Using Time Delay to Teach Science Skills

What is the evidence base?

- This is an evidence-based practice for **students with disabilities** based on six methodologically sound single-subject studies across 25 participants conducted by at least three research teams with no overlapping authors at three different institutions.

- This is an evidence-based practice for **students with intellectual disabilities**, based on six methodologically sound single-subject studies across 25 students with intellectual disabilities conducted by at least three research teams with no overlapping authors at three different institutions.

Where is the best place to find out how to do this practice?

The best place to find out how to implement time delay for science content is through the following research to practice lesson plan starters:

o [Using Progressive Time Delay to Teach Safety Skills (Collins & Stinson, 1994)](#)

With whom was it implemented?

- Students with:
  - o **Intellectual Disability (6 studies, n=25)**
  - o Autism (1 study, n=1)
  - o Multiple Disabilities (1 study, n=2)
- Ages ranged from 13-21
- Males (n=14), females (n=7), not specified (n=4)
- Ethnicity
  - o None reported (n=25)

What is the practice?

Time Delay has been defined as inserting small increments of time between the target stimulus and prompt across trials. This resulted in the student or learner "anticipating" the correct response. During the first trial, the prompt and target stimulus are paired concurrently. In the following trials, a delay is gradually inserted before the prompt (e.g., 1s, 2s) until the student anticipates the correct response (i.e., unprompted correct response) (Touchette, 1971).

Other related terms may include constant time delay or progressive time delay. In constant time delay, the delay between the teacher presenting the target stimulus and the prompt is a constant time period (e.g., 3-s wait before delivery of the prompt) that is fixed and predetermined. In progressive time delay, the delay between the presentation of the target stimulus and the prompt is systematically increased over subsequent trials (e.g., the delay increases progressively after each trial or session of trials by 2-s increments). Time delay can be used to transfer the reliance of the teacher to the word or target stimulus with almost errorless learning.

The studies used to establish the evidence base for using time delay to teach science included:
- Researchers used progressive time delay (PTD) to teach science vocabulary words and generalized word reading of product warning labels to adolescents with disabilities using key words (Collins & Stinson, 1994).
- In combination with backward chaining, time-delay was used to teach students how to perform first aid skills (Gast et al., 1992).
- In combination with peer mediated embedded instruction, time-delay was used to teach students science content and how to use a KWHL (i.e., K = what do you Know?; W = What do you want to know?; H = How will you find out?; L = what did you Learn?) chart during inclusive inquiry science lessons (Jimenez et al., 2012).
- Constant time delay in combination with embedded instruction was used to teach science vocabulary (Riesen et al., 2002)
- Constant time delay in combination with embedded instruction was used to teach students to read and define science vocabulary words (Riesen et al., 2003).
- A treatment package included an orientation lecture, a pre-task demonstration, and constant time delay to teach skills of removing and discarding broken material across three areas (Winterling et al., 1992).

Where has it been implemented?

- Special Education classroom (3 studies)
- General Education classroom (2 studies)
- Special Education and General Education for generalization (1 study)

How does this practice relate to Common Core Standards?

- English Language Arts Standard for Literacy for Science and Technical Subjects (Grade 9-10)
  - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics CCSS.ELA-LITERACY.RST.9-10.4

- o Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words CCSS.ELA-LITERACY.RST.9-10.7

How does this practice relate to the Common Career Technical Core?

Apply appropriate academic and technical skills.
  • Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
  https://careertech.org/sites/default/files/CCTC_Standards_Formatted_2014.pdf
    o Education and Training Career Cluster Standard 4: Evaluate and manage risks to safety, health and the environment in education and training settings

References used to establish this evidence base:

Collins, B. C, & Stinson, D. M. (1994). Teaching generalized reading of product warning labels to adolescents with mental disabilities through the use of key words. *Exceptionality, 5,* 163-181.

Gast, D. L.., Winterling. V, Wolery, M.., & Farmer, J. A. (1992). Teaching first-aid skills to students with moderate handicaps in small group instruction. *Education & Treatment of Children, 15*, 101-124.

Jimenez, B. A., Browder, D. M., Spooner, F., & Dibiase, W. (2012). Inclusive inquiry science using peer-mediated embedded instruction for students with moderate intellectual disability. *Exceptional Children, 78*, 301-317.

Riesen, T., McDonnell, J., Johnson, J. W., Polychronis, S., & Jameson, M. (2003). A comparison of constant time delay and simultaneous prompting within embedded instruction in general education classes with students with moderate to severe disabilities. *Journal of Behavioral Education, 12*, 241-259.

McDonnell, J., Johnson, J. W., Polychronis, S., & Risen, T. (2002). Effects of embedded instruction on students with moderate disabilities enrolled in general education classes. *Education and Training in Mental Retardation and Developmental Disabilities*, *37*, 363-377.

Winterling, V., Gast, D. L., Wolery, M., & Farmer, J. A. (1992). Teaching safety skills to high school students with moderate disabilities. *Journal of Applied Behavior Analysis, 25*, 217-277.

IDEAs
that Work
U.S. Office of Special
Education Programs