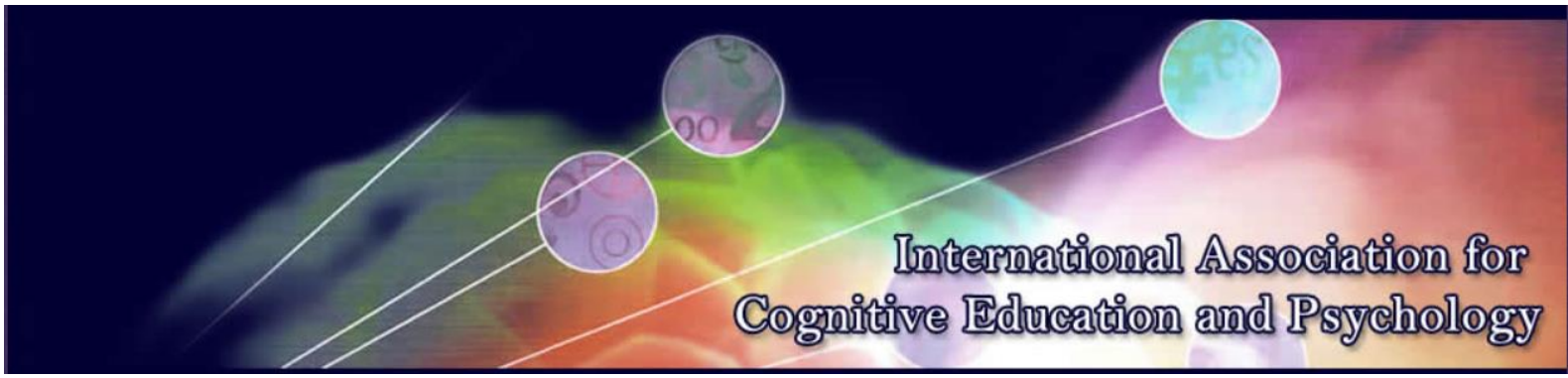

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Conference in Mexico a Great Success

The sixteenth biennial international conference of IACEP, held in Guadalajara, Mexico, from January 28 to January 31, was judged by the participants to be a great success. Registered conferees were from 17 countries, and various parts of the conference program were presented by speakers from Canada, The Czech Republic, Greece, India, Indonesia, Israel, Japan, Mexico, Nigeria, Puerto Rico, Slovakia, South Africa, Spain, and The United States of America.

A special issue of *The Thinking Teacher* featuring news from the conference is in preparation and will be posted in the next few days.

Advancing Cognitive Education in Africa

WP Wahl[1] *and Joanne Hardman*[2]

"Alone we can do so little; together we can do so much."

More than 100 years after Helen Keller became the first deaf-blind person to earn a Bachelor of Arts degree, her words still ring true, especially for scholars and practitioners focusing on cognitive education in Africa. Recent literature on the current challenges facing education in Africa makes it clear that collaborative efforts and innovative partnerships are vital to establish high impact educational practices. Thus, the current advancing of cognitive education in Africa is jointly led by two professional associations, namely the *International Association for Cognitive Education in Southern Africa* (IACESA) and the *International Society of Cultural-Historical Activity Research* (ISCAR). Both of these associations are closely connected with the *International Association for Cognitive Education and Psychology* (IACEP), through respective executive board members (one from each of these associations) serving on the IACEP executive committee. IACESA has provided a professional hub for scholars and practitioners for almost 25

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[2] University of Cape Town, South Africa; IACEP Secretary

years, focusing on cognitive education in Southern Africa. The establishment of this association at its inaugural conference at the University of the Witwatersrand (Johannesburg, South Africa) in 1994, stemmed from a need to consolidate different theoretical approaches focusing on cognitive education that emerged in South Africa during that time. What was at stake was that the field of cognitive education could have developed in an uncoordinated way, compromising its potentially positive impact on post-apartheid South Africa. While actively pursuing this goal ever since, IACESA also enables practitioners to compare and assess different strategies in order to make more effective interventions, often within very different environments. IACESA functions in close collaboration with the Cognitive Education Research Group at North-West University (South Africa) in order to anchor the praxis of cognitive education in Africa in rigorous research. After more than two decades this association has extended its impact into other African countries. In this regard the Nnamdi Azikiwe University, Awka State, has played an important role in initiating the advancement of cognitive education in Nigeria; a field that has not yet received active promotion in Nigeria. At the 14th Annual Conference of the Nigerian Society for Educational Psychologists (6-10 October 2014), a joint paper was delivered by Kingsley Chinaza Nwosu, Victor Nwanguma, and the former President of IACESA (and then Vice President for Africa of IACEP}, Mary Grosser. As regional representative of IACEP, the facilitation of a collective voice influencing the transformation of education in Africa remains an important objective of IACESA.

ISCAR, founded in 2002, brings together a diverse body of researchers whose work finds its foundations in the cultural-historical theory of Lev Vygotsky (1978), and, to a lesser degree the work of his collaborators Luria (1976) and Leontiev (1981). More recently, the research of Yrjo Engeström (1987) has informed a large body of work within ISCAR. Although a diverse body of researchers, those in ISCAR are united by a theoretical framework called Cultural Historical Activity Theory or CHAT. Vygotsky's notion of the importance of culture and history in learning/teaching and psychological development informs the focus on culture and history. This notion has been extended by Cole and Engeström (1991), who coined the acronym CHAT in order to describe a theory that incorporates both a Vygotskian focus on semiotic mediation in development and a focus on the importance of activity as central to development. While Vygotsky focused on the importance of language as the primary mediator of higher cognitive functioning, CHAT goes further and, in the work of Engeström, develops Vygotsky's work to include notions of division of labour, community, and rules as mediators of psychological activity. Human activity is conceived of here as multiple activity systems that interact with each other during the development of the system. In figure 1 below, we can see a graphic representation of a single activity system incorporating the dimensions of division of labour, rules and community as mediators.

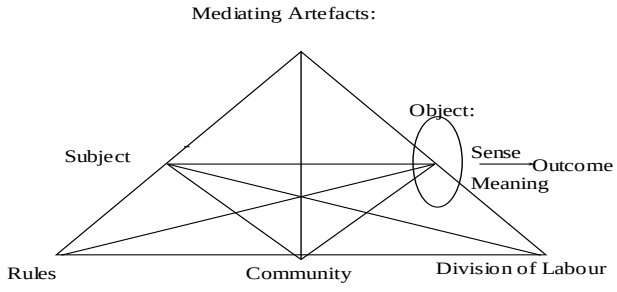

Figure 1. Activity system

While IACEP focuses predominantly on cognitive education, ISCAR broadens this to include work within and between organisations, conceived as systems in which learning happens through contradictions within and between systems that lead to change. Although there is a focus beyond pedagogy in ISCAR, many of its researchers focus specifically on teaching/learning in classrooms and this is where IACEP and ISCAR find complementarity. If we look at figure 1, for example, we can conceive of pedagogy as an activity system, with rules (such as putting up one's hand in the classroom), division of labour (teacher teaches, students learn) and a community whose members share a common object, e.g. students' learning of mathematics. The subject is the teacher who uses mediating artefacts such as language and a variety of tools such as a computer, for example, to work on and transform the object (moving children from not knowing mathematics to knowing mathematics). The outcome would be mathematically literate children. What this adds to the Vygotskian foundation, then, is a deeper picture of the social environment in which higher cognitive functions are developed. There is currently a vibrant, growing community of researchers in this field in Africa.

"Alone we can do so little; together we can do so much." Just like Helen Keller achieved educational excellence beyond her physical limitations, IACESA and ISCAR, together with IACEP, aim to push back the frontiers of cognitive education in Africa today.

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Cognitive Education in South Africa

An interview with Lilian Lomofsky- Educational Psychologist[3]

By Joanne Hardman

Lilian Lomofsky

Certainly, in South Africa, Lilian Lomofsky requires very little introduction in our field: She has been a driving force in cognitive education for decades, both as practitioner and teacher of practitioners. It was Lilian who introduced me to Feuerstein's *Instrumental Enrichment* and taught me how to

[3] Editor's note: This is the first in a series of columns devoted to individuals who are doing important work in cognitive education and/or cognitive assessment. Joanne Hardman has agreed to act as series editor. Suggestions for future articles should be sent to her: Joanne.Hardman@uct.ac.za.

use it in my university practice with pre-service teachers. Lilian and I sat down for a cup of tea and discussed her journey with cognitive education.

Background: Cognitive Education- An introduction

From 1994 – 2006 Lilian held a position as Senior Lecturer in the Department of Educational Psychology at University of the Western Cape, teaching and supervising pre-service and in-service teachers and educational psychologists. On retirement she devoted herself to her private practice. As an educational psychologist in private practice, Lilian has worked with cognitive education for well over three decades. In her practice, cognitive education, which develops executive functioning through mediated engagement with tasks designed by Feuerstein (1980), she aims to develop children's cognitive capacity. While definitions of executive functioning itself are not fixed, what can be agreed upon is that executive functioning is essential for self-regulation and metacognitive control and includes, among other things, working memory, attention, and perception. All these mental skills, localized in the pre-frontal cortex, are essential for success, both in school and outside of school. The strength of cognitive education lies in its mediated approach to instruction. The notion of mediation derives from the work of the Soviet psychologist Lev Vygotsky (1978) and refers to the structured guidance of a culturally more competent other (the practitioner in this instance) who works with a novice to develop his/her thinking skills. Underpinning this approach is the understanding that the brain is, essentially, plastic. Neuroplasticity refers to the brain's ability to change through specific inputs. What cognitive education does then, is to alter the brain through explicit mediation of cognitive capacities such as self-regulation, organizing, planning, and problem-solving. IQ thus is not fixed; rather, it can be modified and enhanced through cognitive education.

How did you come to cognitive education?

Initially a remedial teacher at a private school in Cape Town, Lilian found herself looking for more tools to develop children cognitively. While teaching, Lilian continued her studies in psychology. She was introduced to the notion of Instrumental Enrichment by colleagues in her field and decided to pursue courses in this field at the Feuerstein Institute in Israel and subsequently became a trainer in this methodology. After her training, Lilian found that her entire attitude to teaching and learning had changed. Consequently, on returning to the school, she implemented a cognitive education program over a period of 18 months, in the mornings before school started. Children who participated in this group were those whose teachers felt they could do better than they currently were doing in school. She noticed improvement across the cohort. Of particular interest to this article is the case study of twin boys who had been considered to be 'low functioning' by the school. Lilian worked with these children whose IQs were in the "borderline" range. Over a period of 15 months when retested, the WISC-R scores placed them well within the average range (Lomofsky and Green, 1990). Subsequently, these children matriculated with one achieving a pass and the other achieving a university pass. What this case study illustrates so well is the significant impact that cognitive education can have on cognition. After completing this program, Lilian returned full time to university to pursue her studies in educational psychology, taking with her the valuable insights into teaching and learning that she had gained both through her training and her practice. Upon qualifying as an educational psychologist, Lilian went on to practice, mentor, lecture and implement cognitive education programs in schools and universities.

What are some of the positive things you have taken out of cognitive education?

Lilian is not only a practitioner of cognitive education, but as noted earlier, also teaches practitioners and teachers how to use mediational strategies to improve their teaching. Over the decades that she has practiced with children, she has continually noticed improvements in executive functioning and self-concept among the children she works with. This is not the only positive insight she has had regarding cognitive education. In her work training teachers, Lilian has watched how teachers' entire approach to children's learning changes once they have completed training with her. Their motivation to teach increases as they implement what they have learned in their own classrooms. The impact this training has on developing teachers' motivation, especially in a country such as South Africa, which is plagued by serious educational deficiencies, cannot be overstated. In my own work, I am continually faced with teachers who have lost the motivation to teach and, indeed, many drop out of the profession. Hence, training that increases teacher motivation to teach and develop their learners is important in our context. Further, rather than seeing children as a group, teachers begin to see children as individuals and develop unique programs to suit individual learners' needs. Teachers move from rote-type teaching to more interactive teaching, even developing cognitive education programs for their learners. Implementing cognitive education in a context like South Africa is not without challenges, and Lilian certainly has faced a few of these!

What challenges have you faced implementing cognitive education in South Africa and how have you met these challenges?

One of the major challenges one faces when implementing something new in any context, is the ignorance one faces. People do not have a sense of what cognitive education is, or how it can assist them in teaching/learning and this leads to resistance to engage with the program. Another challenge that Lilian has faced is the curriculum in South Africa, which stipulates outcomes that are indeed in line with cognitive education but provides no pedagogical strategies for achieving these outcomes. Hence, teachers are not trained to mediate learning but rather, to cover the curriculum (see for example Hardman, 2008). Therefore, while prescribing outcomes, the curriculum does not indicate how these outcomes can be met. Convincing the Western Cape Education Department to implement cognitive education in schools continues to be a challenge that Lilian deals with.

TOPICAL SPECIAL ISSUES FEATURED IN JCEP; THREE IN PROGRESS

IACEP's official professional and scientific journal, the *Journal of Cognitive Education and Psychology* (JCEP), follows a strategy of publishing topical special issues as well as individual contributed articles. In the 16 volume years of the journal, 48 issues of JCEP have been published—three per year—and 17 of those have been topical special issues or sections. According to David Tzuriel, current editor of JCEP, these special issues offer both contributors and readers the opportunity to focus sharply on a defined area of content, giving cohesion to the work reported in the articles. Former editor Carl Haywood observed that some special issues have become supplemental texts for graduate courses—required reading.

Three special issues are currently under development, with at least the first planned for publication in 2018. Guest-edited by Matthew E. Poehner, the first of these addresses the topic *Dynamic Assessment of First and Second Language Development.* Authors are Poehner and Paolo Infante (Mediational processes in support of learner L2 writing development: Individual, peer, and group contexts), Juan Jose Navarro (Intervention-oriented assessment: Initial results from a computerized adaptive-

dynamic assessment battery of reading processes—ADPL-BAI), Lenka Krejcová (The theory of deficient cognitive functions in the context of specific learning difficulties), Mizuki Mazzotta and Diane Belcher (Affective outcomes of corrective feedback as mediation on second language Japanese writing). JCEP Editor Tzuriel observed that this issue contributes significantly to the field of dynamic assessment by focusing on subject matters and contents that are closely related to school learning. There is a "flavor" of universality as the research areas derive from different cultures. The topic is also featured in a symposium by these authors at the IACEP conference, January 28-31, 2018, in Guadalajara, Mexico.

The second special issue, planned for publication in March 2019, is guest-edited by Yuriy Karpov and Alex Kozulin and is entitled *The Vygotskian Approach to Instruction*. According to the guest editors, "The purpose of this special issue is to provide readers with examples of Vygotskian-based instructional programs and descriptions of their learning outcomes." Divided into two parts, the issue will address early education (preschool, primary) instruction programs developed within the Vygotsky-Zaporozhetz-Venger theoretical framework as well as instructional programs for elementary and secondary instruction developed within the Vygotsky-Galperin-Davydov-Talzina theoretical framework.

A third special issue, in an earlier stage of development, is to be devoted to issues related to research on cognitive education, such as the design of studies evaluating the effectiveness of cognitive education programs.

Topics addressed in previous special issues of JCEP are:

Cognition and Psychopathology (Volume 16, Number 1)

Classroom Composition Research (Volume 15, Number 2)

Cognitive Education and Creative Education (Volume 15, Number 1)

Inclusive Education (Vol. 14, No. 3)

University Student Learning (Vol. 14, No. 1)

Prospective Cognition in Education and Enculturation (Vol. 13, No. 2)

Cognition and Technology (Vol. 13, No. 1)

What is Cognitive Education? (Vol. 12, No. 1)

Research on Intellectual and Developmental Disabilities (Vol. 11, Nos. 1 and 2)

Culture and Cognition: Developmental Perspectives (Vol. 10, No. 1)

Processes in Learning and Memory: Assessment and Intervention (Vol. 8, No. 2)

Transculturality (Vol. 4, No. 3)

Current Concepts in Cognitive Development and Education (Vol. 4, No. 2)

Mediation (Special Section; Vol. 3, No. 1)

Cognitive Research in Mental Retardation (Vol. 2, No. 3)

Cognition Education in Schools (Vol. 1, No. 2)

Anyone who wishes to propose a topical issue of the journal should communicate with the editor, suggesting the topic, the scope of the issue, topics of individual papers and their authors, and a tentative schedule for preparation of the manuscripts. Instructors who wish to use an issue of JCEP as a text or required reading in a course (and secure copies of the requisite issue) may communicate directly with the publisher, Springer Publishing (see web site: www.ia-cep.org/journal).

ELEMENTS OF COGNITIVE EDUCATION FOR MENTALLY RETARDED PERSONS[4]

Jean-Louis Paour

Université de Provence, Aix-Marseille

Cognitive education is a timely strategy whose methods are found in special education classes, adult education, and even in industry. Under the joint influence of strong social pressures and an expanding market, cognitive education programs have multiplied. This abundance has a positive aspect: The general principles of cognitive education are infiltrating the education system, so we can hope that, in time, cognitive education will enrich the educational mainstream. The cognitive education programs that are available to us now have arisen out of practical and theoretical problems, but the basic concepts and principles that constitute their common denominator could revolutionize educational strategies.

Except for some few basic principles, cognitive education methods and programs represent an astonishing diversity. Such a wealth of instruments can help us to sharpen the interventions and to assure their continuation; nevertheless, it is unfortunate that this diversity does not rest on a clear body of theory (Paour, 1991b). In fact, the programs and materials of present cognitive education practices show great diversity both in theoretical concepts and in application strategies. Following are two examples of such heterogeneity.

A basic postulate of cognitive education is that problem solving depends strongly on relatively generalizable cognitive tools that can be called upon in extremely diverse situations. Thus, the primary objective of cognitive education would be acquisition and/or application of such cognitive tools. In this respect, cognitive education is clearly different from psychoeducational methods focused on the learning of specific behavior sequences. Thus, the question of *generalization* of acquired knowledge constitutes the keystone of all cognitive tools of problem solving. Except for programs based on Piagetian models, the authors of cognitive education programs have been strikingly nonspecific about what is meant by "basic cognitive tools." This is certainly true of *Instrumental Enrichment* (Feuerstein, Rand, Hoffman, & Miller, 1980). The list of "deficient cognitive functions" proposed by these authors is in serious need of re-analysis in order to distinguish the problems that arise from inadequacies in cognitive strategies, semantic concepts, and logico-mathematical schemas. It is actually possible to accomplish this task within the framework of *Instrumental Enrichment* (see, for example, the attempt of Lidz, 1987). For many other programs it is not possible to conduct this essential analysis, simply because the authors have not presented their concepts clearly and exposed them to scrutiny by others. Without such critical analysis, practitioners lack any clear sense of their objectives and of the adequacy of the methods used to reach them. From this perspective, we can decry the present explosion of instruments. In fact, many of them rest neither on a clearly specified theoretical base nor on effective, original, or properly tested practices. In reality they are derived, at best, from pedagogical intuitions that demand analysis at the psychoeducational level, and at worst constitute no more than "clones" of original instruments.

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[1] Reprinted from *The Thinking Teacher*, 1992, Volume VII, Number 2, by permission of the author.
Translated from the original French text by H. Carl Haywood

Different positions on the conduct of interventions constitute another example of unproductive heterogeneity. In fact, all the extant positions on learning and development are included among these positions, ranging from Piagetian constructivism to classical empiricism (represented by direct and systematic teaching of concepts and cognitive strategies). I am not arguing for reduction of this diversity in favor of any particular theoretical model. Heterogeneity is necessary, because it requires us to take account of the diversity of knowledge and the conditions under which it is acquired. Even so, we should insist that programs be located within a general theoretical framework that would allow practitioners of cognitive education to choose their instruments based on specific needs and to know what specific aspects of functioning and of development they are designed to address.

The heterogeneity in the field of cognitive education calls to mind similar heterogeneity among different concepts of the cognitive aspects of mental retardation: basic structural deficiency, developmental retardation, strategic and metacognitive deficiency, and deficiency in self-regulation processes, among others. Rather than being contradictory, each of these conceptual positions represents a valid facet of the cognitive dimension of mental retardation. The task, then, is to organize them within a common integrative framework that can help us to overcome their apparent contradictions and reveal more clearly their collective explanatory power, a task that I have recently tried to do (Paour, 1991a). Such a theoretical integration permits us to lay out some goals of cognitive education specific to the context of mental retardation. These goals could serve as well to organize the different approaches to cognitive education itself.

The conception of "intellectual deficiency" that I propose rests on the postulate that *cognitive functioning* constitutes the proximal determinant of mental retardation. Whatever distal or predisposing events there might be, cognitive functioning must be held as the direct and immediate cause of the development and maintenance of the psychological characteristics of mental retardation.

The cognitive functioning of retarded persons is characterized by two principal weaknesses. The first consists of limited basic abilities in information processing in the perceptual, memory, and energizing domains. An abundant literature shows that virtually all basic information processing functions, including processing speed, quantity of information treated, and depth of processing, are deficient in retarded persons. As important as it is, the primary functional limitation (in basic *abilities* of information processing) does not explain, by itself, the totality of mental retardation. We do not even know its exact contribution, because retarded persons also have trouble *mobilizing their already limited abilities.* This chronic *deficient functioning*, so characteristic of mental retardation, constitutes the second functional weakness. It is so important that it could constitute the essential determinant of mild retardation.

The functional limitations just described have two major developmental consequences. Once a retarded person has constructed conceptual knowledge, the concepts so constructed either do or do not retain the imprint of the functional conditions under which the knowledge was constructed.

The practice of cognitive education must distinguish among different types of cognitive knowledge that differ with respect to their nature, their use, and their means of acquisition. Two dimensions are particularly important: "declarative" versus "procedural" knowledge, and the degree of "logicity" of acquired knowledge. "Declarative" knowledge is the traditional concept of knowledge (*accumulation of learning* that may lead to understanding);

"procedural" knowledge is *know-how knowledge that permits one to apply knowledge* in the course of problem solving. Cognitive education pays special attention to the latter, the cognitive "know-how" whose function is to support problem solving, learning, and remembering. In addition to this distinction between declarative and procedural knowledge, we can also discriminate knowledge according to its degree of "logicity," that is, the extent to which the knowledge is *about reasoning processes*. Recalling the Piagetian distinction, one can thus conceive of knowledge, declarative as well as procedural, as having either an essentially *logico-mathematical* or an essentially *empirical* character. This double distinction can help us to understand the cognitive aspects of mental retardation. In fact, the structural and functional determinants of retardation have different effects on these different types of knowledge.

With respect to logico-mathematical knowledge, both declarative and procedural, mental retardation is seen essentially as a kind of fixation (either abnormally prolonged or specific to particular levels of organization). To use Piagetian descriptions, all persons must discover a logic that is external to them and that their actions, if they are normally efficient and dynamic, will permit them to test. When children, retarded or not, discover this logic, it becomes established and organized into stable procedural and conceptual knowledge. Once acquired, such knowledge is free of the conditions and the functional history of its acquisition. Although retarded persons take longer to discover this logic, when they succeed in doing so their understanding of it does not seem to be any different from that of nonretarded persons.

By contrast, when it is a question of knowledge that does not rely on logico-mathematical organization (for example, lexical knowledge), the situation is totally different. Its acquisition consists less in *discovery* of external logic than in the *construction* of a personal one. When, for example, pupils must learn a history lesson, what they learn is a joint function of previously acquired information and their personal efforts to assimilate the content of the lesson. But this effort of assimilation of content is not bound by an external logic that is imposed on the learners and that guides their learning. It is the pupils' own requirements as well as their learning know-how that guides them and that will lead them according to their preferences either to continue or to stop their learning activity. This is why knowledge that lacks a logico-mathematical character retains the imprint of the conditions under which it was acquired.

By taking account of the proposed distinction one can understand better that retarded persons are characterized by two different kinds of deficiencies: (a) a general slowing (retardation) of development, and (b) some gaps and incongruities or discrepancies in their empirical knowledge. Retardation of development means that retarded persons have the same operational competence as do nonretarded persons who are at the same level of logico-mathematical development, even though they might reach that developmental level less rapidly. Even though they have the same level lf operational competence, retarded persons, whose cognitive development is characterized by *gaps and incongruities*, have a less structured, and therefore less efficient, organization of empirical knowledge than do nonretarded persons at the same level of logico-mathematical development. This distinction allows us to reconcile the "retardation" and "difference" concepts and perhaps to offer a less simplistic view of mental retardation.

This distinction allows us also to adopt two different goals for cognitive education of retarded persons. The first goal is to construct logico-mathematical knowledge aimed at the acquisition of general conceptual schemes. Examples of work

in this area are studies within the framework of operatory learning that have been done with retarded children and adolescents in order to construct some theoretical and practical bases that could guide intervention efforts (Paour, 1979, 1992). Given the goal of helping subjects to discover an external logic, it would be a good idea to use intervention modes inspired by Piagetian constructivism, giving an essential role to the actions of the learners and to the induction of cognitive conflicts (Paour, 1990).

The second goal is to organize new and reorganize pre-existing empirical knowledge. Only weakly structured, such knowledge tends to be like tiny conceptual islands that are so insecurely linked to each other that it is only with great difficulty that they can be evoked and used for problem solving (Paour & Boulle, 19920. In this domain we have even less in the way of a theoretical guide. We do not know the conditions and the limits of the reorganization of lexical fields; we know even less regarding the most effective strategies for doing so. It is clear that one must take account of certain general conceptual schemes, such as classes, temporal frames, and spatial referents, that serve to organize empirical knowledge. It is just as necessary to take into account some procedural aspects of the organization of knowledge whose object is to support the derivation of relations and of personal organizations.

From this point of view, bearing in mind the importance that cognitive education places on cognitive strategies, we are in a better theoretical position. We do not have to restrict our view to programs of cognitive education in order to have a clear understanding of the nature of these cognitive strategies and especially of the determinants of their stability and of their spontaneous use. We should be aware as well of more sharply focused experimental research (to take the work of a single group, see, e.g., Borkowski, Estrada, Milstead, & Hale, 1989). Since we are dealing with knowledge that does not have a strongly logico-mathematical character, we are tempted often to adopt an instructive, directed teaching approach (Paour, 1990). Of course, the specificity of empirical knowledge requires that the intervenor be more directive in order to give learning opportunities and to propose or demonstrate learning processes (enabling subjects to know how to learn). One should not forget, however, that learners should, in the final analysis, invent their own organization and their own relations. Whereas it is more *convenient* to fall back on a directive method, it is generally more *effective* to search for the proper conditions to stimulate learners to formulate their own relations and organizations.

Up to this point I have held out two primary goals: induction of general (logico-mathematical) conceptual schemas (Goal 1) and reorganization of empirical (lexical) knowledge (Goal 2). This second goal suggests that it is necessary to acquire cognitive strategies, which constitutes Goal 3—to which we can attach help in the formation of metaknowledge (Goal 4) and the automatization of procedural knowledge (Goal 5). These three goas are especially important, since mental retardation is characterized by deficiency in the determinants of accessibility of knowledge, such as (a) the quality of the organization of lexical knowledge, (b) cognitive strategies of problem solving, memory, and learning, (c) metaknowledge, and (d) automatization of procedural knowledge. To be sure, it is on just such accessibility to their knowledge that gifted or expert learners are distinguished most clearly from “notmal’ or novice learners.

The formation of the determinants of accessibility is strongly dependent on motivational characteristics (see, e.g., Haywood & Switzky, 1986). Every time learners cannot rely on an external logic (the feeling of logical necessity that Piaget wrote about), the quality of their cognitive

functioning (problem solving, learning) depends still more strongly on their personal level of self-demand (Asselin de Beauville & Paour, 1992). According to this view, the noncognitive determinants (defensive and reactive personality characteristics) have a decisive influence on the control of cognitive functioning. The extra steps that learners choose to take, in addition to the immediate required responses, appear to be the basis of the construction of effective cognitive strategies, of the formation of metaknowledge, of an increasingly structured organization of lexical knowledge, and of the automatization of procedures. Some learners stop with success, while others want understanding. Some stop with the simple recitation of the lesson, while others look forward to the questioning that follows. Some are content with close approximations, while others seek mastery and even virtuosity. Clearly, the two groups make use of different cognitive tools (strategies and metaknowledge). The difference is effectiveness depends on the effort expended as a function of the degree of personal self-demand. Knowing that retarded persons are characterized by chronic deficient cognitive *functioning* (left to their own devices, they do a poor job of mobilizing their cognitive potential), we can understand their specific deficiency in this domain. I have suggested that the discrepancy (that grows with age) between logico-mathematical knowledge and empirical knowledge, on the one hand, and knowledge whose job it is to make other knowledge accessible, on the other, constitutes a potential source of premature arrest in the intellectual development of mentally retarded persons.

Given that the development of those events that determine the accessibility of knowledge is especially sensitive to motivational characteristics, the final goal (Goal 6) of cognitive education of retarded persons should be to re-orient their motivational systems. This goal is paramount, because in the long range it sets the conditions for the success of all cognitive education. Only a few cognitive educations programs acknowledge the need to enhance the development of intrinsic motivation.

We already know, partly through a series of studies that we have conducted in Aix-en-Provence, that one can contribute to the stable and generalized acquisition of logico-mathematical structures, even in moderately mentally retarded persons (for a recent summary of these studies, see Paour, 1992, and Paour & Soavi, 1992). These gains are accompanied by notable improvement in spontaneous cognitive functioning as reflected in tests that require solving of logic problems. Nevertheless, in spite of their significant gains, these (research) subjects continue to manifest the kind of deficient cognitive *functioning* that characterizes mental retardation. One is tempted to conclude that their motivational characteristics have not been transformed by this type of intervention. In fact, we do not yet know to what extent it is possible to modify the motivational characteristics of mentally retarded persons. Cognitive education programs rarely specify the precise relations between motivation and cognitive functioning, and are even more reticent on the conditions necessary for motivational re-orientation. There are, to be sure, some cognitive education programs in which development of intrinsic motivation (the motivation to process information and to learn for its own sake and as its own reward) is given an important place. One such program, *Bright Start* (Haywood, Brooks, & Burns, 1992) has been found recently to be associated with increases in both problem solving effectiveness and intrinsic motivation (Tzuriel & Kaniel, 1992).

My impression is that this question is usually approached in a roundabout way, with perhaps too much emphasis on enhancing the self concept. Such an objective is legitimate, but there is usually too little effort to relate self concept to actual cognitive effectiveness in problem solving

situations. It is not sufficient to convince subjects that they are capable; it is necessary, first and foremost, to help them to become actually competent. It is only through confirmation of effectiveness in socially meaningful situations that a solid positive self concept can be constructed. Experiences of mastery of different control processes is basic to development of an intrinsic motivational orientation. We know that mentally retarded persons are substantially deprived of this type of experience to the extent that, in conditions of spontaneous functioning, they are rarely I cognitive control situations. Placing retarded persons in such cognitive control situations constitutes my sixth goal for cognitive education.

Summary

Within this cognitive orientation, mental retardation can be conceptualized in two parts: (a) *limitations in basic abilities* in the perceptual, memory, and organizing domains, and (b) *chronic deficient cognitive functioning*. Through the processes of control of cognitive functioning, these two factors are responsible for three major developmental consequences: (a) slowing of development, (b) fixation of cognitive development, and (c) discrepancy between the development of knowledge and its accessibility. The joint action of these major components of retardation is sufficient to maintain it and, on the psychological level, accounts for the slow progress and ultimately the premature arrest of intellectual development. This convergence of major components results essentially from two functional linkages that extend the inertia of the system of deficient functioning. A chronic experiential deficiency in mastery of control processes leads to reinforcement of negative affective and motivational determinants that are responsible for the weaknesses of the control processes. Chronic deficient functioning tends, on the other hand, to increase the importance of discrepancies between knowledge and one's ability to mobilize that knowledge and apply it effectively.

This conception suggests three compelling aspects of mental retardation that any cognitive education program must address. The first is the stability of some possible limitations of basic abilities. The second is the durability of personal characteristics responsible for the weakness of normative control. The third is a discrepancy between acquired knowledge and variables that control the application of that knowledge. This latter group includes inadequate organization of knowledge, the lack, poverty, and weak use of cognitive strategies, lesser development of metacognitive knowledge, and inadequate automatization of cognitive skills. By emphasizing the six goals outlined in this paper, it would be possible to organize a theoretically and practically consistent cognitive education for mentally retarded persons that is focused on their principal cognitive characteristics. These goals of cognitive education are:

1. Construct logico-mathematical knowledge aimed at the acquisition of general conceptual schemes.
2. Organize and re-organize empirical knowledge.
3. Acquire cognitive strategies.
4. Help in the formation of metaknowledge.
5. Automatize procedural knowledge.
6. Re-orient motivational systems.

We already know that it is possible to help retarded persons to reach a high level of logical reasoning (Paour, 1992). We know also that one can get them to acquire effective cognitive strategies (Borkowski et al., 1989). If such attempts at cognitive education with retarded children and adolescents can be shown to be relatively effective, they can sometimes produce lasting changes in spontaneous cognitive functioning, with the following stipulations. After having acceded to a higher stage of logico-mathematical reasoning, retarded persons need

additional help in maintaining and generalizing that strategy. As Haywood (1992) has emphasized, the essential problem is a motivational one, for it is the motivational aspect that determines in any lasting way the quality of spontaneous cognitive function. To what extent, and under what conditions, it is possible to modify motivational orientation and other "non-intellective" individual differences variables must remain questions for the future.

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