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Proposal Review for No. 169

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Title:

Designing Instruction for Concept Learning

Short Description:

A rich history of concept instruction research has led to empirically-based instructional design strategies which focus on (a) defining and presenting a concept's attributes, (b) creating and presenting instances of examples and non-examples of the concept, and (c) fostering guided learner practice in attribute isolation, instance discrimination and generalization, and concept use. This session offers a synthesis of the central views on concept instruction based on a survey of concept instruction theory and research.

Abstract: ([Click here to enhance readability](#))

Designing Instruction for Concept Learning

While concept learning has been considered across a broad spectrum of theoretical foundations, the prescriptions for instruction are strikingly similar. A concept is generally described as a category (class, group, or set) of objects, events, symbols, or relationships with shared characteristics or properties, often referred to as attributes (Tennyson & Cocchiarella, 1986). A category is often described as a grouping of objects, events, symbols, or relationships while an attribute describes the dimension from which the objects and events differ (Brown, 1958).

Based on the objective of the instruction, concept learning and assessment can focus on both recall and application of the to-be-learned concept (Morrison, Ross, & Kemp, 2007). Concept learning assessment typically focuses on a learner's ability to consider the nature of instances encountered based upon defining attributes belonging to the concept category (Bruner, Goodnow, & Austin, 1956), as well as the learner's ability to (a) discriminate between what is and what is not a member of the class and (b) generalize new examples by appropriately judging instances based on the degree of membership to the exemplar class (Markle, 1969). Therefore, successful concept learning is assessed based on the learner's ability to place instances in the exemplar class and to respond to members of the exemplar class as a whole (Gagné, 1965). However, Jonassen (2006) suggests an expanded focus on concepts-in-use in which concept instruction and assessment centers on how the learned concepts are organized within the learner's overall conceptual framework.

Concept Instruction

Instructional prescriptions across theoretical foundations are similar with differences occurring in areas such as sequencing, the degree of learner autonomy to discover attributes and instances, and the objective of the lesson. In general, instructional strategy differences can be seen as either expository (direct presentation of attributes and instances) approaches inquiry (learner exportation or discovery of attributes and instances) approaches (Smith & Ragan, 1999). The following highlights common instructional techniques stemming from a variety of inquiry and expository approaches.

Defining Concept Attributes

Research suggests that learning is enhanced when a concrete definition is presented and that a definition alone is roughly as effective as a single set of examples and non-examples (Klausmeier & Feldman, 1975). Concept instruction generally includes providing learners with a stated definition of the domain of the concept based on the properties (attributes) of the concept class (Markle, 1975).

Creating Instances

Research suggests that factors such as the number, categorization, type, and range of instances of examples and non-examples presented to learners influence concept learning. It is suggested that designers augment the presentation of the concept definition with multiple rational sets of examples and non-examples (Markle, 1969). Others suggest that a variety of examples be included (Fleming & Levie, 1978) and that the set of example and non-example instances should be matched (Merrill & Tennyson, 1977). In contrast to presentation of sets of examples and non-examples, others suggest presentation of prototypical examples (Tennyson & Cocchiarella, 1986).

Markle (1969 and 1975) offers a standard case concept analysis which creates a rational set of examples and non-examples to be used in both instruction and testing that involves (a) the identification of critical and variable attributes (b) creation of examples in which all of the critical attributes are present, and (c) creation of non-examples by varying the variable attributes. The ideal non-example is suggested to be one that shares all but one critical property with the concept class and is as concrete as possible (Markle & Tiemann, 1970).

RULEG or EGRUL Presentation

Some argue that a definition of the concept focusing on the critical (defining) attributes should be presented prior to the presentation of instances of examples and non-examples (Tennyson & Park, 1980). Such an approach is often referred to as a RULEG approach in which, rules, principles, generalizations, or definitions (RU) are presented prior to examples (EG) (Markle, 1969). Others suggest beginning with presentation of the definition followed quickly by a recall or recognition activity (Merrill & Tennyson, 1977). However, others (Markle; Fleming & Levie, 1978) advocate an EGRUL presentation sequence in which the example is first presented followed by the rule, especially in cases where the concept is difficult or abstract.

Guided Learner Practice

A common approach geared toward recall is to offer learners various practice opportunities to classify new instance as members or nonmembers of the class followed by corrective guidance. This strategy typically takes the form of rule presentation and example presentation which is followed by learner practice and instructional guidance indicating either a correct or incorrect learner classification of the concept (Merrill & Tennyson, 1977). In addition, a host of inquiry and generative approaches are recommended which are often geared toward learner application of the concept, including model building exercises (Tessmer, Wilson, & Driscoll, 1990).

Summary Heuristics for Designers

The following summarizes the instructional presentation, learner practice, and learner guidance techniques suggested within the reviewed research. A matrix summarizing the optimum design strategies will be presented:

1. *Define the concept.* Prepare a concept definition which focuses on attributes of the concept. In doing so, consider the critical attributes that are necessary characteristics for determining membership, as well as the variable attributes which are shared by only some in the concept category.
2. *Create instances.* Create instances for presentation to the learner including examples in which all of the critical attributes are present and non-examples in which all but one critical property is present. Consider also the prototypical example.
3. *Design presentation and guided practice opportunities.* Incorporate presentation and guided learner practice opportunities which lead to not only recall, but also application of the concept within a larger conceptual framework. When assessing at a recall level, offer learners the opportunity to classify new instance as members or nonmembers of the class followed by corrective guidance. When assessing at an application level, include practice and guidance approaches which require the learner to use the concept as in exercises that ask the learner to make arguments or judgments on the basis of the concept or to infer relationship or membership.

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Session Type: Concurrent

Interest Area: General

Category of Session: Literature/Theory

Session Length: 30 minutes

Primary Keyword: Instructional Design

Secondary Keyword: Strategies

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Theme: Linking Design and Learning

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