

Thinking Maps® & Write From the Beginning
Theory & Empirical Evidence

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This short paper describes the theoretical basis of two innovative educational programs and the current empirical evidence for the effectiveness of these two programs on student academic achievement. Thinking Maps® (Hyerle, 1995) is a cross-disciplinary program that provides instruction to students concerning eight types of thinking maps (circle, bubble, double-bubble, tree, flow, multiframe, brace, and bridge maps) as graphic organizers and enhances higher-order thinking, as defined by Anderson et al. including creating metacognitive knowledge. Write from the Beginning (Buckner, 2000) is an additional program that is designed as a complement to Thinking Maps, which adds to teachers' use of maps and other strategies, specifically to improve students' composition skills, including structural aspects of writing.

Thinking Maps is based on a long tradition of instruction in graphic organizers as used in various disciplines to facilitate students' comprehension of text and their ability to construct explicit structures that promote higher levels of learning, including analysis and synthesis. In the *Taxonomy for Learning, Teaching and Assessing*, Anderson and his colleagues (2001) refine Bloom's well-accepted cognitive taxonomy to include both cognitive processes (represented by verbs) and knowledge types (represented by nouns). Graphic organizers such as Thinking Maps include both procedural and metacognitive knowledge. Procedural knowledge is how to do something, methods of inquiry, and criteria for using skills, algorithms, techniques and methods, while metacognitive knowledge is defined as knowledge of cognition in general as well as awareness and knowledge of one's own thinking. Thinking Maps may be considered one operational definition of concept maps, which are defined generally as visual, graphic displays that teachers can use for reading or writing assignments (Sinatra, 2000).

In an extensive review on the use of concept maps in science, Ruiz-Primo and Shavelson (1996) reported a number of key findings. Included among these were (1) consistent correlations existed between quality of **concept** maps and other measures of student achievement (e.g., teacher-made tests, standard tests, class grades), (2) instruction on a specific topic improved the quality of students' **concept** maps, (3) **concept** maps of advanced students majoring in biology were at a significantly higher level than those of non-majors, and (4) **concept** maps could be used to distinguish experts from novices within a domain. They identified evidence that direct instruction in text organizational patterns before, during, or after reading improves comprehension (Mosenthal, 1994 as cited by Ruiz-Primo and Shavelson), strengthens content understanding and report writing (Englert et al. 1991; Raphael, Englert, and Kirschner 1986; Richgels, McGee, Lomax, and Sheard 1987; Wong 1997 as cited by Ruiz-Primo and Shavelson), and helps students

to form plans or mindsets of how texts are organized (Englert 1990; Pehrsson and Denner 1988 as cited by Ruiz-Primo and Shavelson).

More recently, Sturm and Rankin-Erickson (2002) examined the effects of two forms of concept mapping, hand-drawn and computer-generated, on the descriptive essay writing of middle-level students with learning disabilities. Student essays were compared on four measures: number of words, syntactic maturity, number of T-units, and holistic writing scores. Results showed that student descriptive essays produced in the hand- and computer-mapping conditions demonstrated significant increases above baseline writing samples on number of words, number of T-units, and holistic writing scores. Carry-over effects were observed in the no-mapping condition and provide an indication that students may have acquired writing skills that generalized into their essay writing when not using maps.

Hyerle (1995) developed thinking maps as a response to his students' difficulties in producing organized coherent writing. The eight map types he defined have specific features that facilitate different structural forms of writing, as well as comprehending text of different genres and purposes. Early adopters of Thinking Maps found that students improved in holistic writing scores, as well as various specific cognitive tasks such as problem solving in mathematics (Hyerle, 1995). Because of the cross-disciplinary nature of the intervention and the increasing sophistication of structures, students in multiple grade levels can use maps. Thus, teachers in a single school can use Thinking Maps to organize a range of inquiry in multiple content areas, using a common vocabulary and shared concepts.

Later research studies into concept mapping approaches like Thinking Maps have demonstrated the effectiveness of these teaching and learning strategies with a wide range of student groups and content areas. For example, Chularut (2001) studied students in English as Second Language classrooms. Variables of interest in the study were (a) students' achievement when learning from text, (b) students' reports of use of self-regulation strategies (self-monitoring and knowledge acquisition strategies), and (c) students' self-efficacy for learning from text in English. A randomized pretest-posttest control group design with a concept mapping group and an alternative learning strategy group was employed. The findings showed statistically significant interaction of time and method of instruction for achievement, self-monitoring, knowledge acquisition strategies, and self-efficacy. For all variables, the concept mapping group showed significantly greater gains from pretest to posttest than the alternative learning strategy group. Chularut concluded that students receiving explicit instruction in concept mapping would outperform students in alternative learning strategy conditions on achievement, self-monitoring, knowledge acquisition strategies, and self-

efficacy. Tekkaya (2003) studied the effectiveness of combining conceptual change text and concept mapping strategy on students' understanding of diffusion and osmosis. Students' conceptual understanding of diffusion and osmosis was measured using a standardized validated measure of the content as a pretest and posttest to a total of 44 ninth-grade students in two intact classes of the same high school located in an urban area. The experimental group was a class of 24 students who received concept mapping and conceptual change text instruction. A class of 20 students comprised the control group who received a traditional instruction. Group Assessment of Logical Thinking Test (GALT) and pretest scores were used as covariates in this study. A pretest-posttest control group design utilizing the analysis of covariance (ANCOVA) showed a statistically significant difference between the experimental and control groups in favor of the experimental group after treatment. Finally, Simone, Schmid, and McEwen (2001) combined 3 tools to support and foster students' development in a course on learning theories - student collaboration, concept mapping, and electronic technologies. In groups of 3 to 5 students, they were asked to generate 3 concept maps and accompanying prose over the term on 3 major issues in the field of learning. They found concept mapping was engaging to students and that it can be an arena for generating and generally structuring ideas, while prose can be a means of communicating such ideas in a form that is common to most people.

Write from the Beginning

Buckner (2000) developed WFtB from her own synthesis of writing research as well as twenty-five years of explorations and observations of the most effective methods for teaching writing to elementary students. Fundamentally, WFtB extends and complements Thinking Maps by providing more elaborated approaches to teaching writing from a developmental perspective, as children move in stages consistent with Piagetian ideas of cognitive development. As children become more proficient writers, WFtB instruction provides teachers with appropriate tasks and assessment strategies to enhance their composition, mechanics and fluency.

In a short description of empirical research supporting the cognitive approaches used in WFtB, Buckner cites the work of Graves (1978), Reeves (2000), Clay (1995) and Calkins (1986). Graves is noted for his research into what is now referred to as the writing process, which incorporates activities designed for students to begin their writing, draft successive pieces after input from teachers and, often, peers, and then complete the process by producing finished text. Clay, of course, developed Reading Recovery, an individual approach to reading instruction for at-risk primary grade readers. All these researchers support the effectiveness of developmental, cognitively oriented instruction that is consistent with contemporary understanding of

psycholinguistics and cognition (e.g., Guterman, 2003, and Nelson, Benner and Gonzalez, 2003).

About the Author

Nancy Cook Smith, Ph.D., is the external research consultant for these studies. Dr. Cook Smith is the president of TRIERE Research in Manchester, New Hampshire. She has conducted many program evaluations for Federal and state funded educational interventions, including programs targeted to academically talented students, students with disabilities, and students placed at risk for academic achievement (e.g., those receiving Title I and state compensatory/remedial services). She has also worked with the validation of exemplary programs under the Program Effectiveness Panel of the U.S. Department of Education and programs for educational professionals, including teachers, administrators, paraprofessionals and child care providers. Dr. Cook Smith has studied the effects of Thinking Maps both qualitatively and quantitatively for the Laurens District 55 School District in Laurens, South Carolina, where she serves as a research consultant for instructional programming, including Federally funded program under “No Child Left Behind.” She recently co-authored *Adolescent Literacy*, a book published by the Northeastern Regional Laboratory at Brown University, and has presented at national and state conferences, including the American Educational Research Association, for over two decades.

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