Accelerating Cognitive Development— Helpful or Harmful to Children?

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Curriculum reform efforts in early childhood education must be based on theory and pedagogy that are well documented with empirical data. What does the research suggest regarding accelerating preschool learnings?

RESEARCH findings from developmental psychology concerning the nature and development of intelligence from birth to six years of age have significantly influenced the direction of curriculum reform in early childhood education during the past decade. Hunt (9) and Bloom (2) have stressed the impact of environment on intelligence, and the latter has suggested that the preschool years may be a critical period for accelerating cognitive development. The rate of intellectual development during the first four to six years of life suggests the possible merits of early intervention to maximize an environmental impact on cognitive development.

This trend toward early cognitive stimulation gathered impetus from the writings of Bruner (3) and Vygotsky (13), who approach learning from similar vantage points. Bruner believes that:

> Any subject can be taught effectively in some intellectually honest form to any child at any state of development (3: 33).

This statement refers to the "structure" of a subject matter area, *not to the psychological structures* that Piaget refers to in the developing organism. These psychological structures constitute the child's intellectual basis for comprehending knowledge. These logical operations evolve as the child develops, with each stage implying qualitative differences in the child's mode of thinking. Thus intellectual growth follows a series of developmental stages, which are invariant in sequence and consequently unresponsive to intellectual acceleration. This conceptualization of cognitive development parallels theory and research concerning language development and the inherent dangers involved in accelerating language development before the age of six. A theory advanced in pediatrics suggests that an emphasis on the communication function of language, during the early childhood years, may be counterindicated when the organism is preoccupied with working on more urgent biologic or

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physiologic functions. Nelson in *The Textbook of Pediatrics* states:

> The processes involved in the development of speech and language are highly vulnerable since the organ systems on which they depend have more urgent biologic functions to serve than communications (11: 104).

Additional data, supporting Piaget's theory regarding the age placement when certain logical operations occur, come from replication studies. Comprehensive evidence is derived from the studies of Elkind (5); Lovell, Mitchell, and Everett (10); Elkind (6); Elkind *et al.* (7); and Sigel, Roeper, and Hooper (12) which further question the efficacy of accelerating cognitive development.

Generally, formal instruction has not accelerated the acquisition of concrete operations since a child's capacity to learn determines what is learned and how it is learned. However, early training in prerequisite thought processes may help the child more easily to grasp certain logical operations such as conservation and classification concepts during the elementary years.

Prerequisite Logical Operations for the Young Child

The research on cognitive development suggests that opportunities for stage-relevant thinking operations be provided for youngsters during the early childhood period. Instead of attempting to accelerate the development of logical operations, the research indicates that ECE programs should emphasize prerequisite thought processes needed by the child to understand conservation, numeration, seriation, and classification.

During the period of ages two to seven, children are in the pre-operational stage of cognitive development. Learning experiences need to capitalize on the sensorimotor interests of the young child and utilize this modality as a means of providing concrete experiences which will develop thought processes. Many school opportunities can be provided for children to engage in logical operations that will help them later with tasks involving *conservation*, *seriation*, and *classification*. These learning opportunities will help the child make the transition from the sensorimotor level to the symbolic stage.

Presenting Learning Tasks Involving Conservation and Seriation

In developing readiness for conservation of number tasks, the child needs to learn the equality of two sets by making a comparison. He can use one-to-one correspondence as he matches objects between groups. Multiple classification can also be integrated into these mathematics activities by having children initially select objects that are similar on several dimensions—size, shape, texture, and color. Then children can select from beads, squares, blocks, or rocks, and classify them by similar characteristics, based on multiple criteria. Once the criteria for multiple classification are established, then two equal sets can be arranged and children can use counting to equate the quantity in each set. The sets should be arranged in squares, circles, and lines, in vertical and horizontal order, so that children will begin to understand conservation of number. In other words, the *number* of objects in a set is *conserved* even when the amount of space that the objects occupy is changed.

Children also need to understand one-to-one correspondence when physical correspondence is destroyed. In setting the table for lunch, or in a dramatic play situation, children can arrange several place settings, which entails matching objects using one-to-one correspondence. This operation involves identifying knives, forks, spoons; arranging them in proper order, which entails matching; sensing directionality—left from right; and using spatial discrimination in placing them in proper position with respect to the plate and cup.

Seriation involves placing objects or events in order with respect to one property. This task requires the child to identify the extreme of that property and consider the relation of each succeeding object or event in terms of being more or less than the preceding or following object or event.

For instance, after a lesson in multiple classification, blocks may be selected that are graduated in size. Children first differentiate the largest and smallest; later, they insert the other sized blocks in their proper position from smallest to largest. If color is the one property to be considered, then various shades of one color from dark to light may be used to help children seriate objects.

In effect, logical tasks that involve conservation of number are really helping the child learn to use one-to-one correspondence to estimate quantity—thus *cardinal number*. If objects that are seriated are labeled first, second, third, and so forth, the child learns to use *ordinal number* to designate position. If different size and shape of objects are used for seriation and conservation activities, and the teacher helps the child use such terms verbally as long, short, large, small, round, and square while performing the operations, then the child is beginning to understand size relationships and geometric forms too.

In dramatic play activities, the child is beginning to understand spatial relationships as he puts the car under the tunnel, the cows in the corral, and the train on the tracks. Positional terms are frequently used to describe object-to-self relationship.

Prerequisite operations to conservation of continuous quantity and weight may also be introduced through measurement lessons that deal with liquids and solids. By pouring water from different-shaped quart bottles, children begin to learn equivalency and irreversibility. These operations are essential to comprehending conservation of quantity. In weighing equal masses on a scale, children learn that they can vary the shape, size, and color and see that the weight remains constant. These are the early learnings essential to later grasping conservation of weight.

In conclusion, in considering the question of accelerating cognitive development, one must contemplate both the efficacy and the wisdom of this view. The research on the effects of a preacademic program on achievement suggests that the findings on long-term gains are equivocal (8). In addition, the secondary effects of such a program—increased passivity of the learners (1: 23)—suggest that a thrust for attainment in the intellectual area may impede growth in other areas of personal and social development.

However, the desirability of accelerating cognitive growth depends on the way one conceptualizes it. If cognitive stimulation implies assessing and diagnosing a child's stage of intellectual development and providing learning opportunities that match his capacity, then few educators would question the wisdom of intellectual acceleration. Nevertheless, if cognitive stimulation means training all youngsters early either in Piaget's concrete operations or in formal academic skills, then this raises some formidable questions as to priorities for ECE. Merely because the early childhood years are regarded as a critical period for acceleration of learning does not justify intensifying pressures on children for academic achievement irrespective of individual capabilities.

In effect, one's definition of cognitive acceleration ultimately influences the purposes, priorities, and programs that are generated under the guise of early childhood education.

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