

description does not specify whether people can or will reason spontaneously in a formal operational manner, but only what they can do given appropriate experiences, instruction, or motivation. In contrast, theories like Case's are focused on the particular cognitive processes that are integrated in actual strategy use. They deal with cognitive performance (for a more detailed discussion of this distinction see Stone and Day, 1980).

The need for complementary competence and performance theories is highlighted (1) by the finding that adolescents and adults do not always and spontaneously think "formally" and (2) by the finding that they can easily be taught formal operational strategies. The apparent ease of learning formal operational strategies after age 12 is encouraging for those who think, as I do, that the use of "formal" thought is critical in everyday situations. ■

#### References

Brown, A. L., and DeLoache, J. S. "Skills, Plans, and Self-Regulation." In *Young Children's Thinking: What Develops?* Edited by R. Siegler. Hillsdale, N.J.: Erlbaum, 1978.

Case, R. "A Developmentally Based Theory and Technology of Instruction." Review of Educational Research 48 (1978a): 439-469.

Case, R. "Intellectual Development From Birth to Adulthood: A Neo-Piagetian Interpretation." In *Young Children's Thinking: What Develops?* Edited by R. Siegler. Hillsdale, N.J.: Erlbaum, 1978b.

Inhelder, B., and Piaget, J. *The Growth of Logical Thinking from Childhood to Adolescence*. New York: Basic Books, 1958.

Pascual-Leone, J. "A Mathematical Model for the Transition Rule in Piaget's Developmental Stages." *Acta Psychologica* 63 (1970): 301-345.

Piaget, J. "Intellectual Evolution from Adolescence to Adulthood." *Human Development* 15 (1972): 1-12.

Stone, C. A., and Day, M. C. "Competence and Performance Models and the Characterization of Formal Operational Skills." *Human Development* 23 (1980): 323-353.

Stone, C. A., and Day, M. C. "Levels of Availability of a Formal Operational Strategy." *Child Development* 49 (1978): 1054-1065.

Tulkin, S. R., and Konner, M. J. "Alternative Conceptions of Intellectual Functioning." *Human Development* 16 (1973): 33-52.

## Matching Curriculum to Students' Cognitive Levels

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Although Piaget postulated that most adolescents possess the mental structures required for formal reasoning, Epstein (1978, 1980) reports that only 34 percent of all adolescents attain formal thought. This discrepancy raises the possibility that schools may be able to develop abstract thinking in a greater percentage of students.

To this end, the Shoreham-Wading River School District has implemented a comprehensive program of inservice education in a project called Cognitive Level Matching. To date, approximately 65 of the district's 200 teachers have participated.

Purposes of the inservice education are to sensitize teachers to the process of cognitive development and to enable them to: (1) assess the cognitive abilities of their students; (2) assess the cognitive demands of school-based inputs including curriculum, social interaction, teaching/questioning techniques; and (3) match, as closely as possible, the demands of the curriculum with student cognitive abilities. Creating this match is the cornerstone of our project.

Approximately 600 middle school students have been given Arlin's *Test of Formal Reasoning* (1980) in order to determine their cognitive abilities. Unlike most Piagetian tests, Arlin's is a paper-and-pencil test,

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requiring only one hour for completion, administered to large groups of students with minimal teacher direction. Simultaneously, participating teachers have been examining existing school-based inputs and making adaptations and modifications, as well as developing new approaches. Peer-teacher observations, teamwork, and the development of new taxonomies are components of their examination.

Although the Cognitive Level Matching project is in its first year, much has already been achieved. Curriculum units have been developed that enable teachers to match inputs to the wide range of cognitive abilities found in most heterogeneously organized classrooms. The curriculum units will become part of a teacher resource file.

At the conclusion of three years, Arlin's test will be readministered to the middle school and high school students. We expect to find a greater percentage of them reasoning on the formal level than our original testing revealed. ■

#### References

Arlin, Patricia. "Test of Formal Reasoning." University of British Columbia, 1980.

Epstein, H. "Growth Spurts During Brain Development: Implications for Educational Policy and Practice." In *Education and the Brain*. Edited by J. F. Chall and A. F. Mirsky. Chicago: University of Chicago Press, 1978.

Epstein, H. "Some Biological Bases of Cognitive Development." *Bulletin of the Orton Society* 30 (1980).

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