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**TOWARDS A COGNITIVE CURRICULUM FOR PRESCHOOLERS :
RESEARCH AND PRACTICE**

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The Need for a Cognitive Curriculum

There is a range of curricula for preschoolers already available in Singapore and one might ask why yet another one is needed and specifically a cognitive curriculum. Part of the answer is that, in spite of existing curricula, many children arrive in the primary school unprepared for academic learning. It is true that the majority of Singapore's young children are in pre-schools and they are not classified as mentally retarded or learning disabled, yet many children may have more ability to learn than is demonstrated by their school performance. Why then did they not learn well? One answer is that they do not know how to learn. Learning is a subset of thought, and thought is what cognition is. Thus, a cognitive curriculum is needed in order to teach children how to think effectively and this includes how to learn. The assumption is that children who have been taught some fundamental principles of thought, learning and problem solving will be more effective in academic and social learning.

In addition, it has been observed that unpreparedness for academic learning is not uniformly distributed over all children from all pre-school centres. It is more characteristic of some pre-schools who have inadequate facilities and poorer support. Since there is no defensible reason to assume that such children are inherently less intelligent than are "affluent" children, it is reasonable to assume that a cognitive curriculum, if applied systematically to all, should bring the learning abilities of all children up to a workable level with respect to primary school materials.

A new kind of pre-school curriculum is also needed because present widely-used curricula for the pre-school education of children fall primarily into one of two groups: those with an emphasis on social development, with little academic preparation, and those with a pre-academic emphasis that is merely a simplified version of the primary one curriculum. Neither approach is maximally helpful in improving the educability of children. Educators and developmental psychologists have found generally that the strongest and most effective educational curricula are those that are based on a general theory of child development and a specific theory of developmental change.

Theoretical Influences of a Cognitive Curriculum

A cognitive curriculum for young children is built on a theoretical base that deals with the nature of learning, child development and intelligence - a fact that most teachers like about. In Vanderbilt University (JFK Research Center of Peabody College) the Cognitive Curriculum for Young Children is based on the systematic thoughts of at least four theorists:

- 1 Piaget's stage theory of the sequential and hierarchical development of cognition;
- 2 Vygotsky's concepts of the social context of learning and the idea that in everyone there is a difference between performance and potential and that potential can be approached with help in learning the modes of thought necessary to higher levels of understanding;

- 3 Feuerstein's theory of structural cognitive modifiability, that intelligence is flexible and that cognitive functions are compounds of native ability, learning history, attitudes toward learning, motives and strategies, normally acquired through an active role of parents or other adults interacting with children, called "mediated learning";
- 4 and Haywood's motivational theory of cognition, that intrinsic motivation (expressed, for example, in exploration, novelty seeking, reasonable risk taking) is of particular importance in acquiring and applying cognitive processes.

Reuven Feuerstein's theory of structural cognitive modifiability has had the greatest influence on the development of this curriculum. This is built upon the following fundamental assumptions:

- 1 The ability to learn effectively consists of principles of thought, perception, learning, and problem solving that children learn; it is not an ability with which they are born.
- 2 The learning of such principles ordinarily occurs within the family through a process called mediated learning experience ie. the passing of values and modes of thought from adult to child.
- 3 When for a variety of reasons the cognitive processes necessary for effective learning are not acquired at the usual times and under the usual circumstances, they can be taught later, and if they are taught and learned, the effectiveness of attempts at further learning will improve.
- 4 Adequate cognitive development cannot occur without the critical of mediation of parents and other child-rearing agents.
- 5 While there is orderliness in the sequence of cognitive development, it is still possible to stimulate the development of specific cognitive structures irrespective of "normal" sequence, ie. to go back and pick up aspects of cognitive development that have been missed and that are important to learning and social functioning.

The concept of Mediated Learning is the core of the theoretical underpinning of this curriculum. Mediated learning is the process by which parents or other child carers interpret the world to children, ie. explain the meaning of the children's successive encounters with their environments. It occurs through a long series of interactions between parents and children, usually around naturally occurring events. Mediated learning occurs in every culture, in every social class, with and without the formal education of the parents and in every language. The process is largely verbal.

Piaget's general theory of cognitive development influences the cognitive curriculum in a number of ways:

- 1 The notion that cognitive development proceeds in an orderly and predictable fashion, according to certain stages.
- 2 The twin concepts of assimilation and accommodation as the principal mechanisms

by which cognitive growth occurs. Piaget emphasized the process of assimilation while Feuerstein places greater emphasis on the process of accommodation. This is demonstrated by the latter's efforts to change the children themselves rather than the environment.

- 3 The emphasis on the importance of the Stage of Concrete Operations. The movement from the Stage of Pre-Operational thought into the Stage of Concrete Operations is critical for the subsequent development of Formal Operations, and normally occurs around the age of 6 to 7 years in normally-developing children who have average experiential backgrounds. The criteria of concrete operational thought include: conservation, seriation, categorization and class inclusion.

A major goal of the cognitive curriculum according to the Vanderbilt University team (Burns et.al) is to enhance the cognitive development of young children toward, and one hopes into, concrete operational thought by bringing about the operations of conservation, seriation, categorization and class inclusion.

Vygotsky in 1920 appeared far ahead of his times when he wrote that there is an identifiable measurable difference between intellectual potential and intellectual performance. Performance is measured as what one typically does without help. Potential is what one is capable of doing, given sufficient help. In other words what a child can do is not necessary what he is capable of doing, because so many factors other than ability can influence performance. Vygotsky refers to the difference between typical and maximal performance as "the zone of proximal development," by which he means that it ought to be possible, without too much difficulty, to teach cognitive principles and strategies.

"There is some difference between performance and potential in every child and it is possible to reduce the difference by teaching principles and strategies of learning and problem solving that will be generalizable to new problems and even to the ultimate generation of one's own principles and strategies."

(Burns et al)

J.McV.Hunt has proposed a "motivational theory of cognition" while Carl Haywood has proposed a "cognitive theory of motivation." These complementary concepts give intrinsic motivation a central place in cognitive development as well as in the effectiveness of learning. Intrinsic motivation inheres in the task rather than in non-task aspects of the environment. Haywood's research indicates that poor learners are more likely to be characterized by task-extrinsic than by task-intrinsic motivation. Intrinsic motivation develops as a joint function of increasing chronological age and increasing mental age and motivational orientation can be changed from relatively task-extrinsic to relatively task-intrinsic by a number of manipulations in the cognitive curriculum. Intrinsic motivation leads to effective learning.

Components of the Cognitive Curriculum for Young Children (CCYC)

This cognitive curriculum is composed of five major components which are interrelated.

- 1 **Mediated Teaching Style.** In this method of teaching, it is the role of teachers to serve as "mediators" between children and their environment. Teachers help children to interpret the meaning of experiences and to extract from those experiences some broadly generalizable principles and strategies of perceiving the world; of thinking systematically, clearly and effectively; of learning and problem solving.

- 2 **Curriculum Units.** The curriculum itself consists of the application of mediated teaching in conjunction with carefully constructed classroom curriculum units. Seven classroom units have been devised to enhance the development of specific groups of cognitive processes that are important to the ability to do academic learning. In order of their sequence in the school year, these units are as follows:
 - a) ***Self Regulation.*** Children learn to control their behaviour first in relation to external stimulus (ie. teachers' direction and prompting) then internal stimulus (self-regulation) and finally in a social context. Concepts of time are emphasized and children learn to plan and to relate activities in a temporal, logical sequence.
 - b) ***Quantitative Relations.*** Children learn basic concepts of number, one to one correspondence, ordinal and cardinal numbers, conservation and counting as a strategy for finding out how many.
 - c) ***Comparison.*** Children learn to compare objects, events on single then multiple dimensions, to compare in the face of irrelevant variations, and to use comparison spontaneously.
 - d) ***Role Taking.*** Children develop the ability and inclination to take different perspectives on physical tasks and then in social interaction.
 - e) ***Classification.*** Children learn to group according to essential similarity, to form classes and assign abstract labels, to identify by position within class, and to assign to multiple classes.
 - f) ***Seriation.*** Children acquire an understanding of relations and learn to sequence and approach tasks systematically. This includes projecting simple numerical patterns, projecting spatial patterns and projecting sequential patterns by relating events to foregoing and succeeding ones.
 - g) ***Distinctive Features.*** Children learn to identify letters of the alphabet by their distinctive features and then to generalise this understanding to other areas. Children thus learn discriminative behavior.

- 3 **Daily Activities.** This component is made up of the following activities throughout the day:
 - a) **Planning time.** Children participate in planning the day and learn to consider relevant factors in making schedules.
 - b) **Small Group.** Teaching of the curriculum units is concentrated in 15 to 20 minutes.
 - c) **Directed Free Choice.** Activities are chosen from learning centers around the room.
 - d) **Large Group Activities.** These are planned around teaching content areas, using cognitive functions that are formally taught in a small group, but including more children and emphasizing group interaction.
 - e) **Summary Time.** Children summarize what they learned, how they learned and how to apply it in new situations. (Refer to Appendix 1 on a Typical Classroom Schedule.)

- 4 **Behavior Management.** This component incorporates the cognitive approach and mediational teaching style into the training of teachers for behavior management. This is an important aspect of any education plan for children in groups and has to be consistent across all types of classroom activities. Teachers are taught to reduce undesirable behavior and to enhance desirable behavior through mediation of cognitive processes without the need for task-extrinsic rewards or punishment.

- 5 **Parent Participation.** This component's goal is to teach parents to be effective mediators of learning experiences for their children. Parents are urged to work as volunteers in the classroom once a week where they are instructed in mediation by parent educators. They are also provided with home activities especially designed to reinforce cognitive processes and principles that children have been taught in the classroom. In this way parent-workers "bridge" between the classroom and the home.

Supplementary Services. These services include considerations outside that can affect the progress of the children in cognitive development (eg. speech therapy or physical therapy). Staff personnel who provide such services are encouraged to attend the cognitive education training workshop so that they will be aware of the principles and methods of the cognitive curriculum model and will avoid techniques and conflict.

In addition to these formal components of the cognitive curriculum, program evaluation is essential, especially since one must constantly revise materials and methods in light of information gained from the children themselves. The cognitive curriculum for young children has been evaluated in several programs. Results so far suggest that its use is associated with gains in IQ, independent thinking, and motivation to learn. Classrooms based on the cognitive curriculum are demonstrably different from others.

Content and Process are taught together in the cognitive curriculum but the primary emphasis is on the development of cognitive processes. According to Goodroe (1987) content and process are believed to be interdependent aspects of learning. Children learn to think about the content information that is either experienced in the environment or presented by an adult. Mediation helps the children learn to process the environmental content that surrounds them. She believes that teaching content and process in combination is more effective than teaching either one. In fact, teaching young children to think is difficult, if not impossible, if these two aspects are not combined. This is because preschool children often lack numerous content areas in their knowledge base.

In all these curriculum components the common factor is the use of a mediational teaching style and the goal is to produce structural cognitive change in children. One of the keys to making process and content learning compatible is to make sure the day is carefully planned and planning is done in light of the cognitive focus of the day's activities. Teachers should first select the process or cognitive function to be taught each day and then structure the content in such a way that allows the cognitive function to be emphasized best. In addition to cognitive goals, this curriculum includes individualized educational programs in all developmental areas according to each child's needs (eg. language development, social-emotional development, fine and gross motor development and self help skills). Content and process learning should also be considered when formulating children's individualized educational programs.

The COGNET Research Project

Currently, there is a research project in the University of Tennessee establishing a network of professionals and parents who provide cognitive enrichment to children with the intent of helping them develop independent and effective learning behavior for school and home environments. The research is being implemented with children in kindergarten through grade three simultaneously. Basically COGNET provides a network of teachers and parents who work together to help children become independent learners.

Mediated Learning experiences are utilised to teach children how to learn. Naturally occurring situations are capitalized to emphasize the need for specific cognitive functions known as "Building Blocks of Thinking" and for independent learning known as "Tools of Independent Learning." Participating teachers continue to implement their regular instructional activities but overlay these with mediated learning experiences based on the COGNET curriculum materials. Participating parents reinforce the use of cognitive functions in problem solving situations within the home.

The COGNET Curriculum materials consists of 240 Mini Lesson Plans which provide suggestions for mediating each of the 18 Building Blocks and Tools as well as for connecting one to another. Each Mini Lesson Plan takes one to five minutes to implement. Children use the Building Blocks and Tools in four different types of learning activities:

- a) Initial Instruction
- b) Group Practice and Review
- c) Instructions for Independent Work

and d) Functional Living Skills

Teachers are free to select the activity in which they will implement each plan. The 18 Building Blocks of Thinking and Tools of Independent Learning are:

Building Blocks of Thinking

- Approach to Task
- Precision and Accuracy
- Space and Time Concepts
- Thought Integration
- Selective Attention
- Comparing Behavior
- Getting the Main Idea
- Connecting Events
- Working Memory
- Problem Identification

Tools of Independent Learning

- Inner Meaning
- Self Development
- Feeling of Competence
- Self Regulation
- Goal Directed Behavior
- Sharing Behavior
- Feeling of Challenge
- Awareness of Self Change

Some unique features of the COGNET Enrichment Program:

- emphasize how children learn - and what goes wrong when they have problems.
- provide teachers and parents with diagnostic information for determining the specific learning needs of their children.
- supplement any subject matter of parent's or teacher's choice.
- focus on adult/child interactions as the means for learning to learn.

The Singapore Setting

In 1991 the PREP Project Team of CDIS developed and designed an instructional package for kindergarten teachers to use. It is not certain if all pre-school centers are using the PREP materials but the package contains a rich source of activities and ideas for the teacher to integrate them into other aspects of classroom work.

The philosophy of the PREP package is based on several key ideas from child and language development (see Appendix 2 - Philosophy of the PREP package). The ideas are stated in very general terms without any specific cognitive emphasis. As stated in the manual, the package is designed to prepare children for entry into Primary 1 and to give them a good foundation in both English and the mother tongue. The Curriculum components have a academic and non-academic emphasis eg. language arts, vocabulary, mathematics, music and movement and indoor/outdoor play, values, parental involvement and learning centres.

One of the key features of the package as stated is "the emphasis on the learning of the target language and values across the curriculum in the academic and non-academic areas." (P2)

The package is child-centred and lesson content is based on common themes. This is encouraging as a child-centred approach tends to move more towards a cognitive emphasis especially if it is to cater to children from different home backgrounds. Ideas on how to organise learning centers are creative and varied and these complement well the numerous teaching strategies which are basically interactive and communicative in nature.

The PREP program on the whole presents a very good guide for kindergarten teachers. It is sufficiently flexible for the user to incorporate cognitive process goals into its structure. It is too early to measure the PREP program effectiveness but evaluation will form a vital part of its on-going revision and modification on an empirical basis.

In summary, this paper tries to look into the essential features of a cognitive curriculum appropriate for pre-schoolers. Two existing curricula have been described and current emphases in Singapore's early childhood education show promises of integrating and incorporating various cognitive processes and strategies into its pre-school programs.

References

- 1 The Cognitive Curriculum for Young Children (CCYC)
Office of Information Services
JFK Center. Peabody College. Vanderbilt University
Nashville TN 37203 USA
- 2 COGNET Project
243 Claxton Addition
University of Tennessee Knoxville
TN 37996 USA

APPENDIX 1

Classroom Schedule

A typical classroom day illustrates how these components are operationalized in the classroom. Although various curriculum components are stressed at different periods of the day, there is carry-over of all cognitive functions and content areas to all periods of the day. A sample schedule includes:

- 9:00 a.m. FREE PLAY - Children play indoors or outdoors and independently practice generalized social and cognitive skills. Teachers observe children's behavior.
- 9:15 a.m. SNACK - Snack is served. Teachers talk to children about how they feel, what they did at home the night before, and what they did at school yesterday. Teachers observe and note children's progress.
- 9:30 a.m. PLANNING TIME - All children and teachers talk about the sequence of activities planned for the day and about special topics and events that will happen on that day.
- 9:40 a.m. COGNITIVE SMALL GROUP - Children are divided into heterogeneous groups; each group includes four children. Four children work on a directed cognitive education activity with their teacher for 15 minutes, while the other groups work independently on conceptually related cognitive education activities. The groups switch for the second 15 minutes. The independent activities are planned and set up by teachers. (The COGNITIVE SMALL GROUP units are presented in the curriculum units section that follows this section.)
- 10:10 a.m. BATHROOM AND TRANSITION TO LARGE GROUP - Children are helped to regulate themselves in accordance with environmental changes.
- 10:30 a.m. LARGE GROUP - All children sit in a semicircle. The main goal for this period is to teach specific content areas while reinforcing the cognitive functions emphasized during a particular day. Large group includes about 5 minutes on an active focusing activity, 5 minutes on building a context for teaching the lesson that is meaningful for the children, 10 minutes on teaching the particular lesson within a problem-solving context, and 10 minutes on generalizing the lesson to other cognitive strategies, concepts, and affective functions.
- 11:00 a.m. FREE PLAY - Children play indoors or outdoors and independently practice generalized social and cognitive skills. Teachers observe and note individual child and group progress.

- 11:20 a.m. BATHROOM
- 11:30 a.m. STORY TIME - Children and teachers read stories together. Teachers emphasize the cognitive functions taught on a particular day and relate these to the different contexts presented in the stories.
- 11:45 a.m. PREPARING FOR LUNCH - Children wash hands and take turns setting the table. The cognitive functions needed in these activities are stressed and bridges are given by the teacher so that the children can relate these experiences to the other classroom lessons.
- 12:00 p.m. LUNCH - Children eat lunch in an environment that enhances communication between the teachers and the children and between the children and each other. Cognitive goals and skills in other developmental areas are enhanced.
- 12:20 p.m. BATHROOM AND TRANSITION - Children are helped to regulate their behavior in accordance with environmental changes.
- 12:30 p.m. DIRECTED FREE CHOICE - Children choose an activity from approximately 6 learning centers that focus on cognitive, affective, and other developmental goals. When children need explicit help in a particular developmental area, they are directed toward completing an activity in that area during this time period. Also during this time, teachers work with individual children on curriculum goals in which help is needed. Children move from one learning center to another and complete tasks in each center.
- 1:30 p.m. FREE PLAY - Children play on the playground or in the recreational area and independently practice generalized social and cognitive skills. Teachers observe and note individual and group progress.
- 1:45 p.m. SUMMARY TIME AND GOOD-BYE - Children and teachers review the day's activities. Teachers help children remember the sequence of these activities, and their relation to the children's home life and to the following school day.

PHILOSOPHY OF THE PACKAGE

The philosophy of the package is based on these key ideas:

Child development

emphasising the total child in areas of language, psychomotor, affective and cognitive skills

recognising that a five-year old needs to know about himself and that he is valued and appreciated for his individuality

respecting the active and responsible contribution of the child in the learning process

inculcating in the child positive Asian values to help him to become aware of the unique qualities of himself and others within a diverse cultural context

Language development

promoting a rich learning environment with much to do and discover in order to provide the child with choices and a large content base

recognising that children learn language most easily when it is whole, functional and meaningful. The focus is on the use of the language rather than about the language

affirming that language development should take place within the context of cooperative learning to help children develop social skills

The package is designed to prepare children for entry into Primary 1 and to give them a good foundation in both English and the mother tongue.