

Integrating Computers, Reading, and Writing Across the Curriculum

For the Moss Point, Mississippi, schools, semantic mapping has provided an avenue to improve students' reading comprehension, writing proficiency, and computer application.

In 1982 the State of Mississippi passed major reform legislation requiring school districts to use norm-referenced and criterion-referenced tests to set baseline data and develop goals to improve student achievement, particularly in reading, writing, and computer application. Test results, particularly at the 11th grade level, were to be used as a measure of a district's accreditation-performance rating and also to determine whether students had the basic literacy skills necessary to graduate.

After assessing the performance of its nine schools (six elementary schools, two junior high schools, and one high school) against state accreditation criteria and its own internal definition of excellence, the Moss Point, Mississippi, School District found many students to be achieving below state standards in reading comprehension and in writing. Specifically, students had difficulty with development of essays, sentence formation, usage, and mechanics. Clearly, these problems affected learning in all subjects.

Further, the district recognized that it had no structure to help students integrate information they learned from reading and no avenue for using computers to enhance instruction. We concluded that we needed to abandon our focus on traditional grammar instruction to favor a total commitment

to writing across the K-12 curriculum, one that would additionally maintain content integrity in each subject area.

Semantic Mapping

In 1987, as its vehicle for improving student performance, Moss Point embraced semantic or cognitive map-

Photographs by Richard Sinatra

From words on paper to words on a word processor, a student proceeds through another draft stage in the development of his essay



ping. This strategy, a practical way to apply schema theory in the classroom while teaching students how text is organized, has been acknowledged by the International Reading Association (1988) as an interactive approach "between reader and text by which meaning is found and created."

District staff embarked on a formal plan to use semantic mapping and computers consistently in content coursework throughout the district. We consulted a number of publications for guidance on how to apply the strategy for vocabulary, reading comprehension, and composition development (see Pehrsson and Robinson 1985, Heimlich and Pettelman 1986, Sinatra 1986, Sinatra et al. 1986). In each school, the principal, teachers, librarian, and central office staff worked together to develop effective ways to deliver mapping, writing, and thinking skills to students in every classroom, but particularly in science, social studies, and English classes. Teachers in these disciplines planned how they would use mapping and writing—stressing the drafting, revising, editing, and publishing stages—within selected content lessons. This change necessitated a philosophical shift in content teaching, from a "bits and pieces" skills continuum to an interactive, holistic approach. Apple computer labs were installed within or adjoining each school's library so that librarians could supervise and assist when students were ready for word processing. The Thinking Networks for Reading and Writing computer approach provided models and initial mapping sequences for teacher training.

Staff training was the primary responsibility of principals, a selected cadre of teachers, and assigned central office staff. The district established the following four criteria to assess the effectiveness of both this training and subsequent student performance in reading comprehension, writing proficiency, and computer application:

1. Students can conceptualize content and show this knowledge by mapping the major and minor ideas read about in their written work.

2. Students can use varying map structures to display major and minor ideas they will use in writing.

Using highly structured computer programs, students learned to construct visual maps representing the relationships of major ideas, subordinate ideas, and explicit information.

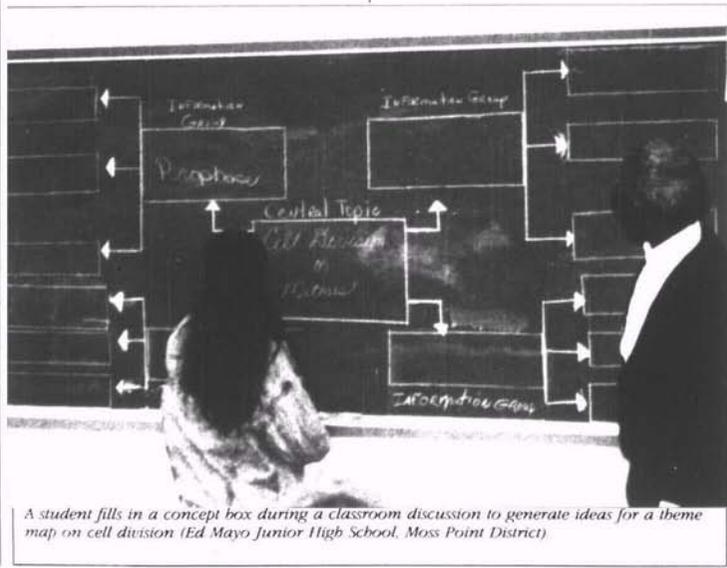
3. Students can synthesize the relationship of ideas displayed on their maps into well-conceived essays.

4. Students can use word processing as an extension of their composing and writing processes in the content subjects.

Classroom Applications

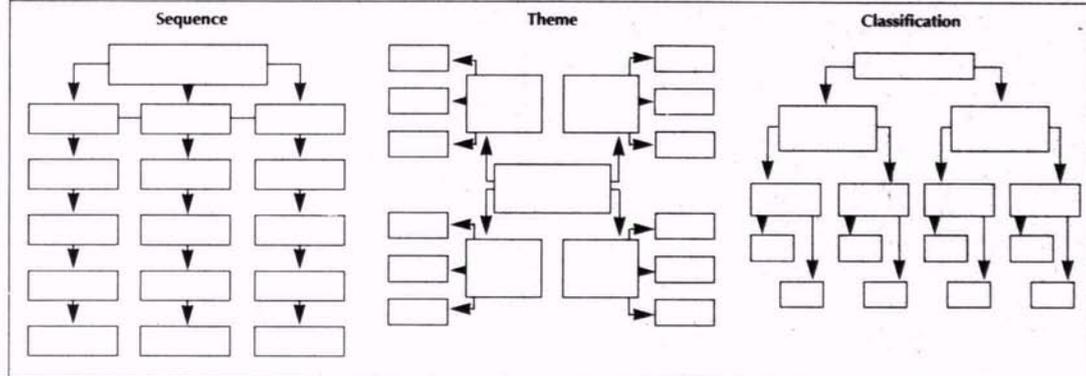
After they were trained in semantic mapping, teachers and librarians led the students through the Thinking Networks Program. Using these highly structured computer programs, students learned to construct visual maps representing the relationships of major ideas, subordinate ideas, and explicit information. For example, one map represented the organization of sequentially organized text; other maps depicted the prose organization generally found in content reading.

Once students in a given class completed the computer mapping programs, their teachers planned ways to apply the strategies in their specific content areas. Using the chalkboard or an overhead projector, each teacher modeled the three types of map constructions for the whole class to see. By arranging concept boxes and connecting them with drawn-in lines, the teacher also related new vocabulary and content ideas within a meaningful, visual whole. In this way, as students read or wrote about the material, they could see how their current knowledge connected with new ideas about a topic. Then through class discussions, the students identified the main idea or the central thesis of their as-



A student fills in a concept box during a classroom discussion to generate ideas for a theme map on cell division (Ed Mayo Junior High School, Moss Point District).

Fig. 1. Generic Semantic Maps



signed reading (Fig. 1 shows the three frameworks: sequence, theme, and classification.)

For instance, in a social studies unit on "Colonizing the Mississippi Valley," the teacher presented a *sequential* organization map. Here the organizing factor was the concept of major events or episodes occurring in historical sequence, and each major episode was supported by the unfolding of minor events in the order in which they occurred. In a science unit about work and energy, the teacher used a *theme* map that portrayed the central topic in one large box in the middle of the map. The major ideas of *friction*, *force*, *weight*, *power*, and *laws* were placed in boxes around the central topic. In smaller boxes connected to these ideas were subordinate data.

For a unit on the circulatory system, some teachers used a *classification* map to show that "blood cells" and "blood vessels" were the two major category types to be covered in the theme reading. Under the "blood cells" box were three smaller boxes: red blood cells, white blood cells, and platelets. In boxes beneath each of these were the specific functions and characteristics performed for the human body.

With practice, teachers elaborated on the three frameworks to show other ways that text can be organized. Maps were generally constructed to illustrate that the more hierarchical a

concept is in relation to other ideas, the larger the concept box that houses the idea information.

In reading. As students constructed their maps about what they had read, the teachers had them organize their thinking in one of two ways. Some teachers would ask students to consider all the major ideas of the assignment first. As students offered their ideas for discussion, the class accepted some, rejected others. Those accepted as main ideas were written in the larger concept boxes on the map. Once all the major ideas were established, the teacher had students identify subordinate ideas related to each main idea. To do this, the students needed to scan the entire reading as they looked for, thought about, and

evaluated the information requested by the teacher.

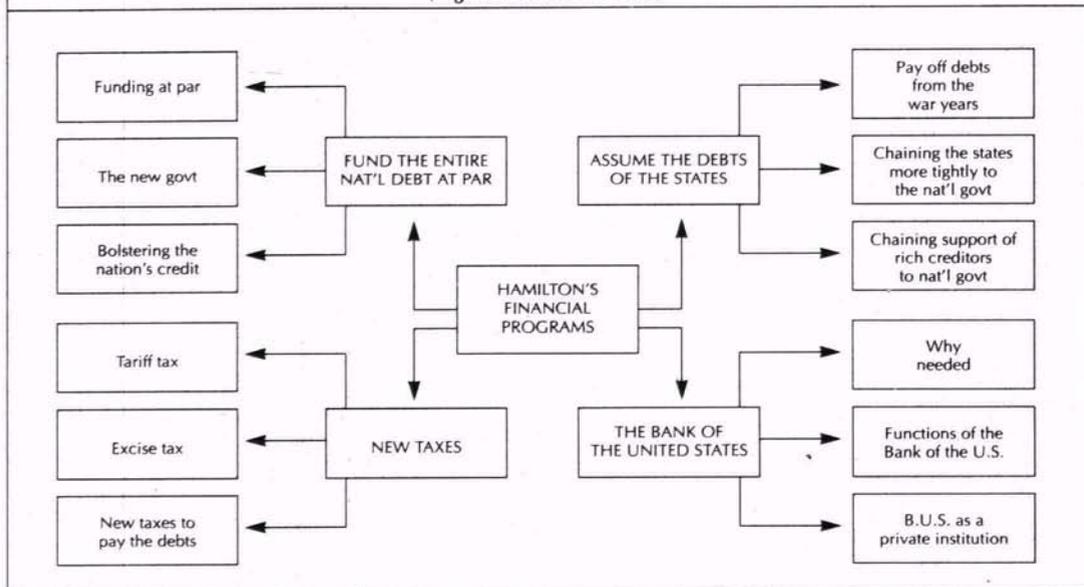
Other teachers chose to have students complete the sections of a map one at a time. To do this, students worked through one main idea at a time by considering subordinate ideas and information relating to each idea. They too needed to refer to their texts, but this task involved working with smaller chunks of text at any one time.

With either procedure, however, students were completing the maps as conceptualized by their teachers. That is, each teacher's procedure and mode of questioning determined how students would arrange the information presented in the content unit. Therefore, once they had completed the guided practice activities, teachers applied the mapping strategy in broader ways. For example, some teachers assigned a unit to be read in class or for homework and then asked students to map the content in ways they thought made sense. During class, they presented their maps on the chalkboard for discussion. The other students offered their views and suggested possible changes in the arrangement of a student's ideas.

In writing. Next, the teachers moved on to the reconstruction of text ideas through writing. During this phase, the students used one of the three types of semantic maps as an organizational guide when they wrote essays or reports on an assigned unit

Using the chalkboard or an overhead projector, each teacher modeled the three types of map constructions for the whole class to see.

Fig. 2. Teacher-Prepared Theme Map: "Hamilton's Financial Programs"
(High School Social Studies)

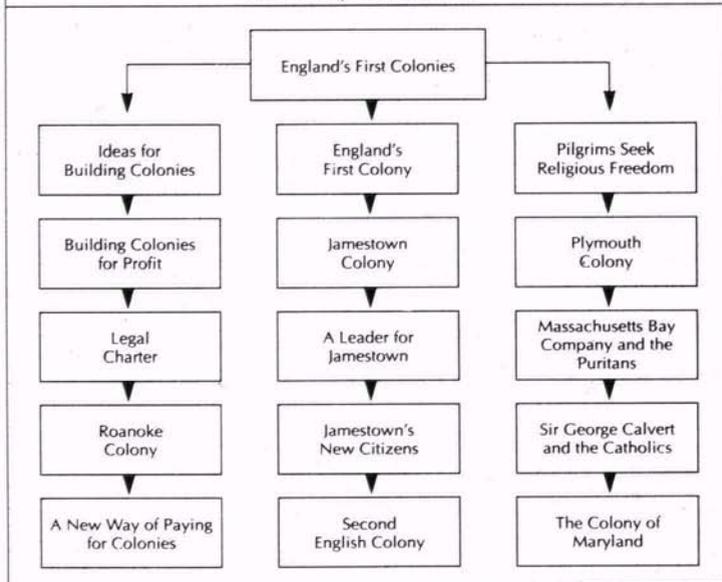


they had just read. Figure 2 shows a social studies map on "Hamilton's Financial Programs" prepared by a high school teacher as a guide for classroom writing. Figure 3 shows a 5th grader's final draft of a sequential map on "England's First Colonies," which she prepared prior to writing an essay on the topic. Such reconstructions through writing helped students organize their thoughts for composition tasks.

When essays or reports were in draft stages, many teachers scheduled time with the librarians in their media centers. Here, the librarians helped students collect additional information on assigned topics and assisted them in word processing techniques. Then students used word processing programs to prepare multiple drafts for review and acceptance by classroom teachers.

In essence, students were learning to think and work at the three highest domains of Bloom's cognitive taxonomy (1956). During analysis of the content reading, they perceived the relationship of the parts to the whole. During the written reconstructions of the content units, they evolved a new whole by combining information within their heads with new information from their texts. Finally, by evaluating the construction of their maps, students used criteria and standards to

Fig. 3. Student-Prepared Sequential Map: "England's First Colonies"
(Elementary Social Studies)



form judgments. These three levels, in turn, subsumed the lower ones of application, comprehension of material, and knowledge of specific factual information.

Improved Student Performance

Although emphasis was given to the 11th grade because of the state's assessment program and as a bench-

mark for summary evaluation of district-wide performance, teachers at all grade levels were pleased with their use of semantic mapping and essay writing. They felt the effort had helped students better understand the conceptual organization of content subjects.

Figures 4 and 5 show the pass/fail numbers for 11th grade students over a four-year period for written essays and reading comprehension (special education students' scores are not included). The results indicate that the district successfully met state requirements. Both figures show statistically significant improvement with the greatest chi square analysis gains in reading and writing occurring between the 1987-88 school year ($p < .001$), the first year of full district implementation. Specifically, 10 of 413 students failed the reading test, and only 2 students failed to write an acceptable essay. For the 1989 assessment, after two years of full implementation, results held exceedingly well, with 99 percent of the 11th graders passing the reading comprehension test and 100 percent passing the written essay examination. Moreover, for the written essay, which was rated into 6 category levels by the state, no students failed and only 3 percent, or 10

Fig. 4. 11th Grade Essay Results

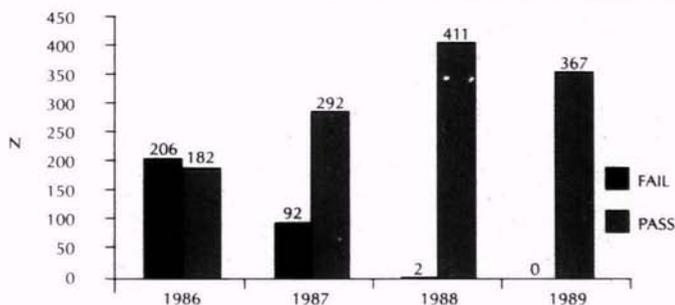
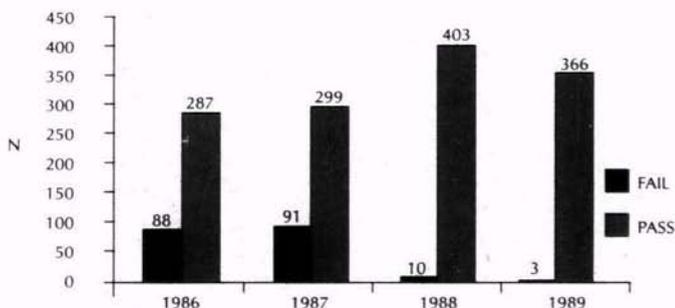


Fig. 5. 11th Grade Reading Results



After a classroom activity to establish the major ideas in a reading, students—with semantic maps close at hand—look over their texts to locate secondary elements to add to their maps (Charlotte Hyatt, Elementary School, Moss Point District)

By merging mapping with writing across the curriculum, district teachers taught their students how to embed facts within a meaningful whole and how to use writing and computers as important tools in all subjects.

students, fell into the fifth level, the *below-average* category. Also, more students than in previous years' assessments achieved the highest categories of *excellent*, *good*, and *above-average* in writing.

Success Factors

Critical to the success of the semantic mapping/computer project, for both teachers and students, was their internalization of the process and wide and consistent application across the subject areas. The involvement of the librarians as the managers of computer-assisted learning was also a key factor in the project's success because they managed computer resources, trained teachers and students in how to use mapping and word processing programs, and collaborated with teachers and students in essay preparations.

The experiences of teachers and students in developing and using the

maps yielded many benefits. First, with the assistance of a computer program, teachers and students learned to perform mapping. Second, students had a model for identifying major, subordinate, and explicit ideas in their text assignments. Third, by merging mapping with writing across the curriculum, district teachers taught their students how to embed facts within a meaningful whole and how to use writing and computers as important tools in all subjects. With semantic mapping, students have a text-elaboration strategy that serves them equally well in reading and in writing contexts.

Now the Moss Point District can be proud of the performance of its students, who are more reflective readers and better organized writers, and of its teachers, who are applying new ideas and technologies to help students learn better. □

For more information about the approach, write to Think Networks Inc., P.O. Box 6124, New York, NY 10128.

COLUMBIA UNIVERSITY TEACHERS COLLEGE CONTINUING PROFESSIONAL EDUCATION FALL 1990 WORKSHOPS

Many Faces, Many Voices: Expanding Curricula to Meet Diversity in
Early Childhood and Elementary School Classrooms
October 19-20, 1990

Observing and Assessing the Pre-School Learner
November 16, 1990

Television: Medium for Mathematics and Science Education
November 16-17, 1990

Applied Critical Thinking: The Discussion Types Model
November 30, 1990

Literature in the Classroom: Non-Fiction as Story-Telling
December 7, 1990

For Brochures:
Continuing Education
Box 132
Teachers College, Columbia University
New York, New York 10027
TEL: 212-678-3064/65
FAX: 212-678-4048



References

- Bloom, B., ed. (1956). *Taxonomy of Educational Objectives: Cognitive Domain*. New York: David McKay.
- Heimlich, J.E., and S.D. Pettleman. (1986). *Semantic Mapping Classroom Applications*. Newark, Del: International Reading Association.
- International Reading Association. (1988). *New Directions in Reading Instruction*. Newark, Del: IRA.
- Pehrsson, R.S., and H.A. Robinson. (1985). *The Semantic Organizer Approach to Writing and Reading Instruction*. Rockville, Md: Aspen Publications.
- Sinatra, R.C. (1986). *Visual Literacy Connections to Thinking, Reading, and Writing*. Springfield, Ill: Charles C Thomas.
- Sinatra, R.C., J. Stahl-Gemake, and N.W. Morgan. (1986). "Using Semantic Mapping After Reading to Organize and Write Original Discourse." *Journal of Reading* 30, 1: 4-13.

Hines Cronin is Superintendent, Moss Point School District, 4924 Church St., Moss Point, MS 39563. **David Meadows** is Assistant Superintendent, Moss Point School District. **Richard Sinatra** is Professor, St. John's University, Marillac Hall, Grand Central and Utopia Pkwy., Jamaica, NY 11439.

Copyright © 1990 by the Association for Supervision and Curriculum Development. All rights reserved.