

ED312611 1989-11-00 Schema Activation, Construction, and Application. ERIC Digest.

ERIC Development Team

www.eric.ed.gov

Table of Contents

If you're viewing this document online, you can click any of the topics below to link directly to that section.

Schema Activation, Construction, and Application. ERIC Digest.....	1
SCHEMA ACTIVATION.....	2
SCHEMA CONSTRUCTION AND APPLICATION.....	2
REFERENCES.....	4



ERIC Identifier: ED312611

Publication Date: 1989-11-00

Author: Alvarez, Marino C. - Risko, Victoria J.

Source: ERIC Clearinghouse on Reading and Communication Skills Bloomington IN.

Schema Activation, Construction, and Application. ERIC Digest.

THIS DIGEST WAS CREATED BY ERIC, THE EDUCATIONAL RESOURCES INFORMATION CENTER. FOR MORE INFORMATION ABOUT ERIC, CONTACT ACCESS ERIC 1-800-LET-ERIC

Readers rely on their prior knowledge and world experience when trying to comprehend a text. It is this organized knowledge that is accessed during reading that is referred to as schema (plural schemata). Readers make use of their schema when they can relate what they already know about a topic to the facts and ideas appearing in a text. The richer the schema is for a given topic the better a reader will understand the topic.

Schema theorists have advanced our understanding of reading comprehension by describing how prior knowledge can enhance a reader's interaction with the text. Accordingly, comprehension occurs when a reader is able to use prior knowledge and experience to interpret an author's message (Bransford, 1985; Norris & Phillips, 1987). Educators and researchers have suggested numerous instructional strategies to help students activate and use prior knowledge to aid comprehension. Yet, schema theory does not explain how readers modify and create new schema when presented with novel information in texts.

SCHEMA ACTIVATION

Because texts are never completely explicit, the reader must rely on preexisting schemata to provide plausible interpretations. Yet, there is much evidence that good and poor readers do not always use schemata appropriately or are unaware of whether the information they are reading is consistent with their existing knowledge. Also, there is evidence that students who do not spontaneously use schemata as they read will engage them if given explicit instructions prior to reading (e.g., Bransford, 1979). Prereading strategies have been developed to help students relate new information appearing in written discourse to their existing knowledge. The design of many of these preorganizers reflects Ausubel's (1959) definition of readiness and the purpose of their use is to create a mind set prior to reading. These preorganizers have included advance organizers (Ausubel, 1960), structured overviews or graphic organizers (Alvermann, 1981), previews (Graves, et al., 1983), concept maps (Novak & Gowin, 1984), and thematic organizers (Alvarez, 1980, 1983; Alvarez & Risko, 1989; Risko & Alvarez, 1986).

SCHEMA CONSTRUCTION AND APPLICATION

Learning novel concepts may require the reader to connect new information to a congruent mental model. Mental models represent an individual's construal of existing knowledge and/or new information in the domain even though this information may be fragmentary, inaccurate, or inconsistent (Gentner & Gentner, 1983). A person's mental model is a representation of a particular belief based on existing knowledge of a physical system or a semantic representation depicted in a text. For example, a person may hold a belief that balls are round, inflatable and are made to bounce. However, this person may encounter a football (an ellipsoid) that is kicked or thrown, or ball bearings that are solid, or a bowling ball that is solid and has holes drilled into it for the purpose of rolling rather than bouncing. This new knowledge is integrated into a new, more complex, mental structure about the shape, substance, form, and function of balls. As Bransford (1985) points out, schema activation and schema construction are two different problems. While it is possible to activate existing schemata with a given topic, it does not necessarily follow that a learner can use this activated knowledge to develop new knowledge and skills. Problem solving lessons and activities can provide learners

with situations that aid in schema construction which includes critical thinking. Critical thinking theory enables a reader to analyze an ambiguous text. When versed in this process, a reader can either weigh alternative interpretations, dismiss others, make a decision to evaluate multiple possibilities, or accept the information as being reasonable. This process helps students to modify or extend their mental model, or existing knowledge base, for target concepts.

Several teacher-directed and self-initiated activities can be used to promote schema construction and application of knowledge to novel situations. Four such strategies that are designed to foster shared meaning between and among teachers and peers are: cases, interactive videodiscs, hierarchical concept maps, and Vee diagrams.

Cases that present learners with single and varied contexts across disciplines provide learners with scenarios that can be discussed and analyzed from multiple perspectives (e.g., see Christensen, 1987; Spiro, et al., 1987). These cases can include written documents, recorded (musical as well as narrative) interludes, paintings, artifacts, video portrayals, and other pertinent substances and materials. Another teacher-directed strategy is the use of interactive videodiscs. Bransford and his colleagues are developing episodes, revolving around problem-oriented learning environments, that can be computer-accessed by learners to invite critical thinking and schema construction (see Bransford, et al., 1989; Bransford, et al., in press).

Hierarchical concept maps and Vee diagrams are two methods that students can initiate on their own for schema construction and application. Hierarchical concept maps (Novak & Gowin, 1984) are designed to help the reader clarify ambiguities of a text while simultaneously revealing any misconceptions that result from a reading. More importantly they provide the learner with a tool from which to initiate ideas that can be shared by visual inspection with someone else. The Vee diagram (Gowin, 1981/1987) is a method by which a learner can learn about the structure of knowledge and knowledge-making within a given discipline and use this knowledge in novel contexts.

Students can be taught to incorporate new information into their existing world knowledge. This can be accomplished through teacher guided instruction and self-initiated strategies that includes methods and meaningful materials that induce critical thinking with conceptual problems. In order for schema construction to occur, a framework needs to be provided that helps readers to elaborate upon new facts and ideas and to clarify their significance or relevance. Students need to learn more about themselves as learners. Notable in this learning context is the relationship between facts and ideas learned in formal school settings and those encountered in everyday learning environments. Perhaps within this inquiry we will be led to discover the ways individuals choose to relate new information to existing schemata and how this new information influences their future knowledge and decision-making.

Additional material on schemata can be found in the ERIC database. Some recent

articles are:

Anstey, Michele. "Helping Children Learn How to Learn," *Australian Journal of Reading*, 11 (4) November 1988, p. 269-77. [EJ 383 664]

Blachowicz, Camille L. Z. and Fisher, Peter J. L. "Defining is an Unnatural Act: A Study of Written Definitions." Paper presented at the Annual Meeting of the National Reading Conference, 1988. 17 p. [ED 301 854]

Bloom, Charles P. "The Roles of Schemata in Memory for Text." *Discourse Processes*, 11 (3) July-September 1988, p. 305-18. [EJ 381 725]

Mealey, Donna L. and Nist, Sherrie L. "Postsecondary, Teacher Directed Comprehension Strategies," *Journal of Reading*, 32 (6) March 1989, p. 484-93. [EJ 383 759]

Scales, Alice M. "Teaching College Reading and Study Skills Through a Metacognitive-Schema Approach." Paper presented at the Annual Meeting of the International Reading Association, 1987. 39 p. [ED 298 428]

REFERENCES

Alvarez, M. (1983). Using a thematic pre-organizer and guided instruction as an aid to concept learning. *Reading Horizons*, 24, 51-58.

Alvarez, M. (1980). The effect of using an associate passage with guided instruction to evoke thematic conceptual linkage. *Dissertation Abstracts International*, 41, 1000A. (University Microfilms No. 8019163).

Alvarez, M. & Risko, V. (1989). Using a thematic organizer to facilitate transfer learning with college developmental studies students. *Reading Research and Instruction*, 28, 1-15.

Alvermann, D. (1981). The compensatory effect of graphic organizers in the learning and retention of meaningful verbal material. *Journal of Educational Research*, 75, 44-48.

Ausubel, D. (1960). The use of advance organizers in the learning and retention of meaningful verbal material. *Journal of Educational Psychology*, 51, 267-272.

Ausubel, D. (1959). Viewpoints from related disciplines: Human growth and development. *Teachers College Record*, 60, 245-254.

Bransford, J. (1985). Schema activation and schema acquisition. In H. Singer & R. B. Ruddell (Eds.), *Theoretical models and processes of reading*, 3rd ed. Newark, DE: International Reading Association, 385-397.

Bransford, J. (1979). *Human cognition: Learning, understanding, and remembering*. Belmont, CA: Wadsworth Publishing Company.

Bransford, J., et al., (in press). *Teaching thinking and content knowledge: Toward an integrated approach*. In B. F. Jones & L. Idol (Eds.), *Dimensions of thinking and cognitive instruction*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Bransford, J., et al., (1989). *New approaches to instruction: because wisdom can't be told* (pp. 470-497). In Vosniadou, S. & A. Ortony (Eds.), *Similarity and analogical reasoning*. New York: Cambridge University Press.

Christensen, C. (1987). *Teaching and the case method*. Boston, MA: Harvard Business School.

Gentner, D. & Gentner, D. (1983). *Flowing waters or teeming crowds: Mental models of electricity* (pp. 99-129). In D. Gentner & A. L. Stevens (Eds.), *Mental models*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Gowin, D. (1981/1987). *Educating*. Ithaca, NY: Cornell University Press.

Graves, M., et al., (1983). *Effects of previewing difficult short stories on low ability junior high school students' comprehension, recall, and attitudes*. *Reading Research Quarterly*, 18, 262-276.

Norris, S. & Phillips, L. (1987). *Explanations of reading comprehension: Schema theory and critical thinking theory*. *Teachers College Record*, 89, 2, 281-306.

Novak, J. & Gowin, D. (1984). *Learning how to learn*. New York: Cambridge University Press.

Risko, V. & Alvarez, M. (1986). *An investigation of poor readers' use of a thematic strategy to comprehend text*. *Reading Research Quarterly*, 21, 298-316. [EJ 337 401]

Spiro, R., et al., (1987). *Knowledge acquisition for application: Cognitive flexibility and transfer in complex content domains* (pp. 177-199). In B. K. Britton & S. M. Glynn (Eds.), *Executive control processes in reading*. Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers. ----- Marina C. Alvarez is a professor at Tennessee State University; Victoria J. Risko is a professor College of Vanderbilt University.

This publication was prepared with funding from the Office of Educational Research and Improvement, U.S. Department of Education, under contract no. R188062001.

Contractors undertaking such projects under government sponsorship are encouraged to express freely their judgment in professional and technical matters. Points of view or opinions, however, do not necessarily represent the official view or opinions of the Office of Educational Research and Improvement.

Title: Schema Activation, Construction, and Application. ERIC Digest.

Document Type: Information Analyses---ERIC Information Analysis Products (IAPs) (071); Information Analyses---ERIC Digests (Selected) in Full Text (073);

Available From: ERIC Clearinghouse on Reading and Communication Skills, Indiana University, Smith Research Center, 2805 E. 10th St., Suite 150, Bloomington, IN 47405 (no cost for a single copy; \$2.00 postage and handling for up to 10 no-cost items).

Descriptors: Elementary Secondary Education, Higher Education, Prior Learning, Reader Text Relationship, Reading Comprehension, Reading Research, Reading Strategies, Schemata (Cognition)

Identifiers: ERIC Digests, Prereading Activities, Schema Theory

###



[\[Return to ERIC Digest Search Page\]](#)