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ABSTRACT

This paper provides an outline of an evaluation schema designed to measure geographic concepts. A concept is summarized as a category of experiences defined by a rule and having a name, criterial attributes, and exemplars. Minimal requirements for such a schema are that it should measure the mastery of the rule, attributes, name, and exemplar identification for a given concept. Prototype items used to order questions that will measure nine different dimensions of concept mastery include 1) given the name of attribute, select the example of the attribute; 2) given an example of an attribute, select the name of the attribute; 3) given the name of a concept, select an example of the concept; 4) given the name of a concept, select a nonexample of the concept; 5) given an example of the concept, select the name of the concept; 6) given the name of a concept, select the relevant attribute; 7) given the name of a concept, select the irrelevant attribute; 8) given the definition of a concept, select the irrelevant attribute; and 9) given the name of a concept, select the definition of the concept. Field tests of this schema have demonstrated that it may be applied efficiently to the design of suitable measurement items for instructon and research in geographic education. (Author/DE)

# Evaluating Geographic Concept Learning: A Model for Classroom and Research Applications[1]

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[1]Paper presented at the Annual Meeting of the National Council for Geographic Education, Milwaukee, October, 1972.

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Man lives in a conceptual world that he builds through both informal and systematic interactions. Concepts enable him to simplify and organize his environment and to communicate efficiently with others. While each of us may be said to have truly unique concepts of objects or events, we share with others at least the criterial attributes of the concept.

The case for concept learning as an important curricular objective is already well established (West, n.d.; Hunt & Metcalf, 1968; Martorella, 1971; 1971a; Wehlage & Anderson, 1972). Less attention, however, has been devoted to the issue of how concept learning most appropriately may be measured. Yet clearly this question should be a paramount one for geographic educators as they engage in instruction and research.

## Concept Learning in Instruction and Research

A concept, for instructional and research purposes in geographic education, may be thought of as a category of

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experience having a rule that defines the relevant category and that is composed of criterial attributes, a set of instances or exemplars of the concept, and a name usually associated with the concept. Assuming this notion of a concept, consider how a fundamental geographic concept may be analyzed. The rule " a body of land surrounded by water" may be used for the concept with the name "island." Criterial attributes are "land," "water," and "all aroundness." Exemplars include Cuba, Hawaii, Santa Catalina, as well as much of the upper regions of Minnesota.

Attributes enable us to distinguish between exemplars and nonexemplars of a concept. Often too, as in the case of island, the learner not only must attend to the presence of attributes, but also to their specific relationship. He must learn that lake is not island though it has the same attributes. Clarification of the attribute relationship occurs through the statement of the concept rule. When one has learned a concept he is able to infer a commonality among exemplars encountered in a particular learning task and to generalize to new exemplars encountered in the future.

Operationally defined in this way, a concept is a structurally different learning objective than a skill, generalization, or other intellectual product. Though concepts are interrelated with these other phenomena, they may be seen as having a discrete identity of their own that requires special instructional considerations (Martorella, 1972).

## Measuring Concept Learning

It is not the purpose of this paper to summarize or critique the existing measurement practices, although several recent works have made important statements on the topic (Block, 1971; Wittrock & Wiley, 1970; Anderson, 1972; Anderson & Kulhavy, 1972). Rather the intent is to outline an evaluation schema that corresponds to the notion of a concept as defined and to demonstrate its usage in research and instruction. Minimal requirements for such a schema are that it should measure the mastery of the rule, attributes, name, and exemplar identification for a given concept. Ideally, too, such a schema should be applicable to all geographic concepts.

A schema devoped originally by Frayer, Fredrick and Klausmeier (1969) and later refined (Quilling, 1972) meets both sets of requirements, and provides the basis for the remainder of this discussion. The following prototype items may be used to order questions that will measure nine different dimensions of concept mastery.

1. Given the name of an attribute, select the example of the attribute.

2. Given an example of an attribute, select the name of the attribute.

3. Given the name of a concept, select an example of the concept.

4. Given the name of the concept, select a nonexample of the concept.

5. Given an example of the concept, select the name of the concept.

6. Given the name of a concept, select the relevant attribute.

7. Given the name of a concept, select the irrelevant attribute.

8. Given the definition of a concept, select the irrelevant attribute.

9. Given the name of a concept, select the definition of the concept.

In order to apply the schema, the following information concerning a concept is required: (a) its attributes, including those which are criterial and those which are noncriterial but frequently associated with the concept, (b) its rule, operationally stated, and (c) some exemplars and nonexemplars of the concept.

## Applications of the Schema

Field tests have demonstrated that the schema may be applied efficiently to the design of suitable measurement items for instruction and research in geographic education (Tabachnick et al., 1970; Martorella & Wood, 1971). In an earlier study by Martorella and Wood, selected items from the schema were used in oral tests with preschoolers to measure treatment effects on geographic concept learning. Results of

this study also suggested the power of the schema to effectively discriminate among dimensions of concept mastery. A study in progress with primary children dealing with conjunctive, disjunctive and relational concepts is employing the schema as the basic criterion measures (Martorella, 1973).

In instruction, the schema serves as a basic diagnostic tool or as a test for teaching effectiveness, and it also suggests a basic instructional pattern. The following materials used in minitexts for primary children illustrate these points.

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Refer to transparencies

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With minimal instruction, preservice and inservice teachers have been able to design similar instructional materials using both written and nonwritten instruction.

## Summary

For research and instructional applications in geographic education, an operational definition of concept learning that differentiates it from other intellectual tasks is essential. In this paper, a concept was summarized as a category of experiences defined by a rule, having a name, and having criterial attributes and exemplars.

A schema field tested in instruction and research was outlined. Apart from the basic test of concept learning, discrimination, the schema provides direction for measures of attribute knowledge and rule identification. Measures discussed in this paper may function as pre- or posttests for instruction or research, and are easily constructed with a minimum of training.

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