High-Leverage Practices in Special Education

Instruction: Research Syntheses

Teaching students with disabilities is a strategic, flexible, and recursive process as effective special education teachers use content knowledge, pedagogical knowledge (including evidence-based practice), and data on student learning to design, deliver, and evaluate the effectiveness of instruction. This process begins with well-designed instruction. Effective special education teachers are well versed in general education curricula and other contextually relevant curricula, and use appropriate standards, learning progressions, and evidence-based practices in conjunction with specific individualized education program (IEP) goals and benchmarks to prioritize long- and short-term learning goals and to plan instruction. This instruction, when delivered with fidelity, is designed to maximize academic learning time, actively engage learners in meaning-ful activities, and emphasize proactive and positive approaches across tiers of instructional intensity.

Effective special education teachers base their instruction and support of students with disabilities on the best available evidence, combined with their professional judgment and knowledge of individual student needs. Teachers value diverse perspectives and incorporate knowledge about students' backgrounds, culture, and language in their instructional decisions. Their decisions result in improved student outcomes across varied curriculum areas and in multiple educational settings. They use teacher-led, peer-assisted, student-regulated, and technology-assisted practices fluently, and know when and where to apply them. Analyzing instruction in this way allows teachers to improve student learning and their professional practice.

HLP11	Identify and prioritize long- and short-term learning goals.
	Teachers prioritize what is most important for students to learn by providing meaningful access to and success in the general education and other contextually relevant curricula. Teachers use grade-level standards, assessment data and learning progressions, students' prior knowledge, and IEP goals and benchmarks to make decisions about what is most crucial to emphasize, and develop long- and short-term goals accordingly. They understand essential curriculum components, identify essential prerequisites and foundations, and assess student performance in relation to these components.

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Special education teachers develop learning goals for students on a long- and short-term basis; these goals determine the focus of instruction. Learning goals include those for students' IEPs as well as for specific subjects (e.g., what to emphasize in math) or sub-areas (e.g., teaching particular concepts and skills in fractions, comprehension of expository text, linear measurement). In prioritizing these goals, teachers identify the most essential, powerful, equitable, and crucial learning outcomes. Multiple policy and practice factors influence this process.

The Individuals with Disabilities Education Act (IDEA, 2006) requires that IEP goals relate to the student's present level of academic achievement and functional performance (20 U.S.C § 1414 [d][1][A][i][I]), and that students with disabilities be provided access to the general education curriculum with appropriate accommodations (IDEA regulations, 2012, 34 C.F.R. § 300.39[3][ii]). Like IDEA, the Every Student Succeeds Act (ESSA; 2015), the successor to the No Child Left Behind Act of 2001, requires states to "promote the involvement" of students with disabilities, including those with significant cognitive disabilities, in the general education curriculum (U.S. Department of Education, 2016, p. 24). ESSA also

> imposed a cap to limit to 1.0 percent of the total student population the number of students with the most significant cognitive disabilities to whom the State may administer an alternate assessment aligned with alternate academic achievement standards in each assessed subject

area. (U.S. Department of Education, 2016, p. 2)

Thus, 99% of students with disabilities in a given population should take the statewide assessments or standards-based tests in each subject area.

Over 40 states and the District of Columbia have adopted the Common Core State Standards (CCSS). The CCSS "Applications to Students with Disabilities" document (CCSS Initiative, n.d.) clarifies the applicability of these standards to students with disabilities; states and districts have developed policies and procedures to link student IEP goals to the CCSS (e.g., Hanselman, 2013; Office of the Superintendent of Public Instruction & Washington Education Association, n.d.). School districts also disseminate pacing guides that identify what is to be taught in a grade, the sequence in which it should be taught, and a timeline (e.g., Tennessee Curriculum Center, 2011–2016).

Finally, there is extensive literature in special education about the need for and success of instruction in foundational skills (e.g. L. S. Fuchs et al., 2015; Moats, 2014; Vaughn, Danielson, Zumetta, & Holdheide, 2015; What Works Clearinghouse, 2009a), even though grade-level standards many not focus on them. All of these factors need to be considered when determining students' goals and objectives so that students with disabilities receive instruction in areas based on their specific strengths and needs while also being provided the maximum opportunity to meet the rigorous standards to which other students are held.

Research Support

In 2000, the National Reading Panel identified critical areas of reading instruction, and similar recommendations have been made for writing (e.g., Graham & Perin, 2007) and mathematics (e.g., U.S. Department of Education, 2008). The Institute for Education Sciences (IES) Practice Guides, based on research reviews using WWC guidelines, also make instructional recommendations. For example, the WWC Practice Guide for mathematics (2009b) recommended an in-depth focus on whole numbers in Grades K–5 and on rational numbers in Grades 4-8, noting that "fewer topics, in more depth, [is] more important for students who struggle with mathematics" (p. 18). Concerning primary students struggling in reading, the recommendation was to focus on up to three foundational skills (WWC, 2009a).

Another source of guidance is the identification of "big ideas," defined in mathematics as "a statement of an idea that is central to … learning…, one that links numerous mathematics into a coherent whole" (Charles, 2005, p.10). Learning progressions, or *developmental learning trajectories* (e.g., Consortium for Policy Research in Education, 2011; Heritage, 2009; Hess, 2011), also help teachers identify and select key prerequisites to teach, as does the scope and sequence of strong curriculum. L. S. Fuchs and colleagues (2015) studied the effect of a fraction intervention that reduced the range of topics

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and found students in the intervention group outperformed those who received instruction in the general education classroom, in several measures of fraction knowledge and skills. Although the researchers did not focus specifically on prioritizing goals, this research involved prioritizing what was taught (along with how it was taught)—in this case based on deep understanding of the domain. Intervention research such as this points to the importance of well-thought-out instructional focus areas.

Research addressing instruction with students with more severe intellectual disability also informs how teachers can prioritize learning goals. Browder and colleagues (2003), in a review of alternate assessment performance indicators, noted increased expectations for academic learning along with the need to address functional skills, communication and inclusion, and self-determination. Other studies (e.g., Collins, Hager, & Galloway, 2011; Karl, Collins, Hager, & Ault, 2013) have demonstrated the effectiveness of combining instruction in core content based on alternative standards with instruction in functional skills, rather than choosing between then.

Conclusion

Prioritized short- and long-term learning goals drive instruction, although grade-level standards and mandates for enabling students' access to the general education

curriculum influence teachers' decisions about prioritizing. However, all standards are not of equal importance (Chard, n.d.); the same can be said of conceptual understandings and skills. In addition, there is a need for out-of-level instruction for some students (L. S. Fuchs et al., 2015); teachers need to identify and prioritize students' goals around critical content (Doabler et al., 2012) while linking to their present level of performance, strengths, and needs.

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HLP12	Systematically design instruction toward a specific learning goal.

Teachers help students to develop important concepts and skills that provide the foundation for more complex learning. Teachers sequence lessons that build on each other and make connections explicit, in both planning and delivery. They activate students' prior knowledge and show how each lesson "fits" with previous ones. Planning involves careful consideration of learning goals, what is involved in reaching the goals, and allocating time accordingly. Ongoing changes (e.g., pacing, examples) occur throughout the sequence based on student performance.

Students with disabilities require more systematically designed instruction than their typically developing peers (Archer & Hughes, 2011). Researchers (e.g., Brophy & Good, 1986; Gersten, Schiller, & Vaughn, 2000; Marchand-Martella, Slocum, & Martella, 2004; Rosenshine & Stevens, 1986; Simmons, Fuchs, Fuchs, Mathes, & Hodge, 1995) have identified at least 16 elements of systematically designed instruction to include within and across lessons and units. Three elements—clear instructional goals, logical sequencing of knowledge and skills, and teaching students to organize content—are essential core components of systematic instruction.

Teachers design instruction that will help students meet challenging yet attainable learning goals that are stated clearly, concisely, and in measurable terms (Hattie, 2008). Instructional content is selected and sequenced logically to support or scaffold student learning. Less complex knowledge and skills are taught before more complex outcomes, information that is used frequently in the curriculum is taught prior to content that appears less often, prerequisites are mastered before higher level knowledge and skills, unambiguous information is taught before less clear material, and content and skills similar in form or function are taught separately before students are required to

make independent discriminations among them (Archer & Hughes, 2011). Teachers make explicit connections among content and skills within and across lessons to allow students to link prior and new knowledge; see relationships among facts, concepts, and principles; and organize content to maximize retention, deepen understanding, and facilitate application.

Research Support

Hattie (2008) summarized findings from 11 meta-analyses on learning goals and concluded that achievement increases when teachers set specific challenging goals (rather than "do your best" goals) and structure learning activities so students can reach these goals. Overall effects varied and were highest when learning goals and success criteria were articulated and shared with students, and lowest when used for lesson planning. L. S. Fuchs and Fuchs (1986) also noted that challenging goals were more effective for students with disabilities and reported effect sizes of $d = 0.63$ and $d = 0.67$ for long- and short-term goals, respectively. Klein, Wesson, Hollenbeck, and Alge (1999) found that, for students with disabilities, student commitment to goals was both helpful and necessary for learning.

Empirical support for well-sequenced lesson and unit design can be found in the literature relating to direct instruction (DI; Adams & Engelmann, 1996; Marchand-Martella et al., 2004). Hattie (2008) reviewed findings from four meta-analyses on DI and found an overall effect size of $d = 0.59$. Effects were similar for typically achieving students ($d = 0.99$) and those with or at risk for disabilities ($d = 0.86$), for word attack ($d = 0.64$) and comprehension ($d = 0.54$) skills, and for elementary and high school students. DI effects were higher for reading ($d = 0.89$) than for math ($d = 0.50$). Forness, Kavale, Blum, and Lloyd (1997) summarized findings from 18 meta-analyses on special education practices and found DI to be the only one of seven interventions to show strong evidence of effectiveness. The Best Evidence Encyclopedia (n.d.) has identified DI as one of six instructional practices with strong evidence of effectiveness.

Hattie (2008) also reviewed findings from 16 meta-analyses on the effects of visual content displays on student learning. Eleven meta-analyses on advance organizers produced a mean effect size of $d = 0.41$, and five meta-analyses on graphic organizers and concept maps produced an average effect size of $d = 0.57$. Effects were greater when instruction focused on central rather than detailed ideas (Nesbit & Adesope, 2006), displays were provided after initial content exposure (Moore & Readence, 1984), and students were provided terms for visual displays (Horton et al., 1993). Effect sizes were largest among students least

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likely to understand relationships between lower and higher order constructs (Horton et al., 1993; Kim, Vaughn, Wanzek, & Wei, 2004; Nesbit & Adesope, 2006; Vasquez & Caraballo, 1993) and mixed for teacher- versus student-generated displays (Kim et al., 2004: Nesbit & Adesope, 2006).

Conclusion

Although considerable research has been conducted on learning goals, lesson sequencing, and visual content displays, few studies have examined these practices in isolation. As such, it is difficult to determine how much each practice contributes to overall intervention effectiveness. More systematic component analyses are needed (C. H. Kennedy, 2005). However, these practices are not likely to be applied in isolation; they usually are used collectively as part of well-designed lessons and units. Because even the best designed instruction may not result in satisfactory outcomes for all students, it is critical that student learning be monitored within and across lessons. If students are not making satisfactory progress, then inadequate lesson goals, poor lesson sequencing, or ambiguous connections might be examined as possible contributors.

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HLP13	Adapt curriculum tasks and materials for specific learning goals.
	Teachers assess individual student needs and adapt curriculum materials and tasks so that students can meet instructional goals. Teachers select materials and tasks based on student needs; use relevant technology; and make modifications by highlighting relevant information, changing task directions, and decreasing amounts of material. Teachers make strategic decisions on content coverage (i.e., essential curriculum elements), meaningfulness of tasks to meet stated goals, and criteria for student success.

Special education teachers select and adapt curriculum materials and tasks so students with disabilities can meet their IEP goals. Special educators make modifications by highlighting relevant information, changing task directions, and adjusting content amount and depth (Vaughn & Bos, 2012). Material adaptations can include

- making substitutions for text material (e.g., audiotaping content, reading content aloud, using other media, working individually with students),
- simplifying text (e.g., making abridged versions, providing outlines and summaries, using multilevel supports), and

- highlighting key concepts and information (e.g., previewing content, developing study guides, summarizing or reducing content).

Teachers may substitute text material when students are unable to read and extract information independently and simplify and highlight content to facilitate comprehension.

Special education teachers also use *content enhancements*, a range of strategies to augment the organization and delivery of curriculum content so that students can better access, interact with, understand, and retain information (Bulgren, 2006; Deshler et al., 2001). Three examples of specific enhancements are graphic organizers, guided notes, and mnemonics.

Graphic organizers are visual–spatial arrangements of information containing words or concepts connected graphically to help students see meaningful hierarchical, comparative, and sequential relationships (Dye, 2000; Ellis & Howard, 2007; Ives, 2007). There are numerous web-based resources teachers can use in developing and customizing graphic organizers for classroom use.

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Guided notes are "teacher-prepared handouts that 'guide' a student through a lecture with standard cues and prepared space in which to write the key facts, concepts, and/or relationships" (Heward, 1994, p. 304). These are designed to actively engage students during teacher-led instruction and provide models of complete and accurate note-taking that can be used to prepare for academic assessments.

Mnemonics are memory-enhancing strategies that help students recall large amounts of unfamiliar information or make connections between two or more facts or concepts (Wolgemuth, Cobb, & Alwell, 2008). Three commonly used mnemonic techniques are letter strategies (Kleinheksel & Summy, 2003), the keyword method, and peg word strategies (Mastropieri & Scruggs, 2010). Again, numerous web-based resources (e.g., The Mnemonicizer and Spacefem's Mnemonic Generator) can help teachers create and customize mnemonics.

Research Support

Most empirical support for adapting curriculum materials and tasks is derived from research on graphic organizers, guided notes, and mnemonic strategies. Hattie (2008) reviewed findings from five meta-analyses on graphic organizers that produced an average effect size of $d = 0.57$. Instructional effects are greater when instruction focuses on the main idea rather than supporting details (Nesbit & Adesope, 2006), displays are provided after initial content exposure (Moore & Readence, 1984), and students are provided terms for visual displays (Horton et al., 1993). Kim and colleagues (2004) reported that graphic organizers

improved comprehension performance for students with learning disabilities, effect sizes were larger for researcher-developed than for standardized measures, and initial gains in comprehension were not found on generalization or maintenance assessments. The use of graphic organizers has been rated as having a "strong level of evidence" by the National Technical Assistance Center on Transition (NTACT; 2016) and the Promising Practices Network, and received a "go for it" rating by the Council for Exceptional Children's (CEC) Current Practice Alerts (Ellis & Howard, 2007).

Numerous studies, including one meta-analysis (Konrad, Joseph, & Eveleigh, 2009), have found that guided notes improve students' academic performance on retention tests at grade levels from elementary through secondary and enhance students' note-taking accuracy (e.g., Hamilton, Seibert, Gardner, & Talbert-Johnson, 2000; Musti-Rao, Kroeger, & Schumaker-Dyle, 2008; Patterson, 2005; Sweeney et al., 1999). More specifically, Konrad and colleagues (2009) reported that guided notes

- produced consistent, positive effects on students' academic performance and note-taking accuracy in Grades 4 through 12;
- had greater impact when supplemented with structured review activities (e.g., prompting questions, study guides and reflection questions, graphic organizers or other diagrams); and
- were particularly effective for students with disabilities when systematic training on their use was included.

In a meta-analysis examining the effects of mnemonics, Scruggs and Mastropieri (2000) reported that these memory-enhancing devices produced an unusually large mean effect size of 1.62 across 20 empirical studies, 19 of which involved students with learning disabilities. These findings were consistent with an earlier narrative review (Mastropieri, Scruggs, & Levin, 1985) that found that students receiving mnemonic instruction outperformed their peers on a variety of school learning tasks. A series of laboratory and field-based investigations (e.g., Scruggs & Mastropieri, 1989, 1991; Scruggs, Mastropieri, McLoone, Levin, & Morrison, 1987) showed similar positive effects for students with learning disabilities' academic performance in literacy, social studies, and science. NTACT (2016) and the Promising Practices Network have rated mnemonics as having a "strong level of evidence" for academic outcomes and CEC's Division for Learning Disabilities' Current Practice Alerts assigned mnemonics a "go for it" rating (Brigham & Brigham, 2001).

Conclusion

It is difficult to assess the strength of research support for curricular and material adaptations per se because they are used for different purposes (e.g., highlight important content, change task directions, adjust content amount and depth), include multiple instructional practices (e.g., graphic organizers, guided notes, mnemonic devices) that are used in isolation or together, and focus on individualized and ever-changing

student outcomes. There does appear to be sufficient empirical support, however, for the three content enhancement approaches described here. Additional research must be conducted on the broader intervention "package" of making curricular and material adaptations. What kinds of adaptations are made, how are they implemented with fidelity, and what impact do they have on important student outcomes? Are some types of adaptations more effective, efficient, and socially acceptable than others? What are the active procedural components in these intervention packages (C. H. Kennedy, 2005)?

There is logical support for teachers to adapt instructional materials and tasks to support specific learning goals. By substituting, simplifying, and highlighting important instructional content, teachers increase the likelihood that students, including those with disabilities, will meet these learning goals. Although teachers understand the need to make adaptations to curriculum tasks and materials for students with disabilities, research also suggests that many fail to do so (e.g., Moody, Vaughn, & Schumm, 1997; Schumm, Moody, & Vaughn, 2000; Schumm & Vaughn, 1992; Schumm, Vaughn & Saumell, 1992). Thus, attention should be focused on the actual implementation of instructional modifications and their subsequent effect on student outcomes.

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HLP14	**Teach cognitive and metacognitive strategies to support learning and independence.**

Teachers explicitly teach cognitive and metacognitive processing strategies to support memory, attention, and self-regulation of learning. Learning involves not only understanding content but also using cognitive processes to solve problems, regulate attention, organize thoughts and materials, and monitor one's own thinking. Self-regulation and metacognitive strategy instruction is integrated into lessons on academic content through modeling and explicit instruction. Students learn to monitor and evaluate their performance in relation to explicit goals and make necessary adjustments to improve learning.

Because students with disabilities do not typically use learning strategies to improve academic performance like their typically developing peers do, they must be taught explicitly to use strategies. Strategies are not step-by-step instructions; instead, a *strategy* "is a heuristic that supports or facilitates the learner" in using higher order thinking or skills (Rosenshine & Meister, 1992, p. 26). Newell (1990) noted that there are two layers of problem solving when using strategies: applying a strategy to a problem, and selecting and monitoring the effects of that strategy. Cognitive strategies (e.g., making predictions, summarizing, apply grammar rules, making meaning from context) are representative of the former, whereas metacognitive strategies (e.g., self-management and self-regulation, planning and monitoring) depict the latter. Strategies help students become "proficient problem solvers" (Montague & Dietz, 2009, p. 286) by teaching them how to self-monitor learning or behavior, recognize problem areas, create and execute solutions, and evaluate success. In short, cognitive strategy instruction teaches students how to learn (Jitendra, Burgess, & Gajria, 2011).

Strategies go across content and skill areas. Some examples of common cognitive strategies include:

- for reading comprehension, collaborative strategic reading (Vaughn et al., 2011) and text interaction strategies (e.g., summarizing, text structure, identifying main idea; Jitendra et al., 2011);

- for writing, the self-regulated strategy development (SRSD) model (Harris & Graham, 2003; Santangelo, Harris, & Graham, 2008);

- for mathematics, enhanced anchored instruction (Bottge et al., 2015), Solve It (Krawec, Huang, Montague, Kressler, & de Alba, 2013), and schema-based instruction (Jitendra & Star, 2011);

- for retention and memory, keyword mnemonic strategies and letter strategies (Fontana, Scruggs, & Mastropieri, 2007); and

- for self-management, self-monitoring (Bruhn, McDaniel, & Kreigh, 2015) and SLANT (Ellis, 1991).

These strategies are effectively taught through explicit instruction, including structured and organized lessons, modeling, guided practice, progress monitoring, and feedback (Archer & Hughes, 2011). In the modeling stage, students observe the teacher using the strategy while thinking aloud to demonstrate how skilled problem solvers approach tasks. Think-alouds also help students build their metacognitive ability (i.e., the ability to think about their thinking; Montague & Dietz, 2009).

Research Support

The vast majority of the research on cognitive strategy instruction has been conducted since the late 1990s. Researchers have developed new strategies (some of which are listed above) and conducted empirical studies to determine their impact on student

achievement. Meta-analyses on these strategies have found that as a whole they are strongly effective, and researchers in many different fields have concluded that strategy instruction is an evidence-based practice for students with disabilities (see Cook & Cook, 2013, for criteria for determining evidence-based practices).

In a synthesis of the quality of studies on cognitive strategy instruction in mathematics, Montague and Dietz (2009) found that the collected studies did not meet the recommendations for identifying evidence-based practices, but the authors noted that the reviewed studies all showed positive and promising results for students. Jitendra et al. (2011) conducted a meta-analysis of studies on cognitive strategy instruction for expository texts and found two group design studies that met the criteria for high quality and two that met the criteria for acceptable quality. The effect sizes calculated based on these studies were 1.12 (high only) and 1.26 (all four), which were both significantly different from 0. Based on this, Jitendra and colleagues concluded that cognitive strategy instruction was an evidence-based practice for teaching students with disabilities to comprehend expository text. In a meta-analysis of science instruction for students with disabilities, Kaldenberg, Watt, and Therrien

(2015) found a related moderate effect size of .64 for reading comprehension strategies (e.g., using a graphic organizer, text structure).

Two different meta-analyses on writing instruction for students with disabilities have found moderate to strong weighted effect sizes for strategy instruction: .82 (Graham & Perin, 2007), and 1.09 (Gillespie & Graham, 2014). Other researchers have found that SRSD alone definitely meets the criteria and is an evidence-based practice (Baker, Chard, Ketterlin-Geller, Apichatabutra, & Doabler, 2009). Finally, Hattie (2008) provided effect sizes for a number of cognitive and metacognitive strategies that ranged from .22 (environmental restructuring) to .85 (organizing and transforming materials).

Conclusion

Cognitive strategy instruction and metacognitive strategy instruction encompasses a range of instructional techniques designed to help students become more self-directed and independent learners. These strategies, when taught explicitly with modeling and guided practice, have been proven effective in multiple studies across content areas and disability types.

HLP15	**Provide scaffolded supports.**
Scaffolded supports provide temporary assistance to students so they can successfully complete tasks that they cannot yet do independently and with a high rate of success. Teachers select powerful visual, verbal, and written supports; carefully calibrate them to students' performance and understanding in relation to learning tasks; use them flexibly; evaluate their effectiveness; and gradually remove them once they are no longer needed. Some supports are planned prior to lessons and some are provided responsively during instruction.	

Scaffolded supports are supports provided to students that are either preplanned or provided "on the spot" and then faded or removed once they are not needed (Rosenshine, 2012); teachers gradually release or transfer responsibility to students (Pearson & Gallagher, 1983) as they become more proficient. Scaffolded supports can be provided in multiple forms including dialogue (e.g., modeling, hints, questions, partial completion of the task, informative feedback; Englert, Tarrant, Mariage, & Oxer, 1994; Palincsar & Brown, 1984), materials (e.g., cue cards, anchor charts, checklists, models of completed tasks; Rosenshine, 2012; Rosenshine & Meister, 1992), and technology (Putambecker & Hübscher, 2005). The term *scaffolded instruction* was introduced by Wood, Bruner, and Ross (1976) based on their study of parent–child interactions and defined by them as assistance by adults that "enables a child or novice to solve a problem, carry out a task or achieve a goal which would be beyond his unassisted efforts" (p. 90). Scaffolding occurs within Vygotsky's *zone of proximal development* (1978)–the distance between what a child can understand and do independently and what he or she can understand and do with assistance. Special education teachers use effective supports for student learning; to do so, the teacher must fully understand the task as well as students' changing understanding and proficiency. For example,

- A middle-school teacher makes an Accountable Talk chart, consisting of sentence stems that students can use in discussions. She and another teacher model a discussion using the stems; students then use these stems in their contributions to the discussion, and later rate themselves using an Accountable Talk scorecard (T. V. Mariage, personal communication, May 15, 2016).

- A primary teacher, in talking to his students during writing instruction, uses step-in moves and step-back moves (Englert & Dunsmore, 2002) during writing instruction. If the students struggle, the teacher steps in–modeling, thinking aloud; once students develop

more confidence and proficiency, he steps back, letting the children complete the writing on their own.

Research Support

Scaffolded supports are often a component of instructional "packages," or instructional interventions that involve multiple components. Several effective reading comprehension instructional approaches incorporate scaffolded supports, with reciprocal teaching (Palincsar, 1986; Palincsar & Brown, 1984) perhaps the most prominent example. The What Works Clearinghouse (2010b) identified six studies of reciprocal teaching that met its standard; this research showed medium to large gains in reading comprehension for adolescents when using reciprocal teaching. Hattie (2008), reviewing two meta-analyses of reciprocal teaching, found high effect sizes on comprehension achievement. Comprehension gains associated with reciprocal teaching have been seen with struggling students with disabilities (e.g., Gajria, Jitendra, Sood & Sacks, 2007; Klingner & Vaughn, 1996; Lederer, 2000).

Scaffolding is a strong component in other instructional packages such as collaborative strategic reading (Klingner, Vaughn, Dimino, Schumm & Bryant, 2001) and POSSE (Englert & Mariage, 1991). Boardman, Swanson, Klingner, and Vaughn's (2013) review of collaborative strategic reading experimental and quasi-experimental studies found gains in reading comprehension for students with learning disabilities. Englert and Mariage (1991) found that fourth-, fifth-, and sixth-grade students with learning disabilities recalled significantly more ideas and produced better organized written recalls, as well as had more strategy knowledge, than students in the control group after participating in POSSE. SRSD (Graham, Harris & Mason, 2005), as part of a writing instruction package, involves substantial teacher scaffolding. Both group planning and single-subject studies (reviewed by Mason, Harris & Graham 2011) showed that SRSD had positive effects on aspects of writing such as quality, planning, and revising in students across disability areas. Finally, scaffolded supports are incorporated into learning routines in content enhancement routines. Lenz and Bulgren's (2013) review of the research surrounding content enhancement routines found positive effects for factual and conceptual comprehension. Other scaffolded instructional "packages" include tools such as cue cards or strategy sheets (e.g., Englert & Mariage, 1991; Klingner et al., 2001), routines with mnemonics (Mason, Harris & Graham, 2011), graphic organizers (e.g., Jitendra, 2007; Lenz & Bulgren, 2013), and checklists (e.g., Jitendra, 2007; Mason et al., 2011), so it is difficult to identify the exact contribution of each component.

Researchers have also looked at individual scaffolded supports. For example, Gajria and colleagues (2007) reviewed 11 studies of content enhancers including

semantic mapping, advance organizers, and mnemonic illustrations, and concluded that there was strong support for using these scaffolds to aid comprehension of content by students with learning disabilities. Similarly, Dexter and Hughes (2011) reviewed studies that showed the effect of graphic organizers on factual comprehension of content by students with learning disabilities in upper elementary, middle, and high schools. E. Swanson and colleagues' (2014) meta-analysis of reading interventions including mnemonics, graphic organizers, and guided notes showed positive effects on content and comprehension of students with learning disabilities and improvement in vocabulary and inference/relational comprehension. It is unclear from these meta-analyses, however, whether the supports were faded when students were successful, and how support was adjusted.

Conclusion

Although it is difficult to isolate the specific contribution of scaffolded supports, they are a key component of instructional approaches that have been shown to increase student performance. Grounded in theory that stresses interactions, ongoing assessment, and fading of support as students become more independent, scaffolded supports occur in many forms. Providing scaffolded supports—both those that are preplanned and those that occur "on the spot"—and removing them when students no longer need them is an important and powerful teaching practice.

HLP16	Use explicit instruction.

Teachers make content, skills, and concepts explicit by showing and telling students what to do or think while solving problems, enacting strategies, completing tasks, and classifying concepts. Teachers use explicit instruction when students are learning new material and complex concepts and skills. They strategically choose examples and non-examples and language to facilitate student understanding, anticipate common misconceptions, highlight essential content, and remove distracting information. They model and scaffold steps or processes needed to understand content and concepts, apply skills, and complete tasks successfully and independently.

Explicit instruction (EI) is a direct, structured, supportive, and systematic methodology for teaching academic skills (Archer & Hughes, 2011). When using EI, the teacher provides an explanation or model, guides students through application of the skill or concept, and provides opportunities for independent application of the skill or concept to ensure mastery (Mercer, Mercer, & Pullen, 2011).

EI allows teachers to use research-based underlying principles of effective instruction, active student engagement, promoting high levels of success, increasing content coverage, instructional grouping, scaffolding instruction, and addressing different forms of knowledge (Ellis & Worthington, 1994). Rosenshine (1983) developed a list of six fundamental teaching functions that incorporate principles of explicit instruction: review, presenting new content in small steps, using guided practice, providing corrective feedback, providing independent practice (both massed and distributed), and weekly/monthly cumulative reviews. When teachers use EI, academic learning time increases, which is strongly linked to student achievement (Archer & Hughes, 2011). In essence, explicit instruction is a set of teacher behaviors that have repeatedly shown to have a positive impact on student achievement, especially those who are struggling to learn.

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Research Support

Teacher effect studies have been conducted on the use of EI elements from various perspectives including reading research, general and special education, cognitive science, and brain imaging studies, all of which have provided converging support for the practice. In addition, EI has been shown to help students learn a variety of academic and academically related skills. For example, EI has been used to successfully teach language skills such as vocabulary (Coyne, Simmons, Kame'enui, & Stoolmiller, 2004; Pullen, Tuckwiller, Konold, Maynard, & Coyne, 2010), word recognition skills in reading (Connor, Jakobsons, Crowe, & Meadows, 2009; Moats, 2000; Stanovich, 1994), and writing strategies (Harris & Graham, 1996; Harris, Graham, & Mason, 2003). Vaughn, Gersten, and Chard (2000) analyzed 13 studies in writing instruction and concluded that EI represents best practice in teaching steps in the writing process and teaching writing conventions. EI also has shown to be effective for students who are struggling to learn math skills and concepts (L. S. Fuchs et al., 2008; Good, Grouws, & Ebmeier, 1983). The National Mathematics Advisory Panel (U.S. Department of Education, 2008) also supports using explicit instruction to teach computation and problem-solving skills.

Finally, EI has been effective in teaching students a variety of cognitive learning strategies to help them become more independent learners (Hughes, 2011)

Conclusion

Explicit instruction is an effective as well as efficient methodology for teaching students (Archer & Hughes, 2011). The elements of EI are clearly operationalized and are based on a wide range of empirical studies span-

ning more than 40 years. These elements address principles of EI when designing and delivering instruction. When EI is used in the classroom, academic learning time is increased. Evidence supports the use of EI with all students (in both general and special education settings), across all ages and grade levels, and across content areas. EI can be used with all learners but is essential for struggling learners. Novice teachers can master the methodology and skillfully use this HLP to teach all learners effectively.

HLP17	Use flexible grouping.

Teachers assign students to homogeneous and heterogeneous groups based on explicit learning goals, monitor peer interactions, and provide positive and corrective feedback to support productive learning. Teachers use small learning groups to accommodate learning differences, promote in-depth academic-related interactions, and teach students to work collaboratively. They choose tasks that require collaboration, issue directives that promote productive and autonomous group interactions, and embed strategies that maximize learning opportunities and equalize participation. Teachers promote simultaneous interactions, use procedures to hold students accountable for collective and individual learning, and monitor and sustain group performance through proximity and positive feedback.

Special education teachers use flexible grouping to differentiate instruction and meet individual student needs. Grouping patterns change often depending on lesson goals and objectives and may include (a) homogeneous and heterogeneous small groups, (b) pairs, (c) whole class, and (d) individual instruction (Hoffman, 2002; Vaughn & Bos, 2012). Varied grouping arrangements are used flexibly to accommodate learning differences, promote in-depth academic-related interactions, and teach students to

work collaboratively. Numerous professional organizations (e.g., International Literacy Association, 2010; National Board for Professional Teaching Standards, 2016) support the use of flexible grouping. Within flexible grouping, many special educators effectively use small groups (i.e., two to six students) to provide focused, intensive instruction. Special education teachers must be skilled in using both *homogeneous* (same-ability) and *heterogeneous* (mixed-ability) small groups to help students meet explicit learning goals.

Homogeneous groups are used to provide focused, intensive instruction for students with common instructional strengths and needs and are configured to meet short-term goals and objectives (Cohen & Lotan, 2014). Special education teachers first identify a limited number of high-priority skills and concepts (i.e., big ideas) and form small instructional groups of students with similar academic abilities and needs. They then provide explicit instruction (i.e., modeling, guided and independent practice) for relatively short time periods and use strategies to maximize student response opportunities (e.g., additional time allocations, rapid pacing, unison responding practices), increase instructional feedback, and monitor student progress. To maximize instructional intensity, teachers use smaller group sizes; for example, a group of one to two students has been found most

> *Researchers have reported that children in schools that used small, homogeneous groups had stronger reading skills than peers from schools that did not.*

effective for improving achievement (Erlbaum, Vaughn, Hughes, & Moody, 2000; Iverson, Tunmer, & Chapman, 2005; Vaughn et al., 2003). Teachers may also provide additional time allocations to ensure student mastery (McLesky & Waldron, 2011).

Heterogeneous groups include students of varied knowledge and skill levels and can serve multiple instructional purposes. Special education teachers use small, mixed-ability groups to engage all students in grade-level content-related conversations, facilitate student thinking and communication skills, and improve interpersonal relationships among students with and without disabilities (Hattie, 2008; Kagan & Kagan, 2009). To use heterogeneous groups as intended, teachers initially form small groups (two to six members) who differ on demographic (i.e., gender, race, socioeconomic status, disability status) or academic-related (i.e., high, average, low achieving) variables. They then select tasks and materials that require collaboration (e.g., one material set), provide directives to promote productive and autonomous interactions, and embed strategies to maximize and equalize student response opportunities (e. g., structured and reciprocal student roles). Teachers monitor small-group interactions, provide positive and corrective feedback, hold students accountable individually and collectively, and sustain group interactions through proximity and feedback.

McLeskey, J., Barringer, M-D., Billingsley, B., Brownell, M., Jackson, D., Kennedy, M., Lewis, T., Maheady, L., Rodriguez, J., Scheeler, M. C., Winn, J., & Ziegler, D. (2017, January). High-leverage practices in special education. Arlington, VA: Council for Exceptional Children & CEEDAR Center. © 2017 CEC & CEEDAR

Research Support

The evidence base on small-group instruction—homogeneous and heterogeneous—is large, varies in rigor, and extends across multiple, related topics (e.g., ability grouping, intensive instruction, peer-mediated instruction, group contingencies, cooperative learning). Research support for the use of small, homogeneous groups can be found, for example, in literature on effective schools (Taylor, Pearson, Clark, & Walpole, 2000; Wharton-McDonald, Pressley, & Hampton, 1998), response to intervention (RTI; (Gersten et al., 2009; McMaster, Fuchs, Fuchs, & Compton, 2005), and preschool literacy (Connor et al., 2009; C. B. Jones, Reutzel, & Smith, 2012). Effective schools researchers reported that children in schools that used small, homogeneous groups had stronger reading skills than peers from schools that did not; preschool reading instruction in small groups produced main achievement effects; and small group gains were greater than similar instruction provided to the whole class. Small homogeneous, skill-based groups are also central to the three-tiered, RTI model for reading intervention (Al Otaiba & Fuchs, 2002; Coyne, Kame'enui, & Simmons, 2001) and are more prevalent in classrooms of highly effective than less effective teachers (i.e., 48 versus 25 minutes per day; C. B. Jones et al., 2012; Taylor et al., 2000).

Most research on small, heterogeneous groups is found in the cooperative learning literature and includes multiple meta-analyses to support its systematic application (e.g., Hattie, 2008; Johnson & Johnson, 1987, 2002; Johnson, Johnson, & Maruyama, 1983; Johnson, Maruyama, Johnson, Nelson, & Skon, 1981; Slavin, 1987, 1990). Hattie (2008) summarized findings that included 306 empirical studies, produced 829 effects, and involved over 24,000 individuals. Meta-analyses compared the effects of individualistic, competitive, and cooperative learning conditions on academic, behavioral, and interpersonal outcomes. Under *individualistic conditions*, students earn rewards based solely on their individual performance; in *competitive conditions*, they garner rewards by outperforming other group members (i.e., earn highest score); under *cooperative conditions*, students share rewards based on their collective group performance. Meta-analyses yielded moderate effect sizes of .59 (vs. individualistic) and .54 (vs. competitive) in favor of cooperative arrangements. Hattie reported further that cooperative learning effects (a) were higher in some subjects than others (e.g., reading, d = 0.44 vs. math, d = 0.01), (b) increased with age (elementary, d = 0.28, vs. middle school, d = 0.33, vs. high school, d = 0.43), and (c) were largest when individual accountability and group rewards were used (Stevens & Slavin, 1990).

Conclusion

It is difficult to assess the strength of the evidence base on flexible grouping per se because it involves the use of multiple instructional arrangements (i.e., from individual to whole group instruction) that are applied flexibly, often for short durations, and

to meet individualized and ever-changing learning goals. Flexible grouping resembles an intervention package whose individual contributions to student success must be isolated and studied through component analyses (C. H. Kennedy, 2005). More empirical studies are needed to examine the decision-making process that undergirds the use of flexible grouping.

Both homogeneous and heterogeneous small-group arrangements, when well designed and implemented, can improve a variety of academic and interpersonal student outcomes (Hattie, 2008; Heward & Wood, 2015). Most evidence suggests that small groups should be highly structured and include (a) systematic goal, task, and material selection; (b) clear instructional directives; and (c) explicit strategies to maximize and equalize student response opportunities. Like all instructional practices, teachers must monitor student academic and interpersonal performance, provide positive and constructive feedback, and hold students accountable for their own and others' performance.

● ●

HLP18	Use strategies to promote active student engagement.
	Teachers use a variety of instructional strategies that result in active student responding. Active student engagement is critical to academic success. Teachers must initially build positive student–teacher relationships to foster engagement and motivate reluctant learners. They promote engagement by connecting learning to students' lives (e. g., knowing students' academic and cultural backgrounds) and using a variety of teacher-led (e.g., choral responding and response cards), peer-assisted (e. g., cooperative learning and peer tutoring), student-regulated (e.g., self-management), and technology-supported strategies shown empirically to increase student engagement. They monitor student engagement and provide positive and constructive feedback to sustain performance.

Student engagement lies at the heart of positive academic outcomes. The correlation between student engagement and academic achievement is consistently strong and significant (Brophy, 1986; Rosenshine, 1976). Teachers frequently and flexibly use engagement strategies to motivate students and create personal connections; these strategies help students value their education and develop autonomy and interest in

learning tasks. Engagement strategies ensure students are active participants in the learning process and school environment. Strategies may include group (i.e. cooperative learning groups, peer-assisted learning) or individually focused structures (e.g., personalized positive feedback, enlisting strategies). In addition to strategies to increase participation, teachers use strategies to connect learning to student's lives and increase students' value of and interest in school and feelings of belonging.

> *Engagement strategies should be strategically chosen and integrated into daily classroom instruction by special education teachers.*

Student engagement is a multidimensional construct comprising cognitive, affective, and behavioral dimensions that are dynamic and responsive to teacher behavior. Therefore, a student's participation in school and class activities (*behavioral engagement*), feeling of belonging and value (*affective engagement*) and persistence and effort on difficult tasks (*cognitive engagement*) work together to define the level of engagement (REL Southeast, 2011). These dimensions are affected by teachers' behavior and instructional practices, which are central to active engagement and achievement in the classroom (Hattie, 2008; Scott, Hirn & Alter, 2014; Skinner & Belmont, 1993).

A student's level of engagement in school is a critical factor in that student's academic achievement and likelihood of graduating from high school. Students with disabilities, now often included in general education settings (McLeskey, Landers, Williamson, & Hoppey, 2012), may not actively participate or display as high engagement

as their typically developing peers (Furlong, Morrison, & Dear, 1994; Hemmeter, Santos, & Ostrosky, 2008). In addition, students with disabilities are at greater risk of dropping out, and engagement is the greatest predictor of high school dropout (Dunn, Chambers & Rabren, 2004). By helping students set personal goals, explicitly teaching and modeling active engagement and participation behaviors, and building positive relationships with students early in their academic career, many of the negative outcomes that place these students at risk can be prevented. Therefore, engagement strategies should be strategically chosen and integrated into daily classroom instruction by special education teachers.

Research Support

Student engagement is a strong predictor of academic achievement and behavior regardless of socioeconomic status or other student-level factors (Klem & Connell, 2009). Engaged and successful students are more likely to graduate from high school, whereas students who experience and disengagement eventually drop out (Appleton, Christenson, & Furlong, 2008; Archambault, Janosz, Morizot, & Pagani 2009; Christenson, Sinclair, Lehr, & Godber, 2001; Christenson & Thurlow, 2004; Rumberger, 2011). Marzano and Pickering's (2011) model of engagement organizes the essential components of engaging students around four questions that reflect the student's perspective:

How do I feel? Student enthusiasm, enjoyment, and pride (among other emotions) increase student engagement (Skinner, Kindermann, & Furrer, 2008). Students need an environment where they feel safe and supported in order to engage in academic tasks. Students' feelings of acceptance also play a role in their level of engagement. To address this, teachers:

- Ensure equity and fairness in academic opportunities including responding to questions, receiving rigorous material, and playing games (Marzano & Pickering, 2011).

- Design the learning environment to encourage active student participation and attention (e.g. table and desk arrangement, group size, location of instruction).

- Build positive personal relationships with students (e.g., know students' academic and cultural backgrounds; include students' names in instruction, examples, and text such as word problems; connect instruction to students' interests; Hattie, 2008).

- Provide positive feedback for students who are actively engaged and attentive (Hattie, 2008).

Am I interested? Student interest and choice is needed for students to be motivated and have ownership in their learning. Teachers:

- Incorporate student interest, choice, and physical movement (Dwyer, Blizzard & Dean, 1996; Dwyer, Sallis, Blizzard, Lazarus & Dean, 2001; Jensen, 2013).

- Keep the momentum of instruction and lesson pace appropriate for the attentional needs of students, including smooth transitions, effective use of instructional time, and effectively preparing students for independent tasks and activities (Emmer & Gerwels, 2006; Kubesch et al., 2009).

Is this important? Students must feel that what they are learning is worthwhile. Teachers need to be explicit in their instructional objectives and relate new information to knowledge students currently have.

Can I do this? Self-efficacy is necessary for a student to put forth effort and persist through difficult tasks. Students need to feel challenged and supported in order to attend to and complete tasks. Teachers:

- Have an awareness of students who are chronically disengaged and make an effort to build relationship and use strategies to enlist students (e.g., teacher helper, mentoring, lunch buddies, encouragement; Archambault et al., 2009; Appleton et al., 2008; Christenson et al., 2001).

- Develop mastery measures for students to work towards, which is particularly important for students with disabilities who often are functioning on a different academic level than their same-age peers.

Effective student engagement practices hinge on the presence of positive teacher–student relationships and a climate that fosters community, ownership, and identity (Cornelius-White & Harbaugh, 2010;

Jensen, 2013). Through his meta-analysis, Hattie (2008) found that teacher–student relationships has a substantial (0.72) effect size related to student achievement. Many other researchers have supported this finding (see Jackson, 2015). Hamre and Pianta (2006) emphasized the developmental nature of student engagement, finding that strong student–teacher relationships in kindergarten have robust effects on students' school outcomes lasting through eighth grade.

Conclusion

Drawing from the larger body of student engagement research in general education, the effect of student engagement is clear, especially for students at risk of poor learning outcomes. Though there is limited research on student engagement among students with disabilities, these students are at greater risk of dropping out than students without disabilities. Knowing that withdrawal and school disengagement lead to negative outcomes (Finn, 1993; Finn & Cox, 1992), teachers need to have multiple strategies to engage students with disabilities. It is particularly important for teachers in inclusive settings to be aware of the signs of disengagement and to employ strategies to interrupt the pattern of disengagement. To support the engagement of students with disabilities, early, positive, and consistent student engagement strategies should be used to promote favorable academic and behavioral outcomes.

HLP19	Use assistive and instructional technologies.

Teachers select and implement assistive and instructional technologies to support the needs of students with disabilities. They select and use augmentative and alternative communication devices and assistive and instructional technology products to promote student learning and independence. They evaluate new technology options given student needs; make informed instructional decisions grounded in evidence, professional wisdom, and students' IEP goals; and advocate for administrative support in technology implementation. Teachers use the universal design for learning (UDL) framework to select, design, implement, and evaluate important student outcomes.

Technology intended to support students with disabilities can be characterized as either *assistive* or *instructional* (M. J. Kennedy & Deshler, 2010). Assistive technology (AT) encompasses most examples of augmentative and assistive communication devices (AACs) that provide students with access to instruction. Other examples of AT include simple pencil grips, text-to-speech features, and advanced tools that help students who are nonverbal communicate with the outside world. AT is often personalized, thereby meeting an individual's specific need and mitigating the impact of the disability to enhance access to instruction, improve communication, support moving around, or otherwise enable individuals to participate in their world (Billingsley, Brownell, Israel, & Kamman, 2013). Instructional technologies are products and approaches intended to support student learning and engagement (e.g., learning-oriented games and software, instructional videos). Special education teachers often use assistive and instructional technologies in combination to address students' unique needs (Alper & Raharinirina, 2006).

> *Students with disabilities benefit when they have access to assistive technology devices and services.*

Policy and Research Support

Technology plays a key role in the lives of students with disabilities (Israel, Marino, Delisio, & Serianni, 2014). Since the 1997 reauthorization of IDEA, IEP teams have been required to "consider whether the child requires assistive technology devices and services" (34 C.F.R. § 300.346[2][v]). When discussing the role of technology for supporting individualized needs for students with disabilities, it is appropriate to consider the promise of universal design for learning (UDL) for designing and delivering high quality instruction (Basham & Marino, 2013; Rao, Ok, & Bryant, 2014). More recently, ESSA referenced universal design for learning (UDL) as a framework that should be considered when designing and delivering instruction and assessments for all students (see CAST, 2016). UDL is a broad framework that guides a teacher to consider multiple means of representation, engagement, and expression when writing lesson plans, delivering instruction, and evaluating learning (Rose, Meyer, & Hitchcock, 2005). When teachers plan lessons using the UDL framework, they consider the interactions between students' needs and the content being taught.

It is challenging for empirical research to keep up with the rapid changes and improvements in technology. Promising tools often become obsolete too quickly for them to be thoroughly studied (Edyburn, 2013). Although there is an empirical base of literature surrounding technology for students with disabilities, it has been characterized as "scattershot" (Okolo & Bahr, 1995; Okolo & Bouck, 2007) and lacks a programmatic focus across and within studies. However, three types of technology for students with disabilities have received

more attention from researchers: video self-modeling, augmentative and alternative communication systems (AACs), and computer-aided instruction.

Video self-modeling involves recording video of a student doing an activity and editing it to show only the segment in which the student meets the target performance goal or exhibits a target behavior. The student watches the clip prior to engaging in similar tasks. Prater, Carter, Hitchcock, and Dowrick's (2012) review of studies revealed that video self-modeling significantly improved performance on a variety of tasks, including reading fluency, on-task behavior, and arithmetic. Improvements in almost all cases (except writing skills) were maintained past the intervention phase.

Two examples of technology-based AACs are picture exchange communication systems and voice output communication aids. These devices are designed to aid communication for students who are nonverbal or cannot use conventional verbal language. In a meta-analysis of single case studies on the efficacy of AACs, Ganz and colleagues (2012) determined that AACs have strong effects for communication skills, social skills, academics, and challenging behaviors, with the strongest effects for communication skills.

Computer-aided instruction is instruction presented using a computer. When designed well, it can reduce the cognitive load on learners and increase their attention level, allowing for more efficient and effective learning (Mayer, 2008). A meta-analysis of studies on the use of computer-aided instruction to improve students' cognitive skills (e.g., perception, memory, attention) found a moderately positive effect with a weighted average effect size of .35 (Weng, Maeda, & Bouck, 2014).

Conclusion

Students with disabilities benefit when they have access to assistive technology devices and services, and when teachers use instructional technology to support their unique needs. In the future, technology will only accelerate in terms of affecting all students' daily lives, in and out of school. As a result, school professionals will be faced with increasingly important decisions regarding how to allocate resources when selecting, implementing, and evaluating the effects of various technology options (Okolo & Bouck, 2007). Thus, an important role for special education teachers is to stay abreast of technology developments and work with their school or district technology specialists to ensure the most effective use of assistive and instructional technologies to meet the needs of students with disabilities (Israel et al., 2014; S. J. Smith & Okolo, 2010).

HLP20	**Provide intensive instruction.**
	Teachers match the intensity of instruction to the intensity of the student's learning and behavioral challenges. Intensive instruction involves working with students with similar needs on a small number of high priority, clearly defined skills or concepts critical to academic success. Teachers group students based on common learning needs; clearly define learning goals; and use systematic, explicit, and well-paced instruction. They frequently monitor students' progress and adjust their instruction accordingly. Within intensive instruction, students have many opportunities to respond and receive immediate, corrective feedback with teachers and peers to practice what they are learning.

In a schoolwide tiered system of support, the highest level of support is intensive intervention. Typically, this level of intervention, commonly referred to as Tier 3, is delivered by special educators, whereas supplemental intervention (Tier 2) is typically delivered by highly trained general educators. Tier 3 instruction is delivered through a process of data-based individualization (DBI). Through DBI, teachers start with a validated supplemental intervention and use diagnostic and ongoing progress monitoring data to design highly individualized instruction and continually adapt the intervention and instruction in response to student performance (National Center on Intensive Intervention, 2013). These instructional adaptations comprise *intensive instruction*. Tier 2 supplemental instruction also uses a research-based intervention to address skill gaps for students below grade level and not making progress with differentiated core instruction. Tier 2 instruction is delivered to small, homogeneous groups of students (approximately four to seven students) and

aims to address skills that are foundational to accessing grade-level content, in order to prevent further academic failure.

Tier 3 intensive instruction is highly individualized for students with severe and persistent learning needs who, according to data, have not responded to evidence-based core instruction and supplemental intervention. Teachers incorporate evidence-based practices that have been proven effective for students with disabilities across all content areas including math, reading, writing and behavior. Intensive instruction integrates cognitive processing strategies; is explicit; integrates opportunities for feedback; and is responsive to student performance data (Baker, Gersten, & Lee, 2002; Santangelo, Harris, & Graham, 2007). Instruction is delivered to a small number of students (no more than three) with similar learning or behavioral needs (WWC, 2009a). Teachers group students based on common learning needs; clearly define learning goals; and use systematic, explicit, and well-paced instruction to address skill gaps.

Teachers use data to identify skills gaps and deliver instruction that is highly focused. Students are taught a small number of high priority, clearly defined skills or concepts crucial to their academic success (WWC, 2009a). Within intensive instruction, students have many opportunities to respond and receive immediate, corrective feedback with teachers and peers to practice what they are learning. Their progress is continuously monitored to determine the effectiveness of instruction, and teachers adjust instruction accordingly.

> *To intensify instruction, teachers use both quantitative and qualitative adaptations.*

Intensive instruction is delivered by highly trained educators, typically reading specialists, special educators, or other academic or behavioral specialists. To intensify instruction, teachers use both quantitative (e.g., increasing instructional time, reducing group size) and qualitative (e.g., integrating strategies that support cognitive processes such as self-regulation and memory with academic instruction and behavior instruction, making instructional delivery more explicit and systematic and increase opportunities for feedback) adaptations (Vaughn, Wanzek, Murray, & Roberts, 2012). Teachers flexibly choose which of these features to adjust in response to student performance data.

Through the DBI framework, special education teachers closely monitor the effectiveness of a supplementary intervention. When students are not making adequate progress with research-validated supplementary interventions, special educators first intensify instruction by decreasing the group size or increasing the instructional time (Vaughn, et. al., 2012). If these quantitative changes are not sufficient, teachers can intensify instruction by modifying instructional delivery. This includes integrating qualitative strategies to support cognitive processing such as making instruction more explicit and systematic and integrating strategies to support self-regulation, memory, and self-monitoring (Vaughn, et. al., 2012). For example, special educators may model a math problem-solving strategy using think-alouds and visuals and then introduce a mnemonic to help students remember the strategy.

Research Support

Despite decades of research on special education, there is little research on instruction that is most effective for the 3 to 5% of students with the most severe learning difficulties. In addition, the efficacy of these interventions has not been adequately assessed when delivered within a tiered intervention framework. Recommendations such as those in the IES Practice Guide on intensive instruction and intervention (WWC, 2009a) are based on the opinions of an expert panel.

As noted, teachers make quantitative changes to instruction such as increasing the amount of instructional time provided or reducing the size of the group (Coyne, et al., in press; D. Fuchs, Fuchs & Vaughn, 2014; Vaughn et al., 2012). Research suggests that

it takes students with disabilities at least 10 to 30 times more trials to master a skill than it does students without disabilities (WWC, 2009a). Intensity can be increased by providing longer instructional sessions or having more frequent sessions (Harn, Linan-Thompson & Roberts, 2008; Vaughn et al., 2012). One-on-one or small-group instruction allows students more opportunities to practice, respond, and receive individualized feedback (WWC, 2009a; Hattie & Timperley, 2007; Okilwa & Shelby, 2010).

Findings from research suggest that executive functioning and its underlying components have a significant effect on general academic success including reading, math, and writing (Barnett et. al., 2008; Blair, 2002; Blair & Razza, 2007; Dembo & Eaton, 2000; Diamond, Barnett, Thomas, & Munro, 2007). Executive functioning skills include working memory, mental flexibility (i.e., selective and sustained attention), and inhibitory control. Many students with intensive needs have depressed executive functioning abilities and thus struggle to plan, regulate their performance and emotions, think flexibly about a problem, and manipulate information so that it can be stored in memory. To overcome limitations in this area, students need to learn planning, problem-solving, and self-monitoring approaches in both social and academic areas. When integrated into academic and social learning, these approach-

es can improve students' achievement and social problem solving (Agran, Blanchard, Wehmeyer & Hughes, 2002; Boekaerts & Casca-llar, 2006). Intensifying instruction by making it more explicit is beneficial to students with learning disabilities and across content areas (Baker et al., 2002; Biancarosa & Snow, 2004; Gersten et al., 2009; National Reading Panel, 2000; J. M. Smith, Saez & Doabler, 2016; H. L. Swanson, 2000; Vaughn et al., 2000).

Conclusion

Although many students make adequate progress with research-validated interventions (e.g., Tier 2 instruction), a number of students do not make progress even with these interventions and require a more intensive approach. Intensive instruction is provided within the evidence-based systematic framework of DBI (D. Fuchs et al., 2014). Over a decade of research indicates that students with disabilities who do not make sufficient progress in general education settings (Tier 1) or with supplemental interventions (Tier 2) require instruction that is more intense along a number of dimensions in order to make significant gains. Intensive instruction is highly responsive to student data and flexibly integrates these aspects according to the individual needs of students.

HLP21	**Teach students to maintain and generalize new learning across time and settings.**
Effective teachers use specific techniques to teach students to generalize and maintain newly acquired knowledge and skills. Using numerous examples in designing and delivering instruction requires students to apply what they have learned in other settings. Educators promote maintenance by systematically using schedules of reinforcement, providing frequent material reviews, and teaching skills that are reinforced by the natural environment beyond the classroom. Students learn to use new knowledge and skills in places and situations other than the original learning environment and maintain their use in the absence of ongoing instruction.	

Generalization and maintenance of newly acquired knowledge and skills by learners is a pervasive problem for students with disabilities, particularly those with autism spectrum disorder (Brown & Bebko, 2012; Phillips & Vollmer, 2012). *Generalization* involves performing a behavior in environments that differ from the teaching environment (Lee & Axelrod, 2005). Haring and Eaton (1978) suggested that skill development progresses in an orderly sequence: initial accuracy (acquisition), followed by fluency and maintenance, which are followed by generalization. Effective teachers must therefore have the knowledge and skills to incorporate generalization when designing and implementing instruction. Generalization of skills must be systematically programmed instead of assuming it will automatically occur (Alberto & Troutman, 2013; Schindler & Horner, 2005). In order to generalize academic and social learning to settings other than where learning takes place, students need the opportunity to use skills in a variety of settings, with a variety of instructors. Specific instructional techniques include teaching behaviors that can be used in many different situations, teaching the behavior in several different settings with several different instructors, varying instructions and reinforcers, and programming for common stimuli between the natural and teaching settings.

Maintenance of behavior is also essential to the process of learning. *Maintenance* occurs when newly acquired skills are used in the absence of ongoing instruction. Effective teachers use schedules of reinforcement, systematic reviews of material, and other techniques to promote maintenance of behavior in novel settings thereby lessening dependence on the teacher (Lee & Axelrod, 2005). They thoughtfully and carefully choose strategies for maintenance and generalization at the onset of teaching new academic or social behaviors and build these strategies into the instructional program.

Research Support

In their seminal work on generalization examining 270 articles in behavior analyses, Stokes and Baer (1977) found 120 that were related to generalization. From these, they summarized eight techniques for programming generalization: (a) sequential modification, (b) introduction of natural maintaining contingencies, (c) training sufficient exemplars, (d) training loosely, (e) using indiscriminable contingencies, (f) programming common stimuli, (g) mediating generalization, and (h) training to generalize.

In order to generalize academic and social learning to settings other than where learning takes place, students need the opportunity to use skills in a variety of settings.

Since that time, studies have assessed the effectiveness of programming for maintenance and generalization on academics, social skills, and behavior in a variety of settings with a wide age range of students.

Mesmer, Duhon, and Dodson (2007), for example, used a generalization technique (i.e., programming common stimuli) to facilitate generalization of completion of academic tasks across settings with students with developmental delays and emotional disorders. Falcomata and Wacker (2013) found that generalization of the treatment effects of functional communication training for students with challenging behaviors could be enhanced through the use of specific techniques for programming generalization. Generalization techniques have been used to promote oral reading fluency (Duhon, House, Poncy, Hastings, & McClurg, 2010; Silber & Martens, 2010) and to increase

maintenance of effects of a writing intervention (Hier & Eckert, 2016). Burns and colleagues (2013) suggested using Stokes and Baer's (1977) framework for programming generalization for sustaining RTI initiatives in schools. Students with autism spectrum disorder have an increased need for generalization training particularly with transferring peer interaction and social skills from small-group or resource-room settings to general education classroom and other settings. Programming specific generalization techniques has been effective in promoting social interactions (Deitchman, Reeve, Reeve, & Progar, 2010; Ducharme & Holborn, 1997; J. Jones, Lerman, & Lechago, 2014), promoting task accuracy and independence in first-grade students across settings (Hume, Plavnick, & Odom, 2012), and facilitating conversation skills (Spencer & Higbee, 2012). Freeland and Noell (1999, 2002) used intermittent reinforcement to study maintenance of students' math performance.

Conclusion

Systematically programming for generalization and maintenance of new learning has a wide range of empirical evidence to support its use as an effective practice when teaching students with disabilities to maintain social and academic skills and use them in a variety of settings with a variety of instructors. The techniques originally

reported by Stokes and Baer (1977) have been used as interventions across a variety of studies. The vast majority of generalization and maintenance studies used single-case methodology, as it is appropriate for intervention research to improve outcomes of students with disabilities. Based on guidelines to determine whether a single-case intervention study meets criteria as an evidence-based practice (Horner et al., 2005), the studies referenced here do reflect evidence-based practice.

HLP22	**Provide positive and constructive feedback to guide students' learning and behavior.**
The purpose of feedback is to guide student learning and behavior and increase student motivation, engagement, and independence, leading to improved student learning and behavior. Effective feedback must be strategically delivered and goal directed; feedback is most effective when the learner has a goal and the feedback informs the learner regarding areas needing improvement and ways to improve performance. Feedback may be verbal, nonverbal, or written, and should be timely, contingent, genuine, meaningful, age appropriate, and at rates commensurate with task and phase of learning (i.e., acquisition, fluency, maintenance). Teachers should provide ongoing feedback until learners reach their established learning goals.	

Note. As discussed in the Preface, two research syntheses were developed for the practice of providing effective feedback; this item appears in both the Social/Emotional/Behavioral Practices HLPs and the Instruction HLPs.

The purposes of instructional feedback are to guide students' learning and increase their motivation, engagement, and independence, leading to improved academic achievement. Feedback is used to elicit what students know related to academic content, and to provide direct support regarding what students need to do to learn. Feedback should be timely, meaningful, genuine, specific but succinct, and age-appropriate, and takes many forms including questioning, scaffolding instruction, providing written comments, and providing computer-mediated feedback (Brookhart, 2008; Doabler, Nelson, & Clarke, 2016; Hattie & Timperley, 2007; Thurlings, Vermeulen, Bastiaens, & Stijnen, 2013). Feedback using programmed instruction or the use of extrinsic rewards is not highly effective in improving achievement

(Hattie, 2008). Moreover, rewards are not a central feature of effective instructional feedback, which should be designed to provide information regarding the student's performance relative to a task.

Feedback should be goal-directed; that is, it is most effective when the learner has a goal and the feedback informs the learner regarding how he or she is doing relative to the goal, and what needs to be done to improve progress (Doabler et al., 2016; Hattie, 2008). Feedback should be clear and tangible, providing the learner with an action that may be taken in response to the feedback that leads toward learning content (Thurlings et al., 2013). Teachers should also use appropriate and meaningful language, make connections to prior learning, and remind students what they already know (Doabler et al., 2016). Different forms of feedback may be provided, including feedback about whether content was correct or incorrect, discussing strategies that were used or could be used for more effective learning, and addressing students' self-regulation (e.g., whether a useful strategy is being applied to solve a problem; Hattie & Timperley, 2007). These types of feedback vary depending on the student's knowledge regarding the content. For example, providing a student with error-correction feedback when initially learning content or a skill can improve learning rate, whereas providing error correction when building fluency relative to content can negatively influence

> *Several reviews of research have concluded that effective instructional feedback has a powerful influence on learning and achievement.*

learning (Hattie & Timperley, 2007).

Feedback is most effective when addressing faulty interpretations of information (e.g., an inefficient or ineffective strategy to solve a problem), and providing cues to guide the learner toward the use of a more efficient or effective strategy or clearer understanding (Hattie, 2008; Thurlings et al., 2013). Feedback should be used to engage a student in self-evaluation, too, helping students to develop error identification skills and increase their self-regulation, independence, and confidence in learning academic content (Hattie & Timperley, 2007).

Research Support

The use of feedback to improve student learning is emphasized in standards from several professional groups, including the InTASC Standards (CCSSO, 2011), CEC's preparation standards (2016), and the National Board of Professional Teaching standards (2012). Research supports the effectiveness of feedback that is used to guide the learning of students and increase their motivation, engagement, and independence, thereby leading to improved learning. Several reviews of research have concluded that effective instructional feedback has a powerful influence on learning and achievement (Coalition for Psychology in Schools and Education, 2015; Deans for Impact, 2015;

Hattie & Timperley, 2007; Thurlings et al., 2013). *Effective feedback* is (a) clear, specific, explanatory, and timely; (b) addresses a faulty interpretation of content and not a lack of understanding; and (c) emphasizes the goal of learning, the progress that is being made toward the goal, and what the student needs to do to make better progress. Further, the timing and focus of feedback are important to its effectiveness; for example, for students who are struggling and have limited understanding of content, the teacher should provide explicit instruction rather than feedback. Finally, research has shown that feedback is effective in improving achievement for students with disabilities and English language learners (WWC, 2014), including those who are struggling with reading (WWC, 2009a), writing (WWC, 2012), and mathematics (WWC, 2009b).

Conclusion

Feedback is among the most powerful influences on student achievement (Hattie, 2008). Using feedback effectively requires that teachers have substantial expertise in monitoring what the student knows about a skill or particular content area, and using this information to provide feedback that supports student learning. When feedback is used consistently and well, student educational achievement is significantly enhanced (Hattie & Timperley, 2007).

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