Instructional Practices for Students with the Most Significant Disabilities in Inclusive Settings

A Review of the Literature

TIES Center

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Instructional Practices for Students with the Most Significant Disabilities in Inclusive Settings: A Review of the Literature

Alicia F. Saunders, Shawnee Wakeman, Elizabeth Reyes, Martha L. Thurlow, and Terri Vandercook

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Executive Summary

The use of empirically validated instructional practices is pivotal for students with the most significant cognitive disabilities to make academic progress in inclusive settings. The purpose of this report is to provide an update on what the literature says about instructional practices that have shown positive academic gains for students with the most significant disabilities in inclusive general education settings. For this report, we reviewed the literature from two prior publications on inclusive academic interventions for this population (Hudson, Browder, & Wood, 2013; Jimenez & Kamei, 2015) and updated the literature they reviewed by adding eight studies.

Across all literature reviews, the studies included 26 studies that evaluated instructional practices from 1975 through August 2019. A total of 69 participants who had a diagnosed significant cognitive disability were included across all studies. A wide range of interventionists were involved in providing the interventions, including general education teachers, special education teachers, paraprofessionals, peers, and researchers. All of the studies took place in the general education classroom.

Findings

Empirical studies investigating academic interventions in inclusive general education settings for students with the most significant disabilities showed positive gains on academic performance measures across content areas and across grade bands (elementary, middle, and high school). Studies were evaluated for levels of empirical support using the Horner, Carr, Halle, McGee, Odon, and Wolery (2005) single-case design criteria, as well as the more recent recommendations of the Council for Exceptional Children (Cook et al., 2014).

We assigned the classifications used by the Institute of Education Sciences (IES) to categorize the practice from each study as evidence-based, research-based, or promising. Embedded trial instruction and constant time delay were found to be **evidence-based practices**; system of least prompts, task analytic instruction, chained tasks taught using task analytic instruction with embedded system of least prompts, simultaneous prompting, and peer support interventions were found to be **research-based practices**; and technology-aided instruction and graphic organizers were found to be **promising practices**.

These instructional practices varied in the extent to which they were implemented by general educators. In some cases interventions were implemented by special educators in the general education classroom, and in others by peers in the general education classroom.

Limitations

Limitations in the literature reviewed here should be kept in mind. First, only eight new studies were added during our updated review, a relatively small number for a six-year period (i.e., 2013-2019). Second, we included only studies that had positive outcomes. We did not include studies that had no evidence of a positive outcome (e.g., neutral effect because one student did not show progress; Courtade, Lingo, & Whitney, 2013) or those that might have had a negative outcome, but we did consider this in determining whether a practice was evidence-based, research-based, or a promising practice. For example, because Courtade et al.'s (2013) primary intervention was a task analysis and there were neutral effects, this practice would be considered research-based regardless of the number of participants, research teams, and geographical areas. Finally, the literature reviews did not specifically address any studies that might have included English learners with significant cognitive disabilities, thereby restricting the statements that can be made about the practices for that group of students.

Future Research

Only two instructional practices had enough support to be considered evidence-based practices, and in many of the studies of these practices the interventionist was the general education teacher. Still, a number of instructional practices were on the cusp of being identified as evidence-based practices; they needed either more participants or additional research studies supporting the practice.

Given this information, it is important to note that regardless of the level of evidence, there was empirical support showing that the instructional practices identified did have positive academic effects for this population when implemented in general education classrooms. The practices can be used, as appropriate, to support academic engagement and instructional effectiveness.

This literature review highlighted the need for additional research on instructional practices that work in general education classrooms, both with the general educator as interventionist and with other personnel (e.g., paraprofessional, special educator) as interventionists.

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Introduction

Inclusion is defined in a variety of ways by researchers who are studying instructional practices. For example, Quirk, Ryndak, and Taub (2018) defined inclusion as "practices that are designed by schools to enable them to deliver equitable educational services to all students, with supports offered to any student who needs them for social or academic success and with a focus on the use of evidence-based instructional practices to maximize the learning of each and every student" (p. 98). Rather than thinking of "inclusion" as a placement, it is considered by these and other researchers as the way the school: allocates resources; supports all learners and their learning needs, including students with significant cognitive disabilities; and designs instruction, incorporating interventions that meet students' strengths and needs within the general education setting.

Despite this and other definitions of inclusion, the fact is that most students with the most significant disabilities more often are removed from general education settings and have little access to the general curriculum (Morningstar, Kurth, & Johnson, 2017). This fact likely has an effect on the availability of research on instructional practices in general education settings used by general education teachers.

Research on inclusive instructional practices for students with the most significant cognitive disabilities historically has varied in the student population studied. Most include students with moderate and severe intellectual disabilities and multiple disabilities. With the development of alternate assessments for students with the most significant cognitive disabilities, and the requirement that states provide a definition of "students with the most significant cognitive disabilities" (Thurlow, Albus, Larson, Liu, & Lazarus, 2019; Thurlow, Lazarus, Larson, Albus, Liu, & Kwong, 2017), this review uses the term "students with the most significant cognitive disabilities" and for each study, the specific student population is identified.

Research shows positive benefits of inclusion for students with the most significant disabilities, but also for their general education peers as well (Carter et al., 2016; Jimenez, Browder, Spooner, & DiBiase, 2012). Students with intellectual disability can make progress on academic as well as social goals in inclusive classrooms (e.g., Brock, Biggs, Carter, Cattey, & Raley, 2016; Heinrich, Collins, Knight, & Spriggs, 2016). Research also has demonstrated that students without disabilities who are taught in classrooms with students with disabilities have consistent or improved academic outcomes (e.g., McDonnell, Thorson, Disher, Mathot-Buckner, Mendel, & Ray, 2003). Additionally, teachers report multiple positive outcomes related to social or contextual issues (e.g., peers miss class less, are actively engaged in lessons, have increased leadership and empathy skills; Carter et al., 2016).

Although the research shows that students with the most significant disabilities can make significant academic gains in inclusive settings, there is limited evidence to support specific pedagogical practices that produce these academic gains. The purpose of this paper is to summarize the research findings and provide recommendations to administrators and practitioners about which instructional practices have empirical support for use in inclusive classrooms. We do this by adding to two prior literature reviews (Hudson et al., 2013; Jimenez & Kamei, 2015) that examined the acquisition of academic content by students with significant intellectual disability.

Hudson et al. (2013) found 17 experimental studies that met our inclusion criteria: (a) a teaching intervention, (b) at least one academic dependent variable, and (c) at least one participant with moderate or severe intellectual disability. Studies were evaluated for quality using the Horner et al. (2005) criteria with seven quality indicators and 21 subindicators looking at (a) participants and settings, (b) dependent variable, (c) independent variable, (d) baseline procedures, (e) experimental control and internal validity, (f) external validity, and (g) social validity.

From the literature review by Hudson et al. (2013) one strategy—*embedded instruction using constant time delay*—was identified to meet the standards for an evidenced-based practice. Ten studies used embedded trial instruction across five geographical areas with a total of 26 participants with moderate and severe intellectual disability, and nine of the 10 studies used embedded trial instruction of the constant time delay procedure across four geographical areas with a total of 22 participants. Embedded instruction with constant time delay was used across a range of content, including sight word instruction, phonemic awareness, identifying numerals, telling time, and teaching definitions of content-specific vocabulary, as well as across grade levels spanning from kindergarten to middle school. The practice was studied in general education settings with the general educator (sometimes coupled with peers) as interventionist as well as with the special educator or paraprofessional as interventionist.

Two other systematic instruction strategies were identified as promising practices—*system of least prompts* and *task analytic instruction*. These, however, did not have enough quality studies to meet criteria as evidence-based. These studies addressed more complex skills such as letter writing and answering listening comprehension questions. Based on the findings of the Hudson et al. (2013) literature review, the majority of studies addressed discrete skills, with fewer targeting more complex skills that require higher level thinking.

Jimenez and Kamei (2015) looked specifically at studies that used embedded trial instruction and found similar results with constant time delay being the primary type of systematic instruction used. Two additional studies were identified that were not found in the Hudson et al. (2013) study. Similar to Hudson et al.'s findings, the majority of skills taught were discrete skills with only one study addressing a chained skill (phonological and phonemic awareness; Jameson, Walker, Utley, & Maughan, 2012). A unique variant from the prior literature review was that

this study emphasized who delivered the instruction in the general education setting, including five general educators, three special educators, five paraprofessionals, and a peer. Jimenez and Kamei also called for additional research with more pedagogical practices, particularly targeting more complex and higher level thinking skills that are aligned to the complexity of the Common Core State Standards.

Both of the two previous literature reviews (Hudson et al., 2013; Jimenez & Kumei, 2015) examined studies in which the instructional strategies were implemented in the general education classroom. Although many of their practices might be difficult, but not impossible, for a general education teacher to implement, there is evidence they can be provided by general educators, as well as by special education teachers, paraprofessionals, and general education peers. These studies, thus, provide important information for administrators and general educators about evidence-based approaches that can be used during instruction for students with the most significant cognitive disabilities.

The purpose of this literature review is to extend previous literature reviews to bring the review of literature up-to-date on pedagogical practices for students with the most significant disabilities in inclusive settings, and to make recommendations for practice based on these findings. This report combines the data from the prior two literature reviews (Hudson et al., 2013; Jimenez & Kamei, 2015) with a current literature review (2013 through August, 2019) on academic interventions in inclusive settings with students with the most significant disabilities. This report details the methodology for conducting the review and the findings from the review. It also provides recommendations and implications for practice from these results.

Method

An electronic search was conducted using university education-related databases for studies published from 2013 through August, 2019. A variety of search terms were used (e.g., "inclusion," "inclusive," "general education," "mainstream," "severe disabilit*", "intellectual disab*," "moderate intellectual disab*," "severe intellectual disab*," "autism," "academic," "math*," "literacy," "science," "social studies," "English language arts"). Titles and abstracts were then screened to reduce the studies found by databases that were irrelevant to the criteria narrowing the field to 25 studies. Seventeen of those studies were eliminated for a variety of reasons, such as they were literature reviews (e.g., Ballard & Dymond, 2017), qualitative studies that did not directly measure an intervention (e.g., Kurth, Lyon, & Shogren, 2015), and the intervention did not have a direct measure in the general education setting (e.g., Britton, Collins, Ault, & Bausch, 2017).

The methodology of each study—specifically the setting and participants, independent variables, and dependent variables—were reviewed to ensure that at least part of the study (a) was conducted in an inclusive, general education setting with at least one participant with a moderate or severe intellectual disability (IQ 55 or below) or a student participating in alternate assessments based on alternate achievement standards if IQ was not specified; (b) used an academic intervention; and (c) the intervention had a direct measure of student academic performance. Also, we searched leading special education journals, specifically ones targeting inclusive practices, such as *Research and Practice for Persons with Severe Disabilities, The Journal of Special Education, Inclusion,* and *Education and Treatment for Autism and Other Developmental Disabilities.* Eight articles were identified that met the criteria for inclusion.

A two-step process for determining evidence-based practices was used in which we (a) identified quality studies that used an experimental design to measure the effect of interventions on academic learning (outcome) for students with significant cognitive disabilities in inclusive settings, and (b) evaluated these studies using quality indicators for level of evidence of support. The studies that met inclusion criteria were coded for quality indicators using recommendations outlined by Horner et al. (2005) for single-case research, mirroring the method used by Hudson et al. (2013) and Jimenez and Kamei (2015).

The previous literature review (Jimenez & Kamei, 2015) used a checklist developed by Test et al. (2009) and updated by the National Technical Assistance Center on Transition (NTACT, 2015) because that checklist contained detailed operational definitions for coding and directions for determining high or adequate quality based on criteria in Horner et al. (2005), and also aligned to the more stringent and up-to-date criteria from the Council for Exceptional Children (CEC) (Cook et al., 2014). The coding used by Hudson et al. (2013) and Jimenez and Kamei (2015) were used in this review. Although we did not recode those articles for quality, we did read the articles and cross check the quality indicators tables across the two literature reviews for studies that appeared in both, finding five discrepancies. For those five articles, two coders reviewed the coding discrepancies to determine the level of quality.

Table 1 summarizes the years of literature the reviews covered, inclusion criteria of the three literature reviews, as well as the number of total studies found. Across the three literature reviews, a total of 27 studies was identified that examined instructional strategies to support academic learning in inclusive settings and that showed positive gains. Jimenez and Kamei (2015) specifically focused on research on embedding instruction as the intervention; they found two studies that were not reported by Hudson et al. (2013): Johnson and McDonnell (2004) and McDonnell, Johnson, Polychronis, and Riesen (2002).

Table 1. Literature Reviews Targeting Inclusive Academic Interventions for Students with the Most Significant Disabilities from 1975 through August, 201

Hudson, Browder, & Wood (2013)	Jimenez & Kamei (2015)	The TIES Center (2019)
• Evaluated studies between 1975-2012 • Inclusion criteria: (a) published in English, (b) used as teaching intervention, (c) measured academic learning, (d) included at least one participant with moderate/severe ID (i.e., IQ <55) (e) implemented in a general education classroom, and (f) used an experimental design. *17 studies that met inclusion criteria; one excluded for this report ($n = 16$)	• Evaluated studies between 1975-2013 • Inclusion criteria: (a) same criteria as Hudson et al. (2013) (b) narrower focus: had to use embedded instruction to teach academic skills aligned to grade-aligned content standards *11 studies met inclusion criteria; 9 overlapped with Hudson et al. (2013) *Found 2 additional studies that met inclusion criteria ($n = 2$)	• Studies from 2013 to August 2019 • Inclusion criteria: (a) same criteria as Hudson et al. (2013) (b) could have used a generalization measure in an inclusive classroom *8 studies that met inclusion criteria ($n = 8$)

*Total number of studies analyzed across the three literature reviews for this report ($n = 26$)

After further review of all studies in the two previous reviews, one study that had originally been included in Hudson et al.'s review (McDonnell, Mathot-Buckner, Thorson, & Fister, 2001) was removed from this literature analysis because the three participants in that study were in inclusive settings but were working on skills unrelated to the content being addressed in the general education setting. Therefore, the studies included in this literature review include 26 studies dating as early as 1975 through August, 2019.

After the 26 studies were coded for quality indicators, practices were then evaluated to determine the level of empirical support. To be considered "evidence-based" the practice had to have been conducted with a minimum of 20 participants, across five high or adequate quality single-case design studies with three different research teams in three geographic regions; and show no evidence of negative effects across studies. To be considered "research-based," the practice had to have been conducted across three single-case design studies showing a functional relation with a least two research teams, and have more positive effect outcomes than negative effects across studies. In order to be considered "promising practice," the practice had to have at least one rigorous design showing positive effects.

Findings

Of the 26 studies, the practices that fell into one of the three evidence categories are included in Appendix A. It includes a definition and the total number of studies that included that practice across the three literature reviews and the level of evidence for each practice. For a detailed description of each study, see Appendix B. For more information on several of these practices in a user-friendly format, visit https://wiki.ncscpartners.org/index.php/Instructional_Resource_Guide.

Instructional Practices

For each of the practices listed in Appendix A, we provide here a brief definition of the practice, along with a specific example from the literature.

Embedded Trial Instruction

Embedded trial instruction, often shorted to "embedded instruction," involves distributing instructional trials and opportunities for students responding across ongoing routines and activities within the general education classroom (e.g., during instruction or during natural breaks in instruction such as independent seat work time). Embedded trial instruction was used by Johnson and McDonnell (2004) to teach a student with a developmental disability the concept of "greater than" using double-digit numerals in a general education math classroom.

Systematic Instruction Strategies

Constant time delay. Constant time delay is a form of errorless learning that is most commonly used with discrete responses (e.g., number identification, vocabulary words, matching). The skill is initially taught with a controlling prompt by the instructor at a zero-second time delay, and then the controlling prompt is faded by introducing a wait time (e.g., 4 seconds) before delivering the controlling prompt. A controlling prompt is a prompt that is added to the target stimulus that helps the learner make the target response. For example, if the student is identifying sight words related to a science lesson, the instructor may provide a model prompt as the controlling prompt, pointing to the sight word and saying the sight word aloud. In the research, constant time delay was often combined with embedded trial instruction and used to provide vocabulary instruction in the general education setting (Jameson, McDonnell, Johnson, Riesen, & Polychronis, 2007; Jameson, McDonnell, Polychronis, & Riesen, 2008; Jimenez et al., 2012; Johnson, McDonnell, Holzwarth, & Hunter, 2004; McDonnell et al., 2002; McDonnell, Johnson, Polychronis, Riesen, Jameson, & Kercher, 2006; Riesen, McDonnell, Johnson, Polychronis, & Jameson, 2003).

System of least prompts. A system of least prompts (also called least intrusive prompting) is a hierarchy of prompts progressing from the least intrusive prompt to the most intrusive prompt (e.g., verbal, gesture/model, physical) with a wait interval between each prompt until the student makes the targeted response. Hudson, Browder, and Jimenez (2014) used a system of least prompts intervention to teach grade-level science concepts through adapted read-alouds for students with moderate intellectual disability in which peers delivered the prompts using a question template for factual and inferential questions.

Simultaneous prompting. Simultaneous prompting is a nearly errorless form of learning where an instructional cue and controlling prompt are presented simultaneously during teaching trials with assessment probes conducted prior to the instructional session to measure skill acquisition (Gibson & Schuster, 1992; Schuster, Griffen, & Wolery, 1992). Simultaneous prompting has been most often researched in comparison studies combining or alternating with other interventions. For example, Collins, Evans, Creech-Galloway, Karl, and Miller (2007) compared simultaneous prompting with direct massed trial instruction, direct distributed trial instruction, and embedded trial instruction for teaching functional and core sight words to students with significant cognitive disabilities in a general education classroom setting. The trials were defined as: (a) direct massed trials included one session with several trials of systematic instruction delivery on the sight words delivered in a 1:1 format; (b) direct distributed trials included a set amount of trials of each sight word within a session, delivered by multiple instructors at designated times throughout the day; and (c) embedded trials included natural occurrences of the sight words within the general education lesson. Similarly, Reisen et al. (2003) conducted a study where simultaneous prompting was compared with constant time delay within embedded trial instruction to teach science content vocabulary words to students with moderate to severe disabilities in a general education classroom setting.

Task Analytic Instruction

Task analytic instruction involves taking the steps of a chained task (i.e., a multi-step task) broken down into a series of discrete skills (i.e., each individual step) that are linked sequentially. Task analytic instruction was most often used during embedded trials and was combined with a response prompting strategy to teach each step of the chained task, such as constant time delay or the system of least prompts. Task analytic instruction with constant time delay was used to teach concepts such as early reading (Jameson et al., 2012) and writing (Wolery, Anthony, Snyder, Werts, & Katzenmeyer, 1997). Task analytic instruction with the system of least prompts was used to teach students with severe to moderate disabilities to write composition letters to others in a secondary composition general education classroom (Collins, Branson, Hall, & Rankin, 2001).

Peer Support Interventions

Peer implemented supports are intervention strategies where peers are trained to deliver the instruction and prompting. Peers were used to support implementation of interventions by providing supports such as rewording questions, chunking assignments into smaller tasks, facilitating participation in class activities, modifying activities and materials (Carter, Cushing, Clark, & Kennedy, 2005), delivering a system of least prompts (Hudson et al., 2014), peer-mediated time delay (Jimenez et al., 2012), and partner learning with error correction (McDonnell, Thorson, Allen, & Mathot-Buckner, 2000).

Technology-aided Instruction

Technology-aided instruction is defined as any electronic item, equipment, application, or virtual network that is used intentionally to increase, maintain, or improve skills such as daily living, word productivity, and recreation/leisure capabilities. Technology-aided instruction involves technology as a central feature of an intervention that supports the goal or outcome for the student, and generally always uses a type of instructional delivery, such as prompting (Odom et al., 2015). The use of technology-aided instruction is on the rise in educational research for students with significant disabilities. Studies used for academic content in inclusive settings include Smith, Spooner, and Wood's (2013) investigation using an iPad with slideshow presentations to teach science vocabulary and corresponding pictures using explicit instruction. More recently, Knight, Kuntz, and Brown (2018) used video prompting on a tablet across subject areas to teach math, science, and writing concepts to students with severe disabilities in inclusive settings.

Graphic Organizers

Graphic organizers are an instructional tool used to aid in comprehension or to organize key information. Graphic organizers were used to teach reading comprehension of text in subject areas such as science (Jimenez et al., 2012) and social studies (Wood, Browder, & Flynn, 2015).

Population Descriptions

Student Population

The breakdown of disability categories for participants included in the 26 studies is shown in Figure 1. The majority of students had an intellectual disability ($n = 43$). Many studies did not differentiate by "moderate ID" or "severe ID" or specify an IQ, so the intellectual disability category here includes both studies that differentiated and studies that did not. Students with autism spectrum disorder ($n = 9$) were included in this review only if the student either had a significant cognitive disability or participated in the alternate assessment aligned to alternate achievement standards. The remaining categories included in this review were students with

multiple disabilities (*n* = 15) and students with pervasive developmental disability (PPD), developmental delay (DD), or not otherwise specified (*n* = 2).

Figure 1. Disability Categories for Included Participants in the 26 Studies
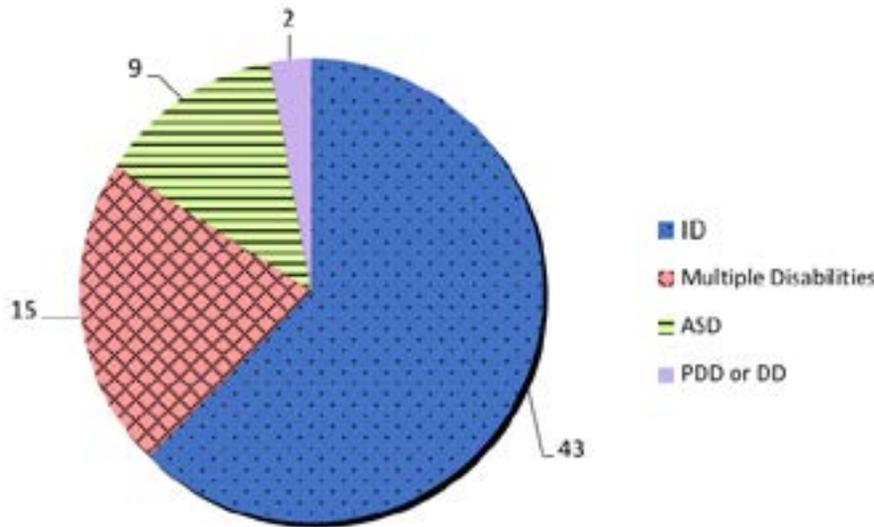
Note. ID=Intellectual disability; ASD=Autism Spectrum Disorder; PPD=Pervasive developmental disability; DD=Developmental disability

Interventionists

Figure 2 shows the distribution of interventionists conducting the academic intervention in the inclusive general education classroom setting. The term "interventionist" is used because a range of adults and peers implemented the instructional strategies. Contrary to the anticipated finding that the majority of interventions would be delivered by a paraprofessional providing support in the inclusive setting, a wide representation of interventionists was found, including general education teachers (*n* = 12), peers (*n* = 10), special education teachers (*n* = 7), paraprofessionals (*n* = 7), and a researcher (*n* = 1).

Figure 2. Interventionists Delivering Academic Interventions in the 26 Studies
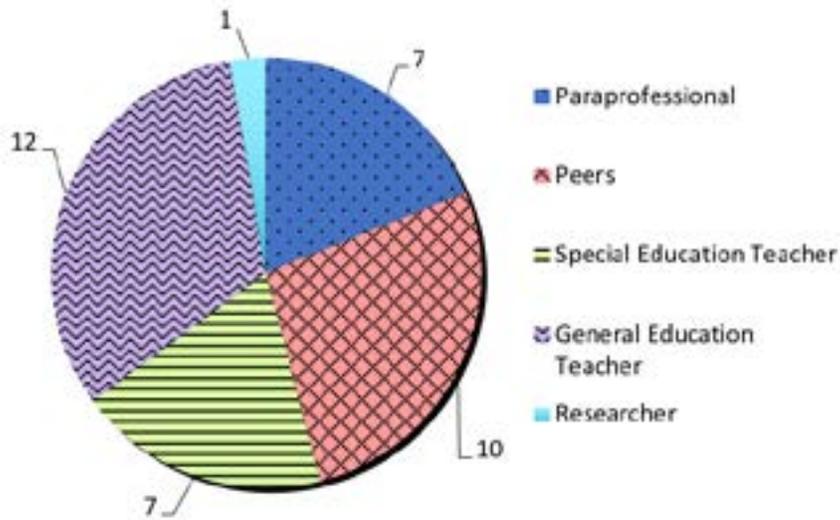
Setting

Across the 26 studies, there was a fairly even distribution of grade levels, with slightly more studies conducted at the elementary level (see Figure 3).

Figure 3. Grade Levels in the 26 Studies
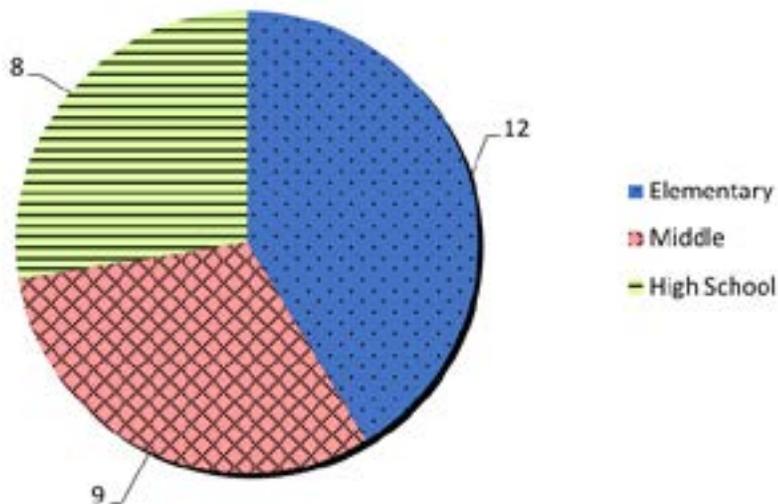
Skills Addressed in the General Education Setting

One concern that special education teachers and parents of students with the most significant disabilities often voice is the limited time students have to work on the functional skills that are in a student's Individualized Education Program (IEP) within the general education setting. Over half of the 26 studies identified across the three literature reviews addressed both academic skills and functional skills, including social skills within the general education setting (see Table 2).

Table 2: Skills Addressed in Inclusive Academic Interventions

Academic	13
Academic/IEP	5
IEP/Functional	1
Academic/Functional	2
Academic/IEP/Functional	4
IEP/Social	1
Total	**26**

Academic Content Areas Addressed

Across the three literature reviews, each study was analyzed for the content area addressed in the study. A large number of studies addressed sight word/vocabulary instruction only. It is important to note that studies that addressed vocabulary instruction were coded as such, regardless of content area (e.g., identifying science words was coded as vocabulary). The research findings by academic content areas addressed are shown in Figure 4. In addition to these categories, academic engagement/responding ($n = 3$), social interaction with peers ($n = 1$), and calendar time ($n = 1$) also were addressed.

Figure 4: Research Findings by Content Area Targeted

Note: The number of findings does not equal the total number of studies because many studies addressed more than one content area.

Discussion

This literature review combined the results of two previous literature reviews (Hudson et al., 2013; Jimenez & Kamei, 2015) with an updated set of literature, combining all into the single literature review presented here, covering the literature from 1975 through August, 2019. The literature included 26 studies with 69 students with significant cognitive disabilities who were in (and received instruction within) the general education classroom for the intervention studied. This literature provides an important indication about what the research literature explored in relation to the implementation of instructional strategies within the general education classroom.

The findings show that embedded trial instruction and constant time delay have the most support in the literature, followed by other types of systematic instruction—system of least prompts, simultaneous prompting, and task analytic instruction. Peer support interventions were deemed research-based interventions, but it also is important to note many of the aforementioned strategies were used by peers to instruct and support the students with the most significant disabilities. Technology-aided instruction and graphic organizers were additional instructional supports that were deemed promising practices but need additional research support. These also were paired with prompting strategies in the literature.

Implications for Practice

The findings of the composite literature review have several implications for districts and schools, as well as for practitioners. The implications flow from broad—addressing district and school implications—to specific—addressing practitioners working directly with students with the most significant cognitive disabilities in inclusive settings.

The first implication is that inclusion is possible in any grade band (i.e., elementary, middle, or high school). There is a false perception that there are "gateways" to inclusion such as appropriate behavior or prerequisite knowledge and skills (Saunders & Wakeman, 2019). However, the findings from this literature review support that inclusive experiences can be started at any time during a child's educational career and that specially designed instruction can be implemented in the general education classrooms to support gaps in knowledge or skills. In addition, findings from other research show that students exhibit lower rates of problem behavior in inclusive settings (Lee, Wehmeyer, Soukup, & Palmer, 2010). We do encourage practitioners to start with inclusive experiences early on in a child's educational career because, as Erik Carter (2015) notes, "Early segregation does not merely predict later segregation; it almost ensures it." (p. 16).

The second implication of the studies included in this literature review is that several evidence-based practices for students with the most significant cognitive disabilities can be implemented in any type of classroom, including general education classrooms. State and district leaders need to be aware of these evidence-based practices and how they can be implemented within inclusive classrooms. Both embedded trial and constant time delay were identified through studies as evidence-based practices in inclusive classrooms. Four other practices—task analysis, chained tasks with a system of least prompts, simultaneous prompting, and peer supported interventions—were identified as research-based practices. It will be important for school leaders to watch the literature for newly identified evidence- or research-based practices.

The third implication is related to the content of instruction. Figure 4 indicated that a wealth of content (mostly academic) was included in studies, and thus can be the focus of instruction in general education classrooms. Although many of the studies in this literature review focused on the acquisition of vocabulary (i.e., discrete skills), there were also a few studies that focused on more complex academics. The take away for districts and schools is that more complex academic skills targeting higher level thinking can be successfully taught. This implies also that new pedagogical practices need to be identified for this research, particularly targeting higher level thinking skills such as reading comprehension and solving mathematical word problems.

The fourth implication is a recommendation for selecting a variety of interventionists (e.g., general education teachers, special education teachers, peers) for working with students with the most significant disabilities in inclusive settings. This discounts the idea that "inclusion" is only possible if the special education teacher or a paraprofessional can accompany the student

with a significant cognitive disability to the general education setting, or that the general education teacher has to stop instruction. Findings showed that academic progress for students with the most significant disabilities could be made regardless of who delivered the instruction in the inclusive classroom. In fact, just using the general education teacher or special education teacher as the interventionist may limit the number of opportunities students with the most significant cognitive disabilities have to respond because they are working with all students in the classroom. Peers, in contrast to teachers, may actually increase the number of opportunities to embed instruction and for students with the most significant disabilities to respond (Brock et al., 2016). Additionally, peers were found to be less stigmatizing than having an adult present. Carter et al. (2016) reported that adults in close proximity to students with the most significant disabilities, such as paraprofessionals providing one-on-one support, actually decreased the number of social interactions with peers, particularly for students in middle and high school.

Finally, school faculty should be provided professional development on these evidence-based or research-based practices. The professional development should be extensive, including modeling and ongoing coaching so that educators become fluent in their use and can deliver instruction with fidelity. Only when the instructional strategy is implemented as it was designed, with consistency and over time, will students benefit. Peers who are selected as peer tutors/interventionists should also receive training and ongoing coaching as well (Brock et al., 2016; Carter et al., 2016).

Limitations

There are several limitations that need to be kept in mind as the implications are considered. First, this review relied heavily on the findings of Hudson et al. (2014) and Jimenez and Kamei (2015). An updated search was conducted through August 2019; however, it is possible that some studies were missed due to differences in terminology within the literature. We did a thorough hand search of all prevalent journals for students with intellectual disabilities and inclusive practices to try to control for this. Second, it is possible the students with the most significant disabilities were not placed beside their peers within the general education classroom. With that said, placement near a peer also does not necessarily equate to increased social engagement or academic engagement (Brock et al., 2016; Carter et al., 2016). Likewise, although the authors screened for studies where students were working on academic skills unrelated to the general education content and eliminated them, it is possible the methods were unclear or studies were included where this was the case.

Furthermore, systematic instruction strategies had the most literature support. Although this is critical for educators to know, often these practices can look different from the instruction that peers are receiving in the general education setting. There is a great need for additional practices

with empirical support to show academic gains in students with the most significant disabilities in inclusive settings, particularly for strategies that can be used simultaneously within the lesson. Recommendations for methods on how to recognize student performance levels and use these to make adaptations within the lesson (i.e., "on the fly") are needed as well.

Additionally, we included only studies that had positive outcomes, as is customary in literature reviews. Some studies did not show enough demonstration of effect in the participants for the data to be considered as high quality (e.g., Courtade et al., 2013); however, these findings are still contributions to the literature, given the limited number of studies found overall. Studies with neutral or negative effects may have factors to consider as suggestions for future practice. For example, in Courtade et al. (2013), the student who did not show an effect on engagement in the general education setting during whole group instruction on the floor was a kindergartener who exhibited highly distractible behavior in that classroom setting. Therefore, it may not have been the intervention that did not work, but rather the context that was the contributing factor to the student not responding. Finally, most of the studies in the recent literature (2013-2019) did not specify whether the students were English learners, and thus the findings cannot be generalized to English learners with the most significant cognitive disabilities. Future research should make an effort to answer the question, "What works for who and in what context?"

Conclusion

Although limited in its breadth, this research we reviewed indicates that the inclusion of students with the most significant disabilities is not just a possibility, it is a reality. Regardless of content, interventionist, or grade level, the provision of best practice pedagogical strategies can result in academic achievement in general education contexts for students with the most significant disabilities, and without compromising attention to academic, functional, or social skills. Still, teachers within schools will need support to be able to implement identified strategies to promote the success of all students. The culture of inclusivity is an important factor in the success of students with the most significant cognitive disabilities being meaningful members in the inclusive setting, and at the forefront must be an attitude of high expectations for ALL learners (Quenemoen & Thurlow, 2019; Thurlow & Quenemoen, 2019).

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*indicates research studies included in the analysis

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Interventions Studied

Intervention Studied	Definition	Number Studies Level of Evidence	Studies
Embedded Trial Instruction	Instructional trials distributed across ongoing routines and activities within the general education classroom (e.g., during instruction or natural breaks in instruction).	13 Evidence Based Practice	Collins et al. (2007); Heinrich et al. (2016); Jameson et al. (2007); Jameson et al. (2008); Jameson et al. (2012); Jimenez et al. (2012); Johnson & McDonnell (2004); Johnson et al. (2004); McDonnell et al. (2002); McDonnell et al. (2006); Polychronis, McDonnell, Johnson, Riesen, & Jameson (2004); Riesen et al. (2003); Wolery et al. (1997)
Constant Time Delay	CTD is a form of errorless learning that is most commonly used with discrete responses (e.g., number ID; vocabulary words, matching). The skill is initially taught with a controlling prompt by the instructor at a 0-sec time delay, and then the wait time is delayed (e.g., 4 sec) before delivering the controlling prompt.	11 Evidence Based Practice	Jameson et al. (2007); Jameson et al. (2008); Jameson et al. (2012); Jimenez et al. (2012); Johnson et al. (2004); McDonnell et al. (2002); McDonnell et al. (2006); Polychronis et al. (2004); Riesen et al. (2003); Wolery et al. (1997); Wolery, Werts, Snyder, & Caldwell (1994)
System of Least Prompts	A hierarchy of prompts (with a delay interval between each prompt) progressing from the least intrusive to the most intrusive is used (e.g., verbal, gesture/model, physical) until the student makes the targeted response.	3 Research Based Practice	Hudson & Browder (2014); Hudson et al. (2014); Wood et al. (2015)
Task Analytic Instruction	Steps of a task are broken down and taught as a series of tasks to be completed in order. Steps can be taught using forward chaining backwards chaining, or total task presentation.	5 Research Based Practice	Jameson et al. (2012); Knight et al. (2018); Roberts & Leko (2013); Ruppar, Afacan, Yang, & Pickett (2017); Wolery et al. (1997)
Chained Tasks taught using TA with SLP	Steps of chained task broken down into series of discrete skills that are linked sequentially and then prompted through a System of Least Prompts.	2 Research Based Practice	Collins et al. (2001); Jameson et al. (2012)
Simultaneous Prompting	Errorless learning where an instructional cue and controlling prompt are presented simultaneously during teaching trials with probes conducted prior to the instructional session to measure skill acquisition.	4 Research Based Practice	Collins et al. (2001); Heinrich et al. (2016); Riesen et al. (2003); Tekin-Iftar, Collins, Spooner, & Olcay-Gul (2017)

Intervention Studied	Definition	Number Studies Level of Evidence	Studies
Peer Support Interventions	Peer implemented supports through various intervention strategies where peers are trained to deliver the instruction and prompting.	5 Research Based Practice	Carter et al. (2005); Hudson & Browder (2014); Hudson et al. (2014); Jimenez et al. (2012); McDonnell et al. (2000)
Technology-aided Instruction	Any electronic item/ equipment/ application or virtual network that is used intentionally to increase or maintain, and/or improve daily living, word/ productivity, and recreation/leisure capabilities that plays a central feature of an intervention that supports the goal or outcome for the student.	2 Promising Practice	Knight et al. (2018); Smith et al. (2013)
Graphic Organizers	Instructional tool used to aid in comprehension and/or organize key information.	2 Promising Practice	Jimenez et al. (2012); Wood et al. (2015)

Studies Reviewed

Evidence-based Practices

Study	Purpose	Skills Addressed	Content Area Addressed	Instructional Practice(s)	Participants	Interventionist	School Level Setting	Findings
Jameson, McDonnell, Johnson, Riesen, & Polychronis (2007)	Evaluated effectiveness of one-to-one embedded instruction in the general education classroom for teaching states of matter and other academic and functional instructional sets	Academic	Sight word/ vocabulary and electives	Embedded Trial Instruction and Constant Time Delay	*n*=2 Moderate ID	Paraprofessional and special education teacher	High school	Participants reached higher criterion more rapidly in one-to-one massed instructional interventions while embedded instruction was more efficient for one student
Jameson, McDonnell, Polychronis, & Riesen (2008)	Investigated effectiveness of a training package (written manual, individual training session, and ongoing verbal feedback) with middle school peer tutors to teach art and health vocabulary	IEP and functional	Sight word/ vocabulary And electives	Embedded Trial Instruction and Constant Time Delay	*n*=3 Moderate ID	Peers and general education teacher	Middle school	Peer tutors were able to be successfully trained and implement intervention and participants acquired targeted skills
Johnson & McDonnell (2004)	Taught student to identify the 2-digit number that was "greater than".	Academic	Math	Embedded Trial Instruction	*n*=1 Multiple Disabilities	General education teacher	Elementary school	Participant acquired and maintained math skill taught

Study	Purpose	Skills Addressed	Content Area Addressed	Instructional Practice(s)	Participants	Interventionist	School Level Setting	Findings
Johnson, McDonnell, Holzwarth, & Hunter (2004)	Taught students to answer probe questions related to general science curriculum, identifying functional sight-words drawn from the general reading curriculum	Academic	Sight word/ vocabulary	Embedded Trial Instruction and Constant Time Delay	*n=1* Moderate ID	General education teacher	Elementary school	Effective for all participants. Teaching strategy had positive social validity from teachers and paraprofessionals
McDonnell, Johnson, Polychronis, & Riesen (2002)	Taught sight word reading and definition recall for grade-level vocabulary	Academic and functional	Sight word/ vocabulary and electives	Embedded Trial Instruction and Constant Time Delay	*n=4* Moderate ID	Paraprofessional	High school	Participants acquired and maintained target skills
McDonnell, Johnson, Polychronis, Riesen, Jameson, & Kercher (2006)	Evaluated effectiveness of embedded and small-group instruction to teach vocabulary word definitions	Academic and IEP	Sight word/ vocabulary, science, and social studies/history	Embedded Trial Instruction and Constant Time Delay	*n=4* 1 Moderate ID, 2 Multiple Disabilities, 1 ASD	Paraprofessional	Middle school	Embedded and small-group instruction were equally effective in promoting the acquisition and generalization of the target skill
Polychronis, McDonnell, Johnson, Risen, & Jameson (2004)	Compared the effectiveness of trail distribution schedules implemented in an embedded instruction package to teach academic skills for math or reading	Academic and IEP	Early reading, math, and writing	Embedded Trial Instruction and Constant Time Delay	*n=4* 1 Moderate ID, 2 ASD, 1 PDD/DD	General education teacher	Elementary school	Both schedules led to the acquisition of the target skills and students were able to generalize skills

Study	Purpose	Skills Addressed	Content Area Addressed	Instructional Practice(s)	Participants	Interventionist	School Level Setting	Findings
Wolery, Werts, Snyder, & Caldwell (1994)	To evaluate the effects of a peer implemented constant time delay procedures to teach functional and academic content	Academic	Sight word/ vocabulary	Constant Time Delay	*n*=1 Moderate ID	Peers and general education teacher	Elementary school	Participants acquired skills taught, peers implemented constant time delay procedures with fidelity, and peers were able to make modifications as needed
Research-based Practices								
Carter, Cushing, Clark, & Kennedy (2005)	Evaluated the impact of altering the number of participating peers on the social and academic outcomes of students with and without disabilities	IEP and social	Reading comprehension, science, and writing	Peer Support Interventions	*n*=3 Moderate ID	Peers	Middle school and High school	Higher levels of social interaction and contact with the general curriculum were observed when students with disabilities worked with two peers relative to one peer
Collins, Branson, Hall, & Rankin (2001)	Taught participants to write letters that included the following 4 components: (a) heading, (b) greeting, (c) content body, and (d) closing	Academic	Writing	Chained Tasks taught using TA with SLP	*n*=3 Moderate ID	Peers	High School	Direct instruction can be incorporated with functional academic skills within an inclusive setting
Collins, Evans, Creech-Galloway, Karl, & Miller (2007)	Taught functional and core content sight words across trial formats and settings	Academic, IEP, and functional	Sight word/ vocabulary, math, science, and social studies/ history	Embedded Trial Instruction and Simultaneous Prompting	*n*=4 Moderate ID	Paraprofessional, peers, and special education teacher	Elementary school, middle school and high school	Results varied slightly but minimally in acquisition and maintenance

Study	Purpose	Skills Addressed	Content Area Addressed	Instructional Practice(s)	Participants	Interventionist	School Level Setting	Findings
Collins, Hall, Branson, & Holder (1999)	Taught sets of facts, one related to course content and one for another subject area	Academic	Social studies/ history and writing	Teacher-delivered statements of related and unrelated factual information embedded into other content	*n*=2 Moderate ID	General education teacher	High school	Of the total six facts presented, one student acquired two related facts and one unrelated fact, while the other student acquired two related and two unrelated facts
Heinrich, Collins, Knight, & Spriggs (2016)	Taught STEM (science, technology, engineering, math) content through discrete and chained tasks in math, science, and technology	Academic, IEP, and functional	Sight word/ vocabulary, math, science, and writing	Embedded Trial Instruction and Simultaneous Prompting	*n*=3 1 Moderate ID, 2 Multiple Disabilities	Paraprofessional and peers	High school	Participants reached criterion in two to eight sessions and maintained the skills for one month following intervention
Hudson & Browder (2014)	Evaluated Systems of Least Prompts, Peer Supports, and Adapted Novel Read-Alouds on Listening Comprehension	Academic	Comprehension	System of Least Prompts and Peer Support Interventions	*n*=3 2 Moderate ID, 1 Multiple Disabilities	Peers	Elementary school	Evaluated Systems of Least Prompts, Peer Supports, and Adapted Novel Read-Alouds on Listening Comprehension
Hudson, Browder, & Jimenez (2014)	Evaluated System of Least Prompts Intervention and Adapted Science Read-Alouds on Listening Comprehension	Academic, IEP	Early reading and science	System of Least Prompts and Peer Support Interventions	*n*=3 2 Moderate ID, 1 Multiple Disabilities	Peers	Elementary school	Intervention was effective for teaching listening intervention effects did not generalize to untrained lessons

Study	Purpose	Skills Addressed	Content Area Addressed	Instructional Practice(s)	Participants	Interventionist	School Level Setting	Findings
Jameson, Walker, Utley, & Maughan (2012)	Compared effectiveness of one-to-one embedded instruction implemented in the general education classroom to teach total task academic behavioral chains with one-to-one massed trials instruction in special education classrooms	Academic	Early reading	Embedded Trial Instruction, Constant Time Delay, Task Analytic instruction, and Chained Tasks taught using TA with SLP	*n*=1 PDD	Special education teacher	Elementary school	All students reached criterion on the targeted behavioral chains, and both special education and general education teachers believed that the embedded instruction allowed the students to participate more in the general education setting
McDonnell, Thorson, Allen, & Mathot-Buckner (2000)	Examined the effectiveness of partner learning on the spelling performance, academic responding, and competing behavior	Academic and IEP	Writing	Peer Support Interventions	*n*=3 Moderate ID	Peers, special education teacher, and general education teacher	Elementary school	Partner learning led to improved spelling accuracy for students with severe disabilities and did not negatively affect the spelling accuracy of their peers
Riesen, McDonnell, Johnson, Polychronis, & Jameson (2003)	Compared the efficacy of constant time delay and simultaneous prompting within an embedded instruction format to either read or verbally define key vocabulary words.	Academic	Sight word/ vocabulary, science, and electives	Embedded Trial Instruction, Constant Time Delay, and Simultaneous Prompting	*n*=2 Multiple Disabilities	Paraprofessional	Middle school	Constant time delay and simultaneous prompting procedures were effective in promoting the acquisition of the target skills although varied in level of effectiveness by participant

Study	Purpose	Skills Addressed	Content Area Addressed	Instructional Practice(s)	Participants	Interventionist	School Level Setting	Findings
Tekin-Iftar, Collins, Spooner, & Olcay-Gul (2017)	Examined the effects of professional development with coaching for general education teachers to teach academic core content	Academic, IEP, and functional	Electives	Simultaneous Prompting	*n*=3 ASD	General education teacher	Middle school	Results showed teachers acquired and maintained teaching behaviors with 100% accuracy. Students acquired targeted academic content, maintained it overtime, and generalized it across persons and settings
Promising Practices								
Jimenez, Browder, Spooner, & DiBiase (2012)	Examined the effects of peer-mediated time-delay instruction to teach inquiry science and use of a knowledge chart	Academic	Sight word/ vocabulary, reading comprehension, and science	Embedded Trial Instruction, Constant Time Delay, Graphic Organizers, and Peer Support Interventions	*n*=5 Moderate ID	Peers and general education teacher	Middle school	All participants increased the number of correct science responses across all science units
Knight, Kuntz, & Brown (2018)	Used video prompting to teach social important academic skills aligned with students' IEPs and content taught in inclusive classes for core academic subjects	Academic and IEP	Math, science, and writing	Task Analytic instruction and Technology-aided Instruction	*n*=3 1 Moderate ID, 2 ASD	Paraprofessional	Elementary school	Functional relation found between the paraprofessional delivered video prompting and correct responding to academic tasks for all three participants

Study	Purpose	Skills Addressed	Content Area Addressed	Instructional Practice(s)	Participants	Interventionist	School Level Setting	Findings
Roberts & Leko (2013)	Examined integration of functional and academic goals in individualized story-based lesson plan using adapted text on grade level content	Academic, IEP, and functional	Sight word/ vocabulary and reading comprehension	Task Analytic instruction	*n*=3 Multiple Disabilities	Special education teacher	Middle school	Participants improved performance on academic and functional goals across tree staff-student dyads. Staff improved ability to implement intervention strategies and lesson components with fidelity
Ruppar, Afacan, Yang, & Pickett (2017)	Examined the effectiveness of shared reading teaching content from the graphic novel *The Odyssey*	Academic	Sight word/ vocabulary and writing	Task Analytic instruction	*n*=1 Multiple Disabilities	Special education teacher and general education teacher	High school	Results showed improvement for the number of correct responses across vocabulary, engagement, and comprehension for the one participant in the study
Smith, Spooner, & Wood (2013)	Taught using embedded, computer assisted instruction to teach science terms and application of those terms	Academic	Sight word/ vocabulary and science	Technology-aided Instruction	*n*=3 2 Multiple Disabilities, 1 ASD	Researcher	Middle school	Functional relationship existed between the number of correct responses made during probe sessions and introduction of the intervention for all participants
Wolery, Anthony, Snyder, Werts, & Katzenmeyer (1997)	Teachers were taught to embed instructional trials using a constant time delay procedure into their ongoing academic classroom activities	Academic and functional	Writing	Embedded Trial Instruction, Constant Time Delay, and Task Analytic instruction	*n*=1 Severe ID	General education teacher	Elementary school	Students correct performance on the targeted goals increased when teachers implemented constant time delay procedures in their classrooms

Study	Purpose	Skills Addressed	Content Area Addressed	Instructional Practice(s)	Participants	Interventionist	School Level Setting	Findings
Wood, Browder, & Flynn (2015)	Taught participants to generate questions about United States history, identify if answers were in previously read text or not, and to answer literal questions from the book using a graphic organizer and self-monitoring sheet	Academic	Reading comprehension and social studies/ history	System of Least Prompts and Graphic Organizers	*n*=3 Moderate ID	Special education teacher	Elementary school	All participants improved the number of questions generated and answered from baseline to intervention and were able to generalize comprehension skills during lessons in the general education setting