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Center on Innovations in Learning

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In the United States, a number of educational reforms have occurred over the past several years. Among these is the standards-based reform. The standards-based reform is comprised of three main components: higher content standards, assessments to determine whether students have met the standards, and accountability criteria for both students and schools (Nolet & McLaughlin, 2005). For students with disabilities—particularly high-incidence disabilities (e.g., learning disabilities, emotional/behavioral disorders, high-functioning autism, ADHD, and mild intellectual disabilities)—these reforms have changed the way that they are taught and assessed in the general education curriculum.

First, higher standards are now the norm and are often tied to teachers' daily lesson plans in most states. In fact, 45 states have adopted the Common Core State Standards (CCSS), and efforts are underway to develop a national standards-based test to assess whether students have met common core components (Haager & Vaughn, 2013). Second, states have developed assessments to determine if students have met their own state's standards. In many cases, these are aligned with or are the same as the CCSS. Under certain circumstances, some students with disabilities may opt out of such tests (e.g., students who are unable to participate in an assessment with reasonable accommodations); however, for most students with high-incidence disabilities, participation in such testing is required (McLaughlin & Thurlow, 2003). Third, schools are now accountable for their students' meeting the set standards on state tests. Currently, 26 states have exit exams that students must pass to move on to the next course, grade level, or to graduate from high school (Center on Education Policy, 2012; Deshler, Schumaker, Bui, & Vernon, 2006). Finally, changes in the Individuals with Disabilities Education Act (IDEA) in 1997, and subsequently in 2004, now require schools to provide students with disabilities greater access to the general education curriculum. It is believed that *meaningful access* to the general education curriculum will allow these students to learn core content and, in the process, prepare them to pass state tests (Deshler, Schumaker, Bui, & Vernon, 2006).

Research Synthesis

As more states and schools implement standards with assessments that are required for students to advance, teachers are being presented with the new challenge of teaching students with more diverse disabilities in their classes. For many teachers this means changing how content is presented, how students are engaged with the content, and how students are assessed on the content (Nolet & McLaughlin, 2005). Consequently, classroom innovations, either technological or methodological, are now becoming more prominent in assisting students with disabilities to learn and teachers to teach in inclusive or general education classes. While many of the technological innovations (e.g., word prediction and text-to-speech software) were originally designed to assist persons with disabilities (Kurzweil, 1999; Swiffin, Arnott, Pickering, & Newell, 1987), today, these innovations have been adopted for use by the general population and are incorporated into the tools (e.g., cell phones, computers) that we use every day.

> ***Special education innovations should improve on current instructional practice. An ideal special education innovation would allow a student with a disability to compete on the same level as peers without disabilities.***

Special education innovations should improve on current instructional practice. An ideal special education innovation would allow a student with a disability to compete on the same level as peers without disabilities. In other words, innovations should not only increase achievement or improve behavior for students with disabilities, but effect a positive change large enough so that students with disabilities who use the innovation can achieve at the same level as peers (without disabilities) who are using established best practices. *Technological innovations* mentioned in this chapter are typically one of three types: (a) those that represent advances in technology, such as smartpens and tablet applications (i.e., "apps"); (b) those that apply traditional technology in new and innovative ways, such as content acquisition podcasts (CAPs); and (c) those traditional teaching methodologies that now incorporate components of technology, such as repeated readings that use text-to-speech technology. On the other hand, *methodological innovations* typically are of two types: (a) those strategies or procedures that try to mediate the learning process so that students can now efficiently learn the content (e.g., strategic note-taking, concrete-representational-abstract teaching sequence), and (b) those that try to teach skills and problem-solving procedures in new and innovative ways (e.g., STAR, LAP strategies, see below). Today, many methodological and technological innovations in education can be applied to different content areas and to students of different ages. For the purpose of this chapter, two broad areas—literacy, and mathematics and science—will be presented, as well as examples of special education innovations in these areas.

Literacy Innovations in Special Education

In reading, students with disabilities have well-documented difficulties, including reading at appropriate rates when compared to peers without disabilities (Jenkins, Fuchs, van den Broek, Espin, & Deno, 2003), learning sight words and vocabulary (Jenkins et al., 2003; Wolf & Bowers, 1999), making inferences (Cain & Oakhill, 1999), and comprehending information read from text (Jenkins et al., 2003; Wagner et al., 1997). In writing, students with disabilities have problems that range from lower order mechanical problems to higher order strategic problems (Wong, 1997). Specifically, these problems include low levels of productivity; weak mechanical skills; and difficulty in planning, generating, organizing, revising, and editing (Graham, Harris, MacArthur, & Schwartz, 1991; Lewis, Graves, Ashton, & Kieley, 1998; Mayes, Calhoun, & Lane, 2005). To address these problems among students with disabilities, researchers have developed a number of literacy innovations.

One innovation in literacy instruction is methodological but also incorporates technology: a repeated readings intervention developed to improve reading fluency and comprehension.[1] Although the repeated reading intervention has been used in schools for some time, this recent twist on it integrates Kurzweil 3000 software into the repeated reading process. In one study, Coleman and Heller (2010) used repeated reading with computer modeling among students with disabilities. In this intervention, the student read the passage aloud for the first, third, and fifth time. In the second and fourth readings, the computer, via the Kurzweil software, read the passage as the student read along silently with the passage on the computer screen. In those instances when the student read the passage aloud, he or she was provided with a correction on any errors made while reading. In the first and fifth reading, the student was also asked comprehension questions. The advantage of incorporating software into the intervention was that each word was highlighted as it was read aloud by the computer (i.e., computer modeling). According to the researchers, all students who used the repeated readings procedure with computer modeling were able to increase reading fluency, accuracy, and comprehension from first to fifth readings. In addition, most of the students demonstrated slight increases in reading fluency on novel passages.

[1] See Chard, Vaughn, & Tyler, 2002 and Therrien, 2004 for in-depth discussions of the effectiveness of repeated readings.

Another literacy innovation, strictly methodological, teaches an inference strategy, INFER, to students with disabilities to improve their reading comprehension (Fritschmann, Deshler, & Schumaker, 2007). This innovation goes beyond seeking a mere literal comprehension and helps students mediate text so that they can achieve the more difficult inferential comprehension. This inference strategy employs a first-letter mnemonic device, an acronym, which prompts students to respond to a variety of inference questions. Using the acronym "INFER" as the mnemonic device keyed to a five-step process, students perform five actions while reading a passage. In the first step, *I—Interact*, students *interact with a text* and the questions by previewing the passage and reading the comprehension questions at the end of the passage. Next, they categorize the questions into factual and inferential questions and further categorize the inferential questions into four types: purpose, main idea/summarization, prediction, and clarification questions. In the second step, *N—Note*, students *note what they know* to activate any background knowledge relating to the information, underline key words in the questions, as well as place code letters next to each question based upon the four types. Next, in the third step, *F—Find*, students *find the clues* by reading the passage and underlining clues that are related to key words in the questions and remembering the answers. Next, for *E—Explore,* students *explore more details* by looking for additional information to support their answers. Finally, in step five, *R—Return*, students *return to the question* to make sure that they have answered it. When the INFER strategy was taught to ninth-grade students with disabilities, students improved their comprehension from 32% during the baseline phase to 77% during the instructional phase.

A third innovation in literacy instruction is the use of "quick writes" to improve writing skills of students with disabilities (Mason, Kubina, & Hoover, 2011; Mason, Kubina, & Taft, 2009). Quick writes are 10-minute writing responses to an open-ended question (e.g., Should students your age be given a laptop computer for school? Explain why or why not. Should students your age have cell phones? Explain why or why not.). These writing activities can be used to support content learning by assigning a brief writing activity to students in a nonthreatening and informal manner (e.g., Should a species like the mountain lion, that was originally found in Pennsylvania, be reintroduced back into Pennsylvania?). Quick writes are meant to encourage free expression; therefore, writing mechanics are not taken into account. They teach effective writing skills with different genres such as narrative, persuasive, and informative writing. Quick writes incorporate two learning strategies: POW and TREE. These strategies help students with both prewriting tasks and the actual writing. Using the acronym POW (i.e., pick my ideas, organize my notes, write and say more) facilitates students' planning out their ideas by getting them down on paper and elaborating on them prior to writing. Using the acronym TREE (i.e., topic sentence; reasons, three or more; examine; ending) provides students the ability to transform their ideas into an essay. Results from studies that taught students with disabilities to use quick writes have demonstrated that students can improve in the number of parts to their writing, the number of words written, and the quality of their written essays (Mason et al., 2011; Mason et al., 2009).

Another innovation for improving the writing skills of students with disabilities is the use of word prediction software (see Peterson-Karlan, 2011, for a full review of technology to support writing for students with disabilities). Word prediction software works by offering the user a list of word choices, appearing after the first letter of the word is typed. Most programs also contain a read-back function (via text-to-speech software) for students to check spelling and grammar (Grant, 2009). Recent studies (Evmenova, Graff, Jerome, & Behrmann, 2010; Handley-More, Deitz, Billingsley, & Coggins, 2003; Mirenda, Turoldo, & McAvoy, 2006) that examined the effectiveness of word prediction software for improving the writing skills of students with writing disabilities and of students with physical disabilities have found positive effects on performance. Handley-More et al. (2003) found that when the program *Co-Writer* was used by students with learning disabilities, students showed improvements in legibility and spelling. Likewise, when Mirenda et al. (2006) had 24 students with physical disabilities use word processing with *Co-Writer*, students exhibited significant differences using word processing with word prediction software than when using handwriting skills. These differences were found among legible words, correctly spelled words, percentage of correct word sequences, and average total length of correct word sequences in essays. Finally, Evmenova et al. (2010) compared the effects of three word prediction software programs (*WordQ*, *Co-Writer*, and *WriteAssist*) against word processing alone (i.e., baseline condition). In this study, the researchers found that, regardless of the word prediction software, students with mild disabilities improved written spelling accuracy. When using any one of the three programs, students also increased the total number of words produced and the rate at which they composed, though increases varied according to the program.

Math and Science Innovations in Special Education

In mathematics education, students with disabilities have difficulties in a number of areas that include memory problems, such as retrieving math facts (Garnett & Fleischner, 1983), remembering and using multiple steps to solve problems (Bley & Thornton, 1995; Bryant, Bryant, & Hammill, 1990), comprehending math vocabulary, understanding and solving math word problems, using procedural strategies and rules, and understanding math concepts (Maccini, Strickland, Gagnon, & Malmgren, 2008). In science education, students with disabilities have difficulty recording notes during lectures and discussions (Boyle, 2010a), understanding and using reasoning skills on categorical reasoning tasks (Scott & Greenfield, 1991, 1992), and effectively using problem-solving skills on science tasks, particularly inquiry-based science activities (Dalton, Morocco, Tivnan, & Mead, 1997).[2] To address these issues and help students learn more efficiently in these areas, researchers have developed several innovations in mathematics and science instruction.

To teach abstract mathematics concepts to students with disabilities, researchers have advocated the use of the concrete-representational-abstract (CRA) teaching sequence. Even though CRA was first used in 1988 (Peterson, Mercer, & O'Shea, 1988), it is only now becoming the preferred method to teach mathematical problem solving to this population. The CRA sequence helps students gain a conceptual understanding of many different subdomains in math such as addition, subtraction, multiplication, division (Flores, 2010; Miller & Kaffar, 2011; Miller, Stringfellow, Kaffar, Ferreira, & Mancl, 2011; Morin & Miller, 1998), integers (Maccini & Hughes, 2000; Maccini & Ruhl, 2000), and solving equations (Witzel, Mercer, & Miller, 2003). Instruction using CRA begins with the use of manipulatives (i.e., concrete), advances to the use of pictures or tallies (i.e., representational), and eventually moves to solving problems using only numbers (i.e., abstract).[3] Typically, students receive a few lessons at each stage. For example, Miller and Kaffar (2011) taught students with and without disabilities to regroup in addition over five concrete lessons, three representational lessons, and eight abstract-level lessons. These lessons used explicit instruction, teacher modeling and demonstrations, guided practice with supports, and independent practice. Results from several studies indicate that CRA instruction was more effective than traditional instruction. For example, Miller and Kaffar (2011) found that students who were instructed using the CRA sequence performed better than students in a comparison group in terms of accuracy of computational regrouping and fluency of computational regrouping (i.e., number of problems correctly solved per minute; Miller & Kaffar, 2011). Likewise, Flores (2010) used CRA among students with math difficulties and found increases in students' scores on subtraction with regrouping from baseline to instructional phases.

Another methodological innovation is strategy instruction in math. The use of first letter mnemonic strategies (e.g., LAP, STAR) is changing the way teachers teach math to students with disabilities, particularly with more complex mathematical content, such as fractions and word problems. For example, one study taught students with learning disabilities to solve problems involving the addition and subtraction of fractions (Test & Ellis, 2005). The LAP fraction strategy incorporates three mnemonically keyed steps: *L—Look* at the sign and denominator, *A—Ask* yourself the question, and *P—Pick* your fraction type. During the L step, students *look* at the addition or subtraction sign in their problem and *ask*

[2] For more detailed information about the mathematical and science problems among students with disabilities, see the following reviews: Dalton, Morocco, Tivnan, & Mead, 1997; Jordan & Hanich, 2003; Swanson & Jerman, 2006.
[3] See Flores, 2010, for a detailed explanation of CRA that includes solved examples.

themselves, "Will the smallest denominator divide into the largest denominator an even number of times?" Students then *pick* one of three fraction types and follow the procedures for solving that particular fraction. Once students were able to recite the strategy steps at 100% mastery, they moved to a practice session in which they practiced identifying and dividing the smallest denominator into the largest denominator. Next, students practiced the LAP steps to solve different fraction types. Finally, every 10 days over a 6-week period, students were given the LAP fractions strategy test and the LAP fractions test. During instruction, the researcher modeled problems while thinking aloud, provided guided practice, and had students solve problems independently. Results from this study found that students could apply the LAP strategy to successfully solve addition and subtraction problems involving fractions.

A second strategy instruction, the STAR strategy, was incorporated into CRA instruction to teach students with disabilities to correctly solve algebraic word problems (Maccini & Hughes, 2000; Maccini & Ruhl, 2000). The steps for the strategy are as follows: *S—Search* the word problem; *T—Translate* the problem; *A—Answer* the problem; and *R—Review* the solution. In their first study, Maccini and Ruhl (2000) taught eighth-grade students with disabilities to use the STAR strategy combined with CRA. Using the STAR strategy, students were taught to solve problems over three phases: concrete, semiconcrete, and abstract. Across all three phases, students made substantial average gains in their accuracy of solving the problems: The average baseline accuracy rate was 35%, and the rate increased to 85% in the concrete phase, dipped to 78% in the semiconcrete phase, and increased to 89% in the abstract phase. For the most part, scores were maintained during near transfer, far transfer, and maintenance phases as well. Another study (Maccini & Hughes, 2000) that used the same training and similar procedures again resulted in increases in the correct solution and answer.

Finally, in a third study that combined CRA and the math instruction strategy FAST DRAW, Morin and Miller (1998) taught students with disabilities to solve multiplication problems. In this effort, three lessons were taught at the concrete level, three at the representational (i.e., semiconcrete) level, one lesson on the use of the DRAW strategy, and three lessons at the abstract level. The DRAW strategy (mnemonically, *D—Discover* the sign; *R—Read* the problem; *A—Answer*, or draw and check; and *W—Write* the answer) was first taught to students, then the FAST strategy, again through lessons at the concrete, representational, and abstract levels. The steps identified by the FAST acronym are *F—Find* what you are solving for; *A—Ask* yourself, "What are the parts of the problem?"; *S—Set* up the numbers; and, *T—Tie* down the sign. The FAST DRAW steps were taught to students who were solving traditional paragraph word problems, both with and without extraneous information in the problem. The results from this study found that of the 63 lessons taught, only four times did students' problem solving of multiplication problems drop below 80%. Even when used with word problems involving multiplication, students with disabilities were able to correctly solve these types of problems.

A methodological innovation for helping students learn science content is the strategic note-taking (SN) intervention (Boyle, 2010b, 2013; Boyle & Weishaar, 2001; Lee, Lan, Hamman, & Hendricks, 2008). This intervention is comprised of both the mnemonic CUES strategy and SN paper. This strategy was developed to assist students in retaining information during science lectures by incorporating steps that help them focus attention on teacher cues and science vocabulary in the lecture, as well as providing steps—such as clustering similar lecture ideas and categorizing summarized lecture points—to help them organize lecture content. In the strategy, each step prompts the student to perform an action using lecture information and the SN paper. In the first step, the *C—Cluster* step, students aggregate lecture information into manageable units of three to six related ideas and record the chunked ideas on the SN paper. The *U—Use* step prompts students to pay attention and listen for teacher cues (i.e., number cues and importance cues) during the lecture and, when they hear these cues, to record the lecture points that are associated with them. In the next step, *E—Enter*, students listen for vocabulary words in the lecture and record them in the appropriate area on the SN paper. In the *S—Summarize* step, students write a word or words that would categorize the three to six lecture points they have already listed (i.e., clustered together) on the SN paper.

The SN paper was developed based on Mayer's select-organize-integrate (SOI) model of learning (Mayer, 1996), as well as other research on generative note-taking (Peper & Mayer, 1986), and designed specifically for science lectures. At the top of the SN paper, students would quickly identify the lecture topic and relate the topic to their own background knowledge of it. In the next portion of the SN paper, students clustered together three to six main lecture points with details, as they were being discussed in the lecture. Next, students summarized (or categorized) clustered ideas. If there were any new science vocabulary words, students would also list these in the appropriate section of the SN paper, under "New Vocabulary or Terms." The steps of naming three to six main points, summarizing immediately after naming lecture points, and listing new vocabulary were repeated on additional pages until the lecture ended. The last page directed students to write five main points from the lecture with descriptions of each.[4]

In the studies of the SN strategy, students participated in two training sessions. During the first 50-minute session, the investigator followed a scripted lesson and trained students how to use the SN strategy with the SN paper. Throughout the training, the investigator provided a brief description of SN,

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[4] For copies of the actual SN paper see the following website: https://sites.temple.edu/snotetaking

modeled the technique, and guided students through practice portions of a videotaped lecture. During the second session, students used the same videotape, but new SN paper. Unlike the first session, during which the lecturer periodically paused for student feedback, the second session played the videotaped lecture in its entirety without interruption so that students could become acclimated to a typically paced lecture. Results from the Boyle (2013) investigation best exemplify the effectiveness of SN for middle school students with and without disabilities. Boyle reported that both students with and without disabilities who used the intervention scored better on measures of the cued lecture points recorded (e.g., emphasis and organization cued lecture points), total lecture points recorded, number of science vocabulary recorded by students, and total words in notes. In addition, students with learning disabilities in the SN group scored as well as or better than students without disabilities in the control group. Results from other studies (Boyle, 2010b; Boyle & Weishaar, 2001) also demonstrate that students with disabilities who were taught SN outperformed peers with disabilities who used traditional note-taking to record notes during lectures.

Promising Technologies

One innovative technology, called content acquisition podcasts (CAPs), provides vocabulary instruction to high school students with and without disabilities (Kennedy, 2011; Kennedy & Wexler, 2013). CAPs use digitized or multimedia content to teach science and social studies vocabulary while incorporating research-based methodologies such as morphemic analysis, context analysis (Baumann et al., 2002; Ebbers & Denton, 2008; Nagy, 2007), and keyword mnemonic instruction (Mastropieri, Scruggs, & Levin, 1987).[5] CAPs are produced by creating slides that display the vocabulary word; its pronunciation, definition, and morphemes; keyword; and its synonyms and antonyms. These slides are then synchronized with narration explaining the different components of the slide. Once created, the file is saved as a movie and imported into a moviemaking or video program on a computer. Each CAP is typically 3 to 5 minutes in length. Students then play the CAP and learn the vocabulary word. Kennedy (2011) reported that for students with disabilities, CAPs that integrated morphemic and contextual analysis, along with the keyword mnemonic method, were more effective than CAPs that contained only the word, definition, and pictures. Students who used CAPs improved their performance from pretests to posttests on both an open-ended measure (i.e., students write the definition, a synonym, an antonym, and any additional information they might know about vocabulary) and a multiple-choice measure (i.e., given the stem for each word, students choose the appropriate definition of the word, given the answer and distractors).

[5] Please see Brigham, Scruggs, & Mastropieri, 2011, for a detailed explanation of how the keyword method is used to support the learning of science vocabulary.

Another promising technological innovation that helps students compensate for poor note-taking skills is the *smartpen* (Hannon, 2008; Stachowiak, 2010). A smartpen is an electric pen that contains a micro-camera that records information when students write lecture information on special dot paper. At the same time, the pen simultaneously records the audio portion of the lecture. The dot paper contains microdots that tell the location of the pen on the paper through the pen's micro-camera. The pen's camera takes 72 snapshots per second, sufficient to capture anything written on the paper. Each picture is decoded by software in the smartpen to provide an (x, y) coordinate pair, telling the smartpen exactly where the pen tip is on any given page and synchronizing these coordinate pairs with the audio recording. For example, if a student is only able to record a partial lecture point (e.g., *plasma*) on the dot paper, after the lecture ends, the student taps the written word *plasma* and that particular audio portion of the lecture will be played (e.g., *Plasma is the fourth state of matter. It is an ionized gas*.), enabling the student to amend his or her lecture notes by adding to or correcting information. Of course, any training should involve the teacher modeling how to use the smartpen, followed by guided practice to ensure students' fluent use prior to independent practice. Even though only a few studies of this innovation have been conducted to date, mostly exploratory in nature, the smartpen has been recommended for use with students with disabilities (Van Schaack, 2009).

> ***As students with disabilities enroll in larger numbers in challenging and advanced courses and are required to pass state tests in order to graduate from high school, merely gaining access to the general education curriculum is no longer sufficient.***

One final technological innovation that should be mentioned is the use of handheld tablets (e.g., iPads, iPods) in special education. Over the past several years, iPad and iPod applications (apps) have become increasingly popular for use in special education classrooms to assist students in monitoring their behaviors/social skills (Blood, Johnson, Ridenour, Simmons, & Crouch, 2011) and their academic performance (Haydon, Hawkins, Denune, Kimener, McCoy, & Basham, 2012; Kagohara, 2011; Nordness, Haverkost, & Volberding, 2011). For example, when three second-grade students with disabilities used a math application called Math Magic on iPads 3 days per week (10 minutes per session) over 4 to 15 weeks, students improved over baseline scores on two-digit subtraction problems and improved scores by an average 17% on a standardized district test (Nordness et al., 2011). In another study (Haydon et al., 2012), high school students with emotional disturbance were taught to use iPad apps on targeted math skills (e.g., coin math, fractions, patterns, and operations); they were able to improve on the number of correctly solved math problems versus traditional worksheet sessions, and students exhibited higher rates of engagement.

Summary

Recent articles in the field of special education reflect the challenges in trying to help students access the general education curriculum to address Common Core State Standards. As students with disabilities enroll in larger numbers in challenging and advanced courses and are required to pass state tests in order to graduate from high school (Deshler, Schumaker, Bui, & Vernon, 2006), merely gaining access to the general education curriculum is no longer sufficient (Lynch & Taymans, 2004). In fact, students with disabilities need to be *active participants* in the general education curriculum in order to ensure that they progress and are prepared to pass state tests (DeSimone & Parmar, 2006). Many have argued that *genuine access* to the general education curriculum can only come about through new innovations in teaching and proper class supports that focus on what is taught and how the curriculum is delivered (Soukup, Wehmeyer, Bashinski, & Bovaird, 2007).

Action Principles for SEAs, LEAs, and Schools

The action principles are meant to serve as suggestions and recommendations for agencies seeking to encourage the use of innovations in public schools, to show how districts can support teachers who want to learn about or who use innovation in their classrooms, and to suggest what teachers can do to increase the likelihood that innovation will be successful in the classroom.

State Education Agency (SEA)

a. Develop a state website solely dedicated to innovations in special education. The first step might be for SEAs to develop a website on innovations in special education. This website should be separate from the state education website. Because state websites are so large, they are tedious to maneuver through and find the information that a person is seeking. A dedicated innovations website could contain examples of how innovations are used in schools throughout the state and the country. Examples might include video clips of teachers using technological or methodological innovations in the classroom with students. Teachers in the videos could point out the advantages of the innovation, identify potential problems in using it in the classroom, and offer tips for teachers about it. The website could also contain links to journal articles or websites on each innovation, as well as to upcoming training sessions on the innovations.

b. Develop a state conference on innovations in special education. SEAs could sponsor a state conference on innovations in special education. These conferences could provide stipends to teachers to help defray the cost for their attendance. The conference should include a mix of informational sessions about different innovations and "hands on" workshops in which teachers can learn in depth about an innovation and create materials related to the session, materials which they could then use, in turnkey fashion, in their classrooms. The conference could feature national speakers who developed an innovation, as well as federal grant awardees who could discuss findings from projects that used, developed, and evaluated innovations. These awardees could discuss the findings from their research and offer suggestions for using their innovation in different environments (e.g., urban, rural, and suburban) and with different populations of students (i.e., How did general education students respond to the innovation? How did students with autism spectrum disorders respond to the innovation? Students with learning disabilities?).

c. Reward schools for using innovations to teach students with disabilities. Each SEA should try to identify and recognize effective schools within its borders that use innovations. These schools could serve as models, and their personnel could serve as resources for teachers throughout the state. Too often, school personnel within a state, and in some cases within each of its districts, are unaware of colleagues using effective teaching innovations. Often teachers must go it alone to try to teach students with disabilities when, in fact, other teachers in the state have already developed successful innovations for their classrooms. Schools' efforts should be recognized and highlighted on SEA websites for others to learn about and copy. Schools could also offer small monetary awards for teachers who use or develop innovations.

d. Encourage state laboratory schools or university–school partnerships. SEAs could help bring together researchers from universities and school personnel who are looking for innovations. Often, faculty are looking to assess and research a new innovation and, at the same time, schools are in need of an innovation. These schools could serve as laboratory/experimental schools and may well be sites that are using some of the latest innovations in special education. In 2012, the Institute of Education Sciences, an arm of the U.S. Department of Education, offered a grant competition titled Researcher–Practitioner Partnerships in Education Research. This competition solicited proposals from university researchers who would evaluate a school's data and help identify potential problem areas that, in subsequent years, could be addressed through innovations or current best practices. The hope is that these 2-year funded partnerships will be the beginning of long-term collaborations. Initially, funds would be used to help schools identify weak areas and, in subsequent funding cycles, develop interventions and assess the effectiveness of those interventions on student learning and behavior. In many ways, SEAs could take this federal program and use it as a template. State competitions could offer funding that would encourage such partnerships, perhaps in the form of seed money or small grants.

e. Develop materials that show how to integrate innovations into the curriculum. Provided the innovations have been shown to be effective for both students with and without disabilities, the latest innovations should be embedded in the curriculum for teachers to use in their classes. Once an innovation is embedded within the curriculum, the better the chance that teachers will use it on a consistent basis. Lenz and Deshler (2004) have observed from their many years of strategy research that elementary schools are able to seamlessly weave new strategies or innovations into their curriculum; in spite of their general applicability, however, these practices are not often adopted in secondary schools. Further, Lenz and Deshler show that, with proper supports, teachers can use these innovations to help all students learn content.

Local Education Agencies

a. Allocate resources for technology and professional development. If school districts want teachers to learn new skills/innovations, they can either send teachers out for training or bring the training into schools. Schools should offer travel funds for teachers who will target a new innovation that they want to learn. Teachers can then attend the training or workshop to learn it and report back to the school district how the innovation is being used in their classroom. If schools have inclusive classes, co-teachers can attend workshops and then demonstrate to other teachers how the innovations are used in co-taught classes. Another option for school districts is to provide professional development in schools. In either case, the old model of one-shot professional development has been shown to be ineffective. More efficient training involves locating teachers who have a need to learn an innovation and a desire to use it in their classroom. Districts should target these teachers for professional development and then follow up using turnkey methods, such as having the expert model the innovation in the teacher's class and then letting the teacher use it, receiving feedback from the expert. Experts may have to return a few times to help the novice teacher refine how the innovation is used in that particular classroom.

b. Provide a support network after training. For teachers trained to use innovations, districts should provide them a support network in order to share ideas and solicit advice when they encounter problems. An electronic discussion board or chat board can serve as a virtual meeting place for discussions about better ways to teach students with disabilities. The site might also contain other resources like video clips that demonstrate effective teaching using innovations or web articles about innovations.

c. Develop district-wide innovation coaches. Mentors could teach part-time and mentor teachers part-time. They should also be tasked with staying abreast of and being trained in the latest educational innovations for teaching students with disabilities. With such duties, they could serve as professional developers in the district, introducing innovations to teachers. When serving as coaches, they could assess the fidelity of teachers' implementation of innovations and assist in assessing the effectiveness of innovations on student learning.
d. Districts should assess their teachers' and students' attitudes about new innovations. If teachers don't enjoy using an innovation or don't see its value, they are unlikely to use it consistently in the classroom. Therefore, districts need to assess attitudes through customer surveys that ask teachers about an innovation's usefulness, what they like and dislike about it, and what changes could improve its use in the classroom. Students are also consumers of teachers' methods, strategies, and technologies, so they too should provide input about classroom innovations. Further, students should be asked about or interviewed on how they feel the innovation has changed the way they think about content or the learning process while using the innovation. Student input can help the district decide whether changes should be made in the way the innovation is taught to teachers or the way teachers implement the innovation.

Schools

a. Make innovations work for students with disabilities. As noted earlier in this chapter, teachers need to use explicit instruction, especially when introducing a new instructional method or technology. In explicit instruction, a teacher first models or demonstrates an innovation, followed by guided practice with feedback, and ending with the student using the innovation independently. Teachers should strive to teach students innovations that allow them to become autonomous and independent learners. So instead of relying on a note-taker, a student with disabilities should learn the skills (e.g., strategic note-taking) necessary for recording his or her own notes. Teachers should express their high expectations of students; mediocrity never advanced civilization.
b. Tie strategy instruction to the teaching of new technology. For technological innovations, it may be more effective to teach students a strategy that helps them use the new technology in authentic classroom settings. For example, the InSPECT strategy (McNaughton, Hughes, & Ofiesh, 1997) was taught to students with learning disabilities to help them successfully use the spell checker in word processing programs. With new technology, such as smartpens and iPads, it may be necessary to teach students a strategy so that they can use the technology properly and effectively. Regardless of

the technique or strategy, explicit instruction is still needed to insure that students learn to use technology effectively.

c. Teachers need to insure that new innovations transfer to the classroom. Once students learn to use the innovations, teachers should make sure that students with disabilities can generalize the innovation to different contexts with different content. This stage of instruction teaches students how to use the innovation in a flexible manner—modifying steps of the strategy when necessary or modifying how technology is used in new situations. This adaptation of an innovation may also necessitate teaching students its use in those classes with more advanced content.

d. Train with fidelity using all training steps. The idea of fidelity in interventions refers not only to teachers following the prescribed implementation procedures for an innovation, but also to how much time (e.g., days, sessions) teachers spend—sometimes referred to as intensity—on specific training steps when training students how to use student strategies (Swanson, Wanzek, Haring, Ciullo, & McCulley, 2012). Intervention fidelity is important because it determines whether an innovation fails or succeeds, especially in special education classrooms where students require explicit step-by-step instruction and scaffolding to master a skill or innovation. Therefore, the more complex an innovation, the more critical it becomes for teachers to follow the prescribed training procedures.

e. Monitor the progress of learning by identifying specific skills to be assessed and use benchmark tests that parallel components of state tests. As with any innovation or intervention, it is important to assess student progress. Progress is typically assessed daily for a newly implemented innovation and then periodically once it is determined that the innovation is working as intended. When measuring an innovation's effectiveness, teachers should focus on its usability (i.e., Can students use it successfully?), students' fluency in using it (i.e., Can students use it quickly without making too many mistakes?), and its effectiveness as measured by outcomes (i.e., For a math innovation, have students increased the number of correct problems solved compared to previous measures?). Finally, since the goal of the kind of academic innovations discussed here should be to increase students' skills to a level comparable to that of nondisabled peers, teachers should consider using a districtwide benchmark measure (i.e., smaller tests whose questions are similar to state tests) to insure that students are on track to do well with district and state measures.

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