

Instructional Events Grounded in Research & Theory

Based on Smith and Ragan (1999, 1993)

Learning Outcome	Grounded Events
<p>Verbal Information</p> <p>Declarative knowledge: Names, labels, facts or a collection of propositions.</p>	<p>Associational Techniques</p> <ul style="list-style-type: none"> • <i>Mnemonics Devices</i> (“FACE” for “Every Good Boy Does Fine”). • <i>Metaphors</i> (“white cells attack infections like soldiers attack enemies”). • <i>Instructor or learner generated images</i> (pictures, graphs, tables and maps). • <i>Rehearsal</i> (drill & practice). <p>Organizational Techniques</p> <ul style="list-style-type: none"> • <i>Clustering and chunking</i> into categories (e.g., periodic table). • <i>Expository and narrative structures</i> (e.g., chronologies, cause and effect relationships, problem solutions, comparisons and contrasts). • <i>Graphic and advanced organizers</i> (e.g., concept tree linking new to prior knowledge). <p>Elaboration Techniques</p> <ul style="list-style-type: none"> • <i>Write meaningful sentences</i> (e.g., sentences using elements of periodic table). • <i>Devise rule</i> (e.g., describe why elements are organized in rows and columns). <p>Feedback Techniques</p> <ul style="list-style-type: none"> • <i>Simple correct answer feedback</i> (Are answers complete and correct?).
<p>Concepts</p> <p>A set of objects, symbols or events grouped together on the basis of shared characteristics which can be referenced by a particular name or symbol.</p>	<ul style="list-style-type: none"> • <i>Inquiry Approach</i> (e.g., exploratory or discovery learning that typically begins with a presentation of examples and non-examples of a concept). • <i>Expository Approach</i> (begins with explanation of a concept and its key attributes). • <i>Attribute Isolation</i> (points out the critical attributes of a concept). • <i>Concept Trees</i> (hierarchical, graphic representations of a specified concept that illustrate the concept relationship to subordinate and superordinate concepts). • <i>Analogies</i> (supplied by instructor or generated by learners) • <i>Mnemonics</i> (when verbal information is important to concept learning or for helping learners remember the key attributes of a concept) • <i>Imagery</i> (a mental image of concrete concepts, such as pictures, graphs, tables and maps presented by the instruction or generated by learners). • <i>Feedback</i> (explanatory feedback describing why an instance is classified as an example or nonexample, or why learners over or undergeneralized concept, delayed after learner responds to several instances to discern patterns).

<p>Rules</p> <p>Relational rules or principles and procedural rules or procedures.</p>	<p>Procedural Rules (Procedures)</p> <ul style="list-style-type: none"> • Learn to <i>determine if/when procedure is required</i>. Provide correct answer feedback with learner controlled explanatory feedback. • Learn to <i>list the steps in a procedure</i>. • Learn to <i>complete the steps in a procedure</i>. • Learn to <i>elaborate sequence</i>, starting with simple epitome of rule and elaborating to more complex versions of same rule. • Learn to <i>check appropriateness of completed procedure</i>. <p>Relational Rules (Principles)</p> <ul style="list-style-type: none"> • Ask learners to create their own <i>mnemonic device(s)</i> to support principle • Ask learners to create <i>images/diagrams</i> that illustrate relationships of concepts as presented in the principle • Practice <i>stating principle</i> (in own words). • Practice <i>recognizing situations</i> where principle is applicable. • Practice <i>applying principle</i> to predict, explain, or control for effects of one concept on another. • Practice <i>determining if principle was applied correctly</i>.
<p>Problem Solving</p> <p>Combine learned principles, procedures, verbal information and cognitive strategies in a unique way within a domain to solve original problems. Includes both well-defined (or structured) problems and ill-defined (or structured) problems.</p>	<ul style="list-style-type: none"> • <i>Presentation of the Problem</i> (case studies, simulations, limiting the number of rules–principles and procedures–that must be used, presenting explicit representations of necessary rules as cues, providing solutions to parts of the problem, limiting the amount of extraneous information). • <i>Problem Space</i> (Review directions and identify relevant information about goal state; Delineate and analyze relationship between current and goal states; Discern patterns; Define what is known and unknown about the problem and determine what information must be acquired to solve the problem; Break down the problem into intermediate states or subgoals). • <i>Appropriate Principles</i> (guided questions–generative approach–or direct statements–supplative approach–on how to select and apply appropriate principles and procedures to move from the given state, through intermediate states, to the goal state). • <i>Practice</i> (Present multiple representations of the problem; Recommend techniques for limiting alternative approaches to problem resolution; Provide clues about the general form of the solution; Recommend search strategies for acquiring relevant information; Outline generic approaches for problem resolution such as hypothesis testing and working backwards; Establish criteria for evaluating the appropriateness of alternative solutions).

<p>Cognitive Strategies</p> <p>Internally organized skills used to regulate and monitor the utilization of concepts and rules. Includes cognitive domain (i.e., organizing, elaborating, rehearsing, and metacognitive strategies) and affective domain (support) strategies.</p>	<ul style="list-style-type: none"> • <i>Discovery and Guided Discovery</i> (involves more direct instruction than discovery, helping learners ascertain particular strategies through the application of questioning strategies). • <i>Observation</i> (observe a model demonstrating the use of the strategy by paired, cooperative learners, expert demonstration; and symbolic visual or textual representation by fictional character) • <i>Guided Participation</i> (Instructor works with learners to determine characteristics of learning task, identify strategies to facilitate the task, and determine effective methods for employing the strategy) • <i>Direct Instruction</i> (Identify utility of the strategy; Provide overview of steps and their relation to overall strategy; Demonstrate or model the strategy; Illustrate examples and non-examples of strategy use; Practice application of the strategy across gradually more difficult situations; Provide corrective feedback; Encourage and guide transfer of strategy to separate but appropriate context). • <i>Dyadic instruction</i> • <i>Self-instruction</i>
<p>Attitudes</p> <p>Choice behaviors that make certain classes of action more or less probable</p>	<ul style="list-style-type: none"> • <i>Demonstrate</i> desired behaviors representative of target attitude by a respected role. • <i>Practice</i> desired behavior associated with the desired attitude is another powerful tool in attitude formation and change (e.g., role playing and group discussions) • <i>Provide reinforcement</i> for the desired behavior (a stimulus that increases the probability of the preceding behavior reoccurring). • <i>Communicate persuasive messages</i> from highly credible sources • <i>Create dissonance</i> (persuading learner to perform an important behavior that is counter–dissonant–to the person own attitude, attitude change may result).
<p>Psychomotor Skills</p> <p>Coordinated muscular movements that may be difficult to distinguish from intellectual skills</p>	<ul style="list-style-type: none"> • <i>Massed versus Spaced Practice</i> (massed practice engages learners in one or a few intensive periods of practice. Spaced practice exposes learners to short practice sessions distributed over time). • <i>Whole versus Parts Practice</i> (whole practice is advisable if the task is simple, not meaningful in parts, made up of simultaneous performed parts and has highly dependent parts, and if the learner is able to remember long sequences, has long attention spans and is highly skilled). • <i>Progressive parts practice</i> (if learners may have difficulties putting the parts together into a meaningful and well executed whole). • <i>Backwards chaining</i> (where learners are exposed to and practice the last step and work their way to the first step).

Reference

Smith, P. L. & Ragan, T. J. (1999). *Instructional Design* (2nd ed.). Upper Saddle River, NJ: Prentice-Hall, Inc.

Smith, P.L. & Ragan, T.J. (1993). Designing instructional feedback for different learning outcomes. In J.V. Dempsey & G.C. Seles (Eds). *Interactive Instruction and Feedback*, Englewood Cliffs, NJ: Educational Technology Publications, 75-103.