Review Article

Students with Learning Disabilities - Critical Findings

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OVERVIEW

The application of higher-order processing, students integrate their knowledge and skills to solve increasingly complex problems and to complete multifaceted projects. Increasingly, it is this type of complex problem-solving that is expected of individuals as they enter the work force, that has become the focus of many reforms in general education

Recently, Swanson (in press) examined intervention studies that used measures of higher-order processing and samples that included adolescents with LD. Higher-order processes were represented in those studies by measures of metacognition, attributions, understanding, verbal problem-solving, mathematical problem-solving, word knowledge, and speed of processing with students with LD who were in middle or high school programs. Effect sizes were calculated for a total of 58 studies.

The instructional models represented in the 58 higher-order processing studies were placed into four categories: (a) strategy instruction only, (b) direct instruction only, (c) a combined model that included components of both strategy and direct instruction, and (d) nonstrategy/nondirect instruction model (i.e., "none of the above").

The average effect size of the 58 studies was 0.82, suggesting that the instructional approaches designed by researchers to improve higher-order skills of students with LD were quite successful. Greatest gains were documented in the area of metacognition, with an effect

size of 1.19; and the smallest gains were on measures of attribution, with a weighted effect size of 0.38. Attribution training involves teaching students to attribute their successes on particular tasks to their own skill, rather than to luck or to someone else's assistance. The strategy instruction only, direct instruction only, and combined models all yielded significantly higher effect sizes than the more traditional approaches. At the same time, these three models did not differ significantly from one another.

Similar to the findings in a broader meta-analysis (Swanson & Hoskyn, 1998), an instructional model that included only a few components predicted the magnitude of effects for higher-order processing. The important components for teaching higher-order skills to adolescents included a somewhat broader array of components than the K-12 analysis.

It should be noted, however, that in the case of teaching complex material and skills to adolescents with LD, the only component that contributed independently to the variance of the effect sizes was extended practice with feedback. One of the prevailing criticisms of special education for students with LD is "its overemphasis on the `basics' with the exclusion of any creative or cognitively complex activities which provide many students with LD with an unappealing intellectual diet. This overemphasis reflects the tacit belief that the development of basic skills necessarily precedes any complex cognitive activities. The results of Swanson's meta-analysis suggest that providing many practice opportunities can minimize the difficulties with complex cognitive activities experienced by students with LD. This practice should entail the features discussed

previously: small, interactive groups, directed questioning, and carefully controlled tasks.

WRITTEN-EXPRESSION

Over the past 15 years, innovative research in the field of special education has developed methods of providing access to the general education curriculum for students with LD. One area in which progress has occurred is in methods of teaching students with LD to write essays. This research has explored ways to teach students how to analyze material learned in the classroom and to write both personal narratives, based on students' own interpretations of life experiences, and persuasive essays, in which students take positions on controversial social and political issues. Instruction in written expression has been viewed by educators as a way to expand the nature of teaching students with LD to include activities that were both cognitively demanding and intrinsically motivating. It has also been viewed as a means of helping students understand the linkages between reading and writing.

The purpose of this section is to demonstrate the effectiveness of instructional practices in written expression for students with LD. Application of best practices to classroom settings and recommendations for future research will be discussed based on a meta-analysis of recent research in expressive writing.

Thirteen group studies that enrolled a total of 436 children in 3rd- through 9th-grade met the criteria for inclusion in the meta-analysis. Two types of dependent measures for writing instruction were analyzed: (a) actual measures of student writing, and (b) measures that examined students' understanding of the process of composing text. This second type of measure, which included students' views of themselves as writers, addressed issues related to metacognition.

Across all 13 studies, and across all writing performance measures, the mean effect size was 0.81. In educational research, an effect size of this magnitude is typically considered a strong effect (Cohen, 1988). Effect sizes were consistently large, and effects were relatively consistent across the studies. The quality of these studies was consistently high across writing genres and procedures used to assess quality (global scores versus trait/rubric scoring). There was also evidence of positive impact on students' sense of efficacy (i.e., their sense of being able to write). Although the number of studies is not extremely large, it is large enough, and the quality of the research solid enough, to allow inferences to be made for the improvement of classroom practice.

READING-COMPREHENSION

Children with LD have more difficulty comprehending what they read than do students without disabilities, even when controlling for the level of decoding . Descriptive research consistently reveals that a major reason many children with LD experience poor comprehension is due to a failure to read strategically and to spontaneously monitor their understanding of what is being read.

The revelation in the late 1970s that reading comprehension was rarely taught in American classrooms and advances from cognitive psychology yielded instructional research that was more focused on comprehension. A major issue addressed by instructional researchers in the 1980s and early 1990s was how to encapsulate the strategies used by proficient readers and translate them into useable teaching procedures. Early on, researchers were aware that they not only needed to teach students the strategies used by more proficient readers, they also needed to help students understand when and how to use them in a flexible, personalized fashion. This was and remains a challenging task. The challenge resulted in an extraordinarily vibrant period of instructional research that has, in subtle but important ways, transformed the teaching of reading in American schools. But to date, this knowledge base has not had the intended impact on instruction for students with LD.

In an attempt to consolidate the knowledge base and promote dissemination, two syntheses of reading comprehension research were recently conducted. Both focused specifically on instructional intervention research that either involved students with LD exclusively or provided data regarding the impact of the instructional interventions on students with LD.

GROUPING PRACTICES ASSOCIATED WITH IMPROVED OUTCOMES IN READING FOR STUDENTS WITH LEARNING DISABILITIES

Teachers agree that the most effective instruction they can provide for any student is one-on-one; that is, one teacher and one student . While this practice may be ideal, it is rarely practical. Except under unusual circumstances, such as the application of reading recovery for 1st-grade students with reading difficulties or intensive remedial programs for students with significant reading disabilities, teachers rarely have the opportunity to teach one student at a time for more than a few minutes. Thus, most teachers must teach students in groups or through whole class instruction.

The issue of group size is particularly relevant when

considering two issues (a) reading instruction, and (b) youngsters who struggle to learn or have identified disabilities. For many years, teachers addressed the issue of group size and reading by dividing their classes into three or four homogeneous reading groups (Barr & Dreeben, 1991). This practice was criticized in the 1970s and 1980s, as being associated with a range of negative outcomes, including lowered self-esteem and motivation for students in the lowest groups, restricted friendship choices, poorer instruction provided to low-achieving students, and longer instructional time provided to the highest groups

As whole class teaching has become more prevalent, today's classrooms have become increasingly diverse. In particular, increasing numbers of students with LD are provided their instruction for reading within the general education classroom. In order to accommodate the range of diversity, teachers must consider the most effective practices and procedures for enhancing the educational outcomes for students who are often achieving at several grade levels below their classmates. Using alternative instructional grouping formats is one of several critical variables linked to effective instruction in reading.

To address issues about the effects of grouping practices for students with LD in reading, Elbaum and her colleagues conducted an extensive search of all studies (published, unpublished, and dissertations) that provided interventions in reading for elementary grade students in which grouping formats were contrasted. They applied the following definitions for grouping formats:
* Partners--Working for sustained periods of time, students work in pairs and take different roles including alternating being the tutor and tutee, and cooperative partnerships.
* Small groups--students work with other students in group sizes of 3 to 10.
* Multiple grouping formats--a specific combination of formats are implemented systematically (e.g., small groups and pairs).
Nineteen studies were identified that contrasted different grouping methods and one study that contrasted different roles in student pairing. These 19 studies reported outcomes for 28 samples of students with disabilities: 12 samples of students with LD, 12 samples that combined students with LD with other disabilities, and 4 samples of students with behavior disorders. The meta-analysis for overall grouping effects was M= 0.37 (SD = .62), Mdn = 0.30, and range = minus 1.08 to 2.19. The mean weighted effect size for all types of grouping was 0.43. The length of intervention could be calculated for 18 of the 28 samples and ranged from 5 to 36.5 hr. There was no reliable association between length of intervention and effect sizes for reading outcomes.When the focus of the instruction

was examined, there were reliably higher effects when the focus was on general reading or comprehension rather than on word recognition. Table 1 summarizes the mean weighted effect size for each of the grouping-related variables. Subtypes of these grouping formats are summarized in Table 2.

TABLE 1 Mean Weighted Effect Sizes for Each of the Grouping Related Variables

TABLE 2 Mean Weighted Effect Sizes for Subtypes of Grouping Formats
When students with disabilities serve in the role of tutor for reading, regardless of whether it is in a cross-age or same-age situation, it is associated with reliably higher effects than when they are in an alternative grouping format (e.g., whole class) or when they serve in the role of tutee. This is likely because the process of being a "tutor" offers a number of important instructional opportunities for students with LD that are implicit. These implicit opportunities include (a) listening to a proficient model of reading, (b) silently following along while a peer reads orally, and (c) small chunks of silent reading.
Maheady (1997) describes grouping as one of the instructional factors that is alterable and that "can powerfully influence positively or negatively the levels of individual student engagement and hence academic progress" (p. 325). Moreover, Swanson et al. (1999) found that teaching in small, interactive groups contributed significantly to the magnitude of effect for an intervention. There is some initial research that very small groups (n = 3) with highly qualified teachers are as effective as one teacher with one student (Vaughn, Hughes, Moody, & Elbaum, in press). If this finding is confirmed, it provides valuable information about how to efficiently instruct students effectively with special needs.

Thus, alternatives to the well-documented common practice of whole class instruction (Baker & Zigmond, 1990; McIntosh, Vaughn, Schumm, Haager, & Lee, 1993) are needed. This requires that teachers decentralize some of their instruction if they are to appropriately meet the needs of many youngsters, including those with disabilities (Fuchs et al., 1997). There are many opportunities to provide small-group and peer-mediated instruction (for example, see Vaughn et al., in press). In addition, it is important to consider the value added when students with disabilities serve in the role of the tutor and to consider instructional practices that provide this opportunity.

GENERALIZABLE PRINCIPLES OF INSTRUCTION FOR STUDENTS WITH LEARNING DISABILITIES FROM THE RESEARCH SYNTHESES

These research syntheses provide converging evidence about instructional practices that are associated with more effective outcomes for students with LD. It might be assumed that the best instructional practices would be carefully crafted hybrids that capitalize on as many of these findings.

* Research on effective instructional interventions for students with LD has had a significant influence on both general and special education. In all cases where interventions have demonstrated significant positive effects for students with LD, they have resulted in at least as high (and most often higher) effect sizes for all other students in the class, including average and high-achieving students. This is a very important finding.

* Given the increasing numbers of students with LD who are provided instruction in the general education classroom, teachers and parents need not be concerned that the application of interventions that are effective for students with disabilities will provide less than effective outcomes for students without disabilities. Research conducted with individuals with LD has educational benefits for all learners, thus providing for generalizability of effective interventions for students with disabilities to a broader learning community.

* Making instruction visible and explicit is an essential feature of effective interventions for students with LD (Elbaum et al., 1999; Gersten & Baker, in press; Swanson, 1999). Whether it is the explicit teaching of the steps in the writing process (for review, see Swanson et al., 1999; Wong, 1999) or the use of "think alouds" as a means for teaching reading comprehension, students with disabilities benefit when the elements of what they are learning are identified and demonstrated with examples. The benefit to making instruction explicit and overt is twofold. First, a teacher offers students an opportunity to learn how to think about a learning situation in a way that they would likely not discover on their own. Second, by making instruction overt, teachers and peers can provide students with LD with formative feedback to guide and correct the application of their learning.

* Interactive dialogue between teacher and student and between students appears to be a critical component of effective interventions in reading and writing. The role of the teacher and other students is to provide ongoing and systematic feedback to assist in repairing misunderstandings or revising text. For example, Wong (1999) has demonstrated that the quality of feedback and verbal interaction between teacher and student is associated with improved outcomes in writing. The same is true for reading.

* What would typically be considered basic or fundamental elements of reading and writing, such as sounding out words or accurate spelling, are essential for improving outcomes in reading and writing for students with LD. For example, Berninger and colleagues (Berninger et al., 1997; Berninger et al., 1998) have demonstrated that speed of writing is associated with improved outcomes in the quality of written expression. Improvements in reading both regular and irregular words are associated with high effect sizes in reading comprehension (Gersten et al., 1998; Swanson et al., 1999). Thus, effective intervention approaches in reading and writing include both systematic skill building and development of strategies that build skills and knowledge broadly.

* Small interactive groups and pairs are associated with improved outcomes in reading and writing. Interactive dialogue between teacher and student appears to be a critical component of effective interventions, particularly in reading and writing (Gersten & Baker, in press). Englert, Raphael, and Mariage (1994) showed that this dialogue should consistently and persistently facilitate the use of cognitive strategies while reading and writing and solving problems. Interaction between students in the form of peer tutoring is also associated with improved outcomes for all students (Mathes & Fuchs, 1994) and particularly for students with disabilities when they serve in the role of the tutor (Elbaum et al., 1999). It appears that the behests from small interactive groups may extend beyond academic outcomes. In a synthesis of 31 intervention studies for students with LD that provided self-concept as an outcome (Elbaum & Vaughn, 1999), interventions that focused on academic skills within cooperative group structures were associated with exceedingly high outcomes in self-concept.

* Critical variables that influence intervention effectiveness are the use of strategies used to enhance task persistence and the moderation of task difficulty. As early as 1982, Keogh noted that "the organization of curricular content, and the order and sequence of presentation, may have important consequences for children's accomplishments" (p. 33). Controlling for task difficulty to ensure that students experience success and persist in learning activities has long been recognized as a critical feature of effective instruction for students with LD (Gersten, Carnine, & White, 1984). Furthermore, while academic engagement (Anderson, Evertson, & Brophy, 1979; Greenwood, 1999) has been established as an essential factor linked to enhanced academic outcomes, time on task and persistence with tasks is affected by students' motivation to learn. Students' working on tasks that are challenging and meaningful but not beyond their reach influences all of these. Students who experience some

successes in school are much more likely to participate actively in educational or work experiences following school (Blackorby & Wagner, 1996).

* Conscious attention to task difficulty is likely to be linked to higher levels of student achievement. To date, instructional research in areas such as reading comprehension, expressive writing, and problem-solving has rarely addressed these issues of task difficulty, persistence, and motivation in a systematic fashion. In part, this is because topics such as these are still domains that have not been well-systematized (Kucan & Beck, 1997), especially in terms of task difficulty. It is thought that this systematization may well be a productive line of research. In the areas of reading comprehension, written expression, and general higher-order processing, procedural facilitators or strategies assist students to develop a plan of action to guide their learning activities. These plans of action often go undiscovered by students with LD. For example, students with LD may possess the conceptual and background knowledge to generate texts about a particular topic; however, they may appear to have little of this foundation knowledge because they are unable to generate the categories and structure of an expository text about the topic (Englert & Raphael, 1988). By teaching strategies to her students, the teacher provides them with "their culture's best-kept secret about how to obtain academic success" (Harris & Pressley, 1991, p. 395). As proficiency with the strategy develops, the likelihood increases that it will be applied in new contexts. This spontaneous application of strategies would seem to be facilitated by explicitly teaching students where, when, and how to use a particular strategy. This metacognitive knowledge would, in turn, promote students taking ownership of the strategies and modifying them to match the needs of particular situations. Figure 1 provides a summary of these points.

IMPLICATIONS FOR PRACTICE

The National Longitudinal Transition Study of Students in Special Education (Blackorby & Wagner, 1996) revealed that after high school, only 73% of students with LD were involved in work or educational activities. These outcomes for students with LD are disappointing. The challenge to enhance outcomes for students with LD punctuates the need for our continued attention to instructional research in this area.

The research syntheses reported here reveal that, after 30 years of research to establish a knowledge base on instructional practices for students with LD, there are principles to guide instruction, and these principles demonstrate effective outcomes for students with LD, and for higher-achieving students as well. It is encouraging

that appropriate interventions that enhance outcomes for students with LD have been identified and there is substantial research documenting their effectiveness.

These findings represent giant steps forward from the "underlying process approaches" that characterized early research and conceptualizations in the field. However, it is far too early to be satisfied with the status of our knowledge. For example, our understanding of the importance of task persistence on learning is still emerging. Similarly, we know that strategy instruction is effective, but we still know surprisingly little about how to get students to "own" their strategies, personalize them, and apply them spontaneously to new contexts. We are beginning to appreciate the ways that learning communities can enhance outcomes for students with LD, but we need to better understand what structures (e.g., guides, self-assessments) need to be in place.

The findings highlighted in this article provide a blueprint for teachers of students with special needs as well as other struggling learners about how to more effectively meet their educational needs. Teachers need not worry that the instructional adaptations implemented for students with disabilities are interfering with the learning of average-to-high achieving learners. What we know from these syntheses is that instructional practices that enhance learning outcomes for students with LD result in improved outcomes for all students. Additionally, a recent synthesis examining the effects of intervention research on the self-concept of students with LD indicates at the elementary level that academic interventions are the most effective means to improved self-concept (Elbaum & Vaughn, 1999). Again, this confirms the importance of focusing on academic interventions for students with LD resulting in improved outcomes in self-concept and academic performance for non-LD students.

Teachers need to plan and reflect on their instruction to assure that it is explicit and intensive so that students with LD are not robbed of valuable learning time. This includes the design of instruction, particularly in writing and reading, that capitalizes on some of the basic and overlooked elements such as handwriting, speed of writing, speed of reading, and decoding words. Teachers would also enhance the effectiveness of their instruction by assuring that the task difficulty for students is a match with their abilities and emerging skills. Teachers need not interpret this finding as a call for basic instruction and a return to bottom-up teaching. In fact, some of the most effective interventions were meta-cognitive and strategic. Teachers should realize from these findings that an integration of both bottom-up and top-down instruction is valuable. It is important to note that some of the largest gains were found in areas involving intricate thinking such as

composing essays and problem-solving.

Despite the convergence of the syntheses reviewed here, it may strike the reader that the big principles of instruction summarized from these syntheses are not revolutionary. Unfortunately, these principles are too rarely implemented in classrooms (Arreaga-Mayer, Terry, & Greenwood, 1998; Gall, Gersten, Grace, Erickson, & Stieber, 1987; McIntosh et al., 1993; Pressley, 1998). We as researchers know a great deal about these principles, and therefore the responsibility is ours to ensure that they are implemented.

Critical Factors in Instructional Interviews

* Control of task difficulty

* Instruction in small interactive groups of six students or less

* Directed response questioning: procedures that promote "thinking aloud"