordinal interactions, on the other hand, if they were commonly observed, would provide substantial evidence that instruction of students with learning disabilities should be generally taught in separate instructional settings. For better or worse, disordinal interactions have been observed only rarely over the years (Aptitude- treatment interaction, 2002)

Content Area Learning in Inclusive Settings

Content area learning refers to learning academic subjects such as English literature, citizenship, geography, history, and science. Content learning can be of particular importance to inclusion efforts, for number of reasons. Special education teachers, especially at the secondary level, may not be well prepared to teach these subjects; instructional programming may in these cases be best accomplished in inclusive classrooms. Secondary schooling is mostly concerned with content area learning, so it seems appropriate for much of this to take place in inclusive settings. In addition to providing support for content learning, special education teachers can also focus on basic literacy and math skills, as well as organizational and learning strategies.

Earlier research in content area learning in inclusive settings focused on curriculum adaptations, such as study guides, computerized tutorials, and graphic organizers. Much of this research was conducted by Tom Lovitt, Steve Horton and colleagues, and focused on adaptations that provided means to assist poor readers to abstract main ideas from textual material, reduce the readability level, and help organize and streamline the enormous amount of detail often found in secondary textbooks (e.g., Horton & Lovitt, 1989; Horton, Lovitt, & Bergerud, 1990; Lovitt, Rudsit, Jenkins, Pious, & Benedetti, 1985). These curriculum modifications were generally helpful in improving content learning of students with learning disabilities, and other students, in general education content area classes. More recently, research has employed peer-mediated instruction in inclusive content area classes (Mastropieri, Scruggs, Guckert, Thompson, & Weiss, in press).

Inclusive content learning may also be of interest in studying possible differential learning effects. While students are learning academic skills such as reading, they develop cumulative skills over a period of time; students must develop automaticity in applying these skills to higher level learning. Content area learning, on the other hand, requires purposeful, deliberative processing of declarative—generally of verbally-based—information. Studying content acquisition of specific domains of knowledge in inclusive classes can provide us with important information about the relative effects of specific instructional treatments, and any possible differential effects on students with learning disabilities vs. general education students.

Over the past several years, Margo Mastropieri and I, along with other colleagues, have investigated differential learning gains of content information in inclusive classrooms. These studies have included a number of investigations that can be combined under what we referred to as “Differentiated Curriculum Enhancements.” In this model, all students in

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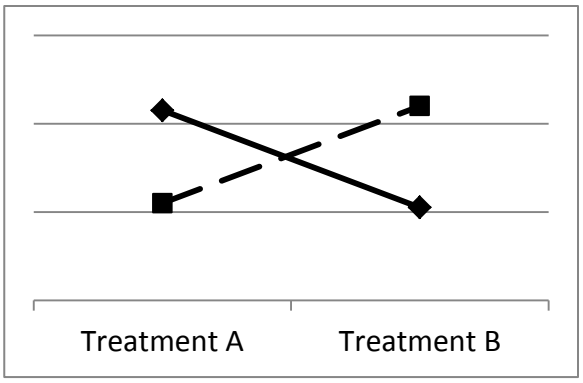

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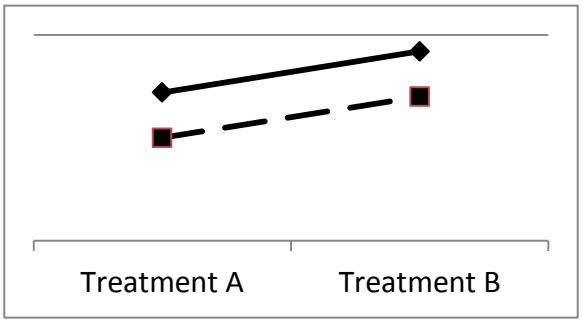

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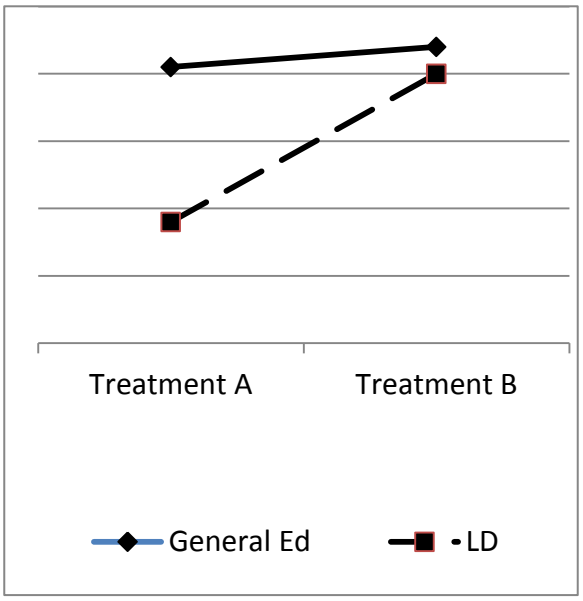

Figure 1. Examples of disordinal interaction (a), no interaction (b), and ordinal interaction (c).

inclusive classrooms receive the same instructional practices and materials. This was done to meet learner preferences not to be singled out, and to reduce the possible stigma associated with modified (or, "dumbed-down" in the minds of some students) curriculum materials (see

Fuchs & Fuchs, 1994). We nevertheless considered these examples of differentiated instruction, because they were presented in a manner that allowed for individualized instruction to occur. In addition to the Differentiated Curriculum Enhancements studies, I also included in this analysis two teacher implementation studies in inclusive classrooms, and one study by Bulgren, Schumaker and Deshler (1994), which is similar in design and implementation. These studies represent a significant number of very similar interventions conducted in inclusive content area classes, for which separate effects could be calculated for students with and without special needs (including very substantial numbers of students with learning disabilities). Although not exhaustive of inclusive content area investigations, they nonetheless comprise a consistent and coherent subset of available research literature in this area. I will describe these studies, and then describe my summary analyses of the possible differential effects of these particular interventions on students with and without special academic needs.

Research on Differentiated Curriculum Enhancements

We designed the Differentiated Curriculum Enhancements studies in three different ways. One type, which we referred to as "tiered activities," employed activities we developed on several levels of difficulty, intended to be completed by students in small groups. All groups were expected to complete all levels of activities in turn, and they were provided with materials and training in progress recording techniques, to be certain all students had mastered each level before moving on to the next level. Student groups, then, each moved through the different activity levels at their own pace. In a second type of Differentiated Curriculum Enhancements, which we referred to as "classwide peer tutoring" (see, e.g., Greenwood, 1997), students in tutoring pairs took turns tutoring each other using "fact sheets" of important content, at their own pace, and pairs evaluated their progress using self-monitoring sheets. In a third type, we employed tutoring pairs with fact sheets, but also provided mnemonic (memory-enhancing) strategies when needed. All of these studies were implemented generally over periods of 8-18 weeks. Each type of intervention is described in turn (see also Mastropieri et al., in press).

Tiered activities. Mastropieri et al. (2006) developed materials, and employed small group activities, on three levels or tiers to enhance learning of a middle school unit on scientific methods (e.g., charting and graphing, measurement, variables used in experimental research, qualitative and qualitative research questions). We developed eight activities using game-like activities, such as "Jeopardy," "Concentration," and "hangman," as well as specific charting and measurement activities, to increase motivation. Each one of these activities was presented at three difficulty levels. On level one, students were asked to identify correct answers to relevant questions or problems from an array. On level two, students were presented with similar questions, but now were expected to produce correct answers, with prompting when needed. Level three required students to provide answers without prompting. This investigation was applied in 13 inclusive eighth grade science classes, randomly assigned to experimental or control condition, over a period of 12 weeks.

The participants included 213 students, of whom 44 were students with disabilities (37 with LD and 7 with emotional/behavioral disabilities). Results supported the effectiveness of the experimental condition using these peer-mediated, tiered learning activities on relevant unit tests, as well as on the yearly high stakes test. We believe the unit-long intervention facilitated outcomes on the yearly test because the unit selected, scientific method, promoted understandings that carried over to other science units.

Simpkins, Mastropieri, and Scruggs (2009) applied a similar treatment, in this case using two levels of difficulty, to study the effectiveness of tiered learning activities in three fifth grade classes, using a crossover design in which all students received both experimental and comparison treatments. This sample included sixty-one fifth grade students (43 general education, 15 at risk, and 3 with learning disabilities) who were taught two 5-week science units (light/sound, and earth/space science) via experimental or control conditions. Again, students with and without special needs scored higher when in the experimental condition.

Classwide peer tutoring with self-monitoring. The tiered activities were found to be effective; however, they involved a level of materials development that we thought might discourage some teachers. Using teacher feedback for materials that were simple to develop and implement, Mastropieri, Scruggs, and Marshak (2008) employed a classwide peer tutoring procedure with partner monitoring to enhance learning in inclusive middle school U.S. history classes studying World War I. Students tutored each other, using "fact sheets" that had been identified by teachers as representing the most important declarative content for the units (e.g., neutrality, Zimmerman telegram, Lusitania). Students tutored for specific periods of time, alternated the role of tutor and tutee, and pairs recorded progress on supplied self-monitoring sheets. In this way, students proceeded to new content only after they had demonstrated that they had mastered the previous fact sheets. Mastropieri et al. employed a crossover design, and reported that students scored higher on posttests when in the experimental condition than in the traditional condition. Scruggs, Mastropieri, and Marshak (2012) conducted a follow-up study using similar methods and involving 10 classrooms (N = 133 general education students, 21 students with learning disabilities, and 3 students with emotional/behavioral disabilities), randomly assigned to condition. This investigation covered seven units of U.S. history covering the period from the end of the Civil War to the beginning of World War II, and was implemented over a period of 18 weeks. Results indicated that students in experimental classrooms scored higher on tutored content, as well as on related content that had not been specifically tutored. This suggested that tutoring benefits may go beyond the actual material being tutoring and may more generally enhance content learning.

In a third classwide peer tutoring study, McDuffie, Mastropieri, and Scruggs (2009) investigated its effect on learning a unit on genetics (e.g., nitrogenous bases, protein, DNA). This investigation included 141 general education students, and 62 students with special needs, of whom 77% had learning disabilities, in 8 classrooms. Similar to the applications in

social studies, students using classwide peer tutoring intervention outperformed students receiving traditional instruction.

Mnemonic strategies. The third type of inclusive intervention was developed to maintain the classwide peer tutoring format, but also to provide additional strategic support for students who had difficulty remembering specific content information. Mastropieri, Scruggs, and Graetz (2005) developed mnemonic strategies (see Scruggs, Mastropieri, Berkeley, & Marshak, 2010) in high school chemistry classes containing students with learning disabilities. Classwide peer tutoring was used as in the previous investigations, and in this case students took turns questioning, using materials that contained chemistry content as identified by teachers (e.g., molarity, core and valence electrons, exothermic reactions, nonpolar covalent bonding). Tutors were trained to provide mnemonic pictures, and corresponding strategies, to facilitate retrieval when students did not immediately retrieve the target content. For example, if partners demonstrated difficulty remembering that a *mole* is the atomic weight in grams of an element or compound, tutors showed partners a drawing of a "mole" (the burrowing animal) sitting on a metric scale reading its weight in grams. In this investigation, students also questioned each other on comprehension of the content, by asking partners to provide additional information and examples ("What is an example of a mole?", "What else can you tell me about moles?"). At the end of the instructional unit, tests indicated that students with and without learning disabilities in the mnemonic tutoring condition outperformed students who received more traditional instruction.

Mnemonic strategies were also employed by Marshak, Mastropieri, and Scruggs (2011) to improve learning of important information in inclusive middle school American history classes. If students had difficulty remembering, for example, that John D. Rockefeller controlled much of the oil industry in the early 20th century, tutors presented a mnemonic picture of a *rock* ("keyword" for Rockefeller, see Scruggs, Mastropieri, Berkeley, & Marshak, 2010) with oil on it (for oil industry). In this investigation, 8 classrooms were randomly assigned to tutoring and traditional conditions, including 144 general education students, 21 students with learning disabilities, and 21 students with other special needs. As with other research in this series, students in the mnemonic tutoring condition outperformed students in the traditional instruction condition.

Other Related Investigations

I also included two teacher implementation studies in this review and synthesis. In one implementation study, Mastropieri, Sweda and Scruggs (2000) used mnemonic strategies in an inclusive fourth grade history classroom to help students learn about the European discovery and colonization of America, while in another implementation, Uberti, Scruggs, and Mastropieri (2003) employed mnemonic strategies to improve learning of reading vocabulary in three inclusive third grade classrooms (e.g., for *jettison* = throw overboard, students were shown a picture of a *jet*, the keyword for jettison, throwing something overboard). In both implementation studies, students scored higher on recall tests when using mnemonic strategies.

Finally, Bulgren et al. (1994) implemented a "Recall Enhancement Routine", which was very similar in substance to the previously described investigations. These researchers employed mnemonic strategies to improve learning in social studies, for 41 seventh and eighth grade students, 18 of whom had learning disabilities. Students in both conditions received a teacher presentation on the history of journalism. In the control condition, students received the presentation followed by a standard review. In the experimental condition, students received the same presentation, but mnemonic strategies (including acronyms, images, and keywords) were embedded within the review portion of the lesson. For example, to help students remember that Copperheads were members of a political group that supported the Confederacy during the American Civil War, students were asked to remember a mental image of a shiny copper statue of a soldier waving a Confederate flag. Students with and without learning disabilities benefited more from the experimental condition procedures.

Summary of Effects for Students With and Without Learning Disabilities

Overall, these 10 selected investigations of content learning in inclusive classrooms involved 1128 students, including 283 with special needs. Of the students with special needs, 80% were characterized as having learning disabilities. For each of these studies, I calculated standardized effect sizes separately for students with and without special needs, as shown in Table 1. As can be seen in the table, across a number of different subject areas (children's literature, American history, world history, genetics, scientific method, earth/space science, science of light and sound, chemistry), and grade levels 3-10, the mean overall effect size was .63 for general education students, and 1.40 for students with disabilities. These effect sizes are in the moderate to high range. The effects are greater, in each case, for students with special needs, and these differences overall were statistically significant, according to a Wilcoxon Matched-Pairs, Signed Ranks test ($p = .005$). It is interesting to note that the smallest advantage for students with special needs, (.36 vs. .43), was observed in the Simpkins et al. (2009) investigation, which was the only one to include a minority of students with learning disabilities in the special needs group (the majority were considered "at risk"). These data can be presented graphically in an interaction chart, as they are in Figure 2. By setting general education control group performance at a standard score of "0", it can be shown that the corresponding control condition performance of students with special needs relative to general education students is 1.03 standard deviations lower, or at about the 15th percentile of the general education scores. After treatment, students with special needs (again, the great majority of whom had learning disabilities) had scored .26 standard deviations below general education students, placing them at about the 40th percentile of the general education scores, and at about the 64th percentile of general education students in the control conditions.

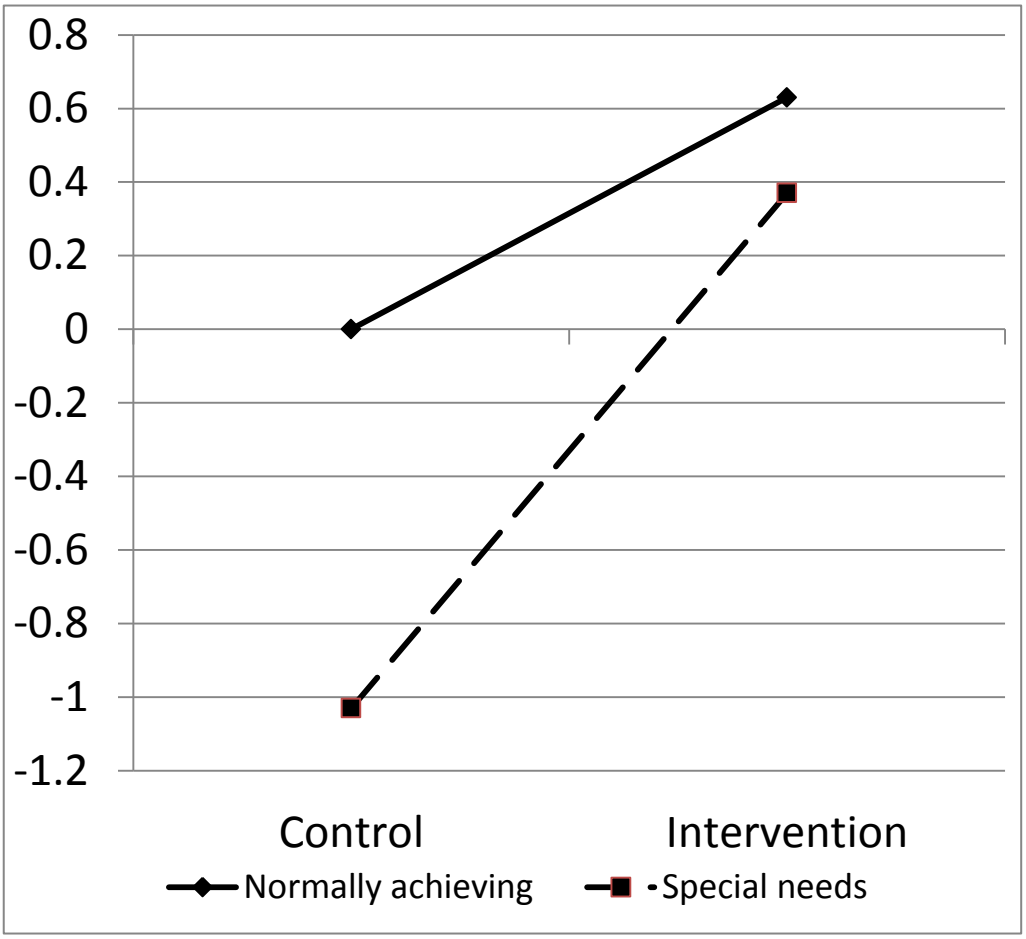

Figure 2. Ordinal interaction representing differential treatment effects from the 10 investigations.

The extent of the difference of learning gain can also be demonstrated with respect to percent increase over control. In this case, gains for students with and without disabilities were calculated as a function of control group performance. These treatments overall have improved functioning of general education students by 16.9% over control students; however, students with special needs gained 63.5% over controls. This difference is also statistically significant (p = .005), according to a Wilcoxon test.

Table 1

Summary of Effect Sizes: 10 investigations, 1128 students, 283 with special needs (80% LD)

Authors	**Effect size**		
	General Education		Special Education
Mastropieri et al. (2008)	.15	>	.41
Scruggs et al. (2012)	.28	>	1.04
Mastropieri et al. (2009)	.35	>	2.39
Simpkins et al. (2009)	.36	>	.43
McDuffie et al. (2009)	.47	>	.63
Uberti et al. (2002)	.76	>	3.33
Mastropieri et al. (2005)	.78	>	.93
Mastropieri et al. (2006)	.79	>	1.15
Marshak et al. (2011)	1.09	>	1.90
Bulgren et al. (1994)	1.29	>	1.82
Mean	**.63**	>	**1.40**

Wilcoxon $z = 2.803$, $p = .005$

Interestingly, these differential effects, which appear so clearly when outcomes are summarized, resulted in statistically significant interactions in only a few of these investigations (e.g., Mastropieri et al., 2008). I believe that the lack of observed significant effect in the other investigations are in fact Type II errors, and are the consequence of the fact that, in these inclusive classrooms, the number of students with special needs was too small to possess sufficient statistical power to yield statistically significant interaction results in individual cases, even when the overall number of classrooms was large. The magnitude and consistency of the differential effects, when these studies are viewed collectively, provides another dimension to the analysis.

These results provide cause for great optimism, as well as cause for some concern, for students with learning disabilities in inclusive content area classrooms. The positive conclusions are that research has revealed several effective strategies for inclusive learning of students with learning disabilities; these strategies appear to have differentially facilitated learning outcomes, so that, after intervention, students with and without disabilities scored very similarly. In some cases (Marshak et al., 2011; Scruggs et al., 2012; Uberti et al., 2003) students with learning disabilities, after training, scored on the same level as, or on an even higher level than general education students. At least in some cases, then, students with learning disabilities and other special needs can benefit very substantially from appropriate inclusive instruction.

In spite of these positive findings, and the apparent differential facilitation of learning outcomes, there remains cause for concern. Although great learning improvements were observed for students with special needs, the effects on other students (the great majority of the students in these investigations) were substantially more modest in most cases. For this reason, teachers may be reluctant to devote the time and resources needed to plan and execute inclusive strategies that are particularly effective for only a smaller proportion of students in general education classrooms. So there is some reason to believe, given these data, that general implementation of appropriate inclusive strategies may be problematic.

In fact, data from some recent research syntheses suggest implementation may indeed be a problem. Scruggs and Mastropieri (1996) and more recently, Scruggs, Mastropieri, and Leins (2011) summarized research from 68 surveys of teacher attitude toward inclusion reported between 1958 and 2011. These surveys, which included 18,926 respondents, indicated that attitudes may have changed but little over these decades: most teachers did support the general idea of inclusion (although fewer than half supported full time inclusion), but a much smaller proportion of teachers agreed that they had sufficient time (< 30%), training (< 40%), or support (< 30%) to include students with disabilities effectively.

In more recent decades, "co-teaching" has been implemented to provide additional supports to general education teachers (Mastropieri et al., 2005). However, this does not appear to have led to improved instructional strategies. Scruggs, Mastropieri, and McDuffie (2007) completed a "meta-synthesis" of 32 qualitative studies of the use of co-teaching in inclusive classrooms, which generally included students with learning disabilities. These studies investigated in depth the activities and perspectives of 453 co-teachers, 142 students, and 42 administrators. Although most teachers commented favorably on co-teaching, instructionally, the practice was more limited. Collectively, the dominant model of co-teaching was "one teach, one assist" (see, e.g., Friend & Cook, 2010), in which the special education teacher provided assistance to the general education teacher in what was often a subordinate role. Zigmond and Matta (2004), for example, studied a number of secondary inclusive classrooms, and represented the conclusions of many other co-teaching researchers when they stated,

> …none of what we saw would make it more likely that the students with disabilities in the class would master the material. . . We did not hear the [special education teacher] chime in with carefully worded elaborative explanations. We virtually never saw the special education teacher provide explicit strategic instruction to facilitate learning or memory of the content material. (Zigmond & Matta, 2004, p. 73)

Scruggs et al. (2007) concluded,

> practices known to be effective and frequently recommended —such as peer mediation, strategy instruction, mnemonics, study skills training, organizational skills training, hands-on curriculum materials, test-taking skills training, comprehension training, self-advocacy skills training, self-monitoring, or even general principles of effective instruction …were only rarely observed. (p. 412)

Findings such as these provide a less optimistic picture of effective inclusion for students with learning disabilities. Combined with the positive results of intervention research, however, it seems very possible that, with increased teacher time, training, and support, more positive outcomes can be realized for students with learning disabilities in inclusive classrooms. These supports should include an increased emphasis on the importance of improving achievement for students with learning disabilities, and the importance of improving learning of general education students, even if to a more modest extent.

Conclusion

The field of learning disabilities has been characterized by multiple and varied changes in theory and practice throughout its history. Researchers have identified a number of important instructional interventions of importance to students with learning disabilities; these interventions provide tools for practitioners and also provide important information about the characterizations of learning disabilities. Some intervention research, conducted in inclusive settings, appears to suggest that interventions that help students attend more carefully, and think more systematically, about academic content may result in differential academic learning gains for students with learning disabilities. These interventions may succeed by serving to help maximize the relative strengths of students with learning disabilities in general intellectual ability, memory of pictures and activities, and ability to benefit from provided academic strategies. At the same time, they directly address and help minimize relative weaknesses in attention and focus, semantic memory, organizational skill, purposive information processing, and spontaneous strategy use. Such characterizations can lead to more general understanding of the instructional needs of students with learning disabilities. That these learning strategies can be presented successfully in inclusive classrooms provides optimism that the general education classroom can be an effective environment for content learning.

Identification of effective intervention strategies is of little practical use if they are not generally implemented in general education classrooms. Summaries of research have

suggested that successful inclusive learning may require additional efforts to maximize teacher time, training, and administrative and personnel support. These efforts can ultimately be employed to maximize academic learning for all students, including those with learning disabilities.

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The Online and Blended Learning Experience: Differences for Students With and Without Learning Disabilities and Attention Deficit/Hyperactivity Disorder

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Abstract

As colleges and universities offer more classes in both online and technology blended formats, students with learning disabilities (LD) and attention-deficit/hyperactivity disorder (ADHD) will face new learning demands. Compared to traditional face-to-face courses, online and blended courses require increased self-management and executive functioning skills, which research indicates can underlie many common learning challenges for students with LD and ADHD. This article presents the outcomes of interviews with postsecondary students with LD and/or ADHD who were enrolled in online and blended courses and compares these experiences to a sample of students without disabilities. Barriers and opportunities to enhance learning are discussed from the students' perspective, as are suggestions to enhance the planning and development of online and technology blended courses.

As the number of online and blended courses offered on college campuses across the nation continues to exponentially increase, it is important to consider the impact of such courses on all learners, including those with learning disabilities (LD) and attention-deficit/hyperactivity disorder (ADHD). The growth trend of both online instruction and students with LD and ADHD in postsecondary education is clear. For example, a recent study by Allen and Seaman (2011) reported that the percentage of students taking online courses increased from 9.6% of all students in 2002 to 31.3% of all students in 2010, representing an increase of almost five million students. For the same time period, enrollment at institutions of higher education increased by approximately 3 million students. Over half a million more students enrolled in at least one online course in fall 2010 versus fall 2009, representing a year-to-year growth rate of 10.1%. This number greatly outpaced the 0.6% growth in total student enrollment for the same period (Allen & Seaman). These numbers are likely to continue to increase, particularly at four-year public institutions, as 65% of the institutional respondents in the Allen and Seaman survey reported that online courses are a critical part of their long-term growth strategy. EDUCAUSE (2008) reported on over 27,000

undergraduates (freshmen and seniors) from 98 institutions and found that students spend nearly 20 hours per week using the Internet for school, work, or recreation. In addition, almost 83% of undergraduates, more often seniors than freshmen, reported using a course management system (CMS) "several times a week or more often" (p. 12).

During this time period, the number of students with disabilities attending postsecondary education also increased, growing from 9.3% in 2000 to 10.8% of all students in 2008 (U.S. Government Accountability Office (GAO), 2009). Additionally, between 1983 and 2008, the number of college students with LD increased from .05% to 3.3% of all college freshmen (Pryor et al., 2008), while the number of college students with ADHD rose from 6.7% in 2000 to 19.1% in 2008 (U.S. GAO, 2009). Clearly, given these statistics, it is likely that college students with LD and ADHD will enroll in at least one completely online course, and even more likely that they will be expected to use a Course Management System (CMS).

Given that one of the hallmarks of students with LD or ADHD is weaknesses in executive functioning skills, the self-management demands of such courses are likely to create new learning challenges (Dukes, Koorland, & Scott, 2009). However, the access needs of these students are largely overlooked in the literature related to online learning. Additionally, the experiences of students with LD and ADHD versus students without disabilities in online and blended courses have not been explored in the professional literature. This study examined the experiences of students with LD and ADHD in online and technology blended courses at two postsecondary institutions in the northeast, and compared these to the experiences of students without disabilities. In order to frame the need for such an investigation, the access needs of students with LD and ADHD in online learning will be examined.

Access needs of students with LD and ADHD. There is growing literature on online and technology blended learning, however, there is a paucity of research on the specific needs of learners with disabilities in these courses (Erickson, Terise, Van Looy, Lee, & Bruyere, 2009; Moisey, 2004; Shayo, 2008; Veal, Bray, & Flowers, 2005). Likewise, despite the access standards set forth by Section 508 of the Rehabilitation Act and the World Wide Web Consortium (W3C; 2012), the general web accessibility needs of people with LD and ADHD have received little attention. Multiple authors have noted that although people with cognitive disabilities are the largest single group of people with disabilities worldwide, their access needs tend to be overlooked by web designers (Bohman, 2004; Bohman & Anderson, 2005; Crow, 2008), often because of a focus on physical and sensory disabilities, and a lack of understanding of the functional limitations caused by cognitive disabilities. Keeler and Horney (2007) also explained that there is a misconception that assistive technology can successfully remove barriers to access for students with cognitive disabilities, such as LD and ADHD. They summarized: "The online education literature related to disabilities is robust with guidelines relating to accommodation indications with physical impairments, including low vision, and blindness, hearing difficulties, and mobility impairments, but is lacking regarding individuals with cognitive impairments" (p. 62).

Several articles outlined the needs of students with disabilities in online and blended courses and proposed guidelines for course developers and instructors to incorporate the principles of universal design for learning (UDL) or universal design for instruction (UDI) (Bissonette, n.d.; Burgsthaler, n.d.; Crow, 2008; Dukes et al., 2009). UDL is defined as a method to provide "a blueprint for creating instructional goals, methods, materials, and assessments that work for everyone" (CAST, n.d.). UDI is described as "an approach to teaching that consists of the proactive design and use of inclusive instructional strategies that benefit a broad range of learners including students with disabilities" (Scott, McGuire, & Embry, 2002). This construct includes nine principles to guide instructors with the planning, delivery, and assessment of student learning in postsecondary courses.

Another example of guidelines for course developers and instructors is *Quality Matters* (Maryland Online, 2011), which provides a set of eight standards to assess online and hybrid (or technology blended) courses. One of these standards relates to course accessibility, and includes statements that the course "employs accessible technologies and provides guidance on how to obtain accommodation," that the "course contain equivalent alternatives to auditory and visual content", and that "course design facilitates readability and minimizes distractions" (p.1). These standards may indirectly address many of the needs of students with LD or ADHD, but more details about the access needs of these students are needed.

Students with LD and ADHD in online courses. To date, few studies have been published that examine the experiences of students with LD and ADHD in online courses. Badge, Dawson, Cann and Scott (2008) conducted a pilot study of how students with and without disabilities (including LD/ADHD) employed tools that allowed the students to control (start, stop, pause) an audio narration that was embedded into a PowerPoint presentation in a college course in Great Britain. The results indicated that the students with disabilities used the tools more often than students without disabilities, and that the total time needed to complete the reading did not differ between the two groups. The authors noted that the students with disabilities were deliberate in their use of the tools, and speculated that they were taking control of the learning situation.

Simoncelli and Hinson (2008) conducted a qualitative investigation of 5 students (2 of whom had LD) enrolled in an online summer course. Their findings included that students with LD did not know what was expected of them on course discussion boards, and spent less time on course discussions or other activities than students without LD. Neither the students with nor those without LD found audio enhanced lectures to be helpful, as some had technical issues downloading the files, while others reported that the audio was distracting. The students with LD reported having difficulty with the computer-based test, which consisted of 50 questions in 50 minutes.

Barnard-Brak and Sulak (2010) examined the accommodation requests and use by students with disabilities in online courses. The results indicated that students with visible

disabilities were more positive about requesting accommodations in these courses than students with hidden disabilities, such as LD and ADHD. The authors concluded that this reluctance to disclose could be related to wishing to avoid "stigma or negative peer interaction" (p. 87). Parker and Banerjee (2007) studied undergraduate students with and without LD or ADHD in regard to overall technology skills. While all students studied reported being either fluent or moderately fluent with basic computer skills, students with disabilities were less comfortable using e-mail, multitasking on a computer, and conducting online literature searches. Noting that online and blended learning requires the ability to work independently and self-regulated learning, and that other research has demonstrated that students with LD and ADHD are less proficient in these areas, Parker and Banerjee (2007) observed that the increase in technology use has significant implications for learners with LD and ADHD.

In a review of the demands placed on learners in online courses, Dukes et al. (2009) described that typically, higher education courses focus on content, or the meaning of the message being taught. However, online courses add a new element, namely that of process demands, or "the methods and actions that a student must engage to access course matter" (p. 39). According to Dukes et al., students must acclimate themselves to these new demands, which include: 1) technology skills; 2) self-motivation, which includes time management and autonomy; and 3) self-regulation, including organization and study strategies. Dukes et al. also observed that the communication requirements among course participants can require new demands for quantity and quality of written language, and fluency of reading. These requirements can impact performance on course discussion boards and synchronous chats.

An additional demand on students in online courses is overcoming feelings of isolation, both from the instructor and from fellow students (McInnerney & Roberts, 2004). Facilitating a sense of community for students can be important to enhance retention (Perrucci, Balboni, & Cacciamani, 2008). Perrucci et al. noted that this may be particularly important for students with disabilities who may experience feelings of disconnectedness from their learning community, even in face-to-face situations.

Clearly, the literature related to online and technology blended courses demonstrates that such learning environments place new and significant demands on students with LD and ADHD, many of which tap directly into areas of common weakness in the LD/ADHD profile. However, the literature currently lacks studies that examine the experiences of students with LD and/or ADHD in such courses, and in particular, the direct perspectives of students. The intent of this study was to examine the experiences of a group of post secondary students with LD and/or ADHD in online and blended courses, and to compare these experiences to a cohort of students without disabilities. A portion of this study that focused on students with LD/ADHD from one postsecondary institution was reported elsewhere (Madaus, Banerjee, McKeown, & Gelbar, 2011). As noted, the present study compares the experiences of students with and without LD and/or ADHD at two institutions.

Method

Sample recruitment. Working with a project liaison on each campus, the appropriate office (Institute for Teaching and Learning, Instructional Design teams, Information Technology) provided a list of faculty who taught courses using a web-based platform (e.g., Blackboard, Moodle). The purpose of the study was explained in an e-mail, and 16 instructors of online courses were requested to forward an invitation to participate in the study to their students. Concurrently, the project liaisons worked with personnel from disability services offices to recruit students with LD/ADHD to participate in interviews. The same e-mail sent by faculty to students was submitted to disability service providers to forward to registered students with LD and/or ADHD. Twenty-nine students with LD/ADHD were invited to participate in the study through an interview. Due to the assistance of faculty in recruiting students to interview, and the undisclosed number of students in each online course, the authors are not able to calculate a response rate.

Interview protocol. A structured interview protocol (see Appendix A) was developed based upon a review of the literature related to online and blended learning and students with LD/ADHD in online and blended courses. Since a structured interview protocol was utilized to collect the data, all of the interviewers asked the same questions in the same order. The reliability of the interviewing procedure was verified when the transcripts were read by the authors. The protocol varied slightly for students who had taken a blended class only (seven questions) and for students who had taken an online course (13 questions). Students with LD/ADHD were also asked an additional three questions (e.g., "In what ways, if any, did your LD/ADHD impact your performance in your online or blended courses?" "Did taking an online class offer any advantages or disadvantages to you relating to your disability versus a face-to-face class?" "Did you self-disclose your disability to your professor in your online course?"). The complete protocol was piloted on two students and revised based on that feedback. The final protocol took between 25 and 50 minutes to complete.

Participating Institutions. The faculty at two participating institutions assisted in the recruitment of students for this study. The first participating institution is a public university in the Northeastern United States. The students from this institution were enrolled in undergraduate or graduate courses. These students (n = 18) participated in face-to-face interviews. The second participating institution is a community college in the Northeastern United States. The students from this institution were enrolled in undergraduate courses. These students (n = 2) were interviewed over the phone.

Interview sample. Ten students without disabilities and 10 students with LD/ADHD were interviewed for this study. Each student received a $20 gift card as compensation. The students represented 9 majors (see Table 1). Eleven were undergraduates (ranging from sophomores to seniors), and nine were graduate students. Thirteen of the students had taken only a blended course, two took only an online course, and five took both an online and blended course. The students had taken between one and 16 blended courses, and from one

Table 1
Sample Demographic Characteristics

Characteristic	Students with disabilities (*n*=10)	Students without disabilities (*n*=10)
Education Level		
Graduate	2	7
Undergraduate	8	3
Freshman	0	0
Sophomore	2	2
Junior	1	0
Senior	4	1
Unassigned	1	0
Major		
Education	1	4
Health	2	0
Physical Therapy	1	6
Statistics	1	0
Sociology	1	0
Communications	1	0
Engineering	1	0
Fine Arts	1	0
Undecided	1	0
Course Modality		
Online Only	0	2
Blended Only	6	7
Online and Blended	4	1
Documented Disability		
ADHD	3	
LD	7	
Disclosed Disability		
Yes	7	
No	3	
Number of Blended		
0	3	3
1 - 5	3	1
6 - 10	1	1
11 - 15	1	0
16+	2	2
Number of Online		
0	6	7
1	3	1
2 - 5	1	2

to five online courses. Only one student reported withdrawing from a blended class, and none of the students withdrew from an online class.

Students with disabilities. Each of the 10 students with LD and/or ADHD was registered with the disability services office at his or her institution and submitted documentation to verify the existence of the disability. Seven of the students reported having a learning disability and three reported ADHD. The students represented nine majors (with one student who was undecided). Four of the students had taken both online and blended classes, while six had taken blended classes only. Seven of these students reported self-disclosing their disability to a professor in a blended or online class. Three reported not disclosing in either environment. Five of the students who self-disclosed stated that they received the accommodation of extended time on tests or quizzes. One student reported withdrawing from a blended class, and none of the students had withdrawn from an online course.

Interview data analysis. Each recorded interview was transcribed in full and then read independently by each of the authors and by an external professional who directs a postsecondary program for students with disabilities. The data were examined via an inductive analysis process (Patton, 1987). In this manner, broad categories were allowed to emerge from the data, rather than reviewing the data with an a priori list. Thomas (2006) describes inductive analysis as "approaches that primarily use detailed readings of raw data to derive concepts, themes, or a model through interpretations made from the raw data by an evaluator or researcher" (p. 238). In this study, the research team read the transcribed interviews to derive categories after data collection was completed. Each of the resulting categories was compared and confirmed and a set of key words and themes were developed. The transcripts and the key words were entered into NVivo9, a qualitative software program, to provide additional frequency analysis of the data. Using this data, the categories were refined to reduce overlap between the categories utilizing the process highlighted by Thomas. The third author coded subcategories in each category. The first author confirmed the reliability of this coding. The research team refined the resulting categories and subcategories to reflect the major themes present in the data. The process allowed a set of key themes to emerge from the data. The parsimonious set of themes is presented in the results section of this article.

Results

Advantages to Online and Blended Courses

Access to course materials and resources. Both the students with and without LD/ADHD commented that one major advantage to online and blended courses was that the course materials were always available, and that they often featured more resources than face-to-face classes. One student with LD/ADHD explained that the course "had a place where if you lost material you could go and find it all" and that "if you have any questions, the syllabus is always there with the requirements." Likewise, a student with LD/ADHD commented:

> Completely online courses usually have a lot more information but if you go to class you would get a lecture and you could miss something. You can take notes but you can't go back. The online course has all of the information presented there and then you can pick and choose, go back if you forgot something you can go to the link. It's usually still there.

Another student with cognitive disabilities explained that it enhanced note taking, because the posted notes allowed time to pause and write, which allowed the student to learn at an independent pace.

Students without disabilities agreed with this perception. One stated that "on a day to day basis, I have more access and it's more convenient." Another student without LD/ADHD explained:

> When my professor posted Power Points online, there were videos and audios and links that were attached to it. I thought that was really helpful, because I was at my home and if I had a question about something, I could just easily go back and review what she said. Instead of having that feeling of that I have to interrupt class and ask the professor. I thought that was a big help.

Another student described "if you have to a miss a course or something she puts all of the notes online and if you're trying to study for something she'll put the study guides and the answers online. It's really useful."

Communication with instructors. Both groups of students described that some courses facilitated increased communication with the course professor. It was noted that "the instructors are much more available" online, and that on a day-to-day basis, there can be more access to the instructors. Access to instructors was the most commonly cited advantage by students with LD/ADHD, as several stated that online and blended courses afforded direct and rapid access to professors for answers to questions. Students without disabilities also found this direct communication to be helpful, as one student described:

> If you have any questions or any worries or any doubts usually an e-mail takes care of it. You get the words from the horse's mouth and you're not relying on word of mouth going around and around, what do you really mean by this? I can actually go right to him and get an answer.

Engagement with peers. Interestingly, the students with LD/ADHD were more likely to comment on the advantage of online and blended courses as a means to access and learn from peers than the non-LD/ADHD group. For example, one student with LD/ADHD stated "it's also nice to see what other students have to say on the discussion boards to make sure that your thinking is kind of on track with everyone else's." Another student with LD/ADHD stated that "the discussion is helpful too because if other kids are having problems with the same things you can go on there and talk to them about it." Additionally, both students with and without cognitive disabilities noted that the online discussions and responses fostered participation, and as one student without LD/ADHD stated, "I was able to

be a bit more bold." A student without disabilities commented on the utility of CMS to allow students to collaborate on projects:

> Yesterday, for the first time, we realized on our CMS we can chat to each other. We've been Instant Messaging and e-mailing and all of these other things and then we realized, "Look! We can chat right here". So we all hopped onto our CMS and it was very convenient.

Challenges

Unclear requirements and expectations. Both groups of students commented on issues regarding an occasional lack of clarity in online and blended courses, and the fact that important components, such as quizzes, might be posted and the student is not aware. For example, one student without LD/ADHD stated:

> If you forget about the quizzes, then you're kind of in trouble, when the professor is not handing out a quiz and you're not taking it and handing it back in, so if you forget about it, it looks like you just weren't trying or something.

Likewise a student with LD/ADHD explained:

> A lot of kids, not just myself, were missing quizzes without even realizing it. I think between the student and the professor there needs to be a strong understanding that quizzes are going to be at this certain time, that there will be deadlines.

Unclear course navigation. Many students with LD/ADHD commented on the overall layout and organization of the CMS, whereas none of the students without disabilities noted this. One student with LD/ADHD stated that "all of them [courses] are different. This one, it's not as straightforward as I would like it to be. Syllabuses aren't straight up front, all the modules aren't right up front, you have to search through [the CMS]." Likewise two other students with LD/ADHD commented on difficulty with navigating around the course, and one explained that despite being a daily internet user, the course "site was a little uninviting in certain areas and I think if I was someone who didn't use the internet all the time I would be thrown off by some of the things on [the CMS]."

Decreased anonymity. While online and blended courses offer a mechanism for increased participation, some of the students, both with and without LD/ADHD, found this to be a challenge. One student without disabilities commented that not being able to answer with a one-word response was a challenge:

> You can't get away with saying I think the answer is yes. Most of the time in a traditional classroom, there are other people who can say 'I think the answer is' so it kind of gives the challenge of really saying what you want to say on there. You have to lay it all out; there are no interruptions. You have to know what you are saying.

The trepidation of posting one's ideas in a public forum was echoed by a student with LD who said "that's just hesitation about putting out what I'm saying on paper for everyone to see that can never be changed because once you post it on the discussion board you can't edit it which is not good."

Increased anonymity. Although some students described that online and blended environments resulted in less anonymity, others commented on the increased isolation in such courses. Students both with and without disabilities cited that such courses can lead to a feeling of anonymity, and the lack of face-to-face contact can lead to less interaction, and what one student without LD/ADHD described as "the information or the personality of the person" speaking in a face-to-face discussion. Both groups also commented on cases where professors were non-responsive to emails or who provided little or non-constructive feedback. One student with LD/ADHD explained a situation this way:

> My professor doesn't give a lot of constructive feedback to the students, and honestly I didn't know and still don't know what I did wrong, if I did anything wrong, what I can improve on, things like that. So the feedback was very limited. I honestly, and I don't mean to be rude, but I haven't really learned anything. I honestly feel like from the first day you log on you learn it yourself, there has been very little direction from the professor.

Advice to faculty. The most commonly offered piece of advice to faculty teaching online or blended courses was to be responsive to students. One student without disabilities requested that faculty members should "please be responsive in the correspondences and to actually participate with the class." In a similar fashion, a student with LD/ADHD suggested that faculty members "make sure you're accessible to them for any questions they have. Give the option of face-to-face because sometimes you can't convey your message." Another student with disabilities stated:

> Be accessible. Make things, I don't want to say relatively simple because students would take advantage of that, but just explain things and tell students exactly what you want, and make constructive feedback, so it can help them when they write and post future assignments.

The respondents, particularly those with disabilities, also highlighted the issue of having clearly stated expectations with frequent reminders at key points. The students called for faculty to be sure the course navigation is clear with specific directions, and that all materials are well organized and "in the proper places, make sure you have all the material there and don't have stuff missing from the syllabus."

Students with disabilities. The students with cognitive disabilities were asked to explain any advantages offered by online or blended courses related to the impact of LD/ADHD on learning. Two of the students noted advantages to these courses on the basis of their ADHD. One described being able to "get up and walk around while doing a post", as opposed to how it would be in class, while the other elaborated, "If I lose any of the information when I'm in class, or I just haven't paid attention, I can catch up by going on [the CMS] and relearning the information or seeing it there and processing it more fully." Another student with disabilities described being able to take notes independently and being able to supplement the notes after class. The ability to use online tools such as spell check and synchronized calendars was also cited by multiple students as being advantageous.

The students with LD and/or ADHD also described some challenges offered by online and blended courses, most commonly the difficulty of receiving extended time for tests and quizzes. Other students cited difficulty in keeping up with reading loads in an allotted time frame, while one commented that having "stuff not mapped out on a wall but tucked away in my computer" impacted organizational skills.

Discussion

The existing but limited literature related to online and technology blended courses demonstrates that the digital medium presents both advantages and challenges for students with and without disabilities. The results of this study indicate largely similar findings for this sample of students with and without LD/ADHD. Both sample groups suggested that access to resources and online tools, along with the flexibility to work at one's own pace, are the main advantages to online and blended courses. Students without disabilities also noted communication with course instructors and engagement with peers in online and blended courses as advantages. Interestingly, students without disabilities identified the increased anonymity resulting in feelings of isolation, and the decrease in anonymity requiring class participation as challenges. This finding reflects the observations of McInnerney and Roberts (2004) and Perruci et al. (2008) who commented on the negative impact of social isolation for students with disabilities in online courses.

Similarly, both students with and without disabilities highlighted the following challenges related to online and blended courses: untimely responses by faculty to questions and posts; unclear course expectations and requirements; and required self-discipline to complete course assignments. Both students with and without disabilities also identified technology issues as a challenge with the digital medium; however, students with disabilities identified the challenge as a difficulty in obtaining extended time for tests and quizzes. As is noted in the literature (Dukes et al., 2009), organizational issues in online courses can be particularly problematic for students with LD/ADHD. The students with disabilities in this sample specifically identified issues with unclear course organization and navigation as barriers, whereas students without disabilities did not describe these issues. Students with LD/ADHD also highlighted the difficulty with completing the required reading for online and blended courses within the set time frame, and the difficulty faculty have in thoroughly explaining their answers to students' questions via email or posts, as challenges.

Limitations and Areas of Future Research

A limitation of this study is the small sample size of students. As a result it is difficult to generalize the findings from this investigation to a broader audience. A larger study with a more students across a broad range of institutions will add weight to the findings. However, the current findings validate much of what is known about students with LD/ADHD and how such students may perform in a digital environment. Future studies at the postsecondary level that examine not only student identified advantages and challenges, but also outcomes related

to learning and assessment of students with and without disabilities will add to our understanding of the impact of the digital learning environment.

Summary

The number of online and blended courses offered at postsecondary institutions across the nation continues to grow. Data from colleges and universities also show the population of students with and without disabilities increasing in number. Although more research is needed in this area, with larger and more heterogeneous samples, the present results indicate that the digital learning environment offers both advantages and challenges to learning for students with and without cognitive disabilities. These advantages and challenges are at times paradoxical in nature (e.g., within the digital environment students can feel isolated with the lack of face-to-face time [increased anonymity], while also feeling that they are required to participate in a course through posts [decreased anonymity]). The evolving digital learning environment requires that students with cognitive disabilities are active learners with the executive functioning skills and self-management to keep pace with course material and expectations without direct intervention from instructors. In order to best ensure that these students have full access to this growing segment of higher education, such skills should be a priority within secondary education and transition planning. Additionally, course developers and instructors in higher education should be cognizant of the need for structured courses with clear expectations and directions for all learners.

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Appendix A: Student Interview Protocol

Student Interview Protocol

1. Can you tell me a little bit about yourself?
   For example,
   a. What year are you?
   b. What is your major?
2. How many courses have you taken that have used a web-based platform?
3. How many courses have you taken completely online?

(If student has not taken any online courses, go to questions in Blended Course Experiences. If student has taken any online courses go to questions relating to Online Course Experiences.)

Blended Course Experiences

1. Can you describe some of the specific features or tools of the online environment that faculty used to help you as a learner? (*Prompt – things like the calendar tool, the discussion boards, video/audio presentations, homework assignments, quizzes/tests, etc*.)
2. Can you describe some of the specific features or tools that were used in the online environment that made learning challenging?
   a. Can you talk about the technology skills that are required in these courses?
3. What methods did your professor use to evaluate your performance and understanding of the class material?
4. Does the amount of work or time spent on course activities differ in courses that use a web-based platform extensively versus traditional courses?
5. What types of approaches did you use to keep up with your coursework in the blended class?

6. Have you ever withdrawn from a course? If yes, based on a recent experience, can you comment on some of the main reasons? *(e.g.: pace of course too fast; content challenging; time issues)*
What advice would you give a new faculty member who is thinking of incorporating technology into his/her course design? Are there suggestions you could offer to faculty that would make their courses work better for you?

6. In what ways, if any, did your learning disability/ADHD/disability impact your performance in your blended

On-Line Course Experiences

1. Why did you decide to take a completely on-line course?
2. What were your perceptions or opinions regarding online courses before you started taking one?
3. Tell me about what you experienced the first time you logged onto the course.
   a. For example, how was the course content presented in the web-based platform? Was it primarily text based? Were videos used? Was audio used?
   b. Were prompts provided to guide your reading? If so, please describe them.
   c. How was your understanding of the readings measured? How often? *(Prompt – weekly?)*
   d. In responding to these questions, is there a particular course you were thinking about? *(Ask about course content area if not stated).*
4. What methods did your professor use to evaluate your performance and understanding of the class material?
5. What types of approaches did you use to keep up with your coursework in the online class?
6. Can you describe some of the specific features or tools of the online environment that faculty used to help you as a learner? (*Prompt – things like the calendar tool, the discussion boards, video/audio presentations, simulations, etc.*)
7. Can you describe some of the specific

courses? *(Ask only if not previously stated during interview).* 7. Did you disclose your disability to your professor in your blended course? Did you ask for accommodations in the course? If yes, what accommodations helped you? If not, why not?	features or tools that were used in the online environment that made learning challenging? a. Can you talk about the technology skills that are required in these courses? 8. Can you comment on your access to the instructor in your online course? How did you communicate? Did you find that the instructor was more or less accessible than in a face-to-face class? 9. Can you comment on how you got to know the other students in your online class? Did the professor do anything to help build a sense of a class community? 10. Have you ever withdrawn from a course? If yes, based on a recent experience, can you comment on some of the main reasons? *(e.g.: pace of course too fast; content challenging; time issues)* 11. What advice would you give a new faculty member who is thinking of teaching online? Are there suggestions you could offer to faculty teaching online courses that would make their courses work better for you? 12. In what ways, if any, did your learning disability/ADHD/disability impact your performance in your online courses? *(Ask only if not previously stated during interview).* Did you disclose your disability to your professor in your online course? In your blended course? Did you ask for accommodations in the course? If yes, what accommodations helped you? If not, why not?

Kopelman-Rubin, D., Klomek, A.B., Al-Yagon, M., Musfon, L., Apter, A., & Mikulincer, M. (2012). Psychological intervention for adolescents diagnosed with learning disorders -"I can succeed" (ICS): Treatment model, feasibility, and acceptability. *International Journal for Research in Learning Disabilities, 1*(1), 37-54.

Psychological Intervention for Adolescents Diagnosed with Learning Disorders - "I Can Succeed" (ICS): Treatment Model, Feasibility, and Acceptability

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Abstract

This study describes a manual-based psychological intervention for adolescents diagnosed with Learning Disorders (LD), "I Can Succeed" (ICS), and reports on the feasibility of the treatment as an intervention to promote adaptive academic and emotional functioning. The intervention consisted of acute and follow-up phases, over 18 months. ICS focuses on developing skills in three major areas: intrapersonal skills, interpersonal skills and school/community skills. The intervention was administered to 40 adolescents with various types of LD and other co-morbid psychiatric disorders (aged 11-15 years) who were consecutively enrolled in an outpatient child and adolescent psychiatric department. Pre-post changes in outcomes showed significant decrease in adolescents' psychopathology (both externalizing and internalizing problems scales of the Child Behavior Checklist (CBCL)). In addition, significant improvement was shown in hope and effort levels. Fairly high satisfaction was demonstrated, with 97% of the participants reporting that ICS was helpful and that they would recommend it to a friend. The modules most often used were the interpersonal ones. The discussion is focused on understanding the feasibility of this manualized psychological intervention in terms of acceptability, adherence and preliminary changes.

Learning disorder (LD) is one of the most common childhood disorders, occurring in approximately 2 to 10 percent of children and adolescents, depending on the nature of the definitions applied (American Psychiatric Association, 2000). As suggested by the *DSM-IV-TR* (American Psychiatric Association, 2000), children with LD manifest an average IQ level but score substantially lower on standardized tests (reading, writing, and/or mathematics) than expected for age, schooling, and level of intelligence.

Beyond documenting the effects of LD on academic functioning, studies have also provided evidence on these children's and adolescents' susceptibility to diverse socioemotional and behavioral difficulties. Prior studies suggest that children and

adolescents with LD, as compared to their nondisabled peers, tend to experience higher levels of peer rejection and loneliness, a lower sense of coherence and self-esteem, and higher levels of depression, anxiety, and internalizing and externalizing behavior problems (Al-Yagon, 2007, 2010; Estell et al., 2008; Lackaye & Margalit, 2006; Wenz-Gross & Siperstein, 1998; Wiener & Schneider, 2002). Data from cross-sectional and longitudinal prospective studies highlight that LD often co-occurs with other psychiatric disorders, such as attention deficit hyperactivity disorder (ADHD), anxiety disorders, depression, and conduct disorders（Capozzi et al., 2008; Carrol, Maughan, Goodman & Meltzer, 2005; Goldston et al., 2007; Mayes, Calhoun & Crowell, 2000; Sideridis, 2007).

Studies have also examined the attachment and interpersonal relationships of LD adolescents. There is evidence that these adolescents, as compared to their nondisabled peers, are less securely attached to parents and less likely to appraise teachers as a secure base (e.g., Al-Yagon, 2007, 2010; Al-Yagon & Mikulincer, 2004a, Murray & Greenberg, 2001, 2006). Other studies have also highlighted the importance of reliable interpersonal relationships with peers and parents as a protective factor among adolescents with LD (e.g. Al-Yagon, 2007; Al-Yagon & Mikulincer, 2004a; De Civita, 2000; Murray & Greenberg, 2001).

Most of the interventions among children and adolescents with LD have focused on enhancing cognitive and learning skills, such as the reading process, writing abilities, mathematic skills, and memory functioning (e.g. Heath, 2007; Wexler, Voughn, Roberts, & Denton, 2010). Fewer intervention programs emphasize the social and emotional domains especially during adolescence (see Kavale & Mostert , 2004, for review), and most of these include cognitive behavior therapy (Kroese, Dagnan & Loumidis, 1997), social skills training (Vaughn, LaGreca, & Kuttler,1999), academic motivational programs (Brier, 2007), and group treatment methods (Freilich & Schechtman, 2010; Mishna & Muskat, 2004). The goal of these interventions is to reduce the emotional difficulties of LD children, using a problem-oriented approach. In a meta-analysis of studies examining social skills programs for children with LD, Kavale and Mostert (2004) concluded that socials skills training has received limited empirical support. It is recommended that social skills training programs should be "rebuilt" as part of a comprehensive treatment. Even less is known about individual psychotherapy with adolescents. Palombo (2001) suggests that the treatment of these children should include work with parents, teachers, and other professionals who are closely involved.

To the best of our knowledge, there is no manual- based treatment model that addresses both academic and emotional aspects of LD. Taken together, there is a need for an empirically supported comprehensive manual- based psychological intervention program focusing on promoting adaptive academic and emotional functioning of adolescents with LD. The current psychological intervention program (“I Can Succeed”, ICS) attempts to cover the intrapersonal, interpersonal, family, and school-relationship levels. The interpersonal aspects of the intervention are theoretically grounded in Interpersonal Psychotherapy for Depressed Adolescents (IPT-A; Mufson et al., 2004 a, 2004b).

ICS Treatment Description

ICS is a manual-based psychological intervention for adolescents who are diagnosed with learning disabilities. The purpose of ICS is to promote academic and emotional functioning of adolescents with learning disorders and related psychiatric disorders. ICS addresses three major areas: intrapersonal, interpersonal, and school/community level. In the intrapersonal area, ICS attempts to promote self-awareness of both personal strengths and weaknesses, to develop self- direction towards setting goals and establishing priorities, and to provide organizational strategies. In the interpersonal area, ICS attempts to improve interpersonal communication, decision making/problem solving, and self advocacy skills (i.e. learning to express what I need and what would help me). In this area, ICS also attempts to strengthen the adolescent-parent relationship. In the school/community area, ICS attempts to strengthen the family-school relationship by choosing a significant figure at school to support the process and guiding parents about effective communication with school staff about school-related issues.

Based on a review of the theoretical and empirical literature, we included in the ICS manual the following areas as key factors to be addressed in a treatment for individuals with LD: *Self-awareness* - Within this domain, the individual with LD works towards developing a clear picture of where his or her strengths and weaknesses lie, but equally important to this knowledge is the understanding that his or her difficulties or limitations are not an intractable part of his or her personality. *Goal setting and organization* - *Goal-setting* includes realistically understanding the steps involved in accomplishing a task and how they can be achieved. Goals must be specific, yet flexible enough to match concrete circumstances (Raskind, Goldberg, Higgins, & Herman, 1999). *Organization* involves the ability to plan and manage task demands, as well as make order of space, time, and materials (Dawson & Guare, 2010). *Parent and School involvement* - Parents become more knowledgeable and can learn new and valuable ways to help their child. School personnel become major participants in the multifaceted team. *Interpersonal skills* - this area focuses on interpersonal communication, which is an important topic among the LD population (Semrud-Clikeman, 2007). This area includes learning adaptive communication strategies and interpersonal problem solving. *Self-advocacy* - participants learn the process of recognizing and communicating their needs and standing up for their own interests and rights.

The ICS protocol consists of acute and follow-up phases. The acute phase includes 13 once-a-week sessions (over a 3-month period). The follow-up phase includes 6 sessions over 18 months (conducted at 2 weeks, 1, 3, 6, 12 and 18 months after the end of acute treatment). Most of the sessions are individual, while up to 4 sessions may be held with parents. The duration of each session with the adolescent is 50 minutes, except for the first session that is 70 minutes. The intervention includes ongoing work with the adolescent's school. One of the sessions is held at school (with school staff, parents, and the adolescent).

The ICS manual attempts to provide a certain flexibility that enables the therapist to address the specific needs of every adolescent and his/her parents while adhering to a

structured protocol. The modules are implemented in a specific order because the acquisition of one skill is based on the acquisition of the preceding skill. One full session is devoted to each of the modules, except for parent training that is addressed in two sessions. However, the manual enables the therapist to conduct additional in-depth sessions during the acute phase as needed, with a maximum of three additional sessions. Therapists decide collaboratively with adolescents and parents which modules should be addressed more intensively. These three in-depth sessions may deal with one or more issues, depending on the needs of the adolescent and his parents. ICS recognizes that the adolescent may need further treatment, therefore if the current treatment does not progress or should adversities arise that cannot be solved, the therapist refers the family to an alternative suitable treatment or further treatment at the conclusion of the protocol.

ICS focuses on developing skills that strengthen resilience and enhance positive development for adolescents with learning disabilities. Below is a description of the sessions:

Psycho-education and establishing the therapeutic contract (session 1). The first session is devoted to establishing the therapeutic contract and psycho-education. First, the therapist explains in depth the findings of the psychological and educational assessment of the adolescent that he or she completed before treatment. This includes an in-depth description of the adolescent's areas of strength and protective factors as well as learning disabilities and their impact on other aspects of the adolescent's life (e.g., emotional, interpersonal, behavioral). An important component is psycho-education on how the LD influences the adolescent's emotional wellbeing, according to the unique profile of the adolescent and the family. Second, an explanation on the protective factors that have been found to predict success among children and adolescents with LD (e.g., self awareness of strengths and nature of LD, proactive approach, the ability to set academic as well as personal goals, self advocacy skills, getting support from parents and teachers) is given alongside the principles on which the treatment process is based. Finally, a discussion on the adolescent's and parents' commitment to the treatment is held in addition to identifying a contact person at school.

Sessions focused on intrapersonal skills (sessions 4, 5, 7). These sessions are aimed at increasing and promoting self-awareness of both personal strengths and weaknesses (e.g., realizing that one has good memory and broad vocabulary but difficulties with reading fluency), developing self-direction towards setting goals and establishing priorities, and providing organizational strategies.

Self-awareness includes an explanation of the meaning of self awareness, emphasizing the importance of understanding one's strengths alongside one's weaknesses. By using self-awareness questionnaires, the therapist focuses on teaching and developing the skill and identifying the difficulties via examination of three aspects: "What is difficult for me?", "How do I identify the difficulty?" and "How do I predict it?" ("When does the difficulty arise?"). A similar discussion is held about the adolescent's strengths and his or her self-awareness of these skills. The therapist explains the need to expand the adolescent's

knowledge regarding his or her strong and weak areas for pursuing future activities (e.g., behaviors, learning style, interpersonal relationships) and discusses in general the issue of "What is the meaning of success for me?" The goal here is to elaborate on the specific meaning of success for each adolescent.

Self-direction and establishment of priorities includes presentation of the meaning and importance of self-direction (taking responsibility) and establishing priorities. This module focuses on learning and developing the skill of organizing a required task and achieving a particular goal in a given area. The discussion focuses on the examination of a given area and the goals compared with the current state, the adolescent's aspirations in the given area, and how he or she takes action in order to achieve them. The therapist assists in setting goals while giving advice on how to achieve them. For example, if the adolescent's goal is to achieve a better grade on a specific subject, the therapist helps him or her to break this long-term goal into specific and realistic sub-goals and organize his or her tasks so he or she can spend as much time as needed to improve his or her knowledge of that subject.

The focus on organizational strategies includes describing the strategies and their importance and then focusing on learning and developing this skill by means of understanding the organizational habits of the adolescent. Up to three organization skills are taught. One such option is teaching the adolescent how to use his or her mobile phone as a reminder of important things. Another example is thinking about the proper way the adolescent can organize his or her desk before starting school work.

Sessions focused on interpersonal skills (sessions 8, 9). These sessions include the improvement of interpersonal communication, decision making/problem solving, self advocacy skills, and self- promoting skills. The therapist explains the importance of understanding the influence of interpersonal relationships on the adolescent in general and on the learning process in particular. The therapist focuses on learning and developing one interpersonal skill (e.g., communication, decision making/problem solving) each time. Before learning the skill, a discussion is held in which the therapist tries to get an understanding of the adolescent's significant relationships using the Closeness Circle and the Interpersonal Inventory derived from IPT-A (Mufson et al., 2004a, 2004b). In the interpersonal inventory, one or more relationships are examined in depth in order to understand their influence on the adolescent's academic and emotional functioning. After learning about the types of interpersonal difficulties the adolescent experiences, the therapist then chooses one interpersonal skill on which he or she works with the adolescent (e.g., adaptive communication; decision making/problem solving) in order to improve the identified relationship.

Another component of the interpersonal skills module is self-advocacy. The therapist presents and explains the meaning of "self-advocacy" (i.e. learning to say what is it that I need, what would help me, and how can I explain this to others to help find a solution). The therapist focuses on learning and developing the skill and explains how one executes self-advocacy. Then, the therapist practices self-advocacy with the adolescent by role playing.

Sessions focused on strengthening the adolescent-parent relationship (sessions 1, 2, 6). In these sessions, the therapist explains to the parent the importance of supporting the adolescent with LD and establishing a "secure base" for him or her. The therapist helps parents clarify the impact of the learning disability on family life in general and on the parent-adolescent relationship in particular. The therapist guides parents towards strengthening their relationship with their child while establishing a new narrative of "all of us in the face of the learning disability" within the family routine. Using this metaphor, the therapist helps members of the family to see the LD as an external problem that influences the adolescent's life and to work to enhance family cohesiveness in order to deal with the adolescent's problems. Discussion is devoted to examining everyday events and categorizing them into those that strengthen the new narrative as opposed to those that do not. The therapist encourages the parent and adolescent to examine the various events and guides them to identify ways in which they can expand and reinforce the new narrative in the future.

Sessions focused on strengthening the family-school relationship- (sessions 1, 3 and throughout treatment). The adolescent and parents are encouraged to choose a significant figure at school who understands the strengths of the adolescent and who would be a cooperative and supportive figure. This significant figure is expected to meet with the adolescent once a week for a few minutes conversation, consider the adolescent's specific needs in school, and whether he or she needs help solving any developing problem. The significant figure is also asked to be in touch once every three weeks with the therapist in order to help strengthen and apply skills the adolescent has learned in therapy into the natural school setting. The protocol includes a meeting with school staff as well. Early in treatment (as early as possible after session 2), the therapist meets the school staff, parents and adolescent at the school. The therapist provides the findings of the diagnosis and focuses on areas of strength upon which to build, as well as the implications of the adolescent's learning disability for his or her academic and emotional functioning at school. In addition, the therapist explains the ICS program and presents what is expected from the contact person at school. Finally, a summary of the session is given in order to strengthen cooperation and the "all of us in the face of the learning disability" support network.

Therapeutic session on completing the treatment and termination (session 13). This session deals with completing the intensive phase of the treatment. The session is held primarily with the adolescent and the parents join for the last 20 minutes. The therapist explains the completion of the treatment and the emotions that may elicit, provides legitimization for positive and negative emotions, and summarizes the adolescent's accomplishments and progress during treatment. The therapist reviews with the adolescent his or her skills and specific achievements in therapy. The therapist directs the discussion towards the adolescent's ability to progress in the future and provide acknowledgement of the fears and concerns regarding relapse, as well as support for applying and generalizing the identified helpful strategies in future real life situations.

Follow-up/booster sessions. The protocol includes six follow-up/booster sessions as follows: two weeks after the completion of the intensive phase of the treatment and then one month, three months, six months, twelve months, and eighteen months after the termination. The booster sessions are mainly individual, but parents join each of these sessions for the last twenty minutes. Follow-up sessions include examination of difficulties and conflicts the adolescent is dealing with, as well as provision of support for the adolescent and the family. The follow-up sessions are usually not used to teach new skills but rather to strengthen specific skills acquired during the acute phase of the intervention and foster their generalization to new situations.

A central feature of the current intervention is the identification, understanding, and conceptualization of the unique nature of the adolescent's LD. This includes conceptualizing the academic aspects as well as the emotional and interpersonal components of LD. The conceptualization is made collaboratively by the therapist, the adolescent, his or her parents, and the school staff, and serves as the starting point for the intervention. Once a conceptualization is made, a treatment plan is developed and individualized for each adolescent. The plan includes a decision about which specific skill-building intervention strategies to emphasize in the treatment of each adolescent. The prioritization of specific skills should include the skills that are most likely to help the adolescent deal effectively with his LD. This therapeutic process is different than targeting the co-morbidity of LD as an isolated psychiatric disorder that is not interconnected to the unique nature of the adolescent's LD.

The Current Study

The goal of the current study is to report on the feasibility of the ICS manual-based psychological intervention for the treatment of adolescents with learning disorders. For this purpose, the intervention was delivered to 40 adolescents with LD aged 11-15 years in an outpatient child and adolescent psychiatric department who were recruited consecutively from referrals to the clinic. These adolescents went through 13 sessions (over a 3-month period) and 6 follow-up sessions over 18 months (conducted at 2 weeks, 1, 3, 6, 12 and 18 months after the end of the 13 sessions). We examined the feasibility of the treatment (i.e., acceptability, participation and preliminary outcomes).

Method

Participants

Participants included 40 adolescents and their parents. Table 1 presents the socio-demographic characteristics of the sample. The sample reported high co-morbidity of other psychiatric disorders (see Table 1). Inclusion criteria consisted of LD diagnosis, normal range IQ, and regular class attendance. Exclusion criteria included suicidal ideation and psychosis. All participants were junior high school students with a mean of 7.4 years of schooling. All of them came from central Israel. The majority of the adolescents came from a middle class socio-economic level and fairly well-educated families. All were diagnosed with various kinds of learning disorders and many of them (77.5%; $n = 31$) had more than one learning

disability, especially co-morbid reading disorder and disorder of written expression. Three adolescents dropped out after session 3 and one after session 4. These participants were not significantly different from the other participants in their demographic characteristics including age, severity of learning disorders, psychiatric co-morbidity, parents' age, educational level, and SES. Ten participants were treated with medication prior to ICS intervention. During ISC, nine participants started medication while two participants stopped. Sixteen of the participants were on Ritalin and one was on an SSRI. The study was approved by the IRB committee of Schneider Children's Medical Center of Israel.

Instruments

Instruments Completed By Parents.

Child Behavior Checklist (Achenbach, 1991). This standardized instrument for rating children's behavior (Hebrew adaptation: Zilber, Auerbach, & Lerner, 1994) includes 112 behavioral items scored on a 3-point scale from 0 = *Not true* to 2 = *Very/Often true*. Achenbach's principal components analysis yielded eight narrow-band syndrome scales and two broad-band syndrome scales (i.e., internalizing and externalizing). Cronbach's α for internalizing baseline was .72, and end of treatment was .62. Cronbach's α for externalizing at baseline and end of treatment was .66 and .82, respectively.

The Mini-International Neuropsychiatric Interview for children and adolescents *(M.I.N.I.- KID;* Sheehan et al., 1998). This is a structured diagnostic psychiatric interview designed to elicit specific diagnostic criteria for DSM-IV and ICD-10.

Adolescents' Self-Report Instruments.

Children's Hope Scale (ages 8–16; Snyder et al., 1997). This scale (Hebrew adaptation; Lackaye & Margalit, 2006) includes three items about goal directed energy (e.g., 'I think I am doing pretty well') and three items about planning to meet goals (e.g., 'I can think of many ways to get the things in life that are important to me'), rated on a six-point scale from *None of the time* (1) to *All of the time* (6). Cronbach's α at base line and end of treatment were .78 and .85, respectively.

Effort scale (Lackaye & Margalit, 2006). This scale includes four items assessing children's self-ratings of investment and effort levels, such as 'I don't give up even when it is difficult for me', rated on a six-point scale from *None of the time* (1) to *All of the time* (6). Cronbach's α at baseline and end of treatment were .89 and .76, respectively.

Children's Sense of Coherence Scale (SOC) (Margalit & Efrati, 1995). This scale includes 16 items assessing three dimensions of children's SOC in the world—comprehensibility, manageability, and meaningfulness (e.g., ''I feel that I don't understand what to do in class''; ''I have trouble with most of the things I try to do'') rated on a 4-point scale from 1 = *Never* to 4 = *Always*. Computation of a single total score tapped global SOC. Current Cronbach's α at baseline and end of treatment were .79 and .82, respectively.

Table 1
Demographic and Clinical Characteristics

Adolescent Characteristics	*N*=40	Mean ± SD or Percentage
Female	*n*=12	30%
Male	*n*=28	70%
Age	*n*=40	12.6±0.87
Years in school (Grade)	6th grade: *n*=1	2.5 %
	7th grade: *n*=24	60 %
	8th grade: *n*=13	32.5 %
	9th grade: *n*=2	5 %
IQ (Full Scale)	*N*=40	95.45±7.48
Learning Disability Diagnosis (DSM-IV-TR)*		
Reading Disorder	*n*=27	67.5%
Disorder of Written Expression	*n*=25	62.5%
Mathematics Disorder	*n*=11	27.5%
Reading & Writing	*n*=18	40%
Reading & Writing & Mathematics	*n*=4	10%
Reading & Mathematics	*n*=5	12.5%
Writing & Mathematics	*n*=5	12.5%
DSM-IV Co-Morbidity Diagnosis**		
ADHD	*n*=21	52.5%
Anxiety Disorders	*n*=11	27.5%
Major Depression Disorder	*n*=3	7.5%
Oppositional Defiant Disorder	*n*=3	7.5%
Tourette Syndrome and Tic Disorder	*n*=1	2.5%

Parent and Family Characteristics		
Mother's Age	*n*=40	43.1 ± 4.45
Father's Age	*n*=39	44.77 ± 5.1
Family Income ***		
Below Average	*n*=5	12.5%
Average	*n*=27	67.5%
Above Average	*n*=8	20%
Mother's Educational Level	*n*=40	14.16 ± 2.45
Father's Educational Level	*n*=39	13.71 ± 2.89

Note: *77.5% (*n*=31) had LD co-morbidity (include ADD/ADHD)
**20% (*n*=8) had psychiatric co-morbidity
*** Family income was based on parent's self report demographic questionnaire.

Peer-Network Loneliness and Peer-Dyadic Loneliness Scale (PNDLS; Hoza, Bukowski, & Beery, 2000)**.** The Hebrew version of this 16-item scale (Al-Yagon, 2011) assesses two subscales of loneliness using Harter's (1982) 4-point "Some kids …other kids" format. The *peer-network loneliness* subscale comprises 8 items such as "Some kids hardly ever feel accepted by others their age – But – other kids feel accepted by others their age most of the time." Cronbach's α at baseline and at end of treatment were .92 and .89 respectively. The *peer-dyadic loneliness* subscale includes 8 items such as "Some kids don't have a friend that they can talk to about important things – But – others kids do have a friend that they can talk to about important things. Cronbach's α at baseline and end of treatment were .93 and .80, respectively.

Satisfaction and Estimation of Progress Questionnaire (Kopleman-Rubin et al., 2011). This questionnaire consists of 14 1-7 Likert scale questions, 3 yes/no questions, and 3 open-ended questions. Adolescents were asked about different aspects of ICS (duration, frequency of session, the most important topic, and most unimportant topic), whether they found ICS useful, and whether they would recommend ICS to a friend who would consider such an intervention. The questionnaire also addressed several areas of functioning, including intrapersonal skills (organizational skills, concentration on academic tasks), interpersonal skills (effective communication, problem solving, effective emotion communication within the family, getting support from parents and teachers), school functioning (behavior and academic grades), and emotional aspects (feeling sad, anxious, stressed, self-esteem, personal coping resources) (see Appendix A). Change of grades from 1 (very significant improvement) to 3 (light improvement) were considered improvement.

Procedure

All adolescents went through a comprehensive psycho-educational assessment and a structured psychiatric interview (M.I.N.I-KID, Sheehan et al., 1998) before beginning the ICS intervention. Adolescents and parents completed questionnaires (Child Behavior Checklist, Children's Hope Scale, Effort Scale, Children's Sense of Coherence Scale, Peer-Network Loneliness and Peer-Dyadic Loneliness Scale) before ICS Intervention (baseline) and at the end of the acute phase (end of treatment). In addition, at the end of therapy, adolescents were asked about their satisfaction with treatment and their estimation of progress using a semi-structured questionnaire (Satisfaction and Estimation of Progress Questionnaire) administered by two independent evaluators.

Nine therapists were trained in 6 separate day-long workshops, which consisted of didactic presentations and role plays. Bi-weekly group supervision was used to enhance adherence. All sessions were audio taped. After each session, therapists completed a checklist of the session interventions, skills training, or strategies that they believed they used in the session.

Data Analysis

In order to examine the acceptability, grades from 1 (very significant improvement) to 3 (light improvement) on the Satisfaction and Estimation of Progress Questionnaire were considered improvement. In order to examine preliminary pre-post intervention changes, mixed models (ANOVA analyses) were performed, with time as a within-subject variable (before intervention, after intervention), and change of medication during ICS intervention as a between-subjects variables (change, no change). Pre-post changes in outcomes showed significant decrease in adolescents' psychopathology.

Results

Acceptability

Ninety-seven percent of the adolescents reported feeling that ICS was helpful and that they would recommend it to a friend; 84% found the specific skills acquired through ICS were useful; 89.2% reported that duration was fine; and 86.5% reported that the frequency of sessions was suitable. Ninety-two percent (mean=2.58 *SD* =.9) reported an improvement in general coping skills; 89.2% (mean=2.76 *SD*=.9) reported improvement in academic grades; 83.8% (mean=2.76; *SD*=.83) reported improvement in organizational skills; 75.7% (mean=2.81 *SD*=.92) reported improvement in concentration on academic tasks; and 78.4% (mean=2.64 *SD*=.83) reported improvement in effective communication.

Adherence

Adherence is defined here as the clinician-reported use of the mandatory components of ICS and teaching of appropriate skill modules. At this phase, it was important to evaluate whether therapists and adolescents would perceive that they were able to adhere to the demands of the treatment structure. Based on therapists' ratings, the modules of treatment

were all delivered according to the sequence prescribed in the manual. Therapists decided collaboratively with adolescents and parents which skill training modules should be addressed more intensively (up to three additional sessions). The modules that were chosen to be more intensively addressed were interpersonal skills, including parent training, effective communication, problem solving/decision making, and self-advocacy (see Table 2).

Preliminary Outcomes

Before the intervention 45% were in the clinical and subclinical range of internalizing problems on the CBCL subscale (11 and 7 participants respectively). After the intervention, only 24.3% were in the clinical and subclinical range (5 and 4 participants respectively). Before intervention 22.5% were in the clinical and sub clinical range of externalizing problems on the CBCL subscale (8 and 1 participants respectively). After the intervention, only 13.5% were in the clinical and subclinical range (1 and 4 participants respectively). Results of our study indicate that participants significantly improved on both subscales. In addition, at the end of treatment, patients reported higher levels of investment and effort in their studying compared to baseline. Moreover, at the end of treatment, patients reported higher hope, which includes both higher goal directed energy as well as higher effort about planning to meet their goals, compared to baseline. Nearly significant improvement was found in the sense of coherence and peer-dyadic loneliness variables (see Table 3).

Discussion

The current study described a manual-based psychological intervention program ("I Can Succeed") for adolescents with LD. Our results demonstrate that ICS is a feasible treatment to deliver and is acceptable to adolescents with various kinds of learning disorders and other co-morbid psychiatric disorders. Few subjects (four) dropped out and satisfaction was high, with 97% of adolescents reporting that ICS was helpful and that they would recommend it to a friend. Most of them (84%) found that the specific skills acquired through ICS were useful. In addition, pre-post changes in outcomes showed significant decrease in both externalizing and internalizing problems scales of the CBCL. Importantly, significant improvements were found in hope, investment and effort in studying, and achieving academic and personal goals. These results indicate that the intervention is targeting not only the LD but the psychiatric symptoms as well as the important psychological characteristics accompanying the LD. This is important since most of the interventions among children and adolescents with LD have mainly focused on enhancing cognitive and learning skills.

Table 2

Frequency of Modules' Use

Modules	No. of Sessions (Module was used), Mean ± *SD*	Percentage of Adolescents Receiving Module
Psychoeducation	1.03±0.16	1 session: *n*=39 97.5%
		2 session: *n*=1 2.5%
Parents training	2.68±0.62	2 session: *n*=16 40%
		3 session: *n*=21 52.5%
		4 session: *n*=3 7.5%
School staff meeting	1	1 session: *n*=40 100%
Self awareness	1.60±0.59	1 session: *n*=18 45%
		2 session: *n*=20 50%
		3 session: *n*=2 5%
Self direction priorities	1.05±0.22	1 session: *n*=38 95%
		2 session: *n*=2 5%
Organization strategies	1.35±0.62	1 session: *n*=29 72.5%
		2 session: *n*=8 20%
		3 session: *n*=3 7.5%
Interpersonal relations (communication analysis and problem solving/decision making)	1.83±0.81	1 session: *n*=17 42.5%
		2 session: *n*=13 32.5%
		3 session: *n*=10 25%
Self advocacy	1.5±0.51	1 session: *n*=20 50%
		2 session: *n*=20 50%
Completing the intensive phase of treatment	1	1 session: *n*=40 100%

Table 3

Pre-Post Outcomes

	N	Before Intervention		After Intervention		*F*	η^2
		M	*SD*	*M*	*SD*	*df*=1, *N*-2	
CBLC: Externalizing Problems Scale	37	8	6.6	6.4	5.4	5.1*	0.13
CBLC: Internalizing Problems Scale	37	9.09	7.2	7.4	6.43	3.97*	0.1
Children's Hope Scale	34	4.25	0.89	4.53	1.00	7.57**	0.19
Effort Scale	34	4.29	1.17	4.61	1.06	7.26**	0.19
Children's Sense of Coherence Scale	38	3.01	0.36	3.12	0.37	3.66	0.09
Peer-Network Loneliness Scale	37	1.66	0.69	1.55	0.47	1.43	0.04
Peer-Dyadic Loneliness Scale	37	1.69	0.74	1.58	0.65	3.38	0.09

Note: * p<.05; ** p<.01

ICS adopts a comprehensive framework and focuses on developing skills in three major areas: intrapersonal, interpersonal/family, and school/community level. Our manual is designed to provide an optimal balance between flexibility and structure. The manual contains modules that should be consistent for all adolescents but it is flexible enough to allow therapists to decide, collaboratively with adolescents and parents, which modules should be addressed more intensively according to the unique needs of each adolescent. Results indicated that the most frequently used modules were interpersonal skills. This is in line with previous studies highlighting the importance of interpersonal functioning in the overall well-being of adolescents with LD (Murray & Greenberg, 2001). It is also consistent with previous studies reporting that overall functioning of children with LD, when followed into adulthood, is associated with their emotional and interpersonal functioning more than the severity of their LD (Goldberg, Higgins, Raskind, & Herman, 2003). This suggests that an interpersonal therapeutic intervention may be an appropriate and beneficial focus of future intervention research with this population. One such option is Interpersonal Psychotherapy

for Depressed Adolescents (IPT-A), which conceptualizes disorders within an interpersonal framework (Mufson et al., 2004a, 2004b).

The two main IPT-A principles included in the ICS focus on adaptive communication and problem solving. A central tenet of IPT-A is that the level of distress experienced by an LD adolescent occurs in an interpersonal context and that the onset, response to treatment, and therapeutic outcomes are influenced by the quality of the interpersonal relationship between the adolescent and his or her significant others. In line with the IPT-A framework, the initial understanding of LD focuses on its interpersonal manifestations, which become a main focus of treatment.

The study has several limitations. The treatment was delivered in an open clinical trial rather than a randomized controlled trial. Therefore, we cannot address questions concerning the comparative efficacy of our intervention and whether or not the improvements made are specific to the interpersonal aspects of the intervention. Sessions were audio taped in order to analyze treatment fidelity but these have not been analyzed yet. Furthermore, our findings are limited by the small number of participants. Feasibility and acceptability of the treatment is limited to adolescents from 11 to15 years old.

In conclusion, our results support the feasibility, acceptability and preliminary positive outcome of ICS for treatment of adolescents with various kinds of learning disorders and co-morbidity of other psychiatric disorders. ICS may be an appropriate intervention to promote emotional and academic functioning among adolescents aged 11-15 with various types of LD and other non-severe co-morbid psychiatric disorders. It seems that most adolescents were seen as needing more intensive work in the interpersonal module of the intervention. Therefore it might be beneficial to add more IPT-A related modules within ICS for future studies. The pilot data do support the future study of the efficacy of ICS in a randomized controlled trial.

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Perceptions of the situation of families with children with learning disabilities and ADHD

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Abstract

The goal of this study was to determine if there were any differences in dynamic family variables, home climate, parents' attitudes towards their children and parental involvement in education, in relation to the students' typological characteristics. The sample consisted of 87 families of pupils (fourth year primary-first year secondary). The families were divided into three groups according to the children's typology: with learning disabilities (LD), with attention deficit hyperactivity disorder (ADHD), or normal achievement (NA). In all cases, both students and parents filled out the "Opiniones familiares: FAOP" (Robledo & García, 2007). The results indicated higher levels of conflict, greater parental involvement in education and more parental rejection towards children with ADHD. Parents of pupils with LD received lower scores than parents of NA children in terms of perception of efficacy in writing instruction and in overall cooperation in teaching writing skills. Lastly, families of NA children showed more favorable patterns regarding their overall development, by offering a greater variety of cultural, intellectual and leisure activities compared with the other two groups of families.

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In recent decades, there has been a proliferation of empirical studies on the influence of the family on the educational development of children; some of these studies have analyzed the effects of household dynamic variables on student learning (Xia, 2010). Results show that family-home climate, parents' attitudes towards their children and parental involvement in education (Barkauskiene, 2009; Bodovski & Youn, 2010; Ghazarian & Buehler, 2010; Khan, Haynes, Armstrong, & Ronher, 2010; Phillipson, 2010; Powell, Son, File, & San Juan, 2010; Regner, Loose, & Dumas, 2009) are factors affecting the academic development of the vast majority of children. This influence is even more marked for pupils with complex problems that can affect their ability to learn, such as specific learning disabilities (hereafter LD) or attention deficit disorder with/without hyperactivity (ADHD). Such pupils usually have special educational needs which require specific attention in all microenvironments in which education takes place, including the family (Shur-Fen Gau, 2007; Snowling, Muter, & Carroll, 2007). However, most research has examined visibly disabled (intellectually, sensorally or physically) children´s family variables, yielding conflicting results in terms of the effects of the children´s condition on their families (Dyson, 2010). Thus, the question remains whether similar effects would be found for less visible disabilities such as LD or ADHD. In Spain, both LD and ADHD have only relatively recently been recognized in the educational sphere, and more specifically, since 2006, following the enactment of the Organic Law of Education. In accordance with this law, these pupils are now included among those identified as having special educational needs, and it is mandatory to offer them and their families adequate treatment for their difficulties. Therefore, there is increasing interest in gaining a precise understanding of all the aspects that influence the course of these disorders, including contextual and family related elements, which is why this study focused specifically on comparing these two types of difficulties.

LD is a concept that encompasses a heterogeneous group of disorders that manifest themselves in significant difficulties in understanding, speaking, reading, writing, reasoning, and mathematical ability, are presumably of biological origin and are related to the functioning of the central nervous system (Kavale & Forness, 2000; Lerner & Kline, 2006).

As for ADHD, it is a neuropsychological disorder that is characterized by a persistent pattern of inattention and/or hyperactivity-impulsivity that affects the social, academic and/or work life areas of the person´s life (Frazier, Youngstrom , Glutting, & Watkins, 2007; Jakobson & Kikas, 2007).

Therefore, it is maintained that ADHD and LD are different disorders of biological genetic origin which are intrinsic to the individual. However, there has now been a shift in focus towards environmental variables, including the family, which it is claimed can enhance or minimize the negative effects of these difficulties and, therefore, must be thoroughly examined and taken into consideration (Pheula, Rohde, & Schmitz, 2011; Snowling et al. 2007; Shur-Fen Gau, 2007).

The ecological research available on learning and environmental conditions confirms the importance of an adequate family climate, as well as the existence of a satisfactory home environment for the child's appropriate development (Barkauskiene, 2009; Campbell & Verna, 2007; Ghazarian & Buehler, 2010; Khan et al., 2010). Specifically, studies suggest that pupils whose families help them and functionally interact with them use effective educational styles, and in families where there are few arguments and low levels of stress, children do better at school and learn more easily (Bodovski & Youn, 2010; Guoliang, Zhang, & Yan, 2005; Halawah, 2006; Heiman, Zinck, & Heath, 2008). However, in troubled or dysfunctional families, children receive less and poorer quality stimulation, and their academic development is therefore slower. These factors are also present in homes where there are children with LD or ADHD (Foley, 2011; Ghazarian & Buehler, 2010; Keown, & Woodward, 2002; Ryan, 2002; Sheppard, 2005). Normally, due to the demands these types of pupil present and the constant frustrations and conflicts that arise from their failure to achieve the set goals, a sense of stress flourishes in their households that impairs family functioning and the development of the individual with these disorders (Cussen, Sciberras, Ukoumunne, & Efron, 2012; Healey, Flory, Miller, & Halperin, 2011; O'Connor, McConkey, & Hartop, 2005; Strnadová, 2006; Theule, Wiener, Rogers, & Marton, 2011; Trainor, 2005). Thus, studies have shown that having a child with ADHD increases the probability of family dysfunction, disrupting the interpersonal relationship between parents, reducing parental effectiveness, complicating the parent-child relationship and increasing family stress levels (Gonzalez & Fornés, 2012). Meanwhile, in the specific case of LD, possibly because these are less well-known types of disorder and are usually diagnosed when the child has attained a certain level of education, the results are not conclusive as regards the issue of family climate. Some studies have even reported finding no differences on this dimension between households with children with LD and those with children without difficulties (Dyson, 2010; Heiman & Berger, 2008). Therefore, there is a need to conduct further studies in this area in order to identify clear patterns or trends in relation to the dimension of family climate in the case of students with LD or ADHD.

Other factors that influence children's learning and development are parents' attitudes and perceptions regarding them. Apparently, a positive attitude on the part of parents toward their children and family support increase pupils' confidence in their abilities and awaken the child's interest in satisfying and meeting parents' expectations (Campbell & Verna, 2007; En-Ling & Chin-Chun, 2011; Figuera, Daria, & Forner, 2003). However, in families where there are children with special educational needs, including pupils with LD and ADHD, parents' negative attitudes towards their children tend to predominate. In such families, there is usually less expression of feelings and emotions, and adults tend to provide negative feedback to their children on their behavior and ability, criticize them or underestimate their abilities, show pessimistic expectations about their academic future and show them less affection (Barkauskiene, 2009; Goldstein, Harvey, &

Friedman, 2007; Stoll, 2000). These behaviors may lead the child to forge a negative self-image, thereby damaging the development of her/his personality (Robledo, García, & Miranda, 2010; Sances, 2009; Taylor, Chadwick, Heptinstall, & Danckaerts, 1996).

Another important aspect of pupils' academic success is parental educational involvement, both in school and at home (Galindo & Sheldon, 2012; Phillipson, 2010; Powell et al., 2010). In this regard, it has been shown that parental involvement in education stimulates pupils' academic motivation, their commitment to school and their perception of competence, control and efficacy (González, Willems, & Doan, 2005; Mo & Singh, 2008; Urdan, Solek, & Schoenfelder, 2007). Thus, parental involvement promotes children's correct academic development in general and is therefore of special interest in the case of LD or ADHD. In this case, it appears that in principle, having a child with difficulties implies that parents actively engage in educating that child (Alomar, 2006; Joyce, 2005; Saucedo & Pérez, 2009; Smith & Adams, 2006; Stoll, 2000). Nevertheless, some evidence suggests that as children with special educational needs grow and their difficulties increase, parental cooperation begins to decline and family dissatisfaction with education professionals rises (Gershwin, Singer, & Draper, 2008; Seitsinger, Felner, Brand, & Burns, 2008; Spann, Kohler, & Soenksen, 2003). It seems that in the case of LD, families perceive difficulty in communicating with the school and school programs are ineffective, failing to meet the needs of children (Dyson, 2010). If family collaboration decreases, children may perceive a certain level of parental disinterest in school, which could contribute to reducing their motivation to learn, exacerbating their problems. However, once again, there is a need to continue analyzing these interactions in the specific case of children with LD and ADHD in order to obtain conclusive results.

As regards family involvement in education at home, there are some important controversies in research findings regarding the parents' provision of stimulating learning environments at home. While some studies found no difference between families of children with LD or ADHD and children with standard performance (Rogers, Wiener, Marton, & Tannock, 2009; Sánchez, García, Jara, & Cuartero, 2011), others have indicated that most households of pupils with problems focus on enhancing the personal growth of family members and provide more stimulation and support for academic tasks (Huston & Rosenkrantz, 2005; Robledo, García, & Díez, 2009). In the latter cases, however, some studies have indicated that helping children excessively on a daily basis can equate to high levels of parental protection (Tarleton & Ward, 2005), which, coupled with inadequate management of conflict with school issues, contributes to parents developing parental anxiety and dissatisfaction. This in turn affects parents' ability to interact sensitively regarding the demands of the child and can lead to the development of an intrusive and ineffective approach to educational collaboration (Hedor, Annerén, & Wikblad, 2002).

In this respect, it has been reported that the parents of children with ADHD show less self-efficacy in helping children and feel less welcome and supported by schools and teachers as regards collaboration, and perceive that they have less time and energy to

engage (Robledo & García, in press; Rogers et al., 2009). Consequently, it is necessary to study this aspect further, as the specific findings for LD and ADHD are not yet conclusive.

In summary, to date, the real impact of each family contextual factor, such as family-home climate, parents' attitudes towards their children or parents' involvement in education, on the academic performance of children with LD or ADHD remains unknown, and the results obtained in the specific cases of LD and ADHD are inconclusive (Hegarty, 2008; Heiman & Berger, 2008; Jordan & Levine, 2009). In addition, the existing studies present some limitations related to the samples, since some have only involved one parent or child, while others have used subjective assessment instruments (Antshel & Joseph, 2006; Murray & Greenberg, 2006; Smith & Adams, 2006; Trainor, 2005). Therefore, there is a need for new studies that overcome these limitations in order to shed light on such a seldom studied field as the relationship between the family and the development of pupils with LD or ADHD, especially in the Spanish context.

This justifies the conduct of new studies which identify stable patterns in relation to the influence of family variables on Spanish pupils' development, which was the purpose of this study.

The goal was to compare the family dynamic context, namely the home climate, parents' attitudes toward their children and parental involvement in education, among three distinct groups of families: families of children with LD, families of pupils with ADHD and families of children with normal academic performance (NA), in order to identify contextual and family situations that may constitute risk or protective factors in the case of children with ADHD or LD, and on the basis of this, to be able to undertake comprehensive intervention measures to address the treatment of these pupils in all their educational settings. We hypothesised that we would find differential patterns in the family variables studied when comparing the three groups of families, according to the children's typology.

Method

Participants

Participants consisted of 87 families of pupils in their fourth year of primary to first year of secondary education (mean age = 11.27). This sample was drawn from a larger sample of 610 families studied. For this selection, we started by looking at the smallest groups (ADHD, $n = 29$) and identified 29 cases of families of pupils with LD and 29 families of children with NA, taking several criteria regarding the characteristics of the children and their families into account in the selection process.

The first inter-sample balance criterion was pupils' intellectual capacity. We considered it necessary for all children in our sample to have an IQ within the normal range. In this case, it was confirmed that all pupils had an IQ of 80 or above (applied test Factor G, Cattell & Cattell, 2001).

The second pairing criterion was the school year, since this was a study which addressed issues related to learning, such as performance, and this factor is closely related to the educational year. This item had a total balance in the distribution of participants among experimental groups, as reflected by the absence of statistically significant differences between groups ($\chi^{2 =}$ .000, $p = 1$). In addition, consideration of the educational level enabled groups to be matched according to children's age ($\chi^{2 =}$ 19.989, $p = .530$).

As regards the family elements considered to ensure the maximum similarity among the groups, we verified that no statistically significant differences existed among groups for any of the factors analyzed, as evidenced by the Chi-square statistic: father's age ($\chi^2 =$ 45.981, $p = .238$), mother's age ($\chi^2 = 47.845$, $p = .131$) father's employment status ($\chi^2 =$ 5965, $p = .427$), mother's employment status ($\chi^2 = 2413$, $p = .660$), parents' marital status ($\chi^2 = 3105$, $p = .540$), number of people living in the home ($\chi^2 = 11586$, $p = .314$) and square meters of housing ($\chi^2 = 71.188$, $p = .251$). Table 1 shows a demographic comparison of the three participant groups, including students' and parents' characteristics.

Regarding the inclusion criteria for pupils in each sample group according to their types, several elements were taken into account. To identify pupils with LD, we used internationally established criteria (American Psychiatric Association (APA) 2003; National Joint Committee of Learning Disabilities (NJCLD), 1997). We first established the need for a diagnosis of a specific delay of at least two years and two standard deviations below the average yield from the normative age group and educational level. Therefore, we initially conducted systematic interviews with teachers, which allowed us to identify pupils who performed poorly in writing, since, as already noted, this study's area of interest essentially resided in learning disabilities related to writing.

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Similarly, we carried out a direct assessment of pupils' writing competence. Led by a researcher and in their own class groups, all the children completed an essay writing task with no set topic or length. The essays were then comprehensively corrected by experienced and highly qualified professionals specifically trained for this purpose, using the text correction protocol developed by the research team headed by J. N. García. Each pupil's results were matched with the scale of regulated scores produced by the researchers, thereby assigning each child a position on that scale. This allowed us to identify those pupils whose writing performance was two standard deviations below the mean expected, based on age and/or year.

Table 1

Demographic characteristics of children and parents from each group

Children				
Year	*Sex*	*NA* *(n = 29)*	*LD* *(n = 29)*	*ADHD* *(n = 29)*
4th Primary (age = 9-10)	Male	1	1	2
	Female	1	1	0
5th Primary (age = 10-11)	Male	5	6	9
	Female	6	5	2
6th Primary (age = 11-12)	Male	4	4	7
	Female	3	3	0
1st Secondary (age = 12-13)	Male	3	3	6
	Female	4	4	1
2nd Secondary (age = 13-14)	Male	2	2	2
	Female	0	0	0
Age	Mean	11.45	11.34	11.03
	Standard deviaton	1.24	1.11	1.61
Parents				
Characteristics	*Values*	*NA*	*LD*	*ADHD*
Father's age	Mean	44.44	44.48	44.71
	Standard deviation	5.994	4.483	5.255
Mother´s age	Mean	41.79	42.1	43.21
	Standard deviation	6.256	4.03	2.377

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Secondly, we required pupils with a standard IQ, so we asked all children to perform test Factor G (Catell & Catell, 2001), which provides an overall intelligence score and the possibility of a collective application.

In addition, for the diagnosis of learning disabilities, international standards also explicitly require the absence of any other developmental disorders which could explain the limitations associated with the field analyzed, and for the child to be receiving standardized and adequate schooling. Therefore, we also verified these aspects in our interviews with teachers, confirming that pupils with LD did not have any other documented developmental disorder and received proper schooling.

The assessment procedure for the identification of writing disabilities was applied to all the pupils sampled, which also allowed us to identify those children who made up the NA group. In this case, faculty interviews were also used to rule out types of learning disabilities (reading or math) in these children, thus confirming that their overall performance in different areas was normal. Moreover, the fact that these pupils were classmates of children with LD meant that both groups had received the same instruction in written composition.

The ADHD group was made up entirely of pupils with neurological and psychological clinical diagnoses, performed by multidisciplinary teams within the area of pediatric neurology at La Fe hospital (Valencia), Hospital de León (León) and the Universities of León and Valencia. However, to confirm the diagnosis we verified that all the children met the following criteria: i) clinical diagnosis of combined ADHD subtype according to the Diagnostic and Statistical Manual of Mental Disorders, fourth edition, revised (APA, 2003) and agreement between parents and teachers about the presence of at least six symptoms of inattention and at least six symptoms of hyperactivity/impulsivity; ii) the duration of symptoms exceeded a year, iii) the problem had appeared before age 7; iv) not suffering psychosis, neurological damage, epilepsy or sensory deficit. In addition, subjects' T scores were over sixty-three on scales of hyperactivity, inattention and total index of the Conners' test, in its parental (CPTRS-R: S) and teacher versions (CTRS-R: S) (Conners, 2001).

With respect to family participants, 57.7% were mothers and only 6.9% were fathers, although 33% of the cases involved both parents (in 2.4% of cases, the family participant did not indicate her/his relationship to the pupil). The average age of the father

figures was 44.5 years while that of the mother figures was 42.33 years. Regarding their education, in the case of families of children with NA, 10% of the parents had only received primary education, 56% secondary education and 33% of parents had studied at university. For families of pupils with LD, 32% of the families had received primary education, 64% secondary and 4% university education. Finally, for the parents of children with ADHD, these figures were 40% primary, 34% secondary and 26% university education.

Table 2
Description of the scales within FAOP

Scale	*Construct assessed*	*Dimensions*	*Number of items – response scale*	*Reliability*	*Example of items*
Family opinions: parental involvement in education (FAOP- IM)	Parental involvement in education (parents' and children's perception).	- Family involvement dimension: Family's motivation and support toward schooling. Collaboration and stimulation at home: stimulating behaviors and the promotion of learning environments within the home or at the family's initiative. - School involvement dimension: School-based collaboration, activities and behaviors of parents in school with children, professionals, other	Parents: 28 items. Children: 20 items Frequency response scale: 1 never-5 always	Parents' version: Cronbach's Alpha = .882 Children's version: Cronbach's Alpha = .885	Personally as a mother / father ... I review my child's homework. I take my child to the library. I suggest activities or trips to the teacher. I call the teacher if I'm worried about something my son has told me.

		families. Communication with school: contact between parents and teachers.			
Family opinions: writing practice (FAOP-PRAES)	Parental role in teaching and motivating written communication skills (parents' and children's perception).	- Reinforcement of motivation in practice: motivation to write by parents. - Efficacy in practice: parental ability to help in writing. - Psychological processes in practice: parental involvement in teaching writing by helping with homework and with mechanical and higher-order aspects. - Writing stimulation in practice: stimulation to write using everyday tasks, and specific models and materials.	Parents: 16 items. Children: 15 items Frequency response scale: 1 never-5 always	Parents' version: Cronbach's Alpha= .858 Children's version: Cronbach's Alpha= .874	In relation to writing... I encourage my child to practice writing at home. I think I'm able to help my child in writing tasks. I tell my child to consider the organization of ideas and the meaning of the text and try to correct the mistakes in this when I check their writing task. I carry out everyday writing tasks with my child, such as shopping lists, letters or e-mails to friends, notes on the refrigerator, Christmas cards ...
Family opinions: home (FAOP-HOME)	Provision of a household with characteristics conducive to learning: resources, enhancing autonomy and maturity, parenting styles,	- Encouraging Learning Materials: provision at home of stimulating materials and spaces for academic development. - Acceptance-love: acceptance, positive interactions and	Parents and children: 37 items. Frequency response scale: 1 never-5 always	Parents' version: Cronbach's Alpha = .751 Children's version: Cronbach's Alpha= .744	At home, there are books appropriate for my child. I speak to my son affectionately. I think my son is a nuisance. At home, everyone

	emotional control (parents' and children's perception).	positive management of the child's feelings and behaviors. - Rejection-hostility: Rejection, hostility, anger, bitterness, resentment or lack parental interest in their children. - Educational styles: permissive, authoritarian or democratic, used by parents to exert control over their children. - Encouraging children's self-reliance, maturity and responsibility.			participates in making family rules. I teach my son basic skills of cooking or cleaning.
Family opinions: climate (FAOP-FES)	Social and environmental characteristics of families (parents' and children's perception).	- Relationship Dimension: Cohesion, Expressiveness and Conflict - Personal Growth Dimension: Independence, Performance orientation, Cultural-intellectual orientation and Leisure-oriented activities. - System Maintenance dimension, stability: Organization and Control	Parents and children: 81 items. Response scale: true or false.	Parents' version: Cronbach's Alpha= .843 Children's version: Cronbach's Alpha= .807	Test FES (Moos & Moos, 1981)

Instruments

In order to assess how parents and children perceived the different dimensions of the family educational context, we used the parental (FAOP-PA, Robledo & Garcia, 2007) and the children's version of the Family Opinions Instrument (FAOP-HI, Robledo & Garcia, in press), and combined their results. This instrument has suitable psychometric properties as regards validity and reliability, with Cronbach's alphas of .921 for children and .929 for parents, and it includes different levels, as detailed in Table 2.

Procedure

We requested the cooperation and consent of the management teams of each school, and the teachers were informed of the purpose of the research and the nature of the help required from them. We asked them to answer questions in relation to the children in order to classify them according to our typology and discard various problematic situations. Similarly, they were required to help researchers carry out the evaluation sessions with pupils in which, after obtaining their families' informed consent, they underwent the relevant assessments. These assessments were carried out in groups over two sessions of one hour each. Expert staff administered the evaluation tests to students. This ensured fidelity in the execution of the study. Teachers also had to distribute the FAOP questionnaire to families, along with a letter explaining the study and requesting their participation and that of their children, and were responsible for subsequent collection. To ensure that parents actually filled in the scales and that they consented to their children's evaluation, they were explicitly asked to sign the questionnaire or deliver it in person. This was another procedure used to ensure fidelity in implementing the study.

Once the field work had been completed, we corrected the assessments and processed the results. We then selected the subsample employed in the statistical analysis, which was carried out using the Statistical Package for the Social Sciences (SPSS) version 17.0. The results are presented below.

Results

We used one factorial design, a 3×1, comparing the three groups of families for the different dependent variables. Multivariate contrasts indicated high and statistically significant results, with a very large effect size [F (48, 74) = 2.655, p <.001, η2 = .633]. Tests of inter-subject effects show statistically significant results, with effect sizes ranging from medium to large for the variables in Table 3.

Post hoc contrasts (Scheffe test) indicated statistically significant differences in the perceptions of families whose children have problems vis-à-vis families of NA pupils in recreation activities (p = .011). The parents of children with ADHD also differed from those of NA children in stimulation of writing (p = .011), rejection (p = .012), relationships (p = .034), personal growth (p = .041) and cultural-intellectual orientation (p = .033) and from those of children with LD in communication with the school (p = .049) and involvement in

school (p = .022). We observed the same in the case of positive conflict resolution (p = .005). Finally, families of children with LD also differed from those of the NA group in parental efficacy in writing instruction (p = .042). For more details, see Figure 1.

Table 3

Intersubject test significant results for group, design 3x1.

Scales	Variables	NA		LD		ADHD				
		Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*F*	*P*	η^2
Family opinions: parental involvement in education (FAOP-IM).	Communica-tion school.	31.36	5.93	30.2	5.73	34.5	4.9	3.451	.038	.103
	Involvement school.	63.5	8.58	60.6	10.82	69.5	10.56	4.283	.018	.125
Family opinions: writing practice (FAOP-PRAES).	Efficacy in writing instruction.	37.1	4.32	33.1	5.12	34.62	5.66	3.446	.038	.103
	Stimulation writing.	25.64	3.52	23.55	3.63	22.3	3.07	5.017	.010	.143
Family opinions: home (FAOP-HOME).	Rejection.	31.8	6.24	34.2	7.65	38.6	7.56	4.894	.011	.140
Family opinions: climate (FAOP-FES).	Expressiveness.	11.9	2.28	10.1	2.72	10.05	2.59	3.666	.031	.109
	Conflict.	13	2.81	14.1	2.22	11.3	2.63	5.790	.005	.162
	Relationships.	40.9	6.57	38.8	6.40	35.8	5.86	3.622	.033	.108
	Cultural-intellectual.	13.2	2.56	12.25	3.02	10.71	3.69	3.646	.032	.108
	Recreation.	15	2.16	11.7	3.71	12.2	2.68	7.972	.001	.210
Total growth.	49.32	5.36	45	9.02	43.6	6.91	3.677	.031	.109	

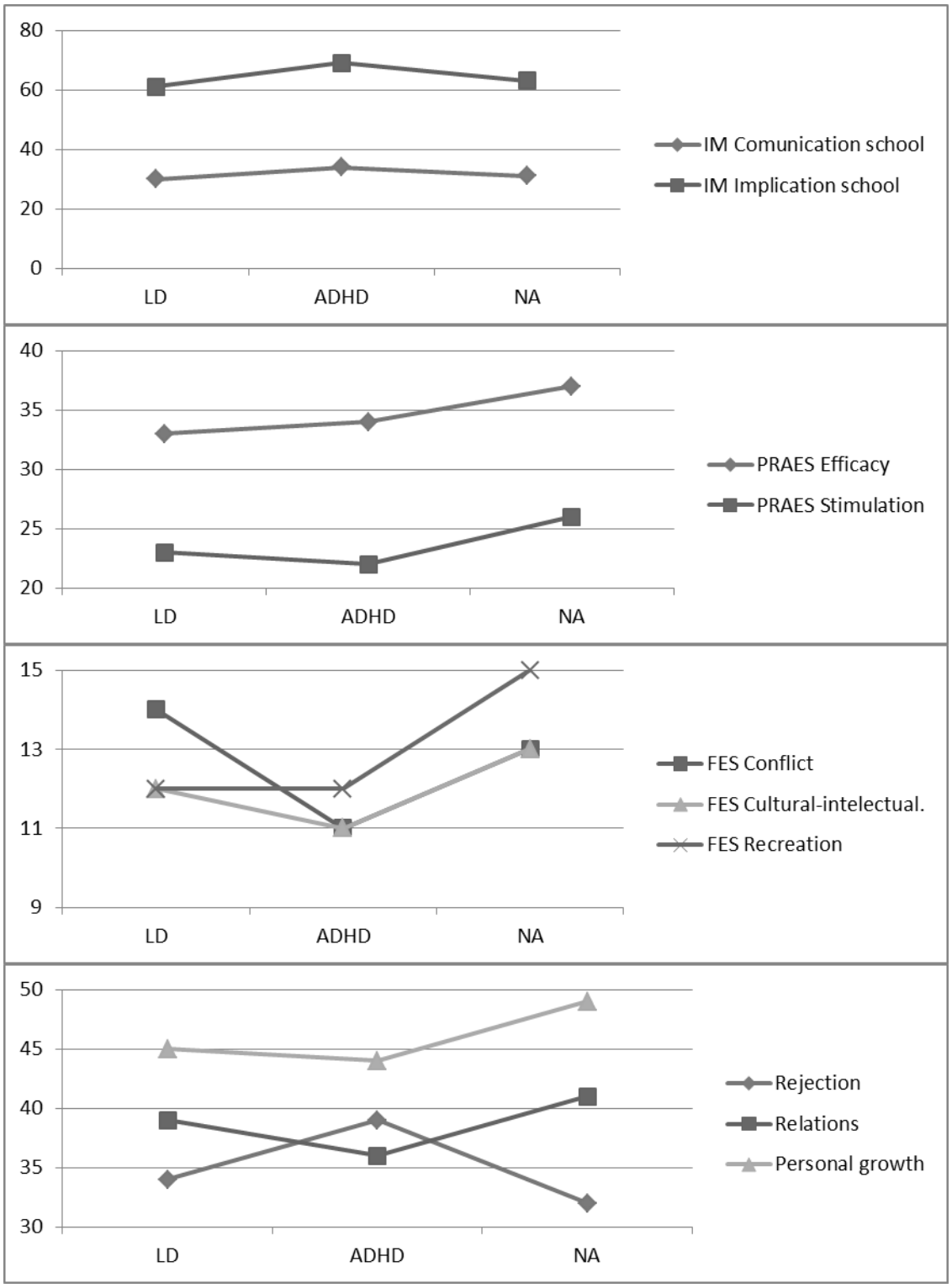

Figure 1. Perceptions of families by family dynamic variables, according to the type of pupils.

Discussion and Conclusions

Interest in LD and ADHD has been gradually shifting toward more holistic perspectives in terms of analysis and treatment, where not only the person is considered, but also all the social agents that surround her (Gortmaker, Daly, McCurdy, Persampieri, & Hergenrader, 2007; Mautone, Lefler, & Power, 2011; Polloway, Bursuck, & Epstein, 2001). However, despite progress in this area, there have been few results up to now, not allowing for definitive conclusions, especially as regards Spanish samples (Hegarty, 2008; Heiman & Berger, 2008; Xía, 2010). Therefore, there is a need to conduct further research in order to analyze all family dynamic variables in relation to the academic performance of children with ADHD or LD as a basis for offering alternative multi-component forms of intervention to promote these pupils' development.

The main objective of this research was to analyze possible differences in the dynamic family variables in relation to the characterization of pupils, by comparing three groups of families differentiated according to their children's typology. When we look at the family dimension and organize our data around the elements evaluated through the FAOP, parents' involvement in education, attitudes towards their children and family-home climate, we can draw several interesting conclusions.

Looking at the variables addressed through FAOP-IM (parents' involvement in education) we can conclude that parental involvement in education is greater in the case of families of children with ADHD (Robledo & García, in press; Saucedo & Pérez, 2009; Smith & Adams, 2006), even in comparison with families of children with LD. One possible explanation for this is that at the time this research was conducted, Spanish legislation still did not address the specific needs of pupils with LD. Therefore, the pupils studied received no specific support for their LD. This, together with the fact that LD is less apparent in outward behavior than ADHD and the problems only become apparent in writing when the pupil has already received fairly advanced schooling, may hinder parental diagnosis and explain the lack of continuous contact with the teachers (Bull, 2003; Karende, Mehta, & Kulkarni, 2007; Rolfsen & Martinez, 2008; Stoll, 2000). It is also important to recognize a specific limitation of this research—a certain bias in the selection of the sample. Participants were selected through intentional sampling, based on the voluntary cooperation of families. Also, in the case of families of children with ADHD, we identified them mainly through associations or groups of families, so parents were aware of the problem the child faced.

Looking at the results derived from FAOP-PRAES (parents' involvement in writing), we can conclude that the families of pupils with LD differ from families of NA children, in the negative direction, regarding parental perception of efficacy in writing instruction. The lower parental sense of efficacy in teaching writing in LD families may be explained by the fact that, because children in this group have disabilities in this area, the help they require from their parents is very specific and the latter may not feel able to provide it (Bloomfield, Kendall, & Fortuna, 2010; Kay & Fitzgerald, 1994). Families of

pupils with ADHD differ from families of NA children regarding stimulation of writing skills. In this case, the literature reviewed showed that one reason parents fail to cooperate on educational issues is their own lack of training in this respect, which is even more salient in the case of helping children who require a very high level of expertise (Karende et al., 2007; Persampieri, Gortmaker, Daly, Sheridan, & McCurdy, 2006). In addition, children with ADHD often have a wide range of needs, which may imply that communicative competence is not sufficiently valued and, therefore, although education in this skill is addressed, it may be done in a more superficial manner or in combination with support in many other areas.

Thus, a practical implication deriving from this result is the need to develop training programs for parents that would enable them to contribute to the education of children with ADHD.

Regarding the results obtained with FAOP-HOME (attitudes toward their children), we saw that parents of children with ADHD reported feeling more rejection toward their children than parents of the other two groups. These results are consistent with those obtained in other studies, which seem to have confirmed that parents of children with ADHD tend to be less affectionate with their children and often unconsciously subject them to the expression of negative emotions of rejection (Kaminski, Jones, & Harshaw, 2004; Presentación, Pinto, Meliá, & Miranda, 2009; Robledo et al., 2010, Shur-Fen Gau, 2007; Taylor et al., 1996). In addition to the children's own awareness of their problems, the emotional and behavioural development of children with ADHD is mediated by other external variables such as parental acceptance, recognized for its potential as a protective factor in reaction to the disorder itself, or family rejection, identified as a high predictor of externalizing problems (Lifford, Harold, & Thapar, 2008; Murris, Meesters, & Van der Berg, 2003; Shaw et al., 1998). Therefore, when designing a comprehensive treatment for children with ADHD, it is essential to consider these elements.

Analysis of FAOP-FES (home climate) variables led us to several conclusions. On the one hand, it confirmed that families of children with ADHD present a less adaptive relationship pattern that those of children with NA. But in addition, the results indicate higher levels of conflict in families of children with ADHD compared to families of children with LD, possibly due to the higher level of external expression of this disorder (Bao-Yu & Lin-Yan, 2004; Hoza et al., 2000; Miranda, Grau, Meliá, & Rosello, 2008; Montiel, Montiel, & Peña, 2005; Taylor et al., 1996; Wells et al., 2000). As for the overall growth dimension, one can conclude that the families of NA children show more favorable patterns regarding their overall development, by offering a variety of cultural and intellectual or leisure activities (Campbell & Verna, 2007; Huston & Rosenkrantz, 2005; Vera, Morales, & Vera, 2005). This can be explained by the fact that in families where children have no problems, parents are able to encourage such activities more often. However, in the case of children with LD or ADHD, it is possible that leisure time is used to focus on academic tasks or on trying to alleviate the problems arising from the disorder itself, as demonstrated in studies which have confirmed that performance-oriented activities

are prioritized in these households (Robledo et al., 2009; Stoll, 2000) and therefore the time spent and interest in leisure or other cultural activities is lower.

In short, this study confirms a trend indicating that contextual family elements show characteristics that are less favorable for learning and development in families in which children have ADHD or LD. However, these results are relative and the limitations of the study should be taken into account: limitations which will have to be overcome in order to be able to extrapolate the findings more accurately. Thus, sample size should be increased and perhaps even pupil typology broadened, to compare families of children with different problems, including children with traditional special educational needs or pupils with several overlapping difficulties. In addition, use should be made of evaluation instruments based, for example, on observation or recording behaviours in real situations, rather than relying exclusively on subjective self-report questionnaires. Nevertheless, it can be concluded that these family-contextual elements emerge as potential risk factors which should be monitored. Therefore, these variables require greater empirical attention in the immediate future, in order to provide comprehensive treatment optimized for these pupils and their families.

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Using Graphic Organizers to Teach Content Area Material to Students with Learning Disabilities

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Abstract

A pretest-posttest comparison group design was used to investigate the effects of a semantic mapping lesson plus visual display versus a semantic mapping lesson alone on adolescents' with learning disabilities (LD) ability to gain and maintain factual knowledge from expository social studies material. In addition, a posttest only comparison group design was used to examine the effects of a semantic mapping lesson plus visual display versus a semantic mapping lesson alone on adolescents' with LD far-transfer ability. The results of this study supported the conclusion that semantic mapping was beneficial for factual recall, while the additive effect of a visual display significantly improved maintenance and far transfer for adolescents with LD. Results of this study also supported the conclusion that normally achieving students and low achieving students also benefit from semantic mapping and the visual display. This finding was consistent over written and multiple-choice measures. Implications for practice and future research are discussed.

The academic demands of the intermediate and secondary grades are escalated as material becomes more complex and abstract (Fletcher, Lyon, Fuchs, & Barnes, 2007). All students must use higher-order processing and comprehension skills to successfully navigate intermediate and secondary content curricula (Dexter & Hughes, 2011; Gajria, Jitendra, Sood, & Sacks, 2007; Graham & Hebert, 2010; Hughes, Maccini, & Gagnon, 2003), often through lecture and expository text presentation (Minskoff & Allsopp, 2003). The shift from primary to secondary grades is difficult for many students, but is especially so for students with learning disabilities (LD).

Students with LD often have difficulty with basic academic skills (e.g., reading) and organizational/study skills (Deshler, Ellis, & Lenz, 1996). These difficulties are exacerbated because of the complex structure of text and lectures at the secondary level, which are often

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conceptually dense and filled with unfamiliar vocabulary (Gajria et al., 2007). Students with LD need explicit content enhancements to assist in verbal (e.g., text or lecture) comprehension and graphic organizers (GOs) have often been recommended as an instructional device to assist these students in understanding increasingly abstract concepts (Bos & Vaughn, 2002; Dexter, 2010; Dexter & Hughes, 2011; Hughes et al., 2003; Ives & Hoy, 2003; Kim, Vaughn, Wanzek, &Wei, 2004; Nesbit & Adesope, 2007; Rivera & Smith, 1997).

GOs are visual and spatial displays that make relationships between related facts and concepts more apparent (Gajria et al., 2007; Hughes et al., 2003; Kim et al., 2004). They are intended to promote more meaningful learning and facilitate understanding and retention of new material by making abstract concepts more concrete and connecting new information with prior knowledge (Ausubel, 1968; Mayer, 1979). GOs can be used before, during, and/or after a student attends to verbal (e.g., text or lecture) stimuli (Nesbit & Adesope, 2006).

Theoretical Framework for GOs with Students with LD

The theory of subsumption (Ausubel, 1960) and assimilation theory (Mayer, 1979) both offer direct implications about the possible benefits of GOs in learning. These two theories provide the basis for how GOs help facilitate understanding of unfamiliar material and clarify relationships between abstract concepts.

The research findings of both the theory of subsumption and assimilation theory appear to have specific implications for students with LD, although neither theory focused directly on this group of students (Dexter, 2010). Specifically, students with LD may benefit more from GOs than their non-disabled peers. A consistent pattern that emerged from the research on these theories is that students displaying lower verbal ability demonstrated larger gains than did students with average or high verbal ability, and these gains helped the students with lower verbal ability match the scores of peers with average verbal ability. Students with LD typically have low verbal ability (Kim et al., 2004) that often manifests itself as difficulty in connecting new material to prior knowledge (Williams, 1993). This is because, according to Mayer (1979), the specific structure of a GO may guide construction of cognitive structures in less knowledgeable students, but may conflict with pre-existing cognitive structures in more knowledgeable students.

Students with LD also typically perform poorly on far-transfer tasks (e.g., applying knowledge to new or unusual situations) due to their inability to detect underlying concepts in verbal information (Suritsky & Hughes, 1991). Based on the above theories, this may be due to difficulty assimilating verbal information with previous knowledge. The research evidence on assimilation theory suggests GOs may be the bridge in connecting verbal information with prior knowledge. This may dramatically assist students with LD in far-transfer tasks.

In addition, based on the visual argument hypothesis (Waller, 1981), Larkin and Simon (1987) concluded only "computationally efficient" (e.g., relationships more explicit than implicit) displays are effective for learning. Based on research published since Larkin

and Simon's seminal work, other researchers have found patterns that support specific design principles that may achieve computational efficiency (McCrudden, Schraw, Lehman, & Poliquin, 2007; Robinson, Katayama, Dubois, & Devaney, 1998; Robinson & Kiewra, 1995; Robinson & Schraw, 1994; Robinson & Skinner, 1996). A general principle is that GOs are effective when they address the limitations of working memory in their design. This is consistent with the work of Swanson and Kim (2005), who found that students with LD performed significantly better on problem solving tasks when stress on working memory was minimized.

Research Base for GOs with Students with LD

Dexter and Hughes (2011) conducted a comprehensive meta-analysis of research studies examining GOs with secondary students with LD. Based on this meta-analysis, the major implication for applied practice is consistent with assimilation theory and the visual argument hypothesis: more instructionally intensive types of GOs (e.g., semantic maps) are better for immediate factual recall while more computationally efficient GOs (e.g., visual display) are better for maintenance and transfer. This knowledge can help teachers in designing GOs for initial instruction and for re-teaching, studying, and retention purposes. For instance, a semantic map for initial instruction, followed by a simpler visual display for review and study will potentially maximize the effects of recall, maintenance, and far-transfer for students with LD.

Semantic mapping (SM) is a heuristic that enables students to recognize relevant information from lecture and text (e.g., main ideas, important supporting details) and organize that information for written or oral retell (Washington, 1988). In SM, students and/or the teacher create a visual representation of new or difficult vocabulary and any relationships existing among the different vocabulary (Bos & Anders, 1992). In addition, when teaching this type of GO, a teacher presents critical attributes of a concept along with examples and non-examples to help promote student discrimination and generalization (Deshler et al., 1996).

Visual displays present concepts or facts spatially, in a computationally efficient manner. That is, relationships between concepts are made apparent and clear by their location on the display. According to Hughes et al. (2003), in a visual display, facts or concepts are typically presented in one of five ways: temporal (e.g., timeline), spatial (e.g., decision tree), sequential (e.g., flowchart), hierarchal (e.g., taxonomy), or comparative (e.g., Venn diagram).

Study Purpose

The purpose of this study was to replicate and extend the current evidence of the effectiveness of GOs with students with LD. While it has been hypothesized that visual displays will assist with maintenance and far transfer for students with LD (Mayer, 1979; Robinson et al., 1998; Robinson & Skinner, 1996; Vekiri, 2002), it has not been directly tested. Given that students with LD have difficulty with maintenance and far transfer (Baumann, 1984; Gajria et al., 2007; Holmes, 1985; Johnson, Graham, & Harris, 1997; Kim

et al., 2004; Williams, 1993), it was important to attempt to validate this hypothesis. Specifically, this study addressed the following questions:

1. What is the effectiveness of a semantic mapping lesson compared to a semantic mapping lesson plus a visual display in improving factual recall during social studies verbal instruction for adolescent students with LD?
2. Does the addition of a visual display to the semantic mapping lesson improve maintenance effects for adolescent students with LD?
3. Does the addition of a visual display to the semantic mapping lesson improve far transfer effects for adolescent students with LD?

Study Hypotheses

Based on the review of theory and meta-analysis of studies of GOs, both the experimental (SM + visual display) and control group (SM only) of students with LD and low achieving students should demonstrate a large effect between pretest and posttest. However, students in the SM + visual display condition should perform significantly higher on tests of maintenance and far transfer.

Method

Experimental Design

A pretest-posttest comparison group design was used to investigate the effects of an SM lesson plus visual display versus an SM lesson alone on students' ability to gain and maintain factual knowledge from expository social studies material. In addition, a posttest only comparison group design was used to examine the effects of the SM lesson plus visual display versus an SM lesson alone on students' far-transfer ability. Stratified purposeful sampling was used to divide the students into three groups: (a) normally achieving; (b) students with LD; and (c) low-achieving. Once these groups were determined, students were randomly assigned to the treatment (SM + visual display) or control (SM only) groups.

Participants and Setting

The study took place in a rural school district in the eastern United States. Three eighth grade social studies inclusion classrooms were selected for the study based on their high density of students with LD. Out of a total of 76 students, parental and student informed consent was obtained for 62 students. Nineteen of these students were identified as having a specific learning disability in reading (e.g., basic skills, fluency, and/or comprehension), 36 students were normally-achieving, and seven students were selected by the classroom teacher as being low-achieving based on factors closely related to characteristics identified in the research literature examining low-achievers (Ford, 1996; McCoach & Siegle, 2001; Schunk, 1998). The demographics of the 62 participating students were similar to the district as a whole. Thirteen participants received free or reduced lunch, similar to the 24% of the entire district. Fifty-five of the students were Caucasian, four were African American, and three were Hispanic. Twenty-eight of the students were female and thirty-three were male. Across

treatment and control conditions, independent *t*-tests demonstrated no significant differences between groups on demographics (see Table 1).

Table 1
Participant Characteristics by Treatment Conditions by Total

	Condition		
Characteristics	SM + Visual Display	SM Only	Total
Number of Participants	33	29	62
Normally-Achieving Students	19 m = 10, f = 9	17 m = 7, f = 10	36
Students with LD	10 m = 6, f = 4	9 m = 5, f = 4	19
Low-Achieving Students	4 m = 3, f = 1	3 m = 2, f = 1	7
Chronological Age			
M	170.20	167.46	168.92
SD	6.67	5.92	6.32
Economic Status			
Free/reduced lunch (*n*)	8	5	13
Race			
African American (*n*)	3	1	4
Caucasian (*n*)	29	26	55
Hispanic (*n)*	1	2	3

Note. SM = semantic mapping. Chronological age stated in months as of April 20, 2010.

Students with LD. Nineteen students were designated as having a primary, specific learning disability in reading. Each of these 19 students received their social studies instruction in the general education classroom. Across treatment and control conditions, independent *t*-tests demonstrated no significant differences between the groups of students with LD on their unique characteristics (see Table 2).

Teacher/Researcher. To ensure authenticity, all instruction was provided in the general education classroom at the normal time for each of the three classes. The primary researcher, with five years experience as a special and regular education teacher, served as the instructor for each of the classes. The classroom teacher remained in the room during each class period, but was situated behind and out of sight of the students.

Table 2
Students' with LD Characteristics by Treatment Conditions by Total

	Condition		
Characteristics	SM + Visual Display	SM Only	Total
Number of Students with LD	10	9	19
Sex			
Male	6	5	11
Female	4	4	8
IQ score (Full scale WISC-III)			
M	95.2	96.6	95.86
SD	8.3	9.1	8.68
Reading Achievement (WJ-III)			
M	78.7	80.3	79.46
SD	7.5	7.9	7.69
Pullout Service (*n*)	7	5	12
Comorbid Conditions			
MD (*n*)	2	1	3
AD/HD (*n*)	4	3	7
MD + AD/HD (*n*)	1	1	2

Note. Scores obtained from school files and were based on tests administered by school personnel within the previous four years. MD = mathematics disability, AD/HD = attention-deficit/hyperactivity disorder, SM = semantic mapping.

Materials

Prior to the study, in collaboration with a content expert (a state certified social studies teacher with a B.A. in history) and the classroom teacher (who had 29 years of eighth grade social studies teaching experience), the primary researcher selected *Feudalism in Middle Ages Europe* as the lesson topic for the study. This topic was derived from a ninth grade state standard, one year above the student level in this study. The ninth grade state standard was selected for content validity purposes (e.g., actual content the students are expected to learn in the future) and to mitigate the chances of prior knowledge affecting the study outcomes.

After selection of the topic, the social studies content expert created an expository passage to be used for instruction. The passage was 546 words long and fell at a 6.4 grade level based on a readability test. The Lexile level was 860L, which equals approximately a late sixth grade or early seventh grade reading level. The rationale to go below grade level

was based on classroom practice. The classroom teacher reported most passages used for instruction over the course of the year fell in the 6 to 7.5 grade level range. Based on the expository passage, the primary researcher created an SM lesson wherein the instructor and students (both treatment and control groups) created a semantic map together. Following the suggestions of Gersten et al. (2005), the lesson was fully scripted to increase the likelihood of fidelity over the three class periods.

Prior to posttest, the treatment condition (SM + visual display) received a researcher-created visual display to study for 10 minutes. The control group (SM only) was only allowed to study the semantic map they created. The visual display provided to the treatment group is illustrated in Figure 1.

Overview of Instruction

The SM lesson was delivered based on the recommendations of Washington (1988) and included: (a) brief introduction; (b) questions and/or predictions; (c) vocabulary overview; (d) stated purpose; (e) reading the passage; (f) brainstorming; and (g) creating the map. Both treatment and control groups were taught concurrently and received the same amount of instruction. Each lesson lasted the fully allotted 45-minute class period.

Brief introduction. The brief introduction served as a connection between the students' background knowledge and the information they would be learning. For each of the three classes, the researcher introduced the concept of feudalism in Middle Ages Europe.

Questions and/or predictions. After the introduction, students were allowed to ask questions about anything they were curious about or make predictions about the passage. Across the three classes, no predictions were made. There was no potentially confounding student question or insight that might have given advantage to one class over another.

Vocabulary overview. Prior to the lesson, the social studies content expert and the classroom teacher identified 13 words from the passage they felt held significance for the lesson and might have been unfamiliar to the students. The vocabulary list included: feudalism, noble, peasant, knight, page, chivalry, squire, vassal, fief, manor, serf, moat, and waterwheel.

Stated purpose. Just prior to reading the passage, the researcher explicitly stated the purpose of the lesson. Specifically, the researcher stated to the class, "For this lesson, the purpose is to recall facts and ideas about feudalism in Middle Ages Europe. I want you to remember as many details from the passage as you can."

Reading the passage. Based on the knowledge that 12 students across the three classes received pullout instruction for passage reading and test taking, the researcher read the passage aloud to each of the classes, firming up main ideas and vocabulary after each paragraph. The common main ideas and common vocabulary were used to increase fidelity of implementation across the three classes.

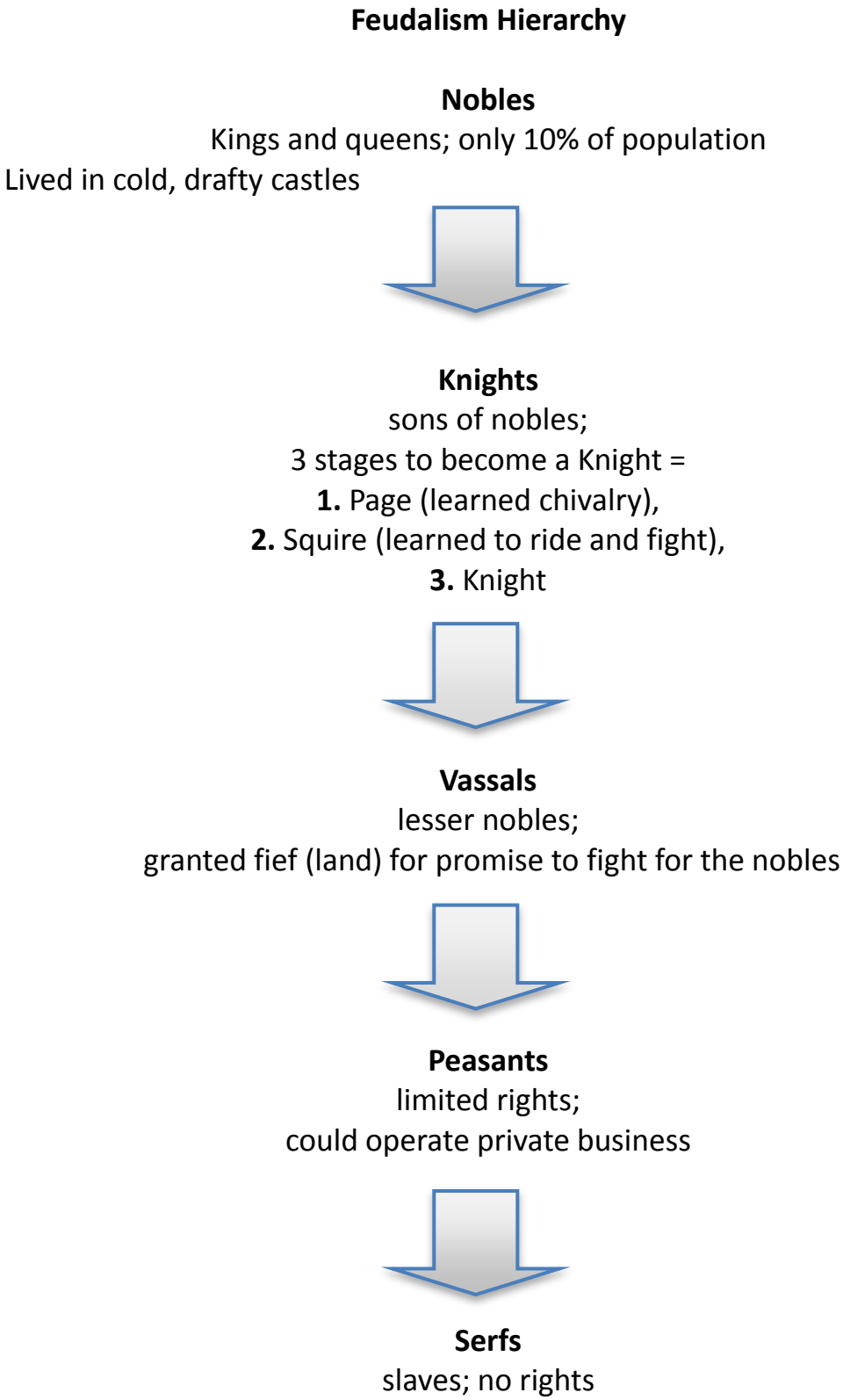

Figure 1. Visual Display

Brainstorming. After reading the passage to the students, the researcher asked the students to brainstorm any facts or ideas they recalled from the lesson. The researcher urged the students not to directly quote from the passage, but to put the ideas in their own words.

Creating the map. After the students ran out of ideas or facts to add to the list, the researcher used prompting to assist the students in creating the semantic map. A typical student-created semantic map from the lesson has been reproduced in Figure 2.

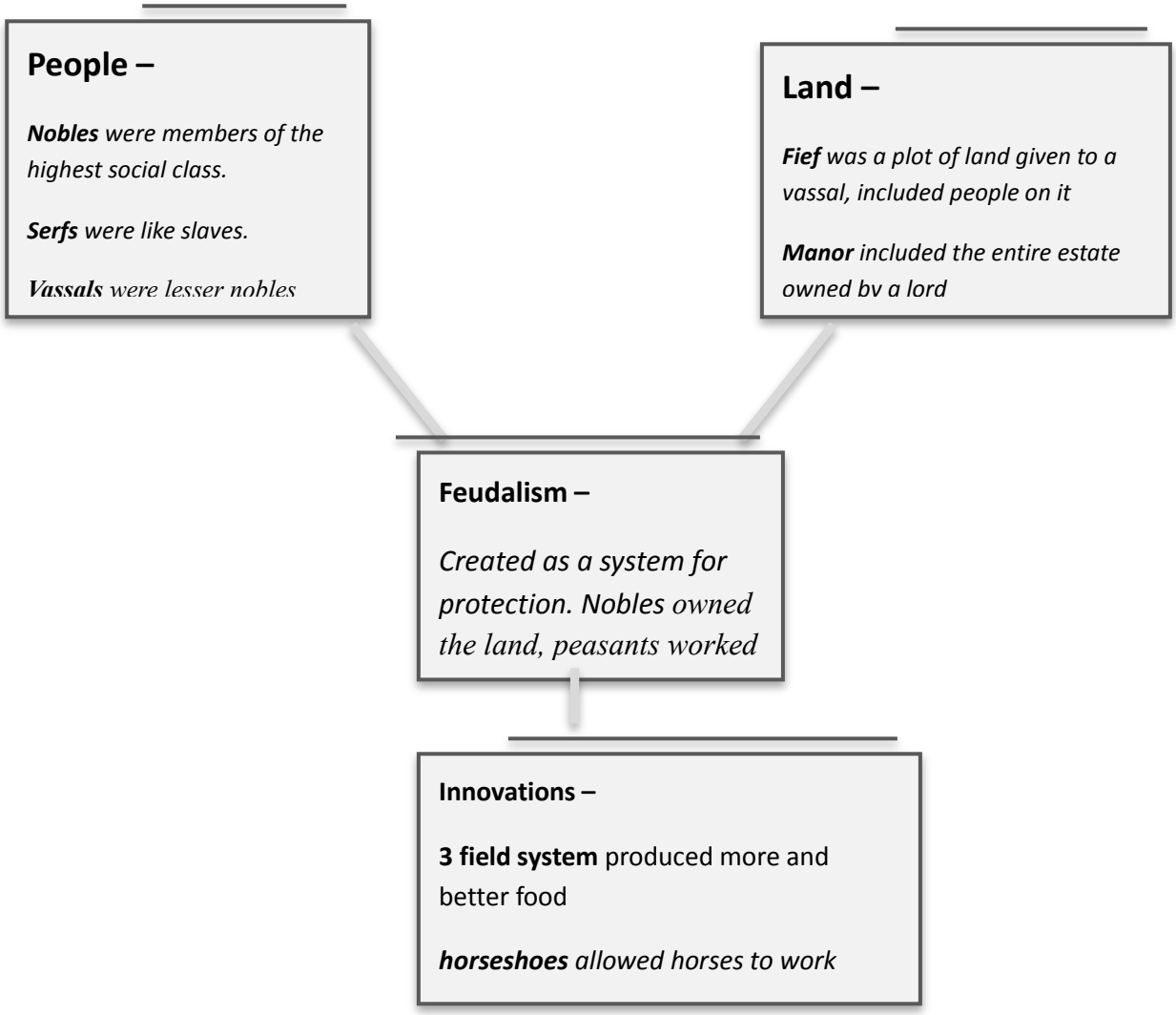

Figure 2. Completed Semantic Map

Fidelity of implementation. The three class sessions were audio recorded to verify instruction was delivered in the same manner for each class. Within the week following instruction, the primary researcher and a graduate research assistant separately analyzed the audio recordings with a copy of the lesson script. Special attention was given to adherence to the script, wording of definitions, and points emphasized. No major discrepancies in instruction were uncovered between classes. The major difference between each class was the student questions and responses. These varied somewhat by class, but it was determined that the researcher was able to successfully guide each class back to common anchoring points in adherence with the script.

Measures

Multiple measures were used at pretest, posttest, and maintenance to test the factual recall of all students in the study – a written factual recall measure and a multiple-choice measure. At each time of testing, the written factual recall measure preceded the multiple-choice measure so that the information in the multiple-choice test did not influence the written recall. Additionally, at posttest and maintenance, a five-question multiple-choice measure was added to test students' far-transfer ability.

Written factual recall. A written factual recall measure was used at pretest, posttest, and maintenance. Due to school district policy and request, the written factual recall measure was not a straight retell measure. The district literacy experts provided a five-paragraph essay outline worksheet for this measure. The worksheet provided a space for a main idea (i.e., thesis), three subordinate ideas, three details for each subordinate idea, and a conclusion statement. The students had much experience working with this worksheet and in other classes were encouraged to fill out the main and subordinate ideas before adding any details. As such, the students understood what to do when told to write in "five paragraph essay form."

The scoring of the written factual recall measure was based on the worksheet. One point was given for each reasonable and correct component (e.g., main idea, subordinate ideas, subordinate details) written in a complete or partial sentence. For example, in the case of an overall thesis statement, "Feudalism in Middle Ages Europe developed out of a need for protection and security" or "Feudalism about land and protection" earned one point; while "Feudalism contained lots of people" earned no points.

Multiple-choice. A multiple-choice measure containing 20 factual recall items was also used at pretest, posttest, and maintenance. This measure was developed by the social studies content expert based on the expository passage and the primary researcher was blind to the items on the test during creation of the scripted lesson. However, like the expository passage, the multiple-choice test was read aloud to the students. Because of this, the researcher was aware of the test items after pretest and before instruction, but the lesson script was not altered in any form. The same test was used at posttest and maintenance, but the questions and answer choices were randomly reordered before each subsequent testing.

The multiple-choice pretest was also used to test the internal consistency of the measure and control for prior knowledge. Because each of the items was dichotomously scored (i.e., 0 for incorrect, 1 for correct), the Kuder-Richardson 20 (KR-20) formula was used to determine internal consistency (i.e., how consistent subject responses are among the questions on an instrument). A reliability coefficient of .81 indicated individual test items produced similar patterns of responding across all participants. This confirmed the test items were homogenous and reliable for the pretest and alternate forms (i.e., posttest, maintenance).

To control for prior knowledge, any participant with more than 12 items correct at pretest would be excluded from the study. No participants were excluded for this reason (i.e., pretest range was 3 – 11 items correct).

Far transfer. Five multiple-choice questions were added to the posttest and maintenance test to measure students' ability to answer far-transfer items (e.g., similar relational content not covered in the lesson). For example, a sample question was "Similar to chivalry, bushido was the Japanese code of which group? (a) Geisha (b) Samurai (c) Rulers (d) Priests." The social studies content expert created the far-transfer items and they were interspersed with the 20 factual recall items.

Scoring and reliability. Initially, the primary researcher scored the written factual recall measures and multiple-choice tests. Afterwards, the researcher coded each measure from 1 – 62 and had two graduate research assistants score each measure for reliability purposes. The coding ensured the graduate students would be blind to condition and student name. For the written factual recall, 83% reliability was obtained initially between the three scorers. After discussion and reexamination among the scorers, the reliability increased to 95%. For the multiple-choice measures, reliability was 100%.

Social Validity. A student attitude measure allowed students to indicate how they felt about the instruction they received. Using a measure previously developed and tested (e.g., Darch & Carnine, 1986; Darch, Carnine, & Kameenui, 1986; Darch & Gersten, 1986), all subjects rated instruction, using a 5-point Likert scale, on three dimensions: how much they learned, whether they liked the SM lesson, and whether they liked studying with the visual display (treatment) or semantic map (control). This measure provided data on the social validity of the experiment.

Results

Written Factual Recall

Pretest-posttest. Descriptive and statistical data for the pretest and posttest written factual recall measure are displayed in Table 3. The *F*-statistic was a result of one-way analyses of variance (ANOVAs) used as significance testing between mean gain by condition.

Table 3

Pretest – Posttest Written Factual Recall

	Pretest		*Posttest*			
Condition	*M*	*SD*	*M*	*SD*	*Mean Gain*	*F*
SM + Visual Display	.51	.53	4.54	1.03	+4.03	
Overall, N = 33						10.01**
SM Only	.55	.69	3.64	1.27	+3.09	
Overall, N = 29						
Disaggregated by Student Type						
SM + Visual Display	.10	.32	4.10	.74	+4.00	
Students with LD, N = 10						25.59***
SM Only	.22	.44	2.89	.78	+2.67	
Students with LD, N = 9						
SM + Visual Display	0	0	2.25	.50	+2.25	
Low Achieving Students, N = 4						*n.s.*
SM Only	0	0	1.67	.58	+1.67	
Low Achieving Students, N = 3						
SM + Visual Display	.84	.76	5.26	1.66	+4.42	
Normally Achieving, N = 19						5.30*
SM Only	.82	.95	4.29	1.57	+3.47	
Normally Achieving, N = 17						

Note. *** = $p < .001$, ** = $p < .01$, * = $p < .05$

Overall, across student type and condition, students averaged less than one correct written statement at pretest. After disaggregating the data, it was shown that students with LD averaged only .16 correct written statements and low achieving students produced no correct written statements at pretest. Mean gains between pretest and posttest favored the SM + visual display group in all categories of students, but most significantly with students with LD, $F(1, 17) = 25.59$, $p < .001$.

Posttest and maintenance only. Results of the written factual recall measure were also analyzed for effect sizes (*ES*s) at posttest and maintenance. Effect sizes here and in subsequent analyses are reported as Cohen's *d* (> .2 = small effect, > .6 = moderate effect, > .8 = large effect; Cohen, 1988). In addition, one-way ANOVAs were used for significance testing. Overall results by condition are displayed in Table 4.

Table 4
Overall Written Factual Recall Posttest and Maintenance Only Effects by Condition

	SM +Visual Display		SM Only			
Measure	*M*	*SD*	*M*	*SD*	*ES*	*F*
Posttest	4.54	1.03	3.64	1.27	.78	9.28**
Maintenance	4.94	1.28	3.45	1.32	1.15	18.03***
	N = 33		*N* = 29			

Note. ES = Effect size. Both effect sizes in favor of the SM + visual display group.
***$p < .001$, **$p < .01$

A moderate *ES* favoring the SM + visual display condition was found for posttest, while a strong *ES* was found for maintenance. These effects were both statistically significant. Of note, the mean number of correct written factual statements increased between posttest and maintenance for the SM + visual display condition, while it decreased for the SM only condition. Thus, a larger effect for maintenance was demonstrated across all students. These data were also disaggregated by student type. The results are displayed in Table 5.

Effects favored the SM + visual display group across each student type for posttest and maintenance. Students with LD demonstrated the largest effects for posttest and maintenance, both strong (e.g., > .8) and statistically significant. Low achieving students displayed large effects, but due to such small sample sizes the effects were not statistically significant. The normally achieving group demonstrated a strong, statistically significant effect for maintenance only. In terms of correct written factual statements, students with LD

were the only group whose mean number decreased between posttest and maintenance. The low achieving and normally achieving groups both saw an increase between posttest and maintenance for the SM + visual display condition.

Table 5

Disaggregated Written Factual Recall Posttest and Maintenance Only Effects by Condition

	SM +Visual Display		*SM Only*			
Group/Measure	*M*	*SD*	*M*	*SD*	*ES*	*F*
Students with LD						
Posttest	4.10	.74	2.89	.78	1.59	11.78**
Maintenance	4.00	.67	2.67	1.12	1.46	9.85*
	N = 10		*N* = 9			
Low Achieving Students						
Posttest	2.25	.50	1.67	.58	1.09	*n.s.*
Maintenance	2.50	.58	2.33	.58	1.29	*n.s.*
	N = 4		*N* = 3			
Normally Achieving Students						
Posttest	5.26	1.66	4.29	1.57	.60	*n.s.*
Maintenance	5.95	1.75	4.06	1.56	1.14	11.95**
	N =19		*N* = 17			

Note. ES = Effect size. All effect sizes in favor of the SM + visual display group.
**$p < .01$, * $p = < .05$

Multiple-Choice Factual Recall

Pretest – posttest. Descriptive and statistical data for the pretest and posttest multiple-choice factual recall measure are displayed in Table 6. The *F*-statistic was a result of one-way ANOVAs used as significance testing between mean gain by condition.

Table 6
Pretest-Posttest Multiple-Choice Factual Recall

	Pretest		*Posttest*			
Condition	*M*	*SD*	*M*	*SD*	*Mean Gain*	*F*
SM + Visual Display	7.24	2.44	14.85	3.05	+7.61	
Overall, N = 33						4.31*
SM Only	7.55	2.15	13.76	2.91	+6.21	
Overall, N = 29						
Disaggregated by Student Type						
SM + Visual Display	6.70	1.89	13.80	1.81	+7.10	
Students with LD, N = 10						*n.s.*
SM Only	6.56	1.74	13.44	1.81	+6.88	
Students with LD, N = 9						
SM + Visual Display	5.25	1.71	11.00	1.83	+5.75	
Low Achieving Students, N = 4						*n.s.*
SM Only	6.00	2.00	9.67	3.06	+3.67	
Low Achieving Students, N = 3						
SM + Visual Display	7.95	2.59	16.21	2.92	+8.26	
Normally Achieving, N = 19						5.01*
SM Only	8.35	2.09	14.65	2.83	+6.30	
Normally Achieving, N = 17						

Note. * = $p < .05$

Overall, across student type and condition, students averaged 7.4 correct answers (out of 20) at pretest on the multiple-choice factual recall measure. The average increased to 14.31 correct answers (out of 20) at posttest. Across all students, there was a significant difference in mean gain, $F(1, 60) = 4.31$, $p < .05$, favoring the SM + visual display group. After disaggregating the data, mean gains between pretest and posttest favored the SM + visual display group in all categories of students, but most significantly with the normally achieving group, $F(1, 34) = 5.01$, $p < .05$.

Posttest and maintenance only. Results of the multiple-choice factual recall measure were also analyzed for *ES*s at posttest and maintenance. In addition, one-way ANOVAs were used for significance testing. Overall results by condition are displayed in Table 7. The means are out of a total of 20 possible items.

Table 7
Overall Multiple-Choice Posttest and Maintenance Only Effects by Condition

	SM +Visual Display		*SM Only*			
Measure	*M*	*SD*	*M*	*SD*	*ES*	*F*
Posttest	14.85	3.05	13.76	2.91	.33	*n.s.*
Maintenance	13.55	3.25	11.14	2.81	.78	9.62**
	N = 33		*N* = 29			

Note. ES = Effect size. Both effect sizes in favor of the SM + visual display group.
**$p < .01$

A small *ES* favoring the SM + visual display condition was found for posttest, although it was not statistically significant. However, a significant moderate effect was found for maintenance across all students, favoring the SM + visual display condition. The mean correct number of multiple-choice items between posttest and maintenance decreased by 1.3 in the SM + visual display group, while the decrease was 2.62 items for the SM only group. These data were also disaggregated by student type. The results are displayed in Table 8.

Effects favored the SM + visual display group across each student type for posttest and maintenance. For posttest, all effects were small. However, for maintenance, all effects were strong and statistically significant for students with LD and for normally achieving students. Students with LD demonstrated the largest effects for maintenance, a robust 1.41. Low achieving students displayed a large effect for maintenance, but it was not statistically significant. Of particular note, the students with LD in the SM + visual display group only decreased by .4 items correct between posttest and maintenance, while the SM only group decreased by 2.44 items correct. The students with LD in the SM + visual display condition

had the highest level of maintenance in relation to posttest scores of the three groups of students.

Table 8
Disaggregated Multiple-Choice Posttest and Maintenance Only Effects by Condition

	SM +Visual Display		*SM Only*			
Group/Measure	*M*	*SD*	*M*	*SD*	*ES*	*F*
Students with LD						
Posttest	13.80	1.81	13.44	1.81	.22	*n.s.*
Maintenance	13.40	1.78	11.00	1.58	1.41	9.57**
	N = 10		*N* = 9			
Low Achieving Students						
Posttest	11.00	1.83	9.67	3.06	.55	*n.s.*
Maintenance	9.50	3.70	6.67	2.08	.89	*n.s.*
	N = 4		*N* = 3			
Normally Achieving Students						
Posttest	16.21	2.92	14.65	2.83	.56	*n.s.*
Maintenance	14.47	3.22	12.00	2.74	.84	6.07*
	N =19		*N* = 17			

Note. ES = Effect size. All effect sizes in favor of the SM + visual display group.
**$p < .01$, * $p = < .05$

Far Transfer

Posttest and maintenance only. Results of the multiple-choice far transfer measure were analyzed for *ES*s at posttest and maintenance. In addition, one-way ANOVAs were used for significance testing. Overall results by condition are displayed in Table 9. The means are out of a total of five possible items.

Table 9

Overall Far-Transfer Effect by Condition

	SM +Visual Display		*SM Only*			
Measure	*M*	*SD*	*M*	*SD*	*ES*	*F*
Far Transfer	3.33	1.11	2.72	1.19	.53	4.36*
Maintenance	3.21	.89	2.31	1.26	.83	16.80***
	N = 33		*N* = 29			

Note. ES = Effect size. Both effect sizes in favor of the SM + visual display group.
*** = $p < .001$, * = $p < .05$

A statistically significant moderate *ES* favoring the SM + visual display condition was found for posttest. In addition, a significant strong effect was found for maintenance across all students, also favoring the SM + visual display condition. The difference between mean correct numbers of far transfer items between conditions was .61 at posttest and increased to .9 at maintenance. These data were also disaggregated by student type. The results are displayed in Table 10.

Effects favored the SM + visual display group across each student type for far-transfer posttest and maintenance. For far-transfer posttest, there was a strong effect for students with LD and the low achieving group, although only the *ES* for students with LD was statistically significant. The normally achieving group had only a small effect for posttest. For far-transfer maintenance, both students with LD and low achieving students had a strong, statistically significant effect. The normally achieving group had only a small maintenance effect. Of particular note, the low achieving group in the SM + visual display condition increased by .25 items correct between posttest and maintenance, while the SM only group decreased by .66 items correct. For both students with LD and normally achieving students in the SM + visual display condition, far -transfer results were almost identical for posttest and maintenance.

Table 10

Disaggregated Far Transfer Effect by Condition

	SM +Visual Display		*SM Only*			
Group/Measure	*M*	*SD*	*M*	*SD*	*ES*	*F*
Students with LD						
Far Transfer	3.51	.85	2.11	.78	1.70	13.88**
Maintenance	3.32	.67	1.78	.97	1.84	16.51***
	$N = 10$		$N = 9$			
Low Achieving Students						
Far Transfer	2.00	.82	1.33	.58	.91	*n.s.*
Maintenance	2.25	.50	.67	.58	2.96	15.04**
	$N = 4$		$N = 3$			
Normally Achieving Students						
Far Transfer	3.53	1.12	3.29	1.10	.21	*n.s.*
Maintenance	3.37	.96	2.88	1.11	.47	*n.s.*
	N =19		*N* = 17			

Note. ES = Effect size. All effect sizes in favor of the SM + visual display group.
*** = $p < .001$, ** = $p < .01$

Social Validity

Students were asked to answer three questions on a 5-point Likert scale (e.g., 1 = very little, 5 = very much). The results of the measure were separated by condition. For each question, mean by condition is displayed in Table 11.

Overall, students in both experimental conditions reported they felt they learned a lot and enjoyed the SM lesson, as well as the opportunity to study with either the visual display or semantic map. There were no statistically significant differences between conditions on

any of the three questions. After disaggregating the data, the students with LD, regardless of condition, supplied the highest ratings for each question. For example, for question 1, the means were 4.6 and 4.56 for the SM + visual display and SM only conditions, respectively. Question 2 yielded means of 4.9 and 4.89 and question 3 yielded means of 4.8 and 4.67, respectively.

Table 11
Social Validity by Condition

	SM +Visual Display	*SM Only*
Question	*M*	*M*
1. How much do feel you learned?	4.42	4.48
2. Did you like the semantic mapping lesson?	4.79	4.69
3. Did you like studying with the visual display (treatment) or semantic map (control)?	4.64	4.55
	$N = 33$	$N = 29$

Discussion

The results of this study supported the conclusion that semantic mapping was beneficial for factual recall, while the additive effect of a visual display significantly improved maintenance and far transfer for adolescents with LD. Results of this study also supported the conclusion that normally achieving students and low achieving students also benefit from semantic mapping and the visual display. This finding was consistent over written and multiple-choice measures.

Written Factual Recall

The written factual recall measure tested the students' ability to produce newly acquired knowledge in essay form. Unfortunately, due to the school district request to use the five-paragraph outline worksheet, the measure ultimately tested only isolated facts the students could remember and write in sentence form. Making matters worse, the time limitations (i.e., seven minutes) precluded any chance at depth or inferential/relational statements as students had very little time to brainstorm and plan their writing effort.

However, these issues aside, the data extracted from the written measures were consistent with the multiple-choice data, and yielded enough information for analysis.

Between pretest and posttest, the SM + visual display condition had a significantly larger mean gain increase in factual statements compared to the SM only condition (4.03 compared to 3.09). An analysis of posttest only effects also favored the SM + visual display condition, with a moderate significant effect ($ES = .78$, $p < .05$). After these data were disaggregated by student type, it was evident that students with LD had the largest mean gain increase between conditions (4.00 compared to 2.67) and the only significant effect when comparing posttest only ($ES = 1.59$, $p < .01$), both favoring the SM + visual display condition. All other students (i.e., normally achieving and low achieving) made large gains from pretest to posttest on the written measures, but no significant differences were found between experimental conditions at posttest. This finding was somewhat surprising. Our hypothesis was that semantic mapping on its own would drive initial acquisition. Therefore, we did not expect such a strong and significant effect for the SM + visual display condition by students with LD at posttest. It is clear the additive effect of the visual display assisted students with LD beyond semantic mapping on its own for writing factual statements at posttest.

When the written factual recall measure was administered again for maintenance, 10 days after posttest, an overall significant strong effect ($ES = 1.15$, $p < .01$) was found favoring the SM + visual display condition. However, unlike posttest, there were large significant maintenance effects for both students with LD ($ES = 1.46$, $p < .05$) and normally achieving students ($ES = 1.14$, $p < .01$) after disaggregating by student type. Large effects were also found for low achieving students, but sample limitations (sample size = 7) negate their statistical significance. The maintenance results clearly match our hypothesis and support our previous finding that the additive effect of the visual display in addition to the semantic map helps students retain newly acquired factual knowledge (Dexter & Hughes, 2010).

The results of the written factual recall measure were consistent with the results of previous research examining GOs and recall of ideas and details in writing for students with LD (e.g., Draheim, 1983; Ruddell & Boyle, 1989; Sturm & Rankin-Erickson, 2002). Each of those studies also found students with LD were able to recall more factual details after attending to a GO. However, each of those studies took place in a resource room setting after regular school hours. The results presented in this study extend the literature on written factual recall by utilizing an inclusion classroom during the regular school day. In this natural setting, students with LD improved significantly, as did their normally achieving peers. Unfortunately, due to the brevity of this study, written measures accounting for relational or inferential statements, increased length, and improved holistic scores could not be administered. By limiting the results of the written measure to only factual recall, some important information often associated with GO research (e.g., attaining relational knowledge) was sacrificed (DiCecco & Gleason, 2002).

Multiple-Choice Factual Recall

Like the majority of studies on GOs with students with LD, this study measured factual recall using a multiple-choice test (Dexter & Hughes, 2010; Gajria et al., 2007; Kim et al., 2004). However, as the previous reviewed studies typically occurred in resource room or after school settings, this study utilized an inclusion classroom during regular school hours. This extends the previous research by testing effects in a more naturally occurring school environment with many types of students included.

As was hypothesized, even though there was a significant overall mean gain increase between pretest and posttest favoring the SM + visual display group (e.g., 7.61 compared to 6.21), there was no significant effect by condition at posttest only overall, or after disaggregation by student type. This supports our previous finding that semantic mapping by itself is effective for initial acquisition (Dexter & Hughes, 2010). Furthermore, the additive effect of the visual display was seen in the maintenance results ten days after posttest. Overall, the SM + visual display condition significantly outperformed the SM only condition at maintenance ($ES = .78$, $p < .01$). After disaggregating the results, large significant effects were found for students with LD ($ES = 1.41$, $p < .01$) and normally achieving students ($ES = .84$, $p < .05$). A large effect was also found for the low achieving group ($ES = .89$), but it did not reach statistical significance due to the small sample size ($N = 7$). Like the results of the posttest, this confirms our hypothesis and supports our previous finding that the additive effect of the visual display in addition to the semantic map is crucial for retention of newly acquired factual knowledge (Dexter & Hughes).

While these results confirmed our hypothesis and were promising, it is important to point out that even for the top overall student condition (SM + visual display) the mean multiple-choice posttest score was 14.85 out of 20. This equals 74.25% accuracy. While this would not be considered ideal by any teacher's standard, it is based on one class period of instruction on new material followed by a delayed (e.g., next day) posttest. This limitation should be addressed in future research.

Far Transfer

This study also measured students' far-transfer ability (i.e., applying knowledge to situations not directly covered in the text or lecture) using a multiple-choice measure. Previous reviews of GO research with students with LD (e.g., Dexter & Hughes, 2010; Gajria et al., 2007; Kim et al., 2004) indicate that GOs may improve inference skills and relational knowledge for secondary students with LD. However, the evidence is limited due to the few studies explicitly measuring far transfer (Dexter & Hughes).

Across all students, there was an overall moderate far-transfer effect favoring the SM + visual display group at posttest ($ES = .53$, $p < .05$). As was hypothesized, after disaggregation, a large significant effect was found for students with LD ($ES = 1.70$, $p < .01$), while only a small effect ($ES = .21$) was found for the normally achieving group. A large effect ($ES = .91$) was found for low achieving students, but again, did not reach statistical

significance due to sample size. This finding is consistent with Mayer's (1979) contention that GOs assimilate material to a broader set of past experiences allowing students with lower verbal ability to more successfully transfer verbal information to new situations, while it may not be necessary for students with higher verbal ability (e.g., normally achieving students).

Likewise, at maintenance, students with LD demonstrated a significant large effect ($ES = 1.84$, $p < .001$) for the SM + visual display group, while the normally achieving group demonstrated only a moderate effect ($ES = .47$). Furthermore, the low achieving group, despite the small sample size, reached a statistically significant large effect at maintenance ($ES = 2.96$, $p < .01$). This supports our hypothesis and previous finding that the additive effect of a visual display to a semantic mapping lesson may bridge the connection of verbal information with prior knowledge and assist students with low verbal ability in far-transfer tasks over longer periods of time (Dexter & Hughes, 2010).

Social Validity

This study also measured students' attitude toward the semantic mapping lesson, the GO they used to study before posttest, and how much they felt they learned. Across all students, the mean scores indicate students liked "very much" the semantic mapping lesson and the GO they used to study, regardless of type. All students also perceived they learned a lot from the lesson. In addition, the classroom teacher was impressed with the results and reported he will use this type of lesson and study format in the future.

Limitations and Directions for Future Research

While the results of this study are promising, there are two significant limitations to this research. First, the measures used in this study primarily focused on factual recall and far transfer. Focusing on these outcomes limited our ability to measure relational and inferential knowledge, which are important for GO research (DiCecco & Gleason, 2002). It is also important to note that all measures were created by a social studies expert and closely tied to the content. While the included measures should have good content validity, there is no way to measure broader construct validity. This fact may limit the generalizability of these findings, and questions the actual level of understanding obtained by students across conditions (Boyle, 1996). Future research should find ways to include relational and inferential measures. Oral retell is a measure that could potentially assess factual recall, as well as more relational or inferential statements. Also, where possible, standardized measures could be used to measure broader construct validity.

The second significant limitation to this research was its brevity. There was only one day of instruction with the semantic mapping lesson that was new to all students. Previous research with GOs suggests a timeframe of four to six weeks for successfully implementing a GO intervention program (DiCecco & Gleason, 2002; Gajria et al., 2007). The positive effects for this study under such a short duration are promising. Future research should seek to test this kind of GO program over a longer period of time. Consistent use of these types of

GOs over time will produce more far-reaching results and better inform inclusionary practice.

Implications for Practice

Consistent with the findings from the meta-analysis, this study found that an instructionally intensive type of GO (e.g., semantic mapping) worked well for immediate factual recall across conditions, while the addition of a more computationally efficient GO (e.g., visual display) produced larger maintenance and transfer effects than semantic mapping alone. These results can help teachers in designing GOs for initial instruction and for re-teaching, studying, and retention purposes. As in this study, a semantic map for initial instruction, followed by a simpler visual display for review and study will potentially maximize the effects of recall, maintenance, and far transfer for students with LD. The retention aspect has special relevance to secondary students with LD who must be able to retain knowledge learned in school for statewide testing and promotion/graduation purposes.

Additionally, this study found that effects went beyond students with LD to low achieving students and normally achieving students. All students improved significantly between pretest and posttest on factual recall measures. All students, regardless of type, also demonstrated at least a small effect on posttest and maintenance only measures, as well as far-transfer measures. There were no negative effects across any condition or any type of student. This finding lends support to the benefits of GOs for inclusive classrooms. Furthermore, this study found all students enjoyed using the GOs and felt they learned a great deal.

The evidence in this study should persuade educational practitioners to make well-planned and well-instructed use of graphic organizers. A thoughtful combination of types of graphic organizers will help make the learning process more efficient for all secondary students, especially those students with LD.

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