Embedded Instruction as an Evidence-Based Practice to Support Inclusive Education
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Definition of the practice. One effective teaching strategy used in special education instruction is distributed learning trials. Distributed trial training has been used to increase skill acquisition for students with moderate to severe intellectual disability (Wolery, Anthony, Caldwell, Snyder, & Morgante, 2002). Different from massed trial training, when multiple trials are repeated shortly after one another and no other responses are emitted in between trials, distributed trial training can occur throughout a school day or lesson. When used in typically occurring activities, lessons, and transitions (i.e., general education contexts) this is called ***embedded instruction.*** The term refers to explicit, systematic instruction designed to distribute instructional trials within the on-going routines and activities of the performance environment (McDonnell, Johnson, & McQuivey, 2008).

Evidence base for the practice. A recent systematic literature review conducted by Jimenez & Kamei (2013) examined the use of embedded instruction (EI) to teach academic content to students with significant intellectual disability. A total of 11 studies were analyzed for research quality with all studies meeting criteria for adequate or high quality research based on the criteria set by Horner et al. (2005). The use of embedded instruction to teach academic skills to students with moderate and severe intellectual disability was judged as either having strong or moderate (acceptable) levels of causal inference based on the National Secondary Transition Technical Assistance Center decision rules (NSTTAC, 2010). All 11 studies used systematic instruction to embed academic trials in various settings, grade levels (elementary and secondary), and across the curriculum (i.e., math, science, language arts, social studies), with constant time delay being the most prevalent strategy used (i.e., in 10 of the studies). For example, Jimenez, Browder, Spooner, & DiBiase (2012) examined the effects of peer-mediated time delay instruction to teach science concepts and vocabulary during inclusive inquiry science to students with moderate intellectual disability. Six general education peers were trained to implement an embedded constant time delay procedure during three science units with five students with moderate intellectual disability. Results indicated that all five students increased the number of correct science responses during all science units. In addition, all six peers were able to implement the intervention with high fidelity. Additionally, the review investigated "who" embedded the instruction and found general educators (e.g., Polychronis, McDonnell, Johnson, Reisen, & Jameson, 2004), special educators (e.g., Collins, Evans, Creech-Galloway, Karl, & Miller, 2007), paraprofessionals (e.g., Reisen, McDonnell, Johnson, Polychronis, & Jameson, 2003), and peers (e.g., Jameson, McDonnell, Polychronis, & Reisen, 2008; Jimenez, Browder, Spooner, & DiBiase, 2012) were effective in using systematic instruction to embed instructional trials. Overall, EI met the standards of an evidence-based strategy to support academic learning of students with moderate and severe intellectual disability.

Embedded Instruction in Practice
Often students need several learning trials embedded in a lesson or activity to ensure learning and progress in the curriculum. Many teachers face the challenge of providing effective and systematic

instruction to students with moderate and severe intellectual disability in general education classrooms. By explicitly embedding systematic instruction (e.g., constant time delay, prompting procedures, and feedback) in the general education setting through various support providers (e.g., general education teachers, peers, etc.) students receive the level of support needed to be successful. Researchers have noted that peers do not have to have prior experiences with tutoring students with disabilities in order to implement the embedded systematic instruction procedures effectively (Jimenez et al., 2012).

Examples of how teachers can use the practice in classrooms. Constant time delay is a successful instructional strategy that general educators, special educators, paraprofessionals, and peers can use to embed instructional support. During a constant time delay procedure, the instructor begins with no delay (0 s) between the task direction and the controlling prompt. After providing a few learning trials embedded within the lesson or after a lesson or two, the instructor will begin to provide "wait time" between the task direction and controlling prompt. For example, during a general education math lesson on perimeter, a paraprofessional or peer support could use naturally occurring instructional opportunities (e.g., transitions between activities, measurement of sides, use of calculator to "find" perimeter) to embed number identification by presenting a numeral and asking, "What number is this?" The student immediately receives the controlling prompt (0 s delay, the number "four") to ensure that there are no opportunities for an incorrect response. After several distributed trials with no delay, the paraprofessional or peer will embed another trial and wait for a response (e.g., 3 s delay). If the student responds correctly,

he/she receives praise (e.g., "That's right, that's the number four!"). If the student responds incorrectly or does not respond within 3 s, the instructor provides error correction and a model for the correct response (e.g., "The number is four"; Polychronis et al., 2004).

Embedded instruction can take place in general education classrooms in many contexts, within a wide-range of content, and with many different people. It is important to be sure that embedded trials reflect meaningful educational goals for the learner! The following are some examples of when and with whom EI can occur.

Transitions and breaks. Paraprofessionals can embed learning trials using constant time delay while students are shifting from one activity (a lecture) to another (small group work), while the class is receiving assignment materials, or during an activity that does not require the student's full attention, such as waiting for the computer to boot up (McDonnell, Johnson, Polychronis, & Reisen, 2002).

Class lectures. Using simultaneous prompting, the special education teacher can embed learning trials of new terminology or math facts. For example, the special education teacher may simultaneously show/read the new vocabulary term to the student while speaking about it within the unit of instruction. By systematically embedding learning trials within the lesson, the teacher can quickly build a student's knowledge and assess at a later time (Collins et al., 2007).

Cooperative learning groups. While a group of students are working on a science investigation, a peer may embed constant time delay trials of new science vocabulary and matching conceptual pictures.

Additionally, the peer may embed opportunities to identify when to use the KWHL (what do you Know, What do you want to learn, How will you find out more, what did you Learn) chart to guide the group of students in their investigation (Jimenez et al., 2012).

Small group instruction. During a social studies lesson, the general education teacher or peer support may be reading a short informational passage. All students are working on comprehension skills and creating an historical timeline. The general education teacher embeds additional learning trials using a least-to-most prompting procedure with the concept of "main character" of the passage. Beginning with least intrusive prompting, the teacher would first ask the student a question, then if they need more support to answer, provide the next level of support (e.g., "I will go back and reread the paragraph; listen to see if you can find the main character"), then if the student still needs more support the teacher may provide another level of prompt (e.g., "Let's go back and reread the first sentence again to see if we can find the main character"). Finally, if the student skill needs more support the teacher may model finding the main character within the sentence (Hudson, Browder, & Jimenez, in press).

Additional Resources

Collins, B. (2012). *Systematic instruction for students with moderate and severe disabilities*. Paul H. Brookes, Baltimore: MD.	A teacher-friendly support for implementing systematic instruction, including constant time delay, task-analysis, prompting and fading strategies.
McDonnell, J., Johnson, J. W., McQuivey, C. (2008). DADD Prism #6 – Embedded instruction for students with developmental disabilities in general education	The guide provides practical and field-tested EI strategies, along with case studies and blank forms designed for practitioners.
Division for Early Childhood (DEC) Recommended Practice Toolkit: Embedded Instruction	Early intervention/early childhood toolkit, including activity plans and matrices. **Supports in toolkit can be easily adapted to fit K-12 instruction.

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