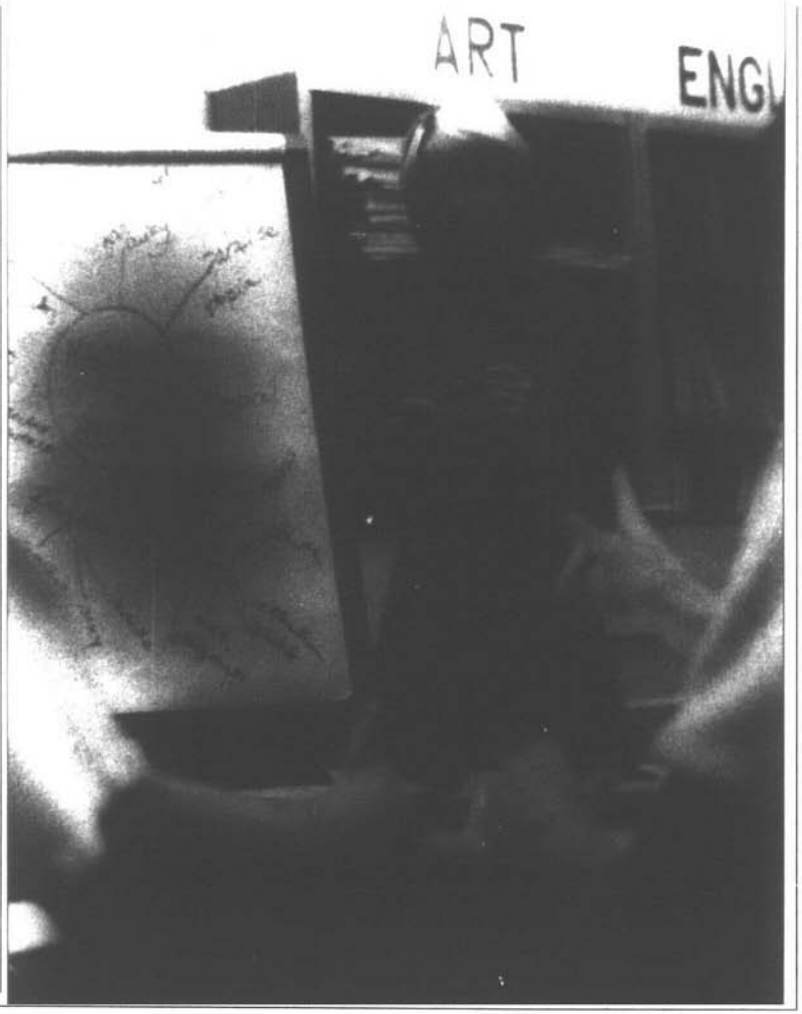
# Infusing Cognitive Strategies Into Teacher Preparation Programs

DAVID S. MARTIN

Although schools are beginning to focus extensively on "cognitive skills" for *students*, they are giving little attention to the impact of those skills on *teachers*. Because some teachers themselves did not have the benefit of systematic cognitive development in their own schooling, they are often unprepared to foster cognitive skills in their students; can only partially identify the cognitive structures underlying the curriculum; and sometimes fail to apply systematic thinking to their own daily instructional tasks.

For these reasons, a component of all teacher education programs should be systematic cognitive development on an adult level, through planned experiences in course work and opportunities to apply that learning in practicum settings.

An experiment in preservice teacher education is now in progress at Gallaudet College in Washington, D.C. Although these particular teacher trainees happen to be deaf, a similar approach could be used in any preservice teacher education program.




## An Experiment in Cognitive Skills Development

Previous work with adult learners has shown that age 20 is not too late to change the cognitive performance of

*David S. Martin is Associate Professor and Coordinator, Undergraduate Teacher Preparation, School of Education and Human Services, Gallaudet College, Washington, D.C.*

Student teachers at Gallaudet College participate in the Instrumental Enrichment program to develop their cognitive skills.

the learner, but that systematic and repeated experiences are necessary. For that reason we selected the *Instrumental Enrichment* program developed by Feuerstein (1980) to see if it would make a difference. *Instrumental Enrichment* is a content-free, paper-and-pencil program in which the learner improves problem-solving strategies in 14 cognitive areas, including comparison, categorization, orientation in space, analytic perception, and logical reasoning. The instructor mediates the learner's work and conducts discussion for insight about the application of these strategies to subject matter and to life situations.

The 24 experimental subjects included juniors in a curriculum foundations course, juniors in an educational psychology course, and seniors in a student teaching seminar. They were compared to a control group of students in another educational psychology course.

Cognitive skills practiced in the educational psychology and the curriculum courses were: projecting virtual relationships, comparing, analyzing, orientation in space, and creating precise instructions. In the student teaching seminar (held weekly during a student teaching semester) students focused on the skills of temporal relationships, cause-and-effect, categorization, hierarchical relationships, logic, and synthesis.

In each course, 45 minutes of every alternate class meeting was devoted to the following routine:

1. Instructor introduces a one-page, paper-and-pencil activity practicing a particular cognitive skill.

2. Class discusses possible strategies for solving the cognitive skill problem.

3. Students work individually or in pairs to find solutions, while instructor helps students having difficulty.

4. Instructor discusses what the group members have learned in general about the mental processes needed to solve these problems (metacognition).

5. Instructor and students brainstorm and list ways that those processes apply to (or "bridge" to) the daily demands of teaching.

For example, in the curriculum course, one cognitive activity involved comparison by finding the most exclusive labels for the similarity between certain objects (for example, for *car* and *bicycle*, the label *wheeled vehicle* is more precisely exclusive than just *transportation*). The class completed several related exercises and discussed the strategies they used. Then, instructor and students bridged to the idea that a teacher must apply that same skill by carefully comparing and labeling the diagnosed needs of pupils before deciding to subgroup them for instruction—thus, the bridge for that day.

Activities are sometimes also followed by a discussion for insight into how that particular skill could be applied to:

- Teaching children the same skill.

Jim Stringham Lane

**"Previous work with adult learners has shown that age 20 is not too late to change the cognitive performance of the learner, but that systematic and repeated experiences are necessary."**

- Other subject matter of the course itself.
- Professional teaching behaviors such as lesson planning and materials selection.
- Life or "outside world" functioning, such as finding a job and selecting a mate.

The students in these experimental courses were compared to the control group. On a measure designed to assess verbal skills, an analysis of the experimental students' writing showed a clear improvement in precision of description, explanation of meanings behind pictorial stimuli, statement of similarities, and statement of differences. No such trend was found for the control students.

On a separate measure in which students assessed how well they believed they used ten desirable work habits, the experimental students clearly increased in the positive perception of their own ability to follow directions, complete course work carefully, find and correct their own errors, and think through a problem before attempting a solution. No such trend was found in the control group.

On a post-test on learning styles, the experimental students showed a statistically significant difference from the control group in preference for a *reflective* style as opposed to an *impulsive* style; no such preference was noted on their pretests. In addition, these student teachers—compared to student teachers who had not had cognitive training—were reported by cooperating teachers to be better diagnosticians, lesson planners, and discussion leaders in their own classrooms.

Thus, the idea of incorporating cognitive education into preservice teacher education is worth serious study. These results, of course, will require further examination through experimentation with larger samples of students.

## A Proposed General Model

Figure 1 presents a model for including cognitive teaching in preservice teacher education programs. Including content-free activities in teacher education courses presents a real chal-

**Figure 1. A Model for Cognitive Skill Development in Teacher Education Programs.**

| | Cognitive Skills | | | | | |
|---|---|---|---|---|---|---|
| **Program Components** | Projecting Virtual Relationships | Comparisons | Analysis | Developing Instructions | Categorization | Temporal Relationships |
| I. FOUNDATIONS *COURSES:* Philosophy | X | | X | | | |
| Ed. Psych. | X | X | X | | | |
| Curriculum | | | X | | | |
| II. METHODS *COURSES:* Subject Areas | | | X | | X | |
| Media | | X | | X | | |
| Exceptional Children | | X | | X | | |
| III. *PRACTICUM:* Observation | X | | | | | X |
| Teacher-Assisting | | | | X | X | X |
| Student Teaching | | | | X | | X |

lenge because those activities appear to "take time away" from traditionally required subjects. But cognitive training must be integrated across the various components of the curriculum because it provides the missing prerequisite enabling skills that will deepen and broaden the teacher's behavior on the job. If cognitive training activities are included several times a week in *each* preservice course and then applied during the practicum setting, no single course instructor bears the entire responsibility.

The model in Figure 1 integrates these skills into all components of a teacher preparation program (foundations, methods, and practicum) and indicates that these skills are to be taught and reinforced at several points in the curriculum. This integrative model, therefore, does not involve *adding* any single course. Instead, it requires the following steps:

1. Training teacher education instructors in the methods and materials of cognitive education, and orienting practicum supervisors to the rationale for cognitive education.

2. Orienting cooperating teachers to the rationale and methods of cognitive education before the trainee's arrival.

3. Reaching agreement among these teacher training faculty members about which generalizable cognitive skills each will emphasize in his or her course work.

4. Allotting one segment of every alternative class meeting in *each* foundations and methods course to one cognitive skill activity and discussions about how that skill would be applied to the course topic, the school curriculum, and/or to professional and personal life. Cognitive activities would

| Cause-Effect Progressions | Hierarchical Relationships | Logic | Synthesis | Examples of Applications to Teaching |
|---|---|---|---|---|
| | | X | | Develop and understand a philosophy |
| | | | | Relate child development to instruction |
| | X | | X | Develop a theory of instruction |
| X | | | | Select and develop variety of methods |
| | | | | Select and develop appropriate materials |
| X | | | | Adapt instruction for special needs children |
| | X | | | Analysis of school structure; analysis of classroom behaviors of pupils |
| X | | X | | Diagnosis of pupil needs; selection of appropriate materials and methods |
| X | | X | X | Develop units; lesson planning; pupil evaluation; identify and teach skills, content, and critical concepts to pupils. |

**"Cognitive training must be integrated across the various components of the curriculum because it provides the missing prerequisite enabling skills that will deepen and broaden the teacher's behavior on the job."**

focus on the skills of planning, analysis, identifying problem-solving strategies, breaking egocentricity, categorization, comparison, relating cause and effect, logical thinking, and synthesis.

5. Requiring each trainee during student teaching to teach cognitive skill development to *children* on a regular basis.

6. Assessing through college supervisors' ratings the trainees' application of systematic thinking to their planning, interaction, analysis and evaluation, and applying stages of teaching (Costa, 1982).

7. Reinforcing the use of cognitive education methods during the student teaching seminar by discussing successes and problems in the teaching of cognitive skills to practicum children, and discussing other insights gained from applying those skills to the trainees' own professional and personal lives.

8. Assessing program graduates by follow-up surveys to determine the extent to which this specialized component has or has not affected their on-the-job professional performance, in comparison with prior graduates of the same teacher training program.

This model clearly requires an unusual professional commitment of time and energy by teacher education faculty members. However, the results of our experiment, in addition to national concern about the quality of teacher performance, indicate that such a model needs to be implemented now.□

*References*


Costa, A. "Supervision for Intelligent Teaching." Unpublished paper, Sacramento State University, Sacramento, California, 1982.

Feuerstein, R. *Instrumental Enrichment: An Intervention Program for Cognitive Modifiability*. Baltimore: University Park Press, 1980.


*Related Readings*


Gage, N.L. *The Scientific Basis of the Art of Teaching*. New York: Teachers College Press, 1978.

Gil, D. *The Decision-Making and Diagnostic Processes of Classroom Teachers*. Research Series No. 71. East Lansing: Institute for Research on Teaching, Michigan State University, 1980.

Martin, D.S. "Can Teachers Become Better Thinkers?" Unpublished research report, Gallaudet College, 1983.

Murray, F.B. "The Cognitive Benefits of Teaching on the Teacher." Unpublished paper delivered at the conference of the American Educational Research Association, April 1983, Montreal, Canada.

Perry, W.G. *Forms of Intellectual and Ethical Development in the College Years*. New York: Holt, Rinehart and Winston, Inc., 1968.

Perry, W.G., Jr. "Cognitive and Ethical Growth: The Making of Meaning." *The Modern American College*. Edited by Arthur Chickering. San Francisco: Jossey-Bass, 1981.

Renner, J.W. "Determination of Intellectual Levels of Selected Students: Final Report to National Science Foundation." Document 75-SP-0517, 1975.

Schenkat, R., and Battaglini, D. "Teaching Reasoning: The Essential Element in Teacher Preparation for Mainstreaming Education." *Research in Education* (1981), ED 204-318.

Shulman, L.S., and Elstein, A.S. "Studies of Problem Solving, Judgment, and Decision Making: Implications for Educational Research. In *Review of Research in Education*, Vol. 3. Edited by F. Kerlinger. Itasca, Ill.: Peacock, 1975.

Waksman, M.; Silverman, H.; and Hammel-Smith, A. *The Questioning Approaches of Instrumental Enrichment and Non-Instrumental Enrichment Teachers*. Toronto: Ontario Institute for Studies in Education, 1978.