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Evidence-based Practice Brief

Systemic Trial-Based Instruction: Effective and Efficient Evidence-based Practices for Teaching Academic Content

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Systematic trial-based instruction refers to a class of instructional strategies that (a) share a common structure and (b) have been established as an evidence-based practice for individuals with developmental disabilities (e.g., see Steinbrenner et al., 2020). Arguably, the two most well-known types of systematic trial-based instruction are discrete trial teaching (e.g., see Smith, 2001) and response prompting strategies, particularly time delay and simultaneous prompting (e.g., see Tekin-Iftar et al., 2019). A range of academic content has been taught with this instruction, including word recognition (Gibson & Schuster, 1992), numeral identification (Akmanoglu & Batu, 2004), story writing (Pennington et al., 2012), and decimal subtraction (Rao & Kane, 2009). Accordingly, the purpose of this article is to inform teachers how to use systematic trial-based instruction to teach academic content.

Overview of Systemic Trial-based Instruction

While there is not a single approach to systematic trial-based instruction (Wilczynski et al., 2012), this class of instructional strategies shares a three-component structure: (a) the presentation of a task directive, (b) a student response, and (c) a response contingency. The three components, which occur in quick succession, comprise a trial. Moreover, trials are separated from each other for a brief period of time called an inter-trial interval.

With respect to presenting academic instruction, a trial involves providing a student with an opportunity to perform an academic task, such as naming a letter of the alphabet, decoding a consonant-vowel-consonant word, stating the product of a multiplication fact, or solving for the variable in a linear algebraic equation. Furthermore, this class of instructional strategies is referred to as systematic because methodical planning is involved in the particular design of the three-component structure, with each component serving a clearly defined purpose.

A trial's first component, the presentation of a task directive, clarifies the teaching situation by (a) having the student attend to a specific environmental cue under circumscribed conditions (Wilczynski et al., 2012) and (b) identifying a specific response (Collins et al., 2018). The second component, a student response, sets the occasion for establishing a relationship between the performance of the response in the presence of the task directive and the subsequent response contingency. The third component, the response contingency, involves the presentation of an appropriate consequence following the student's response. The purpose of the response contingency is to inform the student whether the response was correct and, if so, establishes the likelihood the same behavior will be repeated under similar circumstances in the future (Collins et al., 2018). Affirmative feedback, in the form of a reinforcer, follows a correct response whereas corrective feedback (e.g., stating the correct verbal response or modeling the correct step of a task) follows an incorrect response. Altogether, using these three components, as described, simplifies the teaching situation (Smith, 2001).

Examples in Practice

Next, two brief examples are presented to demonstrate how teachers can use it. The first example involves teaching a discrete task: naming the numeral 2.

The teacher holds up an index card with the numeral 2 on it and presents the task directive, "Name this numeral." Since this task is entirely new to the student, the

teacher presents a prompt (i.e., additional information, beyond the task directive and instructional material) for the purpose of eliciting a correct response. In this instance, the teacher says the first sound in the name of the numeral 2 (e.g., "t"). The student is then given four seconds to make a response. A correct response is followed by a pre-determined reinforcer (e.g., a fist bump), while an incorrect response is followed by the teacher saying the correct response and having the student repeat it.

The second example involves teaching a chained task: using a five-step algorithm to solve a basic addition fact. In this instance, both the teacher and the student would each use a set of instructional materials to complete the task. The teacher, after writing the equation 2+3= on both sheets of paper, would present the task directive, "Find the sum of 2+3=." The prompt would consist of the teacher modeling the first step of writing two tick marks underneath the 2 on her paper. Next, the student would do the same, on her paper, within the response interval. The teacher would follow this behavior with affirmative or corrective feedback. This process would be repeated for each remaining step of the algorithm: (a) writing three tick marks under the 3, (b) combining all five tick marks on the other side of the =, (c) writing the numeral 5 as the sum, then (d) checking one's work.

The three-component structure can be embellished to enhance instructional efficiency. One example is through the inclusion of instructive feedback. It is content presented after the response contingency, and does not involve another student response (Albaran & Sandbank, 2019). For instance, once a student correctly names the numeral 2 and the teacher provides affirmative feedback, the teacher also could demonstrate counting two objects and reading the number word for 2. If the student learned both items then, altogether, three pieces of information would be acquired from the trial instead of just naming the numeral 2.

Why Use Trial-based Instruction?

Finally, there are numerous practical reasons for using systematic trial-based instruction. First, it can be presented effectively by a number of instructors (Smith, 1993) - including certified teachers, paraprofessionals, and peers without disabilities – in both general and special education classrooms. Second, this instruction can be employed in both the 1:1 and small group instructional arrangements that are common to students with developmental disabilities, and result in students' acquisition, maintenance, and generalization of content; moreover, when used in a small group arrangement, efficiency can be increased through planning for observational learning whereby one student learns content that is presented during another student's trial (Collins, 2012). Third, systematic trial-based instruction can be used during a session that lasts 5 minutes or longer. Five minutes of instruction over a 180-day school year amounts to 15 hours of instruction. The presentation of as few as 10 trials during each five-minute session results in 1,800 opportunities for a student to respond. Given that students presenting persistent, significant learning challenges need 10-30 more practice opportunities to master the same skill as their typically developing peers, this instructional approach clearly addresses that need (Gersten et al., 2008).

For more information about discrete trial teaching, time delay, and simultaneous prompting, see Gongola and Sweeney (2012), Steinbrenner et al. (2020), and Tekin-Iftar et al. (2019).

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