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Abstract

Adults with learning disabilities (LD) attending adult basic education, GED programs, or community colleges are among the lowest performers on measures of literacy. For example, on multiple measures of reading comprehension, adults with LD had a mean reading score at the third grade level, whereas adults without LD read at the fifth grade level. In addition, large numbers of adults perform at the lowest skill levels on quantitative tasks. Clearly, significant instructional challenges exist for adults who struggle with literacy issues, and those challenges can be greater for adults with LD. In this article, the literature on adults with LD is reviewed, and evidenced-based instructional practices that significantly narrow the literacy achievement gap for this population are identified. Primary attention is given to instructional factors that have been shown to affect literacy outcomes for adults with LD. These factors include the use of explicit instruction, instructional technology, and intensive tutoring in skills and strategies embedded in authentic contexts.

Keywords

specific learning disabilities, adult literacy, instruction for adults, adult basic education

For the purpose of this article, the definition of literacy as identified in the Workforce Investment Act, Section 203(12) is be used. The term *literacy* is defined to mean “an individual’s ability to read, write, and speak in English, compute, and solve problems, at levels of proficiency necessary to function on the job, in the family of the individual, and in society” (Workforce Investment Act, 1998). This definition supports the goal that all U.S. adults be prepared to successfully perform literacy tasks that allow them to function in society by meeting personal and employment goals as well as making contributions to the community at large (White & Dillow, 2005).

Increasing literacy skills for adults in general remains a critical and elusive goal. The National Adult Literacy Survey (NALS) found that about 50% of all adults performed in the two lowest levels of functional literacy (Kirsch, Jungeblut, Jenkins, & Kolstad, 1993). The National Assessment of Adult Literacy (National Center for Education Statistics, 2003) found no significant improvements between the 1993 and 2003 assessment scores for prose, document, and quantitative skills. In fact, skills for prose and document literacy significantly declined, and 43% of the adults who took the 2003 NAAL scored at the basic or below basic levels (Kutner et al., 2007). Adults unable to handle literacy demands in reading, writing, and speaking in English, computing, and solving problems will certainly struggle in postsecondary education (Heiman & Prechel, 2003; Hock & Mellard, 2005; Sitlington & Frank,

1990). As these challenges continue to persist, the consequences for individuals could limit life opportunities and economic independence.

When we consider the literacy challenges facing adults with learning disabilities (LD), we find them to be even greater than those for non-LD adults. Adults with LD tend to struggle even more than their non-LD peers in attaining basic literacy skills (MacArthur, Konold, Glutting, & Alamprese, 2010; Ransby & Swanson, 2003; Tractenberg, 2002), and they struggle in attaining positive academic outcomes in general (Gregg, 2007). Thus, practitioners who serve adults with LD in literacy programs need to be well versed in what works for whom and under which conditions.

Several researchers have identified the academic skill profile of adults with LD. They have found that adults with LD are among the lowest performers on measures of literacy. For example, adults with LD who participated in a descriptive study of reading component skills scored significantly lower than their non-LD peers. On multiple measures of reading comprehension, adults with LD had a mean

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reading score at the third grade level, whereas adults without LD read at the fifth grade level (Mellard & Patterson, 2008). In a related and supportive study, other researchers found that the performance of adults with LD on multiple measures of reading component skills was lower on all measures than other adults attending adult basic education (ABE) programs (MacArthur et al., 2010). In addition, in an analysis of the NALS data, 58% of adults who reported having LD performed at Level 1 on the prose scale and another 22% performed at Level 2 (Kirsch et al., 1993). These are the lowest levels of performance on the measure and show that these adults will have difficulty with the most basic of literacy tasks. These findings are supported more recently by Mellard and Patterson (2008) and MacArthur et al. (2010), whose findings suggest that the vast majority of adults with LD may need intensive basic skills instruction.

Determining the unique instructional elements that support effective basic skill instruction is of primary importance for many practitioners. Thus, the focus of this review is the instructional factors that have been shown to affect literacy outcomes for adults with LD. This review supplements recent work published by the National Institute for Literacy's Adult Literacy Research Working Group that provides a comprehensive review of evidenced-based research on adult literacy instruction with reading as the targeted literacy area. This work includes *Applying Research in Reading Instruction for Adults: First Steps for Teachers* (McShane, 2005), *Research-Based Principles for Adult Basic Education Reading Instruction* (Kruidenier, 2002), and *Teaching Adults to Read: A Summary of Scientifically Based Research Principles* (Curtis & Kruidenier, 2005). These reports provide a complete and up-to-date review of the literature on reading instruction for adults.

What Is the Literacy Skill Profile of Adults With LD?

Several descriptive studies of adults attending ABE and GED programs have been conducted (e.g., MacArthur et al., 2010; Mellard & Patterson, 2008). These studies shed light on the nature of the literacy skills of adults in these programs, including adults with LD. In a descriptive study reported by Mellard and Patterson (2008), 311 adult learners were administered a comprehensive battery of reading component and learner characteristic measures. The researchers found that 29% of the participants in the study self-reported as having LD. The mean scores of the adults with a self-reported LD were significantly different and lower than for the general population attending adult education centers on multiple measures of literacy. For example, 84% of the LD group reported difficulty reading as a child, and 75% received remedial help in school. Only 46% of the non-LD adults stated they had reading problems when younger, and 25% reported receiving remedial support. In

addition, adult education participants with LD scored 10% to 25% lower on measures of reading comprehension than participants without LD.

In a study of the reading component skills of learners in ABE settings, MacArthur et al. (2010) found that the overall performance of ABE students on multiple measures of reading component skills was low with mean scores for students ranging from about the 3.5 grade level on measures of word attack and decoding to mean scores at about the 5.3 grade level on measures of reading comprehension. About half of the 486 students who participated in the study self-reported having LD, and as a group, they performed lower than other ABE students on all reading component skills measured.

Findings from both studies inform our knowledge about the characteristics of adult learners and their literacy skills. This information helps guide decisions about the instructional methods and curricula needed to intervene and close the achievement gap for adults with LD.

Literature Search

This review of the literature was guided by several key questions related to evidence-based practices. The first question was, "What evidenced-based interventions and practices are available to practitioners who work with adults with LD?" The second question was, "How can we best deliver instruction to adults with LD?" Finally, and to supplement the limited database on adults with LD, the following question was posed: "What research-based instructional practices have been found to be effective with adolescents with LD that hold promise for adults with LD?" Each question was explored by reviewing the research on adolescents and adults with LD. The review targeted effective instructional principles related to literacy.

The research on instructional methods for adults with LD is quite limited. In response to this reality, the search also highlights research-based instructional practices that have been found to be effective with adolescents with LD and therefore possibly foundational to instruction with adults with LD. The adolescents with LD research was evaluated for applicability to the adult population, taking care to note the differences between children and adults and to fill gaps in the adult literacy research base. Our primary criterion for deciding appropriateness of the adolescent literacy research was to focus on research conducted with older adolescents.

The Search Process

Computer searches of the ERIC, PsycINFO, ProQuest Dissertations, and MedlinePlus databases were initially conducted for articles published between the years 1990 and 2008. The search was limited to studies conducted after

1990 to supplement and not duplicate previous reports by the National Institute for Literacy (e.g., *Teaching Adults to Read: A Summary of Scientifically Based Research Principles*—Curtis & Kruidenier, 2005; *Applying Research in Reading Instruction for Adults: First Steps for Teachers*—McShane, 2005) that included a review of the limited research base published before 1990. Recently, the original search was updated to include research articles published between 2008 and 2010. The updated search resulted in the inclusion of two additional descriptive studies and one research intervention study.

The following descriptors were used in various combinations to capture the greatest number of articles: *adults with learning disabilities* and the terms *literacy, reading, math, spelling, language arts, decoding, reading comprehension, fluency, word-level skills, vocabulary, instruction, intervention, treatment, training, teaching methods, direct instruction, explicit instruction, instructional effectiveness, achievement gap, closing the gap, small-group instruction, large-group instruction, learning style, constructivist, low literacy, tutoring, and writing.*

The same databases using the same terms listed above and the phrase *adults with dyslexia* were also used to find additional research studies. In addition, the phrase *college students with learning disabilities* and the terms *postsecondary education, dyslexia, instruction, intervention, treatment, instructional methods, teaching methods, direct instruction, explicit instruction, strategy, small-group instruction, large-group instruction, and writing* were used in the search. We also searched using the phrase *high school literacy* and the terms *reading, math, spelling, language arts, decoding, reading comprehension, fluency, word, vocabulary, LD, dyslexia, teaching methods, instruction, instructional effectiveness, and writing.* Results from all the searches were merged into one file.

The final step was to hand search the following journals from 1990 to the present: *Journal of Learning Disabilities, Journal of Educational Psychology, Learning Disability Quarterly, Reading and Writing, Learning Disabilities Research & Practice, Exceptional Children, Journal of Special Education, Remedial and Special Education, Reading Research Quarterly, Scientific Studies of Reading, Annals of Dyslexia, and Applied Psycholinguistics.* Because of the limited number of research articles found in the *adults with learning disabilities* search described above, our search was expanded to include *adolescents with learning disabilities.* The same search terms described above were used for the adolescents with LD search.

Criteria Used for Inclusion and Exclusion of Research

Qualitative, quantitative, or empirical research studies were included in the review if they met both of the following

criteria: (a) they pertained to either adults or older adolescents with LD and (b) they pertained to instructional methods for reading, writing, spelling, vocabulary, math, science, or social studies. For the purpose of this synthesis, “adults” were defined as individuals older than 16 who were no longer enrolled in K–12 education. “Adolescents,” for the purpose of this review, were defined as individuals older than 14 who were still enrolled in K–12 education. Thus, our review of the literature included “older adolescents” and excluded “younger adolescents” attending upper elementary and middle school. Briefings, position papers, evaluative reports, and general “think pieces” were excluded from the review, as were research studies that dealt with instruction in foreign languages, social skills, self-advocacy, and career development skills.

Limitations of Extant Research

An initial pool of 220 articles and dissertations was found using the process described above. The initial pool was updated to include three research articles published between 2008 and the present. This increased the pool of articles to 223. Most of the research articles involved adolescents with LD. Specifically, 190 articles focused on adolescents with LD. Those articles were pulled from the primary analysis. A total of 11 articles were “think” pieces or ones that dealt with characteristics of adults with LD, and these articles were not included in the review. The remaining 22 articles included studies conducted with adults with LD or reading disabilities, and they were coded as being experimental ($n = 4$), quasi-experimental ($n = 8$), single participant ($n = 7$), or qualitative ($n = 4$). The selected articles were then classified as studies of college students with LD, adults with LD, or studies that included some combination of adults, adolescents, and/or older adolescents. Finally, studies were further divided into categories for reading, math, or multiple content area studies such as reading, English, and math, web-based or technology instruction, transition, cognitive, and direct instruction or writing.

Overall Findings

The question “What evidenced-based interventions and practices are available to practitioners who work with adults with LD?” is discussed below. Specifically, the effects of direct instruction or explicit instructional models, the cognitive and metacognitive self-regulatory behaviors associated with explicit instruction models, and the uses of instructional technology are reviewed. Also, the issue of what constitutes an effective and efficient instructional arrangement or grouping is explored in the question “How can we best deliver instruction to adults with LD?” Several key evidenced-based instructional arrangements for adults with LD are highlighted. Finally, and to supplement the

limited database on adults with LD, we asked, “What research-based instructional practices have been found to be effective with adolescents with LD that hold promise for adults with LD?” Findings from the body of research pertaining to what works with adolescents with LD are shared with the caution that effective practices with adolescents with LD may not always transfer to adults with LD.

The Nature of Instruction

In studies that examined the nature of instruction on the achievement performance of adults with LD, the effects of guided reading, metacognitive training, self-regulation, and explicit strategy instruction were studied. One study examined the feasibility of implementing explicit instruction in typical ABE centers. Results of these studies are summarized below.

Explicit instruction. Explicit instruction has an extensive K–12 research base (e.g., Gersten, Fuchs, Williams, & Baker, 2001; Swanson, 1999; Swanson & Hoskyn, 1998; Swanson & Sachse-Lee, 2000; Torgesen, 2005; Vaughn, Gersten, & Chard, 2000). Explicit instruction involves teachers providing students with clear statements of process, modeling target behaviors, guided practice, independent practice, corrective feedback, and posttesting.

In a study of the effects of explicit instruction on the math word-solving abilities of community college students with LD, researchers found that explicit instruction in translating compare-type word problems, supplemented with visual diagramming for schema, resulted in significant gains in student ability to solve math word problems (Zawaiza & Gerber, 1993). In this study, students were taught math problem-solving skills using different methods. In the attention-control condition, students were given word problems and participated in informal discussions in a math class about solving the word problems. In another condition called translation, students were explicitly taught a process for solving word problems. Explicit instruction in the use of translation methods involved clear statements of process, modeling target behaviors, guided practice, independent practice, corrective feedback, and posttesting. In a third condition, students were taught using the translation methods described above with the addition of a diagramming schema component. In the diagramming component condition, students were taught how to diagram relationships between the key ideas found in word problems and how to create equations.

Six intact classrooms with 38 college students with LD were randomly assigned to one of the three conditions. Students in the translation plus diagramming condition outperformed students in the translation only and attention-control conditions on measures of math word-problem-solving strategies and process knowledge. Researchers also found that posttest reversal-error performance (reversal errors are

errors in which the student does the inverse of what is required to solve comparison-type word problems) showed a significant interaction among groups, $F(2, 35) = 8.7$, $p = .0009$. The translation plus diagram group showed a marked decrease in reversal mistakes, and the attention control condition showed a slight decrease. An unexpected finding was that the translation group had a significantly higher number of reversal mistakes than the translation plus diagram or control groups. The researchers felt that translation only group learned a new process for solving word problems but that the process (strategy) was not yet internalized or supported by visual clues. This may have caused students to perform poorly by relying on a process that was yet unclear or not learned at a mastery level.

Thus, according to the authors, effective instruction should include problem-solving strategies integrated with schema training to help students improve their understanding of word problem content and the important factors that should be taken into consideration when solving such problems (Zawaiza & Gerber, 1993). Schema training, as made operational in this study, involved direct training in recognizing, identifying, and labeling word problem “types,” which helps students develop accurate representations of critical problem elements in memory. No math skill or math strategy outcome measure data were reported.

Focusing attention on word recognition reading component skills and direct explanation, Massengill (2003) studied the impact of guided reading on the reading performance of four low-literate adults. Guided reading is a direct instruction process in which the instructor models expert readers’ behaviors and scaffolds support for both cognitive and metacognitive instruction. Guided reading combines elements of text selection, strategy development, and scaffolded support to improve reading outcomes.

The Massengill (2003) study targeted instruction in multiple word recognition skills and strategies embedded within a guided reading model. A single-participant design was used to test the effectiveness of the intervention. Standardized measures were used to assess growth (i.e., *Slosson Oral Reading Test–R*—Slosson & Nicholson, 1990; *Analytical Reading Inventory*—Woods & Moe, 2006; *Woodcock Reading Mastery Tests* Word Attack Test subtest—Woodcock, 1998). Results of the study showed that the word-level skills of the adults in the study improved significantly as measured by standard reading tests after instruction utilizing guided reading. Overall global reading level was increased for all four learners in the study, with grade-level scores increasing from 1.4 grade equivalents to 3.1 grade equivalents during 32 hr of instruction. These gains are impressive given the initial low reading-level scores of the participants. In sum, low-literate adults benefited from instruction in word recognition skills using a guided reading framework. These results are limited, in part, by the small number of participants in the study and the fact that

the participants were identified as low-literate adults. The participants were described as struggling and disheartened readers (i.e., reading at the first through sixth grade levels).

In an experimental study with 90 adult struggling readers randomly assigned to one of three experimental conditions or one of two control conditions, Rich and Shepherd (1993) investigated the effects of a modified reciprocal teaching reading intervention (Palincsar & Brown, 1984). Struggling readers in an ABE center were taught two reading comprehension strategies (self-questioning and summarizing), either singularly or in combination. Control students were given materials and tests or just tests over reading material. Results showed that the reciprocal teaching condition participants scored significantly higher on measures of reading comprehension. Thus, a proven reading comprehension intervention for children and adolescents was found to be effective for adult struggling readers attending an ABE center. Although many struggling readers do have LD, this study did not identify whether any readers in the study had LD. Thus, extending the findings of this study to adults with LD should be done with caution.

Strategy instruction. Strategy instruction has been linked to effective instruction for adolescents with LD, and there is some evidence to support the idea that adults with LD benefit from the same type of strategy instruction. For example, Allsopp, Minskoff, and Bolt (2005) evaluated the effects of a 3-year demonstration project that involved the development and field-testing of a course-specific strategy instruction model. In this study, 46 adult college students with LD were provided one-to-one semester-long instruction by graduate student tutors. Tutors used explicit instruction to teach the students various strategies that were context based and responded to the immediate needs of the students. A strategy curriculum appropriate for the demands of the courses in which students were enrolled and that reflected research on strategy instruction was developed. Then, students and tutors selected and prioritized the strategies that would be learned and applied them during tutoring sessions. The instructional approach involved having the tutors follow an explicit instruction model while teaching the selected strategies during their tutoring sessions. This instruction was in contrast to previous tutoring that was based on assignment completion sessions. The primary quantitative outcome measure was student grade point average (GPA). Although the study was described as a quasi-experimental study, no comparison group data were obtained (i.e., no such group existed) on the GPA outcome measure. Students' overall GPA improved significantly over preintervention GPA scores, and students maintained the GPA advantage after tutoring support ended. In addition, large effects (Cohen's $d = 1.01$) were obtained for student GPA in the tutored course when GPA in the content course was compared to GPA in the same content area with instructional tutoring support. Given that no comparison group

data are reported, causal factors related to the primary outcome variable are difficult to identify, and the results must be interpreted cautiously.

Butler (1995) investigated the effectiveness of self-regulation and strategic learning instruction on the performance of six adults with LD in various postsecondary education programs and settings. One adult was working in a GED program, two were enrolled in vocational training courses, two were first-year college students, and one was a university graduate student. All had previous documentation of LD using IQ-achievement discrepancy formulas. The intervention was designed to teach students how to be strategic in their learning rather than following a set of specific cognitive strategies. For example, students were taught how to create or co-construct strategies specific to the academic tasks they faced. As a first step in this process, students were exposed to examples of how strategies were used in context before they received direct explanation instruction. This model was, in effect, individualized and targeted tutoring in cognitive and metacognitive learning. Results of the multiple baseline data analysis showed that student performance improved significantly in writing, as did metacognitive knowledge regarding the writing tasks they faced. It is important that measures of engagement indicated that students were actively engaged in their learning and better able to attack noninstructed tasks strategically.

The instructional arrangement used in this study was a one-to-one, intense, and explicit instructional tutoring model. The one-to-one model may be a limiting factor in implementation on a wider scale (Butler, 1995). A single-participant pre-post design was used to measure the effectiveness of the intervention with baseline and postintervention scores graphed. Although the wide generalizability of the results is not supported by the findings of this study, assisting students as they co-construct strategies that address specific and authentic needs seems to be a promising practice.

In another article (Butler, 2003), a review of seven studies of the strategic content learning (SCL) model, conducted with adults and adolescents with LD, was discussed. The stated goal of SCL is to support students in the development of self-regulation and metacognitive behaviors that support learning content and to move from direct instruction in which already created strategies are taught. The SCL model is designed to place more emphasis on co-constructing strategies than teaching previously created strategies that are more generic and, therefore, less contextualized. Co-constructed strategies are the result of a process in which the teacher and learner respond to context-based task demands and together create a strategy that addresses the task at hand. In these studies, students were taught how to construct strategies that addressed immediate academic needs and involved the use of cognitive and metacognitive strategies. Researchers found that students could learn to construct strategies that addressed tasks, increase their

metacognitive knowledge about tasks, monitor their learning success, and become actively involved in strategy development and generalization in comparison to students who did not participate in the SCL instruction. These differences were statistically significant at the .05 level. However, measures of improved literacy outcomes in areas such as reading, writing, or math were not obtained. Thus, the effects of SCL on literacy outcomes are unknown.

The think-aloud strategy has been examined as an intervention for adult struggling readers by Berne (2004). In an analysis of the effects of using think-aloud protocols with community college students, the author questions the practice as an instructional method in terms of improved comprehension monitoring and reading proficiency. Think-aloud is designed to improve metacognitive and cognitive learning through student engagement in tasks that are structured and supported by an expert reader model. In an intact-class pre-post test pilot study, Berne taught students how to use think-aloud to monitor their comprehension of text. However, students in this study struggled with understanding the difficult text they were reading using think-aloud. The lack of basic skills seemed to prevent students from fully embracing and using think-aloud to improve comprehension. Also, their history of reading failure may have inhibited their willingness to participate in reading- and thinking-aloud activities. Thus, although widely used with children and adolescents, use of think-aloud with adults may be dependent on the initial reading skill level of the students and their willingness to publicly read and think aloud.

In a study designed to measure the effects of explicit instruction on learning proofreading for spelling accuracy intervention, McNaughton, Hughes, and Clark (1997) found that, overall, spelling accuracy improved, but not enough to enable the students with LD to reduce spelling errors to a level equal to that of their non-LD peers. Only one of five conditions resulted in significant student performance gains in spelling. Specifically, students who were explicitly taught to use word processing with embedded spell-check statistically outperformed students who (a) wrote by hand with no additional support, (b) wrote by hand and used a print dictionary, (c) wrote by hand and used a handheld spell-checker, or (d) used word processing with no spell-checker. Thus, in terms of proofreading for spelling errors, students were more efficient in correcting spelling errors and preferred the word processing with spell-check condition over the other treatments. Although participant spelling skills did not improve to a point where they spelled as proficiently as their non-LD peers, participants were able to produce improved writing products with fewer spelling mistakes, thus supporting improvement in overall writing skills.

In a study designed to measure the effects of a note-taking strategy on the ability of college students with LD to

improve their lecture note-taking skills, researchers found that a pause and reflect procedure significantly improved students' ability to take and remember lecture notes (Ruhl, Hughes, & Gajar, 1995). In a quasi-experimental design, students with LD and students without LD were presented lectures in which a video lecture was paused for 2 min at logical points. Students then discussed the lecture in dyads and answered questions about vocabulary and concepts.

The pause procedure significantly improved student performance on measures of immediate recall of content and performance on short-term content knowledge tests. However, the procedure did not improve long-term recall as measured by researcher-developed tests of lecture content. The study did not discuss whether pausing the lecture or involvement of students in peer discussion groups enhanced the performance of both groups. However, pausing lectures and providing students with the opportunity to think about and discuss the lecture with peers seems like a promising practice that both engages students in the lecture process and supports clarification of knowledge.

In a follow-up study, Ruhl and Suritsky (1995) tested whether the addition of a lecture outline to the pause procedure would produce even greater gains. Researchers found that the pause procedure condition alone had more benefit than the pause and outline condition for the immediate recall of facts. The pause procedure alone was also more beneficial than the other conditions when completeness of notes was measured. Researchers concluded that the outline may have acted as a distraction during note taking. However, the follow-up study did provide converging evidence that explicit instruction with the pause procedure is an effective practice for taking notes by college students with LD.

The effectiveness of a cognitive writing strategy was investigated in a study of ABE students attending GED preparation classes. The students attended writing classes two or three times a week for about 3 to 4 weeks. All students had a writing goal of passing the GED essay-writing exam. They were taught to use writing strategies found effective for school-age students that included strategies for planning, evaluating, and revising essays. Instruction was explicit with clear explanations of all writing strategies, modeling of the strategies using instructor think-aloud, scaffolded practice, and student mastery of each strategy. Using a multiple-baseline design across participants, the researchers found instruction in the writing strategies to be effective in significantly improving the writing skills of three participants as measured by developer-made measures of writing proficiency. The findings of this study extend the considerable body of research that supports writing strategy instruction as an effective intervention for students in Grades 2 through 12 (Graham & Perin, 2007a) to ABE students participating in GED programs.

Technology-based interventions. Research on the use of technology to support instruction for adults with LD is an

emerging field. Several studies have been conducted to measure the impact of technology-based interventions, including using websites as motivating factors, assistive technology such as text-to-speech, speech recognition software, videodisc-based instruction for teaching algebra, and multisensory presentation of print (e.g., Coiro, 2003; Johnson & Hegarty, 2003; Kitz & Thorpe, 1995; Leu, 2002; Silver-Pacuilla, 2006). One of the most recent innovations in technology-supported instruction is "new literacies" (Leu, 2002). New literacies include the skills, strategies, and self-regulation required to read, write, and learn using Internet technologies and information that prepares students to communicate in a rapidly changing world (Leu, 2002). The research supporting these technology-based instructional supports is discussed below.

In a technology-based intervention study, Johnson and Hegarty (2003) interviewed and observed adults with LD use the Internet to find and use information. In this qualitative study, student motivation for using the Internet was assessed. Students were observed as they navigated the Internet and accessed text on multiple websites. According to the authors, measures of motivation showed that students liked working on the Internet and put forth effort to learn in that environment. Furthermore, observations of the students as they attempted to utilize the resources of the Internet indicated that they were frustrated in finding information and unskilled in the skills and strategies needed to obtain information. The authors suggest that adults with disabilities need instruction in strategies for reading website text and in navigation within sites. Thus, although the Internet was seen as a motivating learning tool, adults with LD seem unprepared to take advantage of learning in this environment (Johnson & Hegarty, 2003).

Silver-Pacuilla (2006) also found technology to engage adult learners with LD attending an ABE program. This project explored the efficacy of supported access to assistive technology to improve the literacy skills of adults with LD. The program was a supplement to regular adult education course work. Silver-Pacuilla studied whether students increased their engagement in learning when using multisensory print through text-to-speech and speech recognition software and whether this had an impact on literacy skills. A total of 10 students participated in the study. An exploratory research design was used involving case studies, reflective conversation, and focus groups. This mixed design model was utilized to analyze the impact of technology on the motivation of adults with LD to access information. The author stated that students felt that assistive technology could make self-study more effective and rewarding, more so than they had experienced in the past. The students felt that they were more engaged in learning, more organized, and better able to engage in self-study with the use of technology.

Kitz and Thorpe (1995) studied the effectiveness of a videodisc program designed to teach college students with LD algebra. The videodisc intervention was built with the principle of direct instruction embedded with the program. Direct instruction in this case included mastery learning of skills and components, quizzes and feedback, and extensive review, all embedded within a highly structured curriculum. Students in the videodisc condition were compared to students in a traditional instructor-taught algebra class. Specific units in algebra were taught in both conditions. Students in the videodisc condition significantly outperformed comparison group students on measures of lesson content. In addition, the videodisc group earned significantly higher grades in the college algebra course and on two measures of algebra skills and knowledge. There were significant differences on measures of algebra skills and on course grades in favor of the videodisc condition. The results of this study show promise for technology-based interventions to engage students in learning and improve basic math skill performance through extensive practice and feedback.

The ever-increasing use of technology to access information is changing the way we think about instruction for adults with LD. Research in this area may help the field improve the literacy support provided to adults with LD. Furthermore, the findings of Johnson and Hegarty (2003) indicate that adults with LD will need to learn new ways to process the abundance of information they encounter in an online environment to take full advantage of the motivating factors associated with learning on the Internet.

An emerging knowledge base in what Leu (2002) and colleagues at the University of Connecticut have termed new literacies is challenging our assumptions about the strategies needed to support comprehension of online information. New literacy research is underpinned by the belief that reading comprehension in an online environment involves different processes than text-based reading. Although there may be clear links to text-based comprehension strategies such as questioning, summarizing, making inferences, and clarifying, these strategies may require different thought processes when reading in an online environment (Coiro, 2003). Furthermore, the Internet provides opportunities for interacting with new text formats such as hypertext and interactive multiple media, and the reader may have different motivations and purposes for reading in an online environment. These factors may change the way the reader approaches the reading task. Although the findings from experimental research studies evaluating the efficacy of interventions designed to improve online comprehension have yet to be reported, practitioners who work with adults with LD should be aware of the implications for instruction of the shifting literacy demands of a new literacy environment. Those who work with adults with LD should explore the use of technology-based interventions as they seem to hold promise for improving the literacy levels of

adults with LD (e.g., Bethell & Miller, 1998; Engstrom, 2005; Johnson & Hegarty, 2003; Silver-Pacuilla, 2006).

Instructional feasibility. If explicit instruction is effective with adults with LD, as research seems to indicate, a question remains as to whether adult educators can and will use explicit instruction with their adult students. To answer that question, Mellard and Scanlon (2006) investigated the feasibility of using explicit instruction with adults with LD. In the study, the authors evaluated the instruction in adult education centers using ecobehavioral assessment with four adult educators' classrooms. Ecobehavioral assessment is an observational method of classifying behaviors of target respondents in which observers code student and instructor behavior. The MS-CISSAR instrument, titled *Mainstream Special Education Version of the Code for Instructional Structure and Student Academic Response* (Carta, Greenwood, Schulte, Arreaga-Mayer, & Terry, 1988), was modified to assess instructor and learner behaviors.

The researchers found that instructors could learn and would use an instructional model that was vastly different from what typically occurs in adult educator classrooms. Teachers engaged students in more discussion about ways to learn information and spent significantly more time in academic and think-aloud talk as opposed to what typically happens in adult educator classes. Typical instruction in this study was found to be one-to-one tutoring help (92% of the time) in which students were helped with assignment completion with little small- or large-group instruction in which instructors took the lead and provided explicit instruction. The authors concluded that explicit instruction with a metacognitive focus was a viable format for instruction in adult educator classrooms and that students obtained significantly more instruction in those classrooms. This initial pilot study shows that explicit instruction is a promising and feasible practice in adult educator classrooms.

Recently, the National Institute for Child Health and Human Development Office of Vocational and Adult Education and the National Institute for Literacy sponsored research efforts for adults in basic education and GED programs. These rigorous experimental studies involve studying the effects of explicit instruction models on the literacy performance of adults in basic education and GED programs. The participants in these studies include adults with LD. Although results are yet to be fully analyzed and published, this national research effort should do much to inform the field as to what instructional methods and content are effective for adults in ABE and GED centers.

How Can We Best Deliver Instruction to Adults With LD?

Currently, most evidence supports intensive instruction as a defining feature of the service delivery model most effective for adults with LD. Intensive instruction means instruction

that is delivered in a one-to-one or small-group format and over an extended period of time. Evidence supports the notion that instruction delivered in this manner and that is pedagogically explicit is the most effective in producing significant literacy skill gains (e.g., Allsopp et al., 2005; Butler, 2003; Hock, 1998; Kitz & Thorpe, 1995; Massengill, 2003; Massengill, 2004; Zawaiza & Gerber, 1993). Explicit instruction delivered in a one-to-one format is very different from a one-to-one assignment completion model in which instruction is limited to finding correct answers to assignments or independent work. Thus, instructional arrangements that support explicit instruction and provide intensive, ongoing instruction seem likely to result in learning gains for adult learners with LD.

Intensive tutoring is one instructional arrangement that holds promise for delivery of intensive instruction. Tutoring, in some form, is the service most often provided to college students and adults (Bigaj, Shaw, Cullen, McGuire, & Yost, 1995; Keim, McWhirter, & Bernstein, 1996; Mellard & Patterson, 2008; Mellard & Scanlon, 2006; Mohr, 1991; Vogel, Hruby, & Adelman, 1993; Zaritsky, 1989). The usual outcome of this service is immediate success. However, learners can become dependent on tutors for success (Brinckerhoff, Shaw, & McGuire, 1993).

Tutoring models that can incorporate what we know about explicit instruction can be positive in terms of student independence and academic success. For example, the strategic tutoring model (Hock, Deshler, & Schumaker, 2000) requires that the tutor follow a four-phase instructional sequence when a student needs assistance with an academic task. In Phase 1, the tutor assesses the student's current approach to the task by asking questions to determine the nature of the strategies the student currently uses. Once the tutor has clarified the assignment and helped the student identify strategies the student currently uses, he or she discusses the rationale for learning a more effective strategy. Then, the tutor asks the student to commit time and effort to learn a more effective strategy. In Phase 2, the tutor co-constructs with the student a learning strategy that addresses the student's immediate academic need. The tutor carefully explains each step of the strategy and checks to make sure that the student understands each step. In Phase 3, the tutor models the strategy for the student by thinking and problem solving aloud on a task similar to the student's current assignment. The tutor also checks the student's understanding of how to use the strategy by guiding the student through application of the strategy to the student's current assignment. Eventually, the tutor guides the student through application of the strategy to current assignments and provides positive and corrective feedback, gradually helping the student to become independent in strategy application. Finally, in Phase 4, the tutor discusses and plans with the student ways the student can independently transfer the newly acquired strategy to future and similar academic tasks.

In a study of the effects of Strategic Tutoring (Hock, 1998), 28 academically at-risk first-year university students, including five students with LD and one with ADHD, were assigned to strategic tutors and received weekly subject-area tutoring in English Composition 101. The mean ACT composite score for this group was 17.74 (ACT composite scores are reported on a scale of 1–36). The reading comprehension mean score was in the 36th percentile as measured by the *Stanford Diagnostic Reading Test* (Karlsen & Gardner, 1995). A comparison group of 28 higher achieving students was chosen as a contrast condition. The comparison students had scores on all measures that were significantly higher than students in the Strategic Tutoring condition. For example, the comparison group mean ACT composite score was 23.39.

Students in the experimental group met with their strategic tutors for approximately 3 hr per week for 3.5 months for English Composition 101 support. During these tutoring sessions, students and tutors worked on preparing for or completing actual theme-writing assignments. Tutors imbedded theme-writing strategy instruction while they provided support for current assignments. Students in the comparison group worked individually on their English Composition 101 assignments but had access to other university tutors.

Students in the experimental condition reported that they learned strategies that tutors reported teaching to them. They also reported learning a relatively high percentage of steps related to those strategies (79%). In addition, results indicate that underprepared college students, including college students with LD, can be taught a writing strategy by means of instructional tutoring and can generalize that strategy to a challenging college course. Six of the students who participated in the study were students with LD or ADHD. The findings of the study indicated that these students can learn the strategies reported as taught to them by their tutors and earn grades comparable to those of their nondisabled peers in challenging courses (Hock, 1998).

Research With Adolescents With LD

A considerably larger body of intervention research exists for adolescents with LD. For the purpose of this review, we highlight the findings of literature reviews, syntheses of research, and results of meta-analyses conducted on adolescents with LD (e.g., Gersten et al., 2001; Swanson, 1999; Swanson & Hoskyn, 1998; Swanson & Sachse-Lee, 2000; Torgesen, 2005; Vaughn et al., 2000). Although transferring the results of adolescents with LD intervention studies to the population of adults with LD must be done with caution, the findings may help inform instruction for the adult population. For instance, a study on the effectiveness writing strategy instruction for adult literacy learners found that

teaching adults writing strategies that have been found to be effective with school-age students was effective for the adult learners as well (MacArthur & Lembo, 2009). Those instructional practices are highlighted next.

Teaching Content to Older Adolescents With LD

Teaching content to high school adolescents with LD has been the focus of much of the work conducted at the University of Kansas Center for Research on Learning (KU-CRL). A line of work called Content Enhancement (CE) has been developed and tested at the KU-CRL. CE is composed of planning and teaching routines. These routines include ways to select and plan for content instruction and ways to explicitly teach content to diverse groups of students using graphic organizers (Lenz, Deshler, & Kissam, 2004). Graphic organizers have been found to be effective in helping adolescents who struggle with learning acquire critical content necessary for improved knowledge of the world (see Hall & Strangman, 2002, for a review of the research supporting the use of graphic organizers).

CE routines are used by teachers to teach curriculum content to academically diverse classes in ways that all students can understand and remember key information. CE is an instructional method that relies on using powerful teaching devices to organize and present curriculum content in an understandable and easy-to-learn manner. Teachers identify content that they deem to be most critical and teach it using a powerfully designed teaching routine (explicit instruction) that actively engages students with the content. Some CE routines help teachers think about and organize content, then present it in such a way that students can see the organization. Others help teachers explain text, topics, and details. A third group helps teach complex concepts so students gain a deep understanding and develop a shared vocabulary for talking about important information. A final group of routines help students complete work in the classroom. All of the routines promote direct, explicit instruction. This type of instruction helps students who are struggling, but it also facilitates problem solving and critical-thinking skills for students who are doing well in class (Lenz et al., 2004).

CE teaching routines have been validated with adolescents with LD in secondary schools settings (e.g., Bulgren & Lenz, 1996; Deshler et al., 2001; Lenz & Bulgren, 1995). Findings from these studies show that critical content can be taught to students in classes characterized by diversity. One of the key outcomes of explicit instruction using CE has been the significant growth of content knowledge by all students in the classes, including students with LD (e.g., Bulgren, Deshler, & Schumaker, 1997; Bulgren, Lenz, Schumaker, Deshler, & Marquis, 2002; Bulgren, Schumaker, & Deshler, 1994). Growth in content knowledge is critical

if adults with LD are to successfully meet the requirements of GED exams, which place heavy demands on knowledge of content. Thus, teaching them content through the use of CE routines may help adults with LD meet the requirements of the GED.

Teaching Students Strategies for Literacy

Teaching students strategies for reading, writing, and remembering important information has been found to be effective for adolescents with LD (Gersten et al., 2001; Swanson, 1999; Swanson & Hoskyn, 1998; Swanson & Sachse-Lee, 2000; Vaughn et al., 2000). These strategies include the cognitive processes efficient readers employ when they read narrative and expository text and the metacognitive and self-regulatory strategies they use when they select, monitor, and evaluate their understanding of text (Deshler & Schumaker, 1988; Gersten et al., 2001; Swanson, 1999; Swanson & Hoskyn, 1998; Torgesen et al., 2007; Vaughn et al., 2000). In addition, the effectiveness of teaching adolescents with LD writing strategies to enhance their writing competencies is well documented in the literature (e.g., Graham & Harris, 2003; Graham & Perin, 2007a; Hallenbeck, 1996). Recently, this body of research has been bolstered by a meta-analysis conducted by Graham and Perin (2007b). In this analysis of multiple research studies conducted with adolescents, the authors found that teaching adolescents strategies for writing, summarizing information, using peers to provide feedback on writing products, and setting goals for writing all produced high effect sizes. Although this body of research was conducted with adolescents at various levels of learning proficiency, many of the participants were adolescents identified as special needs learners.

Central to teaching adults and adolescents with LD content, skills, and strategies is the explicit nature of the instruction. Explicit instruction is characterized by its inclusion of clear explanation of specific skills and strategies supported by expert models of the skills or strategies being applied in the context of tasks familiar to students. In addition, extensive practice of skills and strategies in context with scaffolded support has been found to be effective in guided, partner, and independent structures (Swanson & Hoskyn, 1998; Torgesen, 2005). In addition, practice is greatly enhanced when students are provided with positive, corrective, elaborated feedback (Kline, Schumaker, & Deshler, 1992). Thus, research conducted with adolescents with LD holds promise for adults with LD when the focus of instruction is on teaching important content, teaching reading and writing skills and strategies, and using explicit instruction.

Discussion

This article began with the goal of answering several key questions. The first question was, “What evidenced-based

interventions and practices are available to practitioners who work with adults with LD?” The second question was, “How can we best deliver instruction to adults with LD?” Finally, and to supplement the limited database on adults with LD, we asked, “What research-based instructional practices have been found to be effective with adolescents with LD that hold promise for adults with LD?” This review of the literature on what works with adults with LD, supplemented by highlights from the literature on what works with adolescents with LD, has helped to begin to frame answers to those questions. Transferring the results of intervention studies with adolescents and college students with LD to the population of adults with LD attending ABE and GED programs must be done with caution and is, without question, a limitation of this review. However, the findings may help inform instruction for the adult population.

Although rigorous research on what works for adults with LD and under what conditions continues to be limited, evidence does exist to support several practices. That evidence is highlighted below.

Explicit instruction continues to be a practice supported by research for adults and adolescents with LD. Adults with LD who struggle with learning respond positively to this instructional approach. Teachers can improve student learning of skills, strategies, and content by (a) providing clear explanations of content, skills, learning routines, and strategies, (b) modeling the cognitive and metacognitive behaviors associated with learning, (c) co-constructing with students the strategies and routines that make learning more efficient and effective, (d) engaging students in extensive practice that includes both guided and independent activities and elaborated feedback on each performance, and (e) providing support for planning both proximal and distal generalization of skills, knowledge, and strategies for learning.

Although much of the extant research on tutoring and strategy instruction is limited to adolescents and college students with LD, the nature of these interventions is defined by the explicitness of the instruction that supports teaching and learning. Explicit instruction used to teach reading, writing, mathematics, and study skills is foundational to student success whether that instruction is with adolescents, college students, or adults attending ABE or GED programs. Thus, the principle of explicit instruction seems robust across age groups and settings for individuals with LD.

In addition, explicit instruction that encourages student engagement and conversations about strategy usage and balances explicit instruction with co-construction and student engagement seems to enhance learning. As instructional practices for students with LD continue to evolve, practices in which students share in the construction of strategies and knowledge that address specific demands and contexts seem worthy of consideration (Allsopp et al., 2005; Butler, 1995, 2003; Hock, 1998; Rapp, van den Broek, McMaster, Kendeou, & Espin, 2007).

Instruction in a variety of skills, strategies, and CE routines has been found to be effective in teaching adults with LD. For example, studies have found instruction in math, reading, learning content, writing, note taking, and regulating metacognitive behaviors effective when content instruction is done explicitly. The adult with LD population has shown that instruction must be targeted and powerful and delivered in a manner that allows learners to practice extensively and receive elaborated feedback on their practice attempts. Elaborated feedback is feedback that is individualized (given to one person at a time), immediate (as soon after the performance as possible), positive (at least two positive statements are made about the performance), and corrective (specific feedback on an aspect of the performance that needs to be corrected is given; Kline, Schumaker, & Deshler, 1991). It is important that explicit instruction has been found to be feasible for use by teachers in adults learning centers.

Certain instructional arrangements that support intensive instruction and the teaching of important content, skills, and strategies have been found to be effective with adults with LD. One-to-one or small-group arrangements have been found to support intense and explicit instruction. However, more important than one-to-one or small-group delivery models is the type of instruction delivered in those arrangements. Poor instruction in one-to-one arrangements results in poor learner outcomes similar to the poor learner outcomes attained when poor instruction is delivered in larger groups.

One-to-one or small-group instruction that is intensive, engaging, and explicit in nature has been found to result in significantly larger gains than other types of less intensive or independent learning. Tutoring support can result in significant gains in literacy performance and skills when students are explicitly taught strategies that are responsive to their current learning demands. The effectiveness of tutoring support seems promising when explicit instruction is used to teach cognitive and metacognitive strategies and is delivered in the context of current course work.

The use of instructional technology with adults with LD is a promising practice. The use of technology seems to be motivating to adults with LD, and they engage learning tasks more readily, at least initially. The technology interventions reviewed in the article, although helpful, indicate that adults with LD will require instruction in how to efficiently and effectively make use of technology to learn. Access to technology, although motivating, is not sufficient without related instruction in how to use these tools.

The “Big Take Away” for Practitioners

As demonstrated in this review of the literature, several instructional practices can be effective in addressing the academic needs of adults with LD in postsecondary settings such as ABE, GED, and college programs. Although the list

of interventions and practices is quite limited, practitioners can incorporate proven practices into their daily instruction. For example, using *explicit instruction* when teaching skills and strategies, *teaching context-based strategies* to address literacy needs, delivering instruction in an *intensive and ongoing* fashion, and being mindful of the potential (and limitations) that using *practices proven effective with older adolescents* has for adults with LD are effective ways to improve learner outcomes. The “big take away” is that all these instructional practices and interventions require well-planned, continuous, professional development that moves knowledge off the printed page and into the classroom. Thus, practitioners need intensive support as they weave new practices into their existing “instructional toolbox.”

There is much to learn about effective practices for adults with LD. Although there are instructional practices and interventions that produce significant gains in learner outcomes, the question, “What works with whom and under what conditions?” remains largely unanswered. As a field, we should work toward the goal of delivering instruction to adults with LD that has a strong research base or carefully evaluate interventions when no such research base exists.

A Note on Diagnosis of LD and Describing Participants in Research Studies

In 1992, and in response to the need to add clarity to research conducted with individuals with LD, the Council for Learning Disabilities updated guidelines that set standards for defining the term *learning disabilities* in reports and studies conducted with individuals with LD (Rosenberg, et al., 1993). Those guidelines describe the individual characteristics that should be included when describing participants with LD in research studies. The review of the literature conducted in this article shows that, as a field, we have yet to adopt those guidelines when reporting research conducted on those considered having LD. With the exception of the Sitlington and Frank (1990) study, none of the articles reviewed in the chapter followed the suggested guidelines. Researchers should take care to fully describe or demand full descriptions of the participants in research studies so more informed judgments can be made in regard to how LD was determined.

Although most college students with LD have, at some point in their lives, been documented or treated as having LD, many ABE participants self-report LD and lack formal documentation or are vague in their understanding of any previous diagnosis. Thus, adult education providers must rely on self-report data to determine existence of LD. The reliability and validity of self-report data are somewhat contentious (e.g., Chan, 2009; Cook & Campbell, 1979). For instance, individuals do not reliably report physical data such as height and weight; they overestimate height and underestimate weight. However, individuals do reliably self-report information about health issues and even their

involvement in delinquent or illegal behaviors (Crocket, Schulenberg, & Petersen, 1987; Spitzer, Kroenke, Williams, & the Patient Health Questionnaire Primary Care Study Group, 1999). Adults may also reliably report information about LD. In an extensive study of community college students ($N = 717$), Mellard and Reduque (1993) found that 92.6% of the adults in community college settings with a clinically documented diagnosis of LD reliably reported that they had a disability. Of the same group, 88% reported that they had LD. Thus, a self-report measure of LD was a reliable indicator of the existence of a disability in general and LD in specific. In addition, the reliability of self-report data remains accurate over time as school-age children continue to report LD as adults, supporting the persistence of LD (Gerber et al., 1990). Caution is warranted in generalizing these findings to adults in ABE settings, but the results add some credibility to the reliability of self-report of LD for this population.

Author's Note

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