

YOUNG CHILDREN'S "CONCRETE THINKING":
A CRITICAL ANALYSIS AND AN EXAMINATION
OF CURRICULUM IMPLICATIONS

by

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Young Children's "Concrete Thinking" : a Critical Analysis and an

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ABSTRACT

Young Children's "Concrete Thinking":
A critical analysis and an examination
of curriculum implications.

This thesis focuses on what has become a largely uncontested assumption--that young children are "concrete thinkers". I document the pervasiveness of the assumption, particularly in major curriculum documents that influence teaching, and analyze what is meant by the claim in the contexts in which it appears. I show that the claim about children's "concrete thinking" appeared early in this century as a contested theoretical position, and during this century has become accepted as a simple, largely unquestioned truth.

I expose the main theoretical supports for the claim particularly in the works of John Dewey, Jean Piaget, and Jerome Bruner, and show that their sophisticated ideas have commonly been oversimplified and distorted in the process of being used to support particular educational practices. While my central focus is not on the theories themselves but on the way inferences from them have been applied in education, I will show that the main features of their theories which provide support for

the conception of the young child as a "concrete thinker" have been subjected to increasing and persuasive criticism. I try to make clear that the largely uncontested claim about "concreteness" is not as secure as is commonly assumed.

Alternative theories that support a view of children's thinking that conflicts with the dominant view are examined, and shown to be coherent with a range of data that are discrepant with the dominant theories. In particular I will show that young children routinely engage in "abstract thinking".

Drawing on published studies, and on a study conducted as a part of this thesis, I test the claims about whether young children commonly think in a manner which can be considered in any sense "concrete". I expose a range of data that are inconsistent with the dominant view of children being constrained to forms of "concrete thinking".

I consider the implications of my findings for the curriculum, in particular in focusing on the kinds of teaching and curricula that become accessible if we recognize that young children are competent users of "abstract" forms of thought.

DEDICATION

To Susana, Francisco and Clara,
my children.

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INTRODUCTION

Reflection on Practice and Questioning of the Theory

The modes whereby children do understand and learn have always intrigued me as a professional. Why do children find some topics easy and have trouble dealing with others? How do they make sense of what is presented to them in school curricula? Which teaching practices are more appropriate to their ways of integrating knowledge and attributing meaning to reality? Resolving this kind of issues will certainly be critical for succeeding in educating children and in promoting their school achievement. While we have no undisputed answers to these questions, curriculum planners for early education during the last quarter century have nevertheless worked with a number of assumed answers--inevitably, of course, or else nothing could go forward. But what has emerged is a somewhat stereotypical representation of the child as thinker and learner, that is now often so taken for granted that it is rarely questioned. This stereotypical representation is associated with the concept of the child as a "concrete thinker", largely based upon the constructs

of developmental psychology, and reinforced by progressivist views on education.

In my early quest for a better adjustment of curriculum and teaching to the modes of understanding characteristic of young children, I found myself acknowledging that developmental theories, particularly that of Jean Piaget, provided a significant support to avoid some maladjustments of early schooling curricula that resulted mainly from a lack of consideration of the qualitative features of children's ways of thinking. Such developmental theories appeared important to me insofar as they called attention to the fact that children reason and understand the world, internalize information and make sense of it differently from adults--as "concrete thinkers", in Piaget's terms. (Roldão, 1987a, 1987b). Nevertheless, this theoretical frame proved soon insufficient and even inadequate to explain many of the reactions, questions, modes of reasoning and behaviors that I observed in children in my daily teaching and in the classes of the teachers I worked with as their supervisor. I have then been moved to engage in further investigation in order to get a clearer and more complete perception of the modes of learning and creating meaning of young children.

Throughout my experiences as a participant in various national curriculum reforms in Portugal (1975, 1980, 1989) based on the underlying perception of the child as a concrete thinker, I was increasingly led to question whether the developmental description of the concrete thinker did adequately reflect reality as perceived in actual classroom situations and if the interpretation it was given in curricula and in teaching was even less adequate to portray children's thinking.

The expected improvement in students' achievement as a result of curricula centered on local environment issues, direct observation and concrete experience, was never significant, according to both the statistical distribution of grades and the qualitative assessment of students' performance reported by teachers.

These curricula and recommended teaching practices have been typically associated with the assumption of the limitation of the child to the realm of concrete realities and facts and with the dependence of their thinking upon prior observation and experience. They gave rise, consequently, to a systematic avoidance of topics and areas--such as, for example, history or the study of distant peoples and regions--that, in my view, might easily

engage children's minds and enrich their education.

The belief in the concreteness of children's thinking, along with some benefits related, for example, to the simplification of some topics, has apparently led to a considerable limitation and impoverishing of the educational resources offered to them. Curricula based on the assumption of the concreteness of children's thinking have been, in fact, predominantly made up of local content, empiricist approaches and "hands-on" activities.

The Problem to Be Studied

The problem I intend to discuss in the present study is thus the appropriateness of the conception of the child as a concrete thinker, as it appears implied in the majority of existing curricula for early schooling, and the adequacy of the educational implications of such an assumption. This problem has obvious and significant implications in a number of central concerns of schools and educators of today, since the efficiency of teaching and schooling depends largely upon gaining a clearer understanding of how do children think and learn.

Curriculum planning is not, in my view, simply a matter

of logical organization of ends and means or of a hierarchical sequence of content and skills. Neither is it a mere response to the pressures of particular times and societies, no matter how important all these elements might be. Curriculum is basically a tool designed to implement an educational project aimed at producing what, at a given time and society, is generally conceived of as educated people. Such a tool has then to be critically examined in its conceptual foundations and constantly improved in its appropriateness to gain a better attainment of the intended educational aims. Curricula based upon undisputed and acritically accepted presuppositions (such as the child as a concrete thinker) are certainly different from curricula built upon critical examination of current and alternative or complementary theoretical conceptions. It will, in my view, make a significant difference in terms of the respective educational outcomes.

It is worth noting that a problem like the one I am undertaking in this study--the appropriateness of a concept that has been and remains largely taken for granted as a support for curriculum and teaching--reflects the lack of autonomy of educational research and theory in the face of the dominance of other academic disciplines, such as

Psychology or Sociology, that have shaped many of the currently dominant concepts in education. The discussion of problems such as, for example, students' failure to achieve the objectives of early schooling, has been predominantly studied in sociological terms, undervaluing the role of school, curriculum and teaching. The debate on the adequacy of curricula to students (which is my major concern in this work) has, in turn, moved predominantly to the field of developmental psychology. The problems involved in the direct transfer of sociological or psychological justifications to respond to educational questions have been rarely taken into account.

The present investigation intends to locate the analysis and discussion of the concept and of its implications within an educational perspective.

The study of a problem like the one I am engaged in risks, however, to be perceived as a psychological adventure--which is not the case. There is no intention to develop any alternative psychological theorizing on children's thinking but, instead, to investigate the problem described above as an educational question to be researched within the field of education. It could also appear as the defense on my particular beliefs about

children's modes of thinking. In fact, I pursue a quite different aim. Having noticed how little teachers actually know about children's thinking, and how strongly educational stereotypes have been shaping curricula and teachers' representations, I am interested in developing myself, and encouraging in the educational community, a critical attitude toward established beliefs about children as learners. Such unexamined beliefs have, in my view, frequently resulted in a lower quality of education and in an impoverishing of students' learning.

This purpose can must be pursued through philosophical and empirical research, by means of critical analysis and constant reexamination of educational concepts and derived practices. My major concern is thus to gain a clearer, more comprehensive and better supported view of the child as a thinker and a learner, that will, in turn, be open to critical reexamination in future research and theory. I do believe that such a permanent questioning attitude is central to improve education and curriculum. It will also contribute, I hope, to strenghten the autonomy of educational theorizing.

Nature of the Study, Research Questions
and Methodological Frame of Reference

The present work can be described as a theoretical study centered on the critical analysis of the predominant concept of the child as a concrete thinker, insofar as such an educational conception strongly shapes--and has shaped for decades--existing curricula and teaching practices. The appropriateness of the concept has obvious consequences for the quality and adequacy of curricula and teaching to learners.

The questions that will direct the present study can be summarized as follows:

- What theoretical limitations can be found in the conception of the child as a concrete thinker in light of criticisms of developmental psychology, and of alternative views about children's thinking contributed by other disciplines, such as anthropology and linguistics?

- Does the current description of the child as a concrete thinker, largely predominant in curriculum documents and recommendations for practice, characterize properly children's modes of understanding as they can be inferred from the observation of their talking, behavior,

questions and reactions?

It is expected that the present work will provide a critical examination of a paradigmatic concept that has so far remained almost unquestioned in curriculum research and has seriously affected the quality of early schooling curricula. The conclusions that will result from such an analysis will certainly have implications for curriculum planning and implementation as well as for teachers' education with respect to the whole perception of the potential of children as learners.

The methodology of the study is centered on a conceptual analysis, through the critical examination of existing curricula and the discussion of significant literature related to the concept.

Some empirical data were also examined in a section of the study, since the reflective examination of an educational concept implies also the critical consideration of empirical observations. Two sets of empirical data were then collected from (1) reports found in educational research literature and (2) direct observation of a classroom during a period of five weeks. These data are presented and discussed in order to document the theoretical analysis by offering, or not, disconfirming

evidence about the concept of the child as a concrete thinker. An interpretive-qualitative orientation has been followed in this search. (Soltis, 1984; Miles and Huberman, 1984; Sherman and Webb, 1988).

Organization of the Study

A dialectic tension between theory and practice informs the whole study: starting from a reflective analysis of curricula and practice, it moves to the clarification and debate of dominant and alternative theoretical views, and then again to comparing empirical observation of practice to the theories under examination.

The syntax of the study may, then, be summarized as follows:

Identification level:

1 - the concept as it appears in curricula and teachers' practice and representations.

2 - identification of theoretical sources implied in the concept and modes of their inter-influences.

Critical analysis level:

1 - Discussion of criticisms of the theoretical sources.

2 - Discussion of alternative views about the child as a thinker.

3 - Discussion of empirical data in face of the theoretical discussion of the concept.

Theorizing level:

1 - Contributes to the reconstruction of the concept of the child as a thinker and a learner.

2 - Implications for curriculum.

According to the above schema, the thesis is organized in six chapters, as follows, which may be briefly described by stating the central question each addresses:

Chapter One - How is the presence and influence of the representation of the child as a concrete thinker identifiable in curriculum documents and teachers' discourse?

Chapter Two - What are the major theoretical views underlying this conception? How have these theories been translated, reinterpreted and inter-influential in curriculum and teaching?

Chapter Three - What are the major critiques of the theoretical conceptions that have been identified above that are relevant in educational terms?

Chapter Four - Which alternative or complementary

theoretical conceptions contribute to a more comprehensive and realistic conception of children's thinking?

Chapter Five - Which discrepancies can be identified in actual children's behaviors and talking, observed in several settings, when compared to the prevalent theoretical views about their limitations as concrete thinkers?

Chapter Six - What conclusions and implications for education can be derived from the study?

CHAPTER ONE

The Curriculum for the Concrete Thinker

An examination of curriculum documents for Elementary Education both in North America and in Europe reveals a dominant perception of children as "concrete thinkers" whose intellectual abilities are consequently limited to the range of actually available experience. Such a conception seems to be also currently accepted by teachers in their practice. My first purpose is to document this predominant conception in order to establish the basis for its subsequent analysis and discussion.

It appears to be commonly assumed that young children reason in concrete terms which, within the context of curriculum documents, means basically that: (1) their mental power operates primarily on practical and observable facts and situations; (2) actual experience and direct observation are necessarily prior to any reflective process; (3) abstract concepts and hypothetical-deductive modes of reasoning correspond to higher levels of thinking only reachable at further stages of the child's development. From these assumptions it follows that children's cognitive abilities, lacking the power of

reasoning in hypothetical and abstract terms, evolve from experience-based perceptions to the abstractions of concepts, relations, rules. Early educational activities based upon direct observation, concrete experience, empirical inquiry, are then recommended as the best ways to correspond to this claimed progression.

The very definition of thinking and reasoning, concrete and abstract, being controversial among philosophers, psychologists and educators, the concept of "concrete thinking" as used in educational contexts thus needs a careful analysis. This requires, first, a description of the common use of this term and identifying the meaning associated with it in the discourse of the curriculum documents; second, developing a critical analysis of the consistency and coherence of such a concept in relation to its claimed theoretical supports and in face of alternative theories and discrepant empirical observations; and, finally, discussing the appropriateness of its implications for educational practices and beliefs:

What constitutes conceptual analysis is a thorough, precise, and detailed unpacking or explication of a concept (i.e. general idea or unifying principle), which nine times out of ten will mean a more detailed exploration of one particular usage of a word . . . Conceptual analysis begins, can only begin, when you know the meaning of the word in the sense of having a verbal definition such as the

dictionary may give, but do not fully grasp the significance and implications of that definition. (Barrow, 1981, p.9)

A more detailed clarification and theoretical contextualization of the concept of concrete thinking in educational and curricular thought will be given in Chapter Two. For the purposes of the present chapter the meaning of the concept of concrete thinking will be explored in and inferred from current curriculum texts in order to provide a description which will be the basis for the later critical examination of the concept.

The Discourse of the Curriculum Documents

A set of curriculum documents were examined in detail and have provided convincing evidence of the persistent underlying representation of the child as a "concrete thinker".

Since this study is developed in the context of the Portuguese educational system, the Portuguese Programs for Elementary School (Portugal, 1980, 1990; hereafter PPES, 1980; PPES, 1990) and the Recommendations for Pre-School Activities (Portugal, 1980; hereafter RPSA) will be particularly focussed on to illustrate the conception of children's thinking implied in those documents. In

addition, other curriculum documents will be referred to as a means for comparing perceptions of children's modes of thinking within curricula from different countries and various educational environments: the British Columbia Primary Program (Canada, 1989; hereafter BCPP), the History-Social Science Framework for California Public Schools (U.S.A., 1988; hereafter HSSF) and Matières et Programmes pour l'Enseignement Primaire (Belgium, 1985; hereafter MPEP). Recommendations for pre-school activities in Belgium (Programme des Activités, Belgique, 1985, hereafter PA) and official documents of the Reform of the Educational System in Spain (Libro Blanco Para la Reforma del Sistema Educativo, Ministerio de Educacion y Ciencia, Madrid, 1989; hereafter LB) will also be considered.¹

The examination of the documents will be summarized focussing on the dominant perceptions of the concept under discussion--concrete thinking--implying its articulation with the corresponding perception of abstract thinking. The selected quotations are presented as illustrative of predominant and recurrent aspects of the concept identified throughout the documents.

It should be noted at the outset that the view of the child's modes of thinking in curriculum documents for

elementary school and pre-school appears persistently associated with a developmentalist perspective and is frequently expressed through the terminology of psychologists. The term "concrete" itself is borrowed from the developmental vocabulary although increasingly used without explicitly referring to its main theoretical origin and conceptualization.

The description of children's concrete modes of thinking is therefore assumed to be predominantly supported by developmental psychology, particularly by the research and theorizing of Jean Piaget which is sometimes explicitly referenced, but which is more often implied in statements and principles presented as apparently uncontroversial. The work of Piaget on children's intelligence and cognitive development, having called attention to the fact that the mind operates differently at several stages of an individual's growth, provided a theoretical framework for the description of the development of thinking through a stable sequence of cognitive stages. It is frequently claimed--not only by critics but also by supporters--that Piaget's theory and research have been misinterpreted and distorted when translated into curricula and educational practices (Flavell, 1978; Elkind, 1981; Duckworth, 1979;

1991). It is therefore necessary to highlight the alleged misinterpretations without discarding, however, the critical examination of the theory itself with respect to its educational implications.

Piagetian theory became influential all over the Western world mainly during and after the 1950s until the present time. In Portugal this influence was particularly relevant after the 1960s, given the specific political and educational experience of the country before that time.² The developmentalist orientation was generally absent in previous Portuguese programs. Curriculum documents used to be more like lists of content topics with little consideration given to the qualitative changes of the processes of thinking throughout childhood and youth.³ It should be noted at this point that European curricula in general were traditionally dominated by a "syllabus" orientation, differently from the North American idea of curriculum development that has more recently become influential in Europe too.

Developmental theories have been in many aspects criticized, reexamined and reformulated during the last two decades (Donaldson, 1982, 1983, 1989; Egan, 1983, 1988, 1990; Hughes, 1983; Sugarman, 1988).⁴ Nevertheless,

those criticisms have not emerged in the dominant curriculum discourse, which remained seemingly unchanged with respect to the characterisation of children's modes of thinking. Piagetian descriptions of the pre-operational and concrete-operational stages underlie the majority of assumptions of curriculum documents for pre-school and elementary school. No significant changes or adjustments of such descriptions are identifiable in the more recent curriculum reforms. (e.g. BCPP, 1989; PPES, 1990).

Other influential theories in education and curriculum have, in various ways, contributed to justify or to reinforce the perception of the child as a concrete thinker, namely the Progressivist conceptions of active learning associated with concrete experience (Dewey, 1963, 1964, 1966) and the claims of the Academic Reform Movement (Bruner, 1960, 1965a, 1965b) about the translation of scientific methods and structures into teaching and learning activities. The discussion of the interactions and connections among those theoretically diverse perspectives when translated into curriculum and practices will be developed in Chapter Two. They are referred to here briefly in order to characterize the perceptions of children's modes of thinking described in the curriculum

documents.

In the documents analyzed, we can identify the perception of children's mode of thinking as essentially "concrete"--taking that concept in terms of the definition at the beginning of this Chapter--at different levels of the curriculum discourse:

1. embodied in the sections related to general educational principles and goals;
2. implicit within the content, organization and methods of some particular areas such as Social Studies and Science;
3. supporting the recommendations for practice.

Principles and Goals

In the in majority of curriculum documents analyzed the perception of the child as a concrete thinker does not appear explicitly stated in their articulation of aims and educational perspectives. The explicit reference to the concreteness of children's thinking typically emerges as a justification for selecting and organizing content in a particular framework and for prescribing particular practices. Such references are, however, presented as a natural consequence of the perspective of education defined

in the general principles and goals which closely and persistently link education and development. All the sections on principles and goals in the documents examined refer to education essentially as the promotion of development in every dimension of a human being--cognitive, physical, affective, social, moral--as documented in the following examination of those documents. Organization and sequence of topics and recommended strategies in curriculum documents for elementary school are thus assumed to be supported by the nature and pace of that mostly cognitive development, as described in developmental psychology. The nature of that connection is not, however, clearly explained or analyzed.

When defining general principles and aims for pre-school and elementary school, curriculum documents typically refer to the progression of learning aimed at by education as a process of growth. "Continuous growth" is assumed in BCPP as one of the Position Statements that delineate the major intents of that Program. It is defined as "the ongoing process of increasing the learners' knowledge of themselves and their world" (BCPP, p.8). The general educational aim of promoting development in every domain can be identified in PPES (1990) associated with an

expanding perspective which emphasizes the necessity of starting from local topics:

[the Program is intended] to ensure the students' harmonious development of physical-motor, cognitive, affective, social and moral domains. . . attributing a prominent role to those activities intending to promote the discovery of their social and natural environment. (PPES, 1990, pp 5,6).

The Belgian Program exhibits a similar perspective, emphasizing a claimed general agreement about a developmentalist orientation for education

There is a consensus about the aim of education: the optimal and global development of the individual, of each individual, in the intellectual, social, affective, physical, aesthetical and moral dimensions. (MPEP, p.7; my emphasis)

The Spanish document (LB, 1989) points out that elementary education should not limit its aims to the academic field, promoting instead "wide educational goals that will refer to the whole personality of the child" and specifically "to the integral development of the individual and the promotion of autonomy and personal and social identity" (LB, p.109).

The description of children's concrete mode of thinking appears in curriculum documents as related to the above perception of development as the major aim for education.

Such an association between the description of development or growth and the very definition of education requires some examination. The terms development and growth, though not in fact synonymous, frequently appear as interchangeable in curriculum writing. The overlapping of the two concepts in curriculum texts seems to indicate a connotation of "development" with a natural process-- "growth"--that should be merely facilitated by education. "Promoting development" appears to be the more current and consensual claim in curriculum documents. Such a statement embodies, however, some kind of contradiction, since assuming development as natural growth, there is little place for promoting it, except if one conceives promoting as synonymous with accelerating or facilitating a process whose direction is pre-established. There is worth noting at this point the distinction between a transitive and an intransitive version of the idea of "promoting development": curriculum documents typically refer to an intransitive development when claiming that education aims at promoting and facilitating the natural development of children's abilities. It seems quite more appropriate, in educational terms, to speak transitively of "promoting the development of such and such capacities, understandings or

competences".

Moreover, it is also claimed that development to be promoted by education will consider every dimension of the person, including moral and social ones. Value options and social constraints are, however, always implied in social or moral dimensions of human development. Moral and social aspects of development are seemingly hard to promote as a mere facilitation of an allegedly "natural" process of growth.

"Education as growth" is a metaphorical way of describing the educational process which was coined by Dewey (1966) early in this century and is also current in developmental psychology vocabulary. Discussing the uses and the risks of metaphors in educational discourse, Isaac Scheffler (1960) called attention to the fact that metaphorical statements indicate that "there is an important analogy between two things, without saying explicitly in what the analogy consists" (Scheffler, 1960, p.48). Under the apparent agreement about the central meaning, metaphors always allow for many different interpretations. Sometimes the interpretations that result from more literal translations of the metaphoric image become dominant as appears to be the case when the

curriculum documents assimilate education to the mere promotion and support of a spontaneous process of growth or development. It is uncontroversial that becoming educated implies growing in understanding and experience. The definition of the functions of education as simply supporting and adjusting to a supposed "natural" growth over-extends, however, the meaning of the metaphor in a specific direction which is highly debatable. If there is agreement on the interaction between education and growth, it is still contentious whether education plays a central role in fostering and directing that growth, perhaps even determining what changes will count as "growth", or is taken as a mere facilitator of a natural process as some developmentalists tend to suggest.

The assumption of a developmental perspective in the education of young children is also stated in the Recommendations for Pre-School Activities in Portugal. The legal documents establish as the first aim for pre-school "to provide the conditions required to foster the harmonious and global development of the children" (Bill 542/79, 1979). Such a development is described as "harmonious" when following the sequence of stages described in developmentalist literature. This same

orientation is restated and reinforced in the Recommendations for Activities that are consistent with the description of each stage (RPSA, pp.13-24). The Belgian Program of Activities emphasizes "children's right to an harmonious development" and the need for pre-school "to respond to their demand for action which will provide them with the means for knowing and understanding the world" (PA, p.7). It is interesting to note that the suggestions of activities for the pre-school level generally enhance the importance of the affective domain and the development of expressive abilities, differently from the curricula for grades 1-4 (ages 6-10) where the focus shifts to the development of cognitive processes and social skills. The shift to an increasing emphasis on cognition is apparently associated with the Piagetian sequence pre-operational/concrete operational thought, implying an increasing dominance of logical activity over other mental processes such as imaginative ones and those integrating emotional and affective elements.

Content and Methods

The areas of Social Studies and Science exhibit in a

more explicit way the assumption of the concreteness of children's modes of thinking, given the nature of their subject-matters. Nevertheless, the discourse of other areas, such as Math and Language Arts, persistently reinforces the same principles. This orientation can be found in Science and Social Studies curricula both in the structure and organization of content and in the methodological recommendations for practice. The assumption of a complete and natural dependence of children's thinking on concrete and empirically observable reality is, however, particularly evident in Social Studies with respect to the content, and in Science with respect to the methods.

The concreteness principle is particularly emphasized in the predominant organization of Social Studies that has, in the last four decades, persistently followed the progression currently referred to as the "expanding horizons" orientation. It is usually perceived as a gradual enlargement of areas and processes of study according to a logic of unidirectional progression: from the local to the distant, from the self to others, from the family to community, from concrete experience and direct observation to reflective analysis. This frame of

organizing the content implies the presupposition that young children better understand the concrete, observable reality and can only reason based on actual experiences. The topics are consequently organized from the known to the unknown, from the familiar to the unfamiliar, "known" and "familiar" being usually assimilated to those facts, people or events that are physically closer to the child and directly accessible in the actual environment.

"Expanding horizons" is again a metaphor apparently adequate for education. The very act of educating children implies in fact the aim of expanding their horizons, in terms of enlarging and deepening their experiences and their knowledge and understanding of the world, of themselves and of their relations with the others. Nevertheless the current interpretation of such a metaphor in curricula for Social Studies, as described above, is denied by current empirical observation. Many teachers I have worked with throughout my professional life, when describing their experiences, often point out that children do not readily engage in local topics and prefer distant ones, or that providing information and abstract frames of interpretation prior to concrete experiences is in many cases more helpful for children to understand reality than

starting necessarily from their actual observations. Such reflections from practitioners have, however, remained apparently unexamined by curriculum reformers. Criticisms of the limitations of the developmentalist perspectives-- that are taken, in this work, as referring to the classical Piagetian conceptions--, systematically developed in research and in theory, particularly in the last 20 years, and descriptions of children's behaviours and interests which are not explained within that particular frame of analysis do not seem to have been taken into account either (Mathews, 1980, 1985; Paley, 1981; Egan, 1986).

Curriculum documents from different countries exhibit a common expanding orientation in Social Studies based on the presupposition of the concreteness and consequent limitation of children's thinking abilities to the realm of observable reality. The BCPP recommends the same expanding organization of content which has been traditionally used, with slight changes, as the dominant frame for Social Studies in North American curricula from the beginnings of this century till the present time:

. . . [Social Studies] learning experiences provide the child with opportunities to demonstrate knowledge and understanding of themselves, their community and Canada; gain understanding of the following concepts; identity, characteristics,

needs, interactions, change, interdependence, roles, rights and responsibilities of the individual, family, neighbourhood, province, and nation. (BCPP, pp. 143,144; my emphases)

The area of Study of the Environment in PPES (1990), which integrates Social Studies and Science, also presents an expanding organization of the content under the following sequence of topics: discovering the self, discovering the others and the institutions, discovering the environment, discovering interactions between nature and society. There are thus two directions for expanding the content implied in the curriculum presupposition of children's concrete mode of understanding reality : from the self to others, from the closer to distant in time and space. In both cases what is seriously questionable is the accuracy of such an interpretation of the progression of knowing. In fact, the self is probably the very last object of one's understanding that evolves throughout our lifespan, through a variety of complex interactions with others and testing self representations. Also local and familiar objects do not typically awake one's curiosity, simply as a result of their familiarity to the knower. Curriculum planners' preconceived developmental framework seems then to operate as an artificial organizer of the actual processes of thinking of children instead of

reflecting them.

In addition to the overall expanding organisation of content, some topics allegedly distant from the child's experience and interests (e.g. fishing, industry, tourism) are indicated in some documents as optional "if they are not relevant in the local environment". Other non local topics such as animals from different areas of the world, traditions and customs of other peoples, and houses and other buildings in different regions and countries, are to be studied "exclusively when the children express a particular interest towards the topic" (PPES, p. 81).

Comparing curriculum documents produced recently with the ones they have replaced I have noticed that this orientation has remained unchanged. It is the case with the previous Portuguese Program for Elementary School (1980) which recommended a similar progression of content explicitly justifying it in terms of the Piagetian description of the concrete operational stage (PPES, 1980, p. 30). The expanding horizons framework was also recommended in British Columbia curricula long before the present reform. It has been also currently interpreted both in terms of physical and temporal enlargement (from the local to the distant, from the present to the past) and

of psychological and social progression of knowledge (from the self to others, from the family to larger communities).

The History-Social Science Framework for California Public Schools (HSSF, 1988) is one of the few examples of a different organization of content, emphasizing history instead of community studies and attributing importance to the imaginative experience of the child. The curriculum planners explicitly account for the "importance of history as a story well told" and the document "emphasizes the importance of enriching the study of history with the use of literature" (HSSF, pp.3,4). A combination is suggested between "exploratory activities in the local environment" and "biographies, myths, fairy tales and historical tales to fire children's imagination and to whet their appetite for understanding how the world came to be as it is" (HSSF, p.4). The organizing criteria are dominantly chronological and related to the increasing complexity of skills to be developed (HSSF, pp.23-38). The usual expanding orientation, remains, however the main framework for Social Studies in the United States as we can observe in the National Council for Social Studies Task Force Report on Early and Elementary Education (Charting a Course: Social Studies for the 21st Century; NCSS, 1989).

The area of Science also reflects the perception of the child as a concrete thinker depending upon direct observation and actual experience for reasoning. Although the content is also frequently organized in an expanding format, the methods suggested for promoting learning are particularly related to the perception of the concrete modes of children's thinking, learning and understanding through action, associated with the emphasis on an empirical approach to the knowledge of natural reality:

Scientific knowledge refers to the observable properties of physical objects and physical phenomena. The way the child finds out about these objects and physical phenomena is by active exploration, observing, structuring in his or her mind the characteristics of the object. Scientific knowledge is structured when children interact with, inquire about, and investigate real objects in their environment. The child will come to know the attributes of the objects in the environment and know how to discover the physical nature of new, unfamiliar objects. (BCPP, pp. 143,144; my emphases)

Portuguese Science teachers interviewed in a recent study on practical activities in Science (Miguéns, 1991) also emphasize their perception of students' learning as necessarily based upon empirical activities and concrete examples found in their local environment (p. 162). Behind the recommendations for developing a particular kind of empirical activities , particularly in Science curricula,

emerges very clearly an empiricist interpretation of knowledge, as perceived in the more strict positivistic tradition.

Such empiricist approaches are constantly recommended in documents when dealing with natural topics. Another recommendation that appears to be associated with such narrow empiricist views refers to the focus on the local environment which is very frequent in Science curricula topics (e.g. living beings on the local environment; physical features of the local environment):

The studies to be developed will be based on direct observation using all the senses. . . the experimental spirit must be always present. . . the students must develop a permanent attitude of experimentation with all the activities that are implied in such an attitude: observing, introducing changes, assessing effects and results, drawing conclusions. (PPES, 1990, pp. 97,98)

The developmental perspective underlying the recommended organization of learning is clearly stated in some of the preliminary documents to the existing new Primary Program in British Columbia:

According to one generally accepted theory of child development, as children grow up, they tend to shift from a stage of egocentric behaviour to behaviour that is more socially oriented. It is also observed that their ways of reasoning tend to shift from those based on concrete objects and on

experiences that are immediate and personal to more abstract ways of thinking. (Year 2000: A Curriculum and Assessment Framework for the Future, 1989, p.10; my emphasis)

Similar assumptions referring to the organization of content and/or to the steps of the process of learning associated with developmentalist perspectives can also be found in other curriculum documents such as the Belgian MPEP or the Portuguese document of 1980:

[A developmental perception of the child presupposes, in geographic studies] the priority of real life and concrete situations following a natural progression from the local to the distant. (MPEP, 1985, p.55; my emphasis)

[According to Piaget]. . . the objectives [of the area of Study of the Environment] follow as much as possible the progression of the cognitive stages of development at this age level. . . children develop the ability to "manipulate" mentally things, initially limited to the objects and materials that can be directly used and observed, . . . and moving later to a more varied and powerful use of those mental abilities which prepare the emergence of the formal operations. (PPES, 1980, p.32)

Recommendations for Practice

Some curriculum documents (such as the Portuguese ones) include a separate section for recommendations and some others integrate their recommendations with discussions of

content or objectives (the American and the Belgian ones, for example). Sometimes complementary documents provide guidelines for the teachers in applying new curricula as is the case with the present Canadian and Portuguese Programs which were first implemented in the school year of 1990-1991. In those cases, the guidelines for practice reinforce the assumptions that were identified at the other levels of the documents' discourse: the description of developmental stages as natural and apparently universal, the concreteness of children's mode of thinking at that stage, their dependence upon direct observation and actual experiences, the perception of knowledge as action on the environment, the unidirectional expansion of content, the dominance of an empiricist view of the child's processes of learning and understanding:

[The previous claim] addresses the need to adjust learning experiences to the particular developmental stage of each student [physical, social, cognitive]. . . It is only through acting on the objects that a child can know their properties (physical knowledge); it is also through action that a child establishes relations among objects and is able to coordinate them [attaining the logical mathematical knowledge]. (PPES, 1990, p. 203)

A slightly different orientation is presented in HSSF

in the Primary Curriculum: Kindergarten through Grade Three, recognizing the complexity and variety of the modes whereby children understand and evolve in making sense of themselves and the world. Nevertheless some connections with the expanding horizons tradition associated with the dominant perception of the child as a concrete thinker are also present in this document:

By the time they enter kindergarten, most children have developed important space, time, and causal understandings. These understandings connect and orient each child within his or her world. . . . Geographic and historical forays out into space and back through time must always be connected with the young child's immediate world and with the fund of meanings the child already has acquired. These primary studies, therefore, begin each year by centering first on the child's immediate present. (HSSF, p.26; my emphases)

Suggestions for kindergarten in Portuguese guidelines for pre-school teachers also exhibit a strong and explicit developmental perspective, reinforcing for example the role of the game and the use of the imagination in the pre-operational stage valued basically as pre-steps for the logico-mathematical knowledge to emerge in the further stages of intellectual development:

Many years of study and research on intellectual development support Piaget's assumption that "the game is a form of building knowledge throughout the sensori-motor and pre-operational stages". . . . Free

activities of manipulation of materials . . . are not a waste of time, they foster the establishment of logical structures essential to the acquisition of knowledge. (RPSA, p. 19)

The Translation into Practice

How do the above assumptions appear in actual teaching practices? How present are they in teachers' representations of their teaching and of students' modes of learning? How far do these principles influence classroom activities and materials?

Even though it is not the purpose of the present study to develop a systematic inquiry into these areas, it seems appropriate to include here a brief account and a critical reflection on my own practice as a teacher, as a teacher educator and as a participant in curriculum reforms in Portugal throughout the last twenty years. Although not intending to introduce at this point the intense debate about research paradigms in education, I would point out that many educational researchers do increasingly emphasize the role of personal experience and reflection as a necessary, though not sufficient, component for a better understanding of educational reality. Blouet-Chapiro and Ferry (1991), for example, argue against the limitations of

an exclusively "empiricist approach to educational situations" in the following terms:

"Experimental pedagogy selects the accidental instead of the essential. That is, in order to get a measurable, well limited and handable object of research, facts are taken back from the contexts that make them meaningful. This reductionist process. . . [leads to] hiding the essential in education: its multidimensional structure, its dynamic nature, its personal mediation, its embeddment in a socio-cultural environment." (pp.36,37; my translation)

The retrospective examination of my professional experience, reflecting a personal, but not acritical, appreciation, will, in my view, provide some useful information about the translation of curriculum discourse into practice by many teachers I have worked with, particularly with respect to the concepts under examination.⁶

These comments are not intended as reliable empirical evidence leading to any kind of generalization nor as a systematic description of Portuguese teachers' practices. Nevertheless, I thought that they should not be omitted since they illustrate the reflective practice of the author that gave rise to the theoretical questions that orient this study. On the other hand, they do help to account for recurrent behaviours and responses of teachers observed in various situations and different times, as perceived by the

author, which can offer additional specification of the implications of the concept of concrete thinking in curriculum and teaching practices.

Actual Practice and "Good" Practice

Teachers are very often said to resist innovation and change. That is, in my view, an over-simplified generalization. Individual teachers interact with the whole educational system where they belong, and generate complex mechanisms of both resistance and implementation of changes, depending upon many intervening variables such as professional value judgements, which in turn are related to ideological factors and social and political pressures. On the other hand, the response of the teacher as an individual actor and a professional group member to those pressures also plays an influential role within the dynamic of the system itself. Teaching practices have then to be interpreted in an interactive perspective which accounts for both the actual teaching and the representation of what that teaching should be to get the approval of the professional community.

Many of the above assumptions about the modes of thinking of children were in fact innovative compared to

the tradition of the Portuguese system. They required the adjustment of teachers to both new theoretical information and new recommended practices. The process of implementing curriculum changes is always a difficult one and it has been in many cases inadequately or insufficiently supported. The implementation of curriculum reforms has been generally accompanied by programs of workshops for teachers, where the emphasis was on "how to do" in order to apply the dominant theoretical views of the time, taken as innovative, rather than on a critical reflection on theories compared with educational practice and on the purposes and justification of new perspectives appearing in the documents. Teachers tended then to incorporate the "new" information as the ideal basis for the "right" way to proceed although applying it to their actual practice in various degrees of compromise with their previous experience and mutual interactions.

Programs for in-service and pre-service teachers' education tended to reinforce the dominant views of the time, with some presentation of the theoretical bases of the recommended curriculum and practices but little critical discussion of those views by teachers. Such programs frequently lacked a careful analysis of the

process of change and implementation, with little consideration of the meanings that teachers give their practice. As pointed out by Wideen (1988), referring to the results of recent research on implementation and change in schools and teachers' practice,

schools do not improve without changing practices and norms and meaning systems. . . . We simply must do more extensive observation of schools in collaborative ways that draw out the underlying meanings that teachers give their work and how those meanings change. . . . His (Pansegrau, 1984) results challenged the commonly held belief that formal in-service education actually leads to change or improvement in classroom teaching. . . . It is through informal involvement with other teachers that they brought about changes in their actual practice. (Wideen, 1988, p.36)

The situation with respect to the adjustment of teachers' practices to the concept of the child as a concrete thinker, influential in Portuguese curricula and official guidelines of the last twenty years, can be described in the following terms, according to my observations :

- Teachers generally conceptualize that orientation as the ideal to be pursued in practice and, when questioned, express their agreement with it.⁷

- Actual practices of teachers perceived as more "traditional" remain only slightly affected by the

conceptions of the concrete thinking of the child even when those teachers try to move in that direction.⁸

- The majority of teachers tentatively adjust their teaching to learners who are assumed to think in concrete terms. They are relatively informed about the theoretical supports of such assumption and appear to accept it as uncontroversial; eventual discrepancies observed in practice are viewed by them as resulting from a deficient interpretation or limitations in applying the principles to actual teaching.⁹

- A small number of teachers show some perplexity towards children's reactions and behaviours which do not fit with the assumption of their concrete mode of thinking and learning ; they still have trouble, however, in opposing the dominant orthodoxy of their peers, being frequently labelled as defenders of a move back to more traditional modes of teaching.¹⁰

Materials produced by and for teachers, mainly published textbooks, follow the same logics and have a powerful influence in two major ways: (1) in order to be commercially successful, they apparently reinforce the accepted perspectives about the way the child thinks and learns; (2) they re-translate those conceptions frequently

with rough simplifications and/or misinterpretations, which are reproduced by less informed teachers.^{1 1}

Listening to Teachers

I found useful to check my observations with actual representations of experienced teachers who have also been working in teachers training programs, by interviewing with some of them. The three interviewees, whose responses are presented and discussed in the next section, were selected according to the following criteria:

Criterion 1: experience in teachers' training programs for more than ten years.

Criterion 2: experience developed in diverse schools and areas of the country.

Criterion 3: professional contact, as teachers' trainers with more than two hundred teachers.

Criterion 4: different models and times of their own teacher education.

Criteria 1, 2 and 3 were used to guarantee some similarity of experiences in terms of significance and extent of their appreciation of the predominant conceptions of the child as a thinker in curricula and in teaching

practice. With criterion 4, I intended to capture the commonality or diversity of their own conceptions in relation to, or in spite of, their different backgrounds.

Three teachers--one from pre-school (A), two from elementary school (B and C)--were invited to give their perception of the child as a thinker through individual interviews. The three of them were women, ages ranging from 32 to 47. They all taught pre-service teacher training courses, and had supervised teacher-students for several years. Teacher A had actually 10 years and the two elementary teachers respectively 20 (B) and 26 (C) years of teaching experience, including both school teaching and supervision of teacher-students. They were all familiar with Portuguese curricula for elementary and pre-school during the last two decades. This was deemed worthwhile because their experience was considerable and they might provide data from their own teaching experience and also from their perception of the way the teachers they supervised or taught represented--or not--the child as a "concrete thinker".

Each of them was asked to talk freely for about an hour about three questions:

Question 1 . Were they familiar with the conception of

the young child as a concrete thinker? How did they acquire that conception in their teacher education?

Question 2 . How did this conception evolve through their practice and professional development? Do they agree or disagree with such a conception? Based upon what kind of data?

Question 3 . What was their perception of the emphasis given to the concept of concrete thinking in curricula and in teaching practice? How was the concept, in their view, currently interpreted in curricula and in teaching practice?

The responses, though produced in an open conversation that sometimes extended beyond the boundaries of the topic, were systematized in relation to each question.

Question 1

The three subjects said they were taught the concept of the child as a concrete thinker in their pre-service education, in disciplines such as Psychology and Pedagogy, and particularly in their supervised practice as student-teachers. Two of them pointed out that a major criterion of assessment of their classes as student teachers was the level of "concretization" achieved, i.e., number of

concrete examples available, variety of materials to be manipulated, opportunities for practical activities, etc. Verbal presentations or explanations of a topic by the teacher without "concrete" starting points were negatively evaluated. One of the elementary teachers recalled that these practices were occasionally associated with Piaget, but the other one said that they were not even spoken of as being associated with any particular author. It was simply presented as the obvious manner of dealing with young children since their thinking was thought as limited to the concrete realm. Other educationalists, such as Maria Montessori and Decroly, were read in such a way that they were assumed to support the conception of the child as a concrete thinker.

The pre-school teacher, though younger than the elementary teachers, reported a similar experience with continual emphasis on "hands-on" activities and discovery processes in her education and practice. She appeared to agree with this kind of practice in pre-school: "the teacher must always present activities in which children actually participate and not merely observe or listen. The main goal is to have the child manipulating, observing, doing . . . they must have time enough to discover by

themselves." (Teacher B).

Question 2

The pre-school teacher said she maintains her agreement with this conception of the young child, finding the recommended practices appropriate to their age level. "The teacher--she says--must work in support of the child's autonomous active involvement with materials." (Teacher A). Listening to her responses concerning the curricula and recommendations for pre-school teaching it is possible to identify a strong influence of Piaget's theory and of Dewey and the progressivist ideas of free discovery, autonomous work, lack of imposed tasks or topics, etc.

The elementary teachers (B and C) both claimed to have changed their views about children's way of thinking, as a result of their daily observation of children's behavior and reactions: "Children did not fit our expectations. . . they surprised me both by exhibiting the ability to abstract and hypothesize . . . "concrete" activities were often seen as boring and sometimes they were not the easiest way for children to approach a topic. It depends a lot of the previous information they have in place. I felt I had to move back to the theories and read and study the

authors by myself in a more critical way." (Teacher B). Her personal research and reflection led her to discover other theoretical perspectives and to establish a personal view of the child as a powerful thinker. The concrete and abstract, she argued, "are always there and interact increasingly . . . it is not unidirectional".

Teacher C also said she recognized throughout her classroom experience the inadequacy of her early beliefs, emphasizing particularly that she persistently found children much more capable of moving beyond the immediate and the concrete than she had been taught: "They can do much more than the curriculum documents recommend, for example, abstracting in computation, imagining situations that are described to them, raising hypotheses. . . The activities and materials suggested are often too childish for them . . . Another aspect I always noted was their attraction to new information, to different and distant realities . . . My students have always been fascinated when I "tell" them how things were different in the past, or how people live in other civilizations. They clearly prefer those topics to the local environment. They also enjoy experiences with plants, animals. . . that is more attractive than looking at the shops or transportations in

their neighborhood".

Question 3

All the respondents acknowledged the dominance of the idea of the child as a "concrete thinker" in the design of curricula and--which is, in their opinion, more influential--in textbooks and in programs of teacher education. Commonly no theory is presented, but there is a constant reinforcement of the teaching strategies and materials that correspond to the representaton of the child as a concrete thinker.

Based on their experience as teachers' educators all the interviewees recognized that teachers currently reproduce those practices with little questioning, and simplify the concept of "concrete" in terms of what is material, visible, close.

Many elementary teachers--they say--have not got any theoretical justification for the practices they perepetuate, but "they tend to follow what is said to be scientifically right, and different from the traditional methods they were submitted to as students . . . this generates much confusion." (Teacher C).

Pre-school teachers seem to be more secure in the

theoretical support of their practices, particularly with respect to Piaget. The way his theory is represented is taken as "a useful and appropriate orientation for pre-school teaching." (Teacher A).

It was, however, recognized that many teachers--including the interviewees themselves--adjusted their initial conception of children's thinking to what they observed in daily work, doing it empirically and in various degrees of critical reflection.

The responses of these teachers reinforce in many ways the recognition of a disadjustment between actual behavior and thinking abilities of children and the current curriculum assumptions about their "concrete thinking". On the other hand they somehow illuminate the process of internalizing and reproducing acritically a given paradigm that is, however, perceived as controversial by many practitioners. Obviously, the particular responses of a very few teachers carry no particular weight against well entrenched theories. But it is worth to note that the discrepant observations they make relative to the commonly accepted theories is along the same general lines and lead to intriguing questions on the accuracy of such theories.

As summarized and documented above, the actual teaching

for the child as a concrete thinker appears quite often as a superficial translation of theoretical claims acritically conveyed by the curriculum documents. The actual practice tends to simplify or sometimes distort the theoretical presuppositions underlying the curriculum documents and their implications for teaching. Attitudes of passive acceptance of principles and acritical reproduction of practices are then encouraged.

Conclusion

The description presented in this chapter reflects a certain kind of educational orthodoxy which defines the ideas and practices which are educationally valued and well accepted even when going along with contradictory practices. Those ideas do not appear either simply equated to the dominant social values nor necessarily coincident with the more traditional perspectives. The orthodoxy in education and curriculum does not mean either the existence of a consensus among educationalists and curriculum reformers: there are obvious significant disagreements and even opposite tendencies within the field. Nevertheless, there is a body of assumptions which are persistently recommended as innovative, or effective, or scientific,

depending on the context, which originate in respectable theories and/or investigation very often translated from particular scientific areas such as psychology or sociology and not appropriately contextualized in the education field. Once they become influential, those perspectives tend to remain unexamined and unchanged within curriculum discourse, although reinterpreted in various ways.

Practitioners, when they do not follow those principles, commonly express the need to justify themselves, as if there was in those dominant views some kind of uncontroversial truth that, unfortunately, one cannot always apply properly. It is similarly the case, for example, with other stereotypical concepts such as "integration" and "interdisciplinarity" systematically presented in curricula--and represented by teachers--as a kind of unattainable educational perfection. The same applies also to the perception of the so called scientific inquiry method as the ideal process for learning, taken for uncontentiously good in itself in many curriculum documents, no matter what is meant by it.

In part because educational thought has been and continues fighting for a scientific status, in part because education and tradition have been historically and

sociologically associated, some conceptions or principles have been accepted in our century insofar as they represented significant progress in viewing education from a more scientific, dynamic and innovative point of view. The historical and educational value of any perspectives should not, however, generate new dogmatisms and discourage the free and critical reexamination of both the principles and their implications for action. Nevertheless, the labels of "traditional" and "progressive" tend to be associated with the acceptance or non acceptance of some principles and concepts, implying prejudices and distortions which impoverish the rigor of the discussions and narrow the possibilities of the analyses.

These comments relate to the purposes of the present study as we are dealing with a particular concept which is clearly one of the examples of a present orthodoxy of educational discourse: the child as a concrete thinker. With respect to that particular perception of children's thinking, a critical examination has to deal with the theoretical constructs which can be identified as contributing to support the curriculum assumptions, particularly the Piagetian description of the concrete operational stage (Piaget, 1963, 1964, 1972), Deweyan

conceptions of the student as an active learner (Dewey, 1963, 1964, 1966), and the scientific inquiry as the preferred model for improving the learning processes as recommended by Bruner and the defenders of the Academic Reform Movement in the early 1960s (Bruner, 1960, 1964). The interfaces among such influential and diverse theories and the connections that subtly link them in their translation into curriculum and practices will be examined in the following chapter.

NOTES

¹ It was our concern to diversify the documents under analysis in terms of contexts and educational systems. The curricula from Anglo-Saxon countries both in North America and Britain sharing quite similar structures and goals, we included the curriculum of History and Social Science from California as illustrative of a less common perspective in the United States tradition. In Europe, the Belgian programs reflect both the French and Anglo-Saxon traditions and have changed through several reforms in the last two decades. The documents analyzed refer only to the public schools of the francophone area of the country, covering approximately 30% of the whole educational system.

² Portugal lived under a political dictatorship from 1926 to 1974. The educational system was extremely centralized and ideologically controlled. There was little opportunity for change and innovation. Curriculum discourse encouraged instead tradition and immobility. Portuguese curricula remained almost unchanged till the late 1960s.

³ In 1968 the Programs for grades 5 and 6 (Preparatory School) were reformed and first exhibited a certain "ouverture" to new ideas in education which had long since developed in other countries. The ideas of educational and psychological theorists, such as Dewey or Piaget, although familiar to many teachers and educators, did not become influential in curricula before that time. The curriculum document of 1968 remained, however, organized in terms of sequences of subject matters preceded by a brief introduction including some educational goals, general psychological comments and recommendations for practice. Detailed analyses of the changes in the school system and curricula in Portugal are developed in two collections of research studies published by the Portuguese Ministry of Education on elementary schooling and curriculum development: Escolaridade Obrigatória, (Compulsory Schooling) and Desenvolvimento Curricular (Curriculum Development), Gabinete de Estudos e Planeamento (GEP), Ministério da Educação, Lisboa, 1986-1989. Another collective work, O Ensino Básico em Portugal (Elementary Schooling in Portugal), 1989, Porto: Edições ASA, also includes several articles on the history and problems of elementary schooling in Portugal. The author participated in both these publications which provide an overview of the evolution of curricula within the context of elementary schooling in Portugal.

4 The discussion of those criticisms will be developed in Chapter Two as a means for the clarification of the current concept of concrete thinking and its implications for curriculum and practice.

5 For the description and examination of different perspectives on children's behaviours and modes of thinking see Chapters Four and Five.

6 The reflection presented in this section is based on the following elements of the author's experience, developed on a regular basis within Programs of teachers education (from 1974 to 1983 and from 1985 to 1989) and as a participant and consultant in the implementation of curriculum reforms in 1975, 1977-1980 and 1989-1990: observation of classrooms in elementary school; planning and coordination of meetings and workshops for teachers; analysis of questionnaires and interviews with teachers for evaluating the implementation of new curricula.

7 Teachers participating in workshops typically ask for practical suggestions to better adjust their teaching to the concrete way of thinking of students or how to develop active strategies as prescribed in curriculum documents. Even when invited to discuss the theoretical assumptions implied in concepts such as concrete thinking or active learning (for example, in workshops for teachers first involved in the implementation of curriculum reforms) they persistently avoid such a discussion. Their criticisms, if any, are oriented to the "unrealistic" or "utopian" features of a given program in terms of its applicability, implicitly accepting the correctness of the underlying theories.

8 This aspect emerged very often in programs of inservice teachers' education, when working with more experienced and older teachers. Facing new recommendations for teaching practices, very few of those teachers defend their previous teaching practices, although frequently keeping them unchanged and remaining convinced of their worth. In order to adjust to the recommended active strategies some would, for example, include in the planning of a class a game, or a dialogue at the beginning of the work followed by a lecture about the topic without no consistent connection among these various strategies. They sometimes refer to such "active" elements of their teaching as motivation,

obviously taking the concept in a quite vague and inaccurate way. They seemingly assume that it is good for students to realize the described activities, but for "really learning" a traditional lecture such as those teachers used to provide before should be better...

⁹ In interviews with teachers in 1989 and 1990 we identified a persistent reference to the practical difficulties they find in adjusting their teaching to the concreteness of children's thinking for reasons that are out of their control, such as the lack of resources for manipulative activities and field trips, the size of the classes or the constraints of time. For example, a Grade 3 teacher commented on Science topics: "it should be much better if they learned by doing, I know that. . . but I don't have the materials and it takes so much time. . . ". Some of them also report that "some bad students don't show interest even in active experiences or observations, they prefer to listen to the teacher. . . ". The explanation for the students' difficulties is attributed to their limitations even as concrete thinkers, instead of looking at that particular reaction as eventually requiring a reexamination of the theoretical presupposition of the concreteness of their teaching.

¹⁰ A few teachers, both in workshops and in individual interviews, express some disagreement with, for example, the empirical emphasis of the recommended practices but they typically start their argument by some kind of compromise with the accepted ideas, such as: "I don't mean the students should not engage in practical activities, but in this kind of topic wouldn't a different approach be better ? . . . "

¹¹ A detailed analysis of Portuguese textbooks for Science, Social Studies, Math and Language, Grades 1 to 5, is available in Manuais Escolares - Análise de Situação (Textbooks for Elementary School - Analysis of the Situation), GEP, Ministério da Educação, Lisboa, 1989. This study, developed cooperatively by the GEP and the Faculty of Science from the University of Lisbon, calls attention to the simplifications, distortions and misinterpretations of the curriculum recommendations which appear in current textbooks. Those textbooks were compared to the curriculum objectives and statements and analyzed in the following dimensions: the socio-cultural and ideological, the scientific, and the pedagogical.

CHAPTER TWOTheoretical Views Associated
with Concrete Thinking

In order to clarify and discuss the educational conception of the young child as a concrete thinker, we have to examine the major theories which have contributed to it as it is usually understood among educators. Such theories, that correspond to a diversity of educational conceptions, have to be analyzed in themselves but particularly in their interplay when translated into curriculum with respect to the concept under examination.

I will begin, then, by identifying the constructs coming from theoretical areas and from authors who have been influential in contributing to the conception of the child as a concrete thinker. The modes by which such theoretical constructs have been integrated, transformed and translated into educational and curricular discourse and practices for early education will then be examined. The discussion of the theoretical assumptions themselves will be elaborated in Chapter Three.

Current educational ideas have emerged and evolved

through a complex process of interactions among theoretical views, social and cultural pressures and values, and practices developed by teachers in actual classrooms. Concerning the concept under examination the main theoretical supports identified come from the fields of Developmental Psychology and Educational Theory. Piaget, Dewey and Bruner can be identified as the theorists who, in different and interrelated modes, are associated with the curricular description of children's concrete thinking.

The discussion of these authors will not follow a chronological sequence. It is rather organized in terms of the degree of predominance these authors have had in the construction of the concept. Piaget will be discussed as playing a central role in the whole operationalization of this concept. Bruner's influence in the reinforcement of the concept is more indirect and will then be discussed in terms of the particular association of his emphasis on scientific inquiry procedures with the modes of learning attributed to the concrete thinker. Finally, and as a more philosophical level, Dewey's theorizing provides a set of influential principles that are persistently invoked to support the alleged adequacy of existing curricula to the concreteness of young children's thinking.

Piaget and the Theory of Cognitive Development

Theoretical Principles

The influence of the Piagetian theory of cognitive development has been critical to the perception of the young child as a concrete thinker. The following description refers to the aspects of the theory which play a central role in present curricula assumptions about children's thinking.

The definition of intelligence.

The whole conception of cognitive development as a natural process following a series of sequential stages implies, in Piaget's view, the dependence of learning on development. Development is described as a natural process of adaptation to the environment. This assumption requires some examination both in its epistemological dimension and in its relation with learning and education.

The constructivism of Jean Piaget can be described as an epistemological position which opposes both empirism and

inatism, offering a particular interpretation of the nature and origin of knowledge. Piagetian claims on the nature of human intelligence reveal a clear demarcation from the empirist and particularly from the behaviourist perspectives. His theory represented an innovative and richer conception of intelligence, particularly when compared to the stimulus-response theories previously dominant. Explaining the differences and relations between development and learning, Piaget makes clear his non-empirist view of development:

For some psychologists development is reduced to a series of specific learned items, and development is then the sum, the cumulation of this series of particular items. I think this is an atomistic view. . . . Knowledge is not a copy of reality. To know an object, to know an event, is not simply to look at it and make a mental copy, or image, of it. To know an object is to act on it. (Piaget, 1982 p.276)

And, referring to learning,

Classically, learning is based on the stimulus-response schema. . . . when you think of a stimulus-response schema, you think usually that first of all there is a stimulus and then a response is set off by this stimulus, For my part, I am convinced that the response was there first. . . . Once there is a structure, the stimulus will set off a response but only by the intermediacy of this structure. (Piaget, 1982, p 282).

Piaget also explicitly insists on the difference

between his views of perception and learning and the empiricist ones:

We have to test the validity, among other things, of the empiricist interpretations of those areas that have been privileged as classical justifications for empirism--the area of perception viewed as the source of the immediate knowledge of external reality, and the area of learning thought of as a process of acquisition of knowledge exclusively through experience. (Piaget, 1976, Problemas de Psicología Genética, pp. 103,104; "Problems of Genetic Epistemology", my translation; author's emphasis)

In short, Piaget points to "the insufficiency of the empiricist interpretation. . . although not denying the role of experience" (Piaget, 1979, p.39). Within his genetic epistemological perspective, knowledge is then assumed as a permanent construction, a constant process of adaptation to the environment through evolving structures that are built by means of the mental action of the knower on that environment: "There is no knowledge coming directly from the perceptions, since these ones are always directed and organised into schemata of actions" (p. 39). The structures or schemata are constructed and reconstructed through the processes of assimilation, accomodation and equilibration or self-regulation.¹

On the other hand, the Piagetian conception of

knowledge is also clearly opposed to innatist perspectives. The Piagetian refusal of innatism became particularly critical and a matter of controversy within the field of the acquisition and development of language. In a famous debate² between Piaget and Chomsky in 1975 (Piatelli-Palmarini, 1983), although recognizing the value of the non-empirist approach of Chomsky to the problem of the acquisition of language, Piaget emphasized his own conception of intelligence as a biological function of adaptation to the environment, as well as his distance from the neo-Darwinian perspectives associated with innatism and heredity of mental structures:

I agree with Chomsky on his major contribution to Psychology--the recognition that language is a product of intelligence or rationality and not of a learning process as defined by the behaviourists. . . . But I reject the idea that the logico-mathematical structures could originate in a random factor of natural selection; they are not casual. . . they result of a process of specific and detailed adaptation to reality. (Piaget, 1983, p.81; my translation)

The constructivist epistemology offers then a particular concept of intelligence and cognition which has been enormously influential in education and curriculum:

- (1) intelligence is not an innate and hereditary ability included in the genetic program of the species and of each

individual; (2) neither is it a set of skills which depend upon the stimulations provided by the environment that can be developed through stimuli-response strategies; (3) human intelligence is a biological function of adaptation of the individual to the environment evolving through operational action. The concept of "operation" is critical to the whole constructivist theory. As Piaget puts it,

To know is to modify, to transform the object and to understand the process of this transformation, and as a consequence to understand the way the object is constructed. An operation is thus the essence of knowledge. . . For instance, an operation would consist of joining objects in a class to construct a classification. Or an operation would consist of counting or of measuring. In other words, it is a set of actions modifying the object, and enabling the knower to get at the structures of the transformation. (Piaget, 1982, p. 276)

Thinking means thus to transform the objects by effect of mental action that is responsible for the construction of knowledge through a constant process of intelligent adaptation to, and assimilation of the objects in the environment.

The conception of cognitive development and the nature of learning.

The process of biological adaptation evolves as a natural and progressive construction of more elaborated

schemata of adaptation to the environment. Cognitive development is therefore conceived as a spontaneous process which does not depend upon teaching but precedes and conditions effective learning:

The development of learning is a spontaneous process, tied to the whole process of embryogenesis. Embryogenesis concerns the development of the body but it concerns as well the development of the nervous system, and the development of mental functions. (Piaget, 1982, p.276).

The perception of development as a continuous natural process is closely linked to the function of self-regulation or equilibration as defined by Piaget. This function is common to physiological and mental structures but plays a particular role in promoting progress in human behaviours and mental functions. In the above debate Piaget argues that

self-regulation in organic functions is generally limited to keeping or rebuilding a state of equilibration; differently, self-regulation operates in the domain of behaviours by pushing the individual towards new progress. (Piaget, 1983, p.83; my translation)

Cognitive development follows a necessary sequence of steps which correspond to the increasing need of "superation of the environment and reinforcement of the

power of the organism on the environment" (Piaget, 1983, p. 83). Time and logical sequence are required for development to occur:

. . . for a new logical tool to appear the mastery of previous logical tools is required...time is also essential as an order of sequence.... This leads us to the theory of the stages of development. Development occurs through sequential steps and periods. . . . We identified and will describe four major periods. (Piaget, 1976, pp. 18,19; my translation)

Piaget distinguishes two aspects of development--the psychosocial, resulting from learning in the outside world, and the psychological related to the development of intelligence itself--identifying the second as the object of his theorizing:

. . . the things that children learn by themselves, that were not thought to them and that they have to discover. . . . That spontaneous aspect of intelligence is then what I'm going to talk about, since I'm just a psychologist, not an educator, and also because, from the point of view of the role of the time, that's exactly this spontaneous development which matters, as an evident and necessary prerequisite for educational development in school, for example. (Piaget, 1976, pp. 12,13; my translation)

The Piagetian emphasis on the spontaneous nature of the development of cognitive structures as pre-conditions for learning is one of the critical areas of his influence--and of some misunderstandings too--in education and curriculum,

as will be discussed later.

The stages of development and the concrete operational thinking.

The stages of cognitive development are described as steps in the progressive mastery of structures of knowledge, sequential and integrative. At each stage intelligence operates in qualitatively different ways which are supported and built upon the structures of the previous one. There is then a necessary hierarchy of those structures and consequently an invariance in the sequence of the stages. According to Piaget's empirical observations and theorizing, this sequence is universal even though the pace of the development can be different in different cultural environments due to the different interactions among the three factors of development - maturation, experience and social transmission - and the consequent differences in the modes of equilibration or self-regulation.³ Human knowing is always an intelligent process but logical reasoning is a particular form of intelligence which appears only at the highest level of cognitive development:

Let's clarify the difference between intelligence

and reasoning. Intelligence means solving a new problem, coordinating the means in order to attain an intended goal not immediately accessible. Reasoning is the internalized intelligence, non depending upon direct action but operating on the symbolic representation, through language, of the mental images that allow the subject to represent those things that sensory-motor intelligence could only get directly. (Piaget, 1976, p. 21)

Reviewing very briefly the sequence of Piagetian stages, children start with what Piaget calls the stage of "sensory-motor intelligence" where they develop very simple substructures of knowledge (permanence of the object, elementary sensory-motor causality, etc) "which are indispensable for the structures of later representational thought" (Piaget, 1982, p. 277). At a second stage--the pre-operational--the symbolic function emerges which allows for the reconstruction of the previous structures, making possible language and mental images, but not yet operational thought. Operations are claimed not to be possible given the dependence of representation on perception and consequently the inability for reversibility and transformation⁴ which are prerequisites for operational thinking. At the two last stages, operations appear but in a sequence of two levels of increasing complexity: at the concrete operational stage the child can think logically and realize operations (such as classification, seriation,

the construction of the idea of number, spatial and temporal operations) but "on objects and not yet on verbally expressed hypotheses", which will happen only at the fourth stage of formal or hypothetic-deductive operations (1976, pp. 29-34).

It is important for the present analysis to look at what Piaget means by the difference between these two stages in order to illuminate his conception of concrete thinking:

Finally. . . the child reaches the level of what I call formal or hypothetic-deductive operations; that is, he can now reason on hypotheses, and not only on objects. He constructs new operations, operations of propositional logic, and not simply the operations of classes, relations, and numbers. He attains new structures which are on the one hand combinational. . . on the other hand, more complicated group structures. At the level of concrete operations, the operations apply within an immediate neighborhood: for instance, classification by successive inclusions. At the level of the combinatorial, however, the groups are much more mobile. (Piaget, 1982, pp. 277,278,279)

The current interpretation of "concrete" thinking in curriculum documents reflects this description though considerably simplified. The concreteness is simply associated with observable and physically accessible realities. The epistemological meaning of "object" evident in the above quotation, as well as the nature of the

distinction between the degrees of complexity of concrete and formal operations, are often disregarded in curriculum documents (PPES, p.203; BCPP, p.61)

Experience as a factor of development.

Among the factors that interact under a constant process of self-regulation (biological maturation, experience, social transmission) experience plays a critical role in the Piagetian explanation of development, since it is the one which can be controlled and manipulated through educational action. Maturation of the nervous system works as a necessary but not sufficient condition; it is required for the changes in mental structures to develop harmoniously, but it does not explain or generate those changes. Social transmission is described as some kind of input coming from the outside world in the form of information, affecting but not provoking development; information will be inert if the subject does not have the appropriate cognitive structures in place.

The priority of development over teaching and learning is again stated: "for transmission to be possible between the social environment and the child it has to be the possibility for assimilation. . . . This assimilation is

always conditioned by the laws of this partially spontaneous development I have described" (Piaget, 1976, p.37; my translation).

Experience refers to two different processes in Piagetian theory: physical experience, which is drawn directly from objects and physical reality, and logical-mathematical experience which consists of mental action upon the objects. Physical experience is the basis, the starting point of cognition, but is insufficient to explain the development of logical knowledge: "Children's logic does not come from experience on the objects but from their actions on them, which is different. . . the active dimension of the subject is critical" (Piaget, 1976, p.37; my translation).

Piaget points out that some concepts appear without having been supported by this kind of experience, such as conservation, for example.

. . . some of the concepts which appear at the beginning of the stage of concrete operations are such that I cannot see how they could be drawn from (physical) experience. . . But there is a second type of experience which I shall call logico-mathematical experience where the knowledge is not drawn from the objects. . . . This is an experience of the actions of the subject and not an experience of the objects themselves. . . which is necessary before there can be operations. (Piaget, 1982, pp 278,279, 280)

It is interesting to note that curriculum descriptions of the concrete thinker claiming a Piagetian legitimation emphasize very often physical experience as much more central than Piaget himself did, shifting towards the empiricist perspectives that he clearly rejected.⁵

The Translation into Curriculum

The current description of children's modes of thinking in curricula, as documented in Chapter One, reflects in several aspects the Piagetian theory of intelligence and cognitive development. It is necessary to examine which theoretical claims are emphasized in curricula and how they are interpreted and conveyed in educational documents and practice.

The emphasis on development.

Curriculum documents, as well as teachers in their professional discourse, constantly refer to "development". It appears in the definition of educational goals both as the improvement of one's abilities and potentialities and as the promotion or facilitation of natural psychological development in its several dimensions, with a particular

emphasis on the cognitive field. The latter of these meanings is clearly influenced by the developmentalist conceptions of Piaget, particularly in respect to the precedence of development over learning. It is, however, unclear how such a conception is also implicated in the "development" of attitudes, values and skills. In fact, there seems to be a mixing of the theories of development with their specific constructs and implications, and some kind of common sense assumptions about the same idea. This unclear combination leads to the uncritical acceptance of the principle of "promoting development" without clarifying what is actually intended to be promoted.⁶ We should recall, at this point, the distinction between transitive and intransitive uses of the word "development", as explained in Chapter One.

Since this concept appears at the more general level of curriculum discourse--definition of goals and objectives--it appears again and again throughout the typical sequence of curriculum development activities: selection of content, definition of strategies, evaluation.

The dependence of learning on development.

Another current presupposition in curriculum documents is a consequence of the above concept of development: in many areas the recommended progression of content and strategies follows the unquestioned logic of their dependence on a "natural" process of development. It is, for example, the case with the acquisition of mathematical concepts, with the "hands-on/minds-on" association, or with the assumption that history content is not learnable before the concept of time is consolidated, or that teaching activities must be based upon concrete observation and direct experience for elementary school children.

The adaptive function of intelligence as opposed to intellectual discrimination.

The belief in the universal possibility of developing cognitive abilities given the appropriate opportunities for action on the environment, within the Piagetian conception of development, is commonly used to support the emphasis on a more democratic concept of education.

Educators should be committed to providing for all students the conditions for that ideal development to occur. This is one of the more appealing features of developmental theory which appears translated into curricula in terms of a progressive view of education as opposed to a discriminatory acceptance of "natural" differences in children's intellectual potentialities. It should, however, be noted that this appeal to equality of opportunities in education is not necessarily nor exclusively implied by Piagetian theory. Behaviourists themselves, for example, have insisted in the equal potential of children for learning, given the appropriate teaching strategies (Bloom, 1971).

Logico-mathematical knowledge as the paradigmatic form of knowledge.

The assumption that children can or cannot realize mental operations, understand abstract realities or develop hypotheses is based upon an underlying reduction of the whole process of knowing to logico-mathematical thinking. Piaget himself points out that his theory is focussed on this particular mode of thinking (Piaget, 1976, p.13) which he values as central. Curricula reflect this view without

clarifying whether it is or is not assumed as merely one or the unique important dimension of understanding and therefore knowing. Affective, social and moral development, frequently referenced in educational goals, appear assimilated to and conditioned by the logic of cognitive development.⁷

Piagetian concepts dominant in curriculum and the idea of concrete thinking: action, environment, object, experience.

Piagetian terminology corresponds to a constructivist view of the genesis of knowledge. The concepts used within this epistemological logic cannot be translated into everyday language without risking distortion. In curriculum and education distortion happens quite often, particularly by narrowing and simplifying the meaning and then moving to inadequate generalizations. The current curricular representation of the child as a concrete thinker reflects some of those simplified interpretations. It is associated with the interpretation of the concepts of action, environment and experience

"Action on the environment" is one of the central ideas within Piaget's theory. It is defined as the mental

activity that a subject develops about reality in order to integrate new elements into the existing structures or schemata (assimilation) or to reorganize those structures to respond to new information (adaptation). Operations are defined by Piaget as "mental actions" which transform the object of knowledge (Piaget, 1982, p.276). They transform by categorizing, organizing, classifying, i.e., by modifying the data within the mental structures that are gradually elaborated. A class does not exist in the environment, or in the representation; it results from a mental operation on them. Environment and action are thus intervening elements in the intellectual process, not necessarily limited to the observable and external reality or to the concrete activity of the knower.⁸ In curriculum language an excessive emphasis has been put on the material dimensions of the concepts of environment and action, simplifying and distorting their meaning.

A similar simplification can be identified in the use of the notions of object and experience. "Object" is mainly used by Piaget philosophically, meaning "object of knowledge"--the things to be known--which may apply to both the concrete existing objects and the increasing abstract categories of objects of knowledge. Formal-operational

thinking is precisely defined by the ability to operate on propositions and hypotheses which are also an "object" of knowledge. Dealing with observable, concrete objects is the basis, the starting point; it is experience in its simplest form, according to Piaget. His distinction between physical and logico-mathematical experience--no matter how controversial it may be--does not fit with the common sense notions of concrete experience and objects which appear frequently in curricula for elementary school. Referring for example to the acquisition of conservation, Piaget explicitly says, as we have seen, that "it could not have come from experience". (Piaget, 1982, p. 278)

The curriculum definition of the child as a concrete thinker issues from the description and label of the stage of concrete operations itself and from the combination of the above concepts of experience, environment, objects and action, specially as they are operationalized in the recommendations for practice.⁹

Bruner and the Academic Reform
Movement of the 1960s

The influence of Jerome Bruner in curricula has been predominantly conveyed through his direct participation in

the institutional curriculum reforms implemented in the United States in the early 1960s which soon spread all over Europe as well.

Academically a psychologist mainly interested in the processes of psychological development and in diverse modes of thinking, Bruner has nevertheless developed extensive and diversified theories that remain influential within various areas of the Human Sciences which he always tried to bring together, such as Language, Anthropology, Curriculum and Pedagogy--"the psychology of assisted growth" (Bruner, 1965, p.1013). For the purposes of the present analysis, however, it is the particular influence of his thinking within the curriculum reforms of the 1960s that will be discussed, since his ideas played a considerable role in affecting the orientation of curricula and teaching practices in the last three decades. This influence had implications for the concept of the child as a concrete thinker in curricula by reinforcing--for different reasons--the empiricist components of such a conception.

The Academic Reform Movement emerged both as a response to the political and economic pressures of the time and as a reaction to the previous dominant orientation of

curricula. The schools were accused of encouraging low levels of achievement by the emphasis on flexibility of content and social goals, and excessive consideration of the diversity of interests of the students. The political competition with the Soviet Union after the launch of Sputnik in 1956 stimulated in American political decision centers a strong concern with the promotion of higher technological and scientific standards of competence in schools and universities. Bruner, in his famous book The Process of Education (1960), though keeping in mind the importance of the social and civic aims of schools, recognized the call for "a renewal of the quality and intellectual aims of education" (Bruner, 1960, p.1).

The Process of Education--which will be central for the purposes of the present analysis--resulted from Bruner's report as Chairman of the Woods Hole Conference run in September 1959 in the United States, called by the National Academy of Sciences. Thirty five scientists, academics, educators, psychologists and curriculum specialists met there for ten days in order "to discuss how education in science might be improved in (American) primary and secondary schools. . . . and to examine the fundamental processes involved in imparting to young students a sense

of the substance and method of science" (pp. 2,3).

A considerable amount of effort and funding was invested in implementing the kind of reforms that would be consistent with the conclusions of the Conference summarized in Bruner's influential book. The set of projects implemented at the time, generally referred to as the Academic Reform Movement, originated also a series of curriculum reforms in Europe, mainly in England, during the 1960s and early 1970s.¹⁰ Focusing initially on the disciplines of Science and Maths, given the centrality of improving technological and scientific achievement at the time, it expanded to other areas of curriculum, such as History and Social Studies, and generated a whole curriculum orientation based upon the theoretical assumptions that will be examined in the next section.

Theoretical Assumptions and Concepts

Role of the structure of the disciplines.

Starting from the recognition of the value of science as the most sophisticated form of human knowledge, it was assumed that the learning of science should be central within a curriculum intended to promote excellence and intellectual competence. The exposure of students to any

kind of scientific subject in school being necessarily limited, and scientific knowledge evolving at an increasing pace, the important goal to be reached in school should be learning the fundamental principles and underlying structure of scientific disciplines. If students would grasp that structure, in Bruner's view, they would be able to understand any new topic within the discipline, by means of transfer of the learned principles and structure. The concepts of "structure", "fundamental principle" and "transfer" are critical and inter-connected within Bruner's theoretical framework: "Grasping the structure of a subject is understanding it in a way that permits many other things to be related to it meaningfully. To learn structure, in short, is to learn how things are related" (Bruner, 1960, p.7). It implies the understanding of the "fundamental principles" underlying a given scientific field. It is the transfer of the fundamental principles that guarantee the continuity of learning and the ability to deal with new problems within that field:

The more fundamental or basic is the idea he has learned, almost by definition, the greater will be its breadth of applicability to new problems. . . . To understand something as a specific instance of a more general case--which is what understanding a more fundamental principle or structure means--is to have learned not only a specific thing but also a model for understanding other things like it that one

may encounter. (Bruner, 1960, pp 17,25)

The mastery of the model of knowledge characteristic of each discipline should therefore be critical to pursue and deepen the acquisition of the particular knowledge and concepts of that discipline.

The method of discovery.

To get familiar with the structure of the disciplines implies understanding the methods of investigation corresponding to the particular perspective of that discipline. Scientific knowledge is obtained through intellectual engagement in the scientific processes of discovery, not by simple transmission of acquired information. Having students "learn how to learn" was a constantly recommended purpose of Bruner leading to a predominance of the process over the content of learning. Discussing how to teach in order to reach that objective and simultaneously to engage the interest of the students, he pointed out the "inherent interest of materials taught, giving the students a sense of discovery" (Bruner, 1960, p.72). Bruner was concerned with the apprehension by the students of the spirit of each discipline, its principles and structure, by means of interesting and rigorous

activities, connected with the process of work of the scientists themselves:

A learned discipline can be conceived as a way of thinking about certain phenomena. . . . There is nothing more important in its teaching than to provide the child the earliest opportunity to learn that way of thinking--the forms of connection, the attitudes, hopes, jokes, and frustrations that go with it. . . . At the very first breath, the young learner should, we think, be given the chance to solve problems, to conjecture, to quarrel as these are done at the heart of the discipline. (Bruner, 1965, p. 1014)

Inquiry activities developed by students in a scientific manner became thus the central issue in many of the curriculum projects developed under the inspiration of the Academic Reform Movement. It was strongly believed that this method of learning would constitute the best way to have students become scientifically competent.

Readiness and the spiral of learning.

One of the more influential claims of Bruner in The Process of Education, which seems to conflict with the idea of the dependence of learning from developmental readiness, was that "the foundations of any subject may be taught at

any age in some honest form" (Bruner, 1960, p. 12).

Following the description of cognitive development in the school of Geneva, presented by Barbel Inhelder at the Woods Hole Conference, Bruner did not see in the description of the progression of stages any obstacle for teaching scientific disciplines to children. He rather considered developmental psychology a powerful instrument for adjusting the teaching of scientific subjects to students at different age levels: ¹¹

Research on the intellectual development of the child highlights the fact that at each stage of development the child has a characteristic way of viewing the world and explaining it to himself. The task of teaching a subject to a child at any particular age is one of representing the structure of that subject in terms of the child's way of viewing things. (Bruner, 1960, p. 33)

Such an adjustment of school curricula, supported, in Bruner's interpretation, by the Piagetian characterization of the concrete operational and formal operational stages, would be improved by means of translating into teaching the fundamental principles and structure of the disciplines, gradually deepening and making more precise the understanding of concepts and the range of generalizations, following a spiral progression.¹² He advocated then that children at any stage of their development were ready to learn in a scientific way since "any idea can be represented honestly and usefully in the thought forms of children of school age. . . . Let the

topics be developed and redeveloped in later grades" (Bruner, 1960, pp. 33,34).

The Translation into Curriculum

The curriculum projects developed under the influence of the above principles recommended the organisation of teaching practice as one of reconstructing science through the internalizing of its principles and the pursuit of its methods. In present curriculum documents, as those examined in Chapter One, many of these principles are still influential as it was particularly documented in a few Science curriculum documents.

The New Maths, New Science, New Social Studies curricula encouraged students to experience the inquiry methods specific to the various disciplines. Such an approach resulted in many cases in an overemphasis on empirical tasks and on a somehow artificial imitation of the work of the scientist. Bruner stated in fact that the "schoolboy learning physics is a physicist" (1960, p. 14, author's emphasis), since the student is engaged in activities of the same order, i.e., designed to promote understanding, being merely different in degree. This claim was insistently translated into curriculum as an encouragement to transform students into little scientists

and avoiding any process of learning which would not occur by discovery. Nevertheless he referred to discovery strategies as an aid to teaching and recommended a proper balance between inductive approach and other modes of teaching (Bruner, 1960, p. 21). The current interpretation of Bruner's ideas in curriculum is, however, predominantly oriented to the systematic use of inquiry procedures, leading again to the suggestion of an empiricist orientation, expressed in terms of concrete experience, direct observation and discovery of generalizations. The emphasis upon the experience-orientation combining with the developmental description of the child reinforced, in that way, the simplified representation of the child as a concrete thinker.

It is interesting to note some omissions and distortions of Bruner's thought implied in curriculum materials and documents which claim his theoretical support. In the well known curriculum project in social studies MACOS (Man: A Course of Study, 1965b), coordinated by Bruner, he insistently called attention, for instance, to the inner reality of the child's mind as a fundamental factor of significant learning. Describing MACOS implementation, Bruner points out the limitations of

inquiry activities when interpreted predominantly in terms of their empiricist dimensions versus the abstract discussion of "what might be" and the encouragement of the "personalization of knowledge":

A generation ago, the progressive movement urged that knowledge be related to the child's own experience and brought out of the realm of empty abstraction. A good idea was translated into banalities about the home, then the friendly postman and trashman, then the community and so on. It is a poor way to compete with the child's own dramas and mysteries. (Bruner, 1965a, p. 1014)

Inquiry procedures, that may certainly be very appropriate in several learning and teaching situations, should not, again, be narrowed to an alleged reproduction of an empiricist perception of the scientific method.

Many criticisms were made of the "new curricula" implemented in the 1960s and 1970s. Developmentalists focused on the inadequacy of the scientific orientation of curricula to the stage of children's intellectual development since the understanding of the principles and structures of the disciplines presupposes that formal operations are already in place (Kohlberg & Gilligan, 1979, p. 92). Ausubel (1978, pp. 60-61) criticized the overvaluing of direct experience as a means for learning

concepts that have to be systematically integrated within a hierarchical organization. Specific implications in teaching science, assuming that the mere application of the method is sufficient to think scientifically, are discussed and examined by Valente (1980, p.6).

Critiques reflect some diversity of interpretation: some found the Academic Reform orientation too demanding intellectually for young concrete thinkers; others rejected its actual inductivist emphasis upon concrete experience. In curricula, what remains thirty years after is still a reinforcement of the perception of a dependence of children's thinking on direct observation and experience, associated with the developmental description of the concrete operational stage--even if Bruner himself argued in favour of a more sensible balance and diversity of strategies (Bruner, 1960, pp. 21,22; 1965a, pp. 1013, 1014).

It is also worth stressing that Bruner insisted on teaching children "to learn how to learn" within the particular field of each discipline. Many curricula claiming his inspiration developed, however, programs to improve generic learning skills that would supposedly apply to any disciplinary content. This constitutes one among

many examples of the distortions that have frequently occurred when translating theories into curriculum projects.

Dewey and Progressivism in Curricula

The educational thinking of John Dewey and his curriculum theory are at the heart of any analysis of education in the 20th century. The persistence of his influence throughout the "swinging pendulum" of curricular change is better understood if we consider the comprehensiveness and philosophical breadth of his theoretical perspectives as well as the actual usefulness and innovative features of the practices he recommended at the time. It is also clear that Dewey's association with ideals of progress and social change play a considerable role in the influence and attractiveness of his educational theory up to the present time.¹³

Dewey's theorizing represents a conceptual transition between the main educational ideas that emerged in the late 19th century and the further development and re-elaboration of such theories throughout the 20th century. He transformed and informed the way these ways were

interpreted and applied in the future. In an analysis of the evolution of curriculum ideas in the 19th and 20th centuries, Kliebard (1982) identifies three major tendencies opposed to the humanists' orientation (which were associated with the maintenance of the traditional subject-matters representative of the Western cultural heritage): (1) the "developmentalists" who defended the idea that any curriculum should be built upon adjustment to the natural development of the child; (2) the "social efficiency" movement, influenced by the successful processes of industrial management, focussed on the importance of developing scientific techniques of teaching, accurate standardized tests and careful supervision, in order to ensure the functional success of education; (3) the "social meliorists" who viewed education and schools as major forces to promote social change and justice, by developing humanitarian approaches to social problems.

Dewey's educational theory integrated and reformulated some concepts coming from those different views. The eclectic and reinterpetive dimensions of Dewey's thought contributed to the diversity of interpretations and sometimes distortions that can be found in curriculum

reforms conducted on the basis of his principles, often associated with the general label of "progressive education":

Dewey found himself using the same language as his contemporaries, but he generally meant something considerably different. . . . He was not so much a central figure in one or another of these groups as he was someone who synthesized and reinterpreted certain of their ideas and, consequently, he became identified in a perverse way with practically all of them. . . . His actual influence on the schools of the nation has been seriously overestimated or distorted grossly. It was Dewey's fate to become identified with a vague, essentially undefinable, entity called progressive education, an inchoate mixture of diverse and often contradictory reforms. (Kliebard, 1982, pp. 22,23)

The basic principles of Dewey's theory which have provided a philosophical framework to the conception of the child as a concrete thinker, and which remained influential through various curriculum interpretations and implementations, are identified and examined in the next section.

Theoretical Principles

The activity principle.

The concept of education as a process of growth in which the learner is perceived as an active agent is

central in Dewey's theory. Learning does not occur, he says, by means of passive reception of transmitted information. Only that knowledge one discovers through personal experience or by recreating others' experience is authentic knowledge, and so educationally worthwhile. Such a process of acquiring knowledge follows a "progressive" order, i.e. it leads to growth through sequential steps of increasing complexity and sophistication--from action to communicated meaning, from communication to rationally organized knowledge:

In its first estate, knowledge exists as the content of intelligent ability--power to do. . . . Then, this material is surcharged and deepened through communicated knowledge or information. Finally, it is enlarged and worked over into rationally or logically organized material. . . . The knowledge which comes first to persons, and that remains most deeply ingrained is knowledge of "how to do".
(Dewey, 1966, p. 184)

This assumption implies both an emphasis on activity as a necessary starting point for the "progressive" process of knowledge to occur and the intimate relation between meaningful learning and practical action--"knowledge of how to do".

The activity principle, in Dewey's view, applies to all stages of human life and not only to childhood. Education

is growth, he says, and growth is a lifelong process. Nevertheless, Dewey emphasizes its critical role in early childhood. Having defined the concept of plasticity as "the specific adaptability of an immature creature for growth" (1966, p. 44), he points out the particular importance of early childhood education--and the related role of activity--in the orientation of the whole process of growth:

Normal child and normal adult alike. . . are engaged in growing. The difference between them is not between growth and non growth but between the modes of growth appropriate to different conditions. . . We must strike while the iron is hot. . . . More than we imagine, the ways in which the tendencies of early childhood are treated fix fundamental dispositions and condition the turn taken by powers that show themselves. (Dewey, 1966, pp. 50,116)

Dewey's insistence on activity as a condition for learning is associated in current curriculum documents with the perception of the child as an "active learner".

The utility principle.

Another relevant assumption within Dewey's theory of education, also influential in curriculum up to the present time, is the utilitarian conception of meaningful activity. The utility principle is closely linked to the activity principle. According to Dewey, the meaningfulness of an

activity depends upon its utility as perceived by the agent. Thought engages in action as much as it is intended to pursue a utilitarian purpose, a practical outcome, a solution to a real problem: "Thought or reflection. . . is the discernment of the relation between what we try to do and what happens in consequence" (Dewey, 1966, p. 144). Meaningful and relevant activities in school presuppose the application to concrete situations implying a possibility of translation into the field of real life. School should then encourage learning through problem-solving activities which would unify and integrate the various areas of knowledge around problematic situations as they appear in real life.

Having defined education as a continuous process of growth where ends and means do not differ in nature, Dewey rejected educational activities designed for any remote purpose in the future. Utilitarian and immediate purposes should be always present when planning and developing curriculum. Dewey claimed that there is a necessary relation between knowledge acquisition and the solution of some kind of problem or question that affects the learner. Therefore he insisted on the development of school activities around real problems of the outside world that

would appear as important for children and whose solutions entailed a social utility:

To realize what an experience or empirical situation means we have to call to mind the sort of situation that presents itself outside of school; the sort of occupations that interest and engage activity in ordinary life. . . . Criteria for identifying "genuine problems" must include the relation to personal experience and engaging observation and action outside. (Dewey, 1966, pp. 154,155)

The study of remote events is not excluded from this perspective, so long as they will be connected with actual problems. Dewey says, for example, about history that it can be useful in education, but "the true starting point (of history) is always some present situation with its problems" (Dewey, 1966, p. 214). The essential point of education, according to Dewey, is to have genuine problems within genuine situations to deal with, to think about, to gather and organize information for structuring a response or a solution and, finally, to test the applicability of those solutions to the real situation one started with (Dewey, 1966, p. 163).

The democracy principle.

At the heart of Dewey's conception of school is the

intimate relation between education and society. Dewey believed that schools were at the time the critical social agencies for social change to occur, where justice and democracy should be efficiently promoted. Schools should then work, Dewey claimed, as "miniature communities", offering to children a social environment identical to the outside society but simplified, purified and balanced. Such a proposal implies that (1) the real environment is to be portrayed on a smaller scale and in a simpler format, as a miniature; that (2) such a miniature is not, however, a mere reproduction of the existing society but an improved one; and that (3) it should balance the interests of different groups and cultures within society.

Dewey defended such an organization of schools as miniature communities, engaged in developing socially useful activities, as beneficially affecting the whole educational process and interpersonal relations. A considerable effect on the development of democratic values, attitudes and social abilities of the students would be obtained by encouraging cooperation, discussion and free intercourse of ideas as a result of the organization of the school as a "miniature community":

The great thing to keep in mind, then, regarding the introduction into the school of various forms of active occupation, is that, through them, the entire spirit of the school is renewed. It has a chance to affiliate itself with life, to become the child's habitat, where he learns through directed living, instead of being only a place to learn lessons having an abstract and remote reference to some possible living to be done in the future. It gets a chance to be a miniature community, an embryonic society. (Dewey, 1964, pp. 302, 303)

According to Dewey, the fact that such a community is similar to the existing society but free from its economic pressures offers better opportunities for organizing learning and social education around useful activities such as for instance farming, gardening, cooking, etc. Within a school organized as a productive community children are expected naturally to develop social abilities and critical attitudes. "By providing them with instruments of effective self-direction" the school would guarantee the future improvement of "a larger society which is worthy, lovely and harmonious" (Dewey, 1899 p. 310).¹⁴

The promotion of ideals of education for democracy appear then linked to the development of concrete and productive activities requiring "hands-on" action, perceived as the more appropriate situations for cooperation and collective engagement to occur.

The scientific principle.

Dewey emphasized the role of science in education in three main dimensions: (1) as a means for understanding the recent transformations brought about at the time in industrial societies, (2) as an instrument for developing analytic reflection and critical thinking and (3) as a necessary factor in human progress.

Scientific methods of analysis should inform every area of human experience in order to ensure progress and amelioration of both individual and social life. The traditional dualism, science/humanities, should be overcome. Dewey defended the "restoration of the intimate connection of nature and humanity for it (science) viewed knowledge as the means of securing human progress and well-being" (Dewey, 1966, p. 288). Knowledge about people, their past, their literature, should be dealt with scientifically, "in such a technical way as the accumulation of physical details in science" (p. 290). Yet those subjects only gain sense by their contribution to clarify issues of the present time that were relevant to people's life. Within this perspective, he supported Spencer's claim that "science is the most valuable knowledge" to be learned ¹⁵, but he noted that it was not

sufficient to teach science as a transmissible subject-matter or as the simple training in the manipulatory skills of laboratory apparatus. In learning in such a fashion, children would merely "learn a science instead of learning the scientific way of treating the familiar material of ordinary experience" (Dewey, 1966, p. 220). It would, then, be necessary that the analytic modes of discovery associated with natural sciences should apply to the learning of any area of knowledge. Scientific reasoning, in a perfected logical form, should be embedded in real life problems and in occupations of social interest. On the other hand, the importance of science in education is, in Dewey's theory, associated with its function in promoting human progress. This view is consistent with the optimistic view that was current at the turn of the century, mainly growing from the belief of the 19th century positivists in the increasing power of science in promoting human progress:

[Science] has brought with it an established conviction of the possibility of control of nature in the interest of mankind and thus had led men to look to the future instead of the past. The coincidence of the ideal of progress with the advance of science is not a mere coincidence. Before this advance men placed the golden age in remote antiquity. Now they face the future with a firm belief that intelligence properly used can do

away with evils once thought inevitable. To subjugate devastating disease is no longer a dream; the hope of abolishing poverty is not utopian. Science has familiarized men with the idea of development, taking effect practically in persistent gradual amelioration of the estate of our common humanity. The problem of an educational use of science is then to create an intelligence pregnant with the belief in the possibility of the direction of human affairs by itself. The method of science engrained through education in habit means emancipation from rule of thumb and from the routine generated by rule of thumb procedures. (Dewey, 1966, pp. 224,225)

The Translation into Curriculum

It is commonplace in educational and curriculum writing to assert that Dewey has been frequently misinterpreted either by overemphasis on particular aspects of his thinking or by ignoring the balance between extremes that he cautiously recommended. In fact, it is somehow difficult to make clear what is properly Deweyan in the complex process of his influence in curricula throughout the present century. It seems important to identify some peculiarities of that process before analyzing the major translations of his thought into curriculum discourse:

1. Dewey wrote and worked as a committed educator, i.e. he did not mean to simply produce a theoretical reflection on education, he intended to promote and to support actual significant changes in educational institutions and

practice.

2. The changes Dewey was looking for were embedded in a particular time and national context--influenced by the specific conceptions of society and progress of the transition to, and first decades of, the 20th century and having in mind the problems of a rapidly expanding industrialized, powerful, wealthy and somewhat violent society.

3. As a consequence, his writing was tendentially based on dichotomies which were particularly meaningful at the time: progress versus tradition, experience versus transmission, utility versus empty academism, etc.

The translation of Dewey's principles into curriculum has remained surprisingly insensitive to the above conditions. Progressive discourse is still phrased in much the same terms without accounting for the fact that almost another century is gone and many other transformations and conflicts have occurred both in societies and in education. What, for example, is the present meaning of traditional and progressive? Or how can one retain belief in the school as the privileged agency for changing society more than eighty years after Dewey's early theorizing and when the relations between school and society have become so

much more complex? The power and value of Dewey's ideas are educationally alive and valuable but educators and curriculum planners should consider more carefully the risks of anachronism and ineffectiveness when proceeding to simplistic and unexamined translations. It seems, however, that what happens more commonly today in curricula is a kind of reassertion of Dewey's assumptions as taken-for-granted truths and necessarily linked to any view of education which claims to be progressive and innovative.¹⁶ From the principles discussed above come the following ideas about the learner, that can be identified, for example, in the curriculum documents analyzed in Chapter One, which actually contribute to the passive reproduction of the prevalent perception of the child as a concrete thinker.

The child as an active learner.

Dewey's description of the "progressive" development of learning, defining "knowing how to do" as the first necessary step in the process of knowledge acquisition, gives rise to a particular and somehow restricted notion of active learning. The uncontroversial assumption that learning is always an active process and the controversial

presupposition that such activity occurs dominantly or exclusively "by doing", appear in curriculum documents as practically interchangeable. Consequently, curriculum documents multiply recommendations for experimental activities and concrete tasks--curiously along with lists of theoretical topics that remain almost unchanged through several reforms.¹⁷

Children should manipulate materials before dealing with any kind of abstraction or reflection; they should explore physically the local environment in order to understand "themselves and the world"; they should learn things about the local community necessarily prior to knowing about different worlds and peoples. These activities are assumed to be the most, some would say the only, appropriate and meaningful ways of learning in an active way. The association with the Piagetian description of children's stage of concrete operations appears as a natural encounter of perceptions about the mode of operating of children's minds, even if the respective theoretical frameworks are different.

The child as a problem solver.

According to Dewey, it is the utility of a given

activity for a concrete purpose that makes it meaningful for children. Learning occurs by presenting the learners with purposeful activities "by whose outcome one is affected" (Dewey, 1966, p. 134).

The circular process of problem-solving strategies--from real problems of life to useful solutions for real life, through experience and reflection--is central in Dewey's philosophy of education. Its influence in curricula appears at various levels: (1) in the emphasis of most curricular areas on the study of the surrounding reality of the student as the supposed field of "genuine" problems; (2) in the frequent search for practical results of learning activities in different disciplines as a mode of direct and useful intervention in society; (3) in the recommendations for developing interdisciplinary projects centered around real problems. The development of problem-solving strategies has also been associated with the "teaching for thinking" movements and is also generally recommended in curricula as a basis for an effective preparation for life versus a sterile--i.e. without practical immediate outcomes--acquisition of knowledge or cultural information.

The equation of genuine problems with the realm of real

life and practical usefulness contributes to reinforcing the perception of the concreteness of the children's thinking. As much as useful, practical, real and observable situations are thought to deserve educational prominence, and are assumed to be of greater relevance for the learner, the emphasis on an over-empiricist approach to teaching and learning is reinforced.

The child as a community member.

The implications of the democracy principle in curriculum documents are less evident than the previous ones, in terms of their immediate transposition. The recommendation for implementing "miniature communities" with their autonomous organization is not current in curriculum documents, given the difficulty of adjusting such a model to the actual dimensions and constraints of the regular school systems. Schools inspired more or less directly by Dewey's proposals exist in some particular projects related to the progressive education movement, or in experiences with the purpose of fostering moral development as the "just communities" implemented by Kohlberg and his associates in Massachusetts.¹⁸

The "democracy principle" is however one of the aspects

of Dewey's theory which has been very influential in curriculum ideas and values, namely in what is presently labelled "education for citizenship" or "education for social and personal development" (19). This orientation is predominantly translated in terms of (1) the emphasis on the development of social skills, values and attitudes required for living in a democracy and (2) the concern with the preparation of students for understanding and intervening consciously as members of their society.

Curriculum documents predominantly promote such goals by recommending some procedures in class such as dialogue, open discussion, participant decision-making, group work, etc. It is also promoted by constantly directing activities and studies towards the actual social environment of the student which, being concrete and directly observable, is assumed to be the more appropriate and meaningful setting for the social education of children who are thought to perceive the world in concrete terms.

The child as a discoverer.

Dewey believed that the scientific method provided the model for reflective thinking about experience and life which constitute, in his view, the essentials of learning,

as described above. The translation of such principle in curricula is usually narrowed in a simplistic way: (1) inquiry activities are always preferred as more active and significant than any other form of learning and (2) they are conceived predominantly as a normative sequence of tasks, ideally developed in the local environment, that tentatively portray the scientific research procedures--observing, raising questions and asking for information, exploring and experiencing, concluding and generalizing.

One consequence of this emphasis is the corresponding neglect of modes of learning other than inquiry, modes that are negatively connotated with "traditional" teaching. Discovery and inquiry can, in my view, operate in many significant ways, not necessarily limited to observation and experience. Also, of course, inquiry routines can become meaningless. Dewey surely valued scientific inquiry as a privileged means for understanding reality. But he also emphasized the need to attribute personal significance--always associated with practical utility, in his view--to the discovery process, or it would risk becoming a meaningless technique, "a laboratory ritual" (Dewey, 1966, p. 222). Curriculum documents refer predominantly to the methodological dimension of inquiry

over its significance to the subject. It is apparently assumed that a "natural" link exists between meaningfulness and the pursuit of any discovery activity.

Deweyan concepts related to concrete thinking:
progressive education, growth, active learning.

As with Piaget's theory, some concepts defined by Dewey within his theoretical framework are ambiguously used in curriculum discourse, quite often in terms of common language, contributing to an acritical representation of the child as a concrete thinker.

The notion of "progressive" is one of the cases where simplification and conceptual ambiguity occurs. It appears currently as a wide and vague conception associated with a positive value judgement: it is intended to mean "correct" and "innovative" processes of teaching versus whatever is seen as inappropriate and traditional, without a precise operationalization of those concepts.

In Dewey's conceptualization the term "progressive" had several meanings:

1 . "Progressive" education--as opposed to conservative--meant a constant process of personal reconstruction of experience versus the mere reception of

"outside" information: "In its contrast with the ideas both of unfolding of latent powers from within and of the formation from without, whether by physical nature or by the cultural products of the past, the ideal of growth results in the conception that education is a constant reorganizing or reconstructing of experience" (1966,p.76).

2 . Such a process of reconstruction is "progressive" since it follows a "progressive" order, evolving through sequential and integrative steps--from learning how to do to communicating meaning and then to reflection (Dewey, 1966, p. 184).

3 . An education of this kind would also be "progressive" insofar as it would promote the progress (meaning the amelioration, the improvement of potentialities) of both the individuals and "the society of which they will be the constituents" (Dewey, 1966, p.79).

Dewey meant by "progressive" then (1) a particular definition of education as reconstruction of experience, (2) a logical sequence of steps to be followed in the learning process and (3) positive expected effects of such an educational process on the individual and on the society. In curriculum writing the idea of progressive education appears considerably more simplified and

imprecise.

Dewey closely connected such a conception of education with the idea of growth: on the one hand he viewed education as a continuous process of growth where ends and means were neither separate nor qualitatively different; on the other hand the nature of education would consist exactly in the support and promotion of growth. The metaphorical use of the concept within Dewey's theorizing is basically associated with the emphasis on the continuity of the educational process, similar to a natural process, and also with its constructivist dimension.

Education is growth since it can neither be provoked from the outside nor simply happen inside the subject; it is a process of interaction where the learner "grows" by constantly reconstructing experience and information in a personally useful way. Such a view opposes any definition of determined ends for education: "The educational process has no end beyond itself; it is its own end" (Dewey, 1966, p.50). In curriculum writing "to promote growth" is equated to promoting development, implying a mixed perception of Dewey's definition and of the more recent descriptions of the child's cognitive development which are said to occur spontaneously, preceding and conditioning

the shape and pace of the educational process.

The concept of activity, particularly in the sense of "active learning", associated with the previous ones, became the more pervasive aspect of Dewey's thought in curriculum theorizing. The meaning of the concept within Dewey's writing was analyzed in the section on the activity principle. The overuse of the expression in curriculum documents led to its conversion into a slogan, which risks meaning very little if it is not appropriately redefined for the present time. It has been used as a kind of ritual repetition of an idea which once was novel in the early 20th century. The educational knowledge available in the last decade of this century suggests that we might sensibly reexamine the notion that "active engagement is a necessary condition for learning since authentic learning is always active". But learning can occur in many ways: when one sits reading poetry or informative texts as well as when one develops an activity of empirical inquiry. It is the meaning of "active" that has to be clarified and reexamined, instead of simply equating it to concrete action and direct observation or experience. That interpretation made sense at the time and under the conditions of Dewey's theorizing, but not self-evidently so

today. As Jerome Bruner puts it,

Dewey was writing with an eye to the sterility and rigidity of school instruction in the 1890s . . . His emphasis upon the importance of direct experience and social action was an implied critique of the empty formalism that did little to relate learning to the child's world of experience. Dewey did mighty service in inspiring a correction. But an excess of virtue is vice. We, in our day, are reconsidering education against the background of such an excess. (Bruner, 1964, p. 115)

The Interplay of Theories in Curriculum and Practice

The consideration of the above theoretical perspectives compared to the actual predominant conceptions appearing in curriculum and teaching practices reveals the particular way in which such influences operate. The first observation is that there are some connections among the theories that reinforce each other. This is the case for the role attributed to action in Dewey's and Piaget's writing: Piagetian theorizing elaborates in some sense Dewey's idea of active learning. They correspond, however, to different frames of analysis: for Dewey the reconstruction of knowledge through action is to be understood within a pragmatic conception of the world and society with a consequent emphasis on practicality and usefulness of knowledge; Piaget writes from an epistemological point of view, describing action as the

mental activity of reinterpretation and reconstruction of reality, the central element of knowing which explains cognitive development, with little consideration of practical purposes.

In other aspects it is the difference of aims that emerges in respect to the same concept: the importance of the scientific method in promoting learning corresponds to clearly different purposes in Dewey and Bruner: social progress, individual growth and practical well being for all in a democratic society, and the pursuit of academic excellence and high standards of intellectual achievement, respectively.

Curriculum discourse, however, collapses various levels of interpretation and diverse theoretical frames of analysis into a number of assumptions that are presented as valuable by themselves without sufficient consideration of their ultimate justification. Such assumptions and concepts have become uncontentious in curriculum writing and are persistently invoked as educational paradigms allegedly supporting curriculum options and teaching practices.

Conclusion

The representation of the child as a concrete thinker constitutes one example among others of this process of assimilation, combination and simplification of theoretical views, as it was documented throughout this chapter. In this particular example, concepts coming from Piaget, Bruner and Dewey, though not capturing the whole meaning of their respective theories, have been associated, simplified and often distorted, in the current educational perception of the child as a "concrete thinker". Such a perception is currently translated into controversial curriculum assumptions and correspondent prevailing practices: (1) the role of action in learning is assimilated to concrete activity--"learning by doing"--, (2) the acquisition of knowledge is seen as dependent on the immediate environment--"acting on the environment"--(3) the process of learning is equated to the processes of inquiry--"learning by discovery".

NOTES

1 Assimilation occurs when the subject integrates any new element into an existing structure; adaptation happens when a structure is modified in order to adjust to reality. In both processes the transformation occurs by means of a process of equilibration, i.e. the constant search for equilibrium of the structures of the subject faced with discrepancy between reality and previous schemata.

2 The participants in this debate, organized in Paris by the "Centre Royaumont pour une science de l'homme" included specialists and researchers in the fields of Epistemology, Psychology, Linguistics, and also from more specialized areas such as Artificial Intelligence, Neurobiology, Etology, Anthropology of Knowledge. The purpose was to provide a unique opportunity to have the founders of Genetic Epistemology and Generative Linguistics--Jean Piaget and Noam Chomsky--discuss with each other and the other scientists their respective constructivist view of knowledge and inatist perspective of language acquisition. Jacques Monod, Seymour Papert, Barbel Inhelder and Massimo Piattelli-Palmarini were some of the participants in this outstanding discussion.

3 Equilibration or self-regulation plays a fundamental role in the whole Piagetian theory of cognitive development, based upon the central assumption that "in the act of knowing, the subject is active". Equilibration refers to both the interaction among the three other factors and to the regulatory activity of the subject: when faced with external disturbance he or she "will react in order to compensate and consequently will tend towards equilibrium" (Piaget, 1964, p.281).

4 Reversibility and transformation condition operational thought. As Piaget puts it, "operational reversibility is a model of an equilibrated system where a transformation in one direction is compensated by a transformation in the other direction" (1964, p.281).

5 For examples of this orientation in curricula see descriptions of documents in Chapter One.

6 "Promoting development" has become an educational slogan which is never discussed but whose meaning remains unclear

and increasingly empty. It is however part of the established educational orthodoxy referred to in Chapter Two--the set of ideas whose criticism is currently rejected within the professional community, because arbitrarily connotated with non-progressive views.

7 The studies within fields of developmental psychology other than those of cognitive psychology commonly translate the Piagetian description of development of logical reasoning to the affective, moral or social domains. This is the case, for example, in the studies of Martin Hoffman (1975) on affective development, in the theory of moral development of Lawrence Kohlberg (1979, 1983) and in the research on the development of social cognition and social abilities of John Flavell (1981) and Robert Selman (1977) among others. Moral development in Kohlberg's writing, for example, is in fact a theory of moral reasoning, "a strictly cognitive conception of moral development as if it was the whole process" as Richard Peters pointed out in a critique to Kohlberg's neglecting the affective and motivational components of morality (Peters, 1981).

8 The fact that Piaget did not limit his concepts of experience and action on the environment to external and concrete reality does not mean ignore the fact that he frequently emphasized such dimensions as associated with examples of active learning, leading to the current simplification of those ideas in education.

9 Examples of recommendations for practice were documented in Chapter One.

10 Among the projects developed within the Academic Reform Movement, some became particularly influential, such as the BSCS (Biological Science Education Studies) and SAPA (Science--A Process Approach) in the United States or the Nuffield Foundation Projects in the United Kingdom. In the area of Social Studies, more than 50 projects were implemented in the early 1960s. MACOS, (1965b), centered on the social discipline of Anthropology (Man: A Course Of Study) played a significant role within the movement.

11 This would later become one of the areas of controversy between Bruner and Piaget. Elkind notes that "Piaget finds incomprehensible Harvard psychologist Jerome Bruner's famous hypothesis to the effect that 'any subject can be taught effectively in some honest form to any child at any

stage of development" (Elkind, 1977).

12 Bruner's spiral curriculum is, in his words, supported by the developmental characterization of the stages. This support is, however, understood as an orientation to adjust teaching strategies to the particular modes of viewing the world at different ages not to select or exclude content or concepts. Developmentalists interpret the theory differently, relating the nature and level of abstraction of the content to the mental processes that are or are not in place. They emphasize the hierarchy of the stages, Bruner, though having himself established a sequence of developmental stages, is more concerned with the qualitative specificity of children's understanding.

13 The particular form of presentation of Dewey's ideas contributes to the acceptance of his arguments by the reader: he usually organizes his arguments in a dialectical mode, presenting educational issues in terms of opposite views, which enhances the attractiveness of his alternative proposals. In addition, it is interesting that the very moderation and balance of his conclusions seem to lead the reader to approve the radicalness of the principles partly because they are accompanied by the sensible recognition of some actual limitations. It applies, for example, to the study of distant topics in space or time, accepted as an exception to the emphasis on the actual environment, since it will be useful for the understanding of that same environment. "The true starting point of History is always some present situation with its problems" (Dewey, 1966, p. 214).

14 The optimistic belief in the power of education for changing society is one of the aspects that reflect the influence of the "social meliorists" movement in the late 19th century. See Kliebard, 1982, Education at the turn of the century: a crucible for curriculum change, Educational Researcher, January, p. 16-24.

15 See Spencer, Herbert, Second Essay, Intellectual Education, pp. 65-73.

16 As Cremin notes, "by the 1950s the more fundamental tenets of the progressives had become the conventional wisdom of American education. . . . the irony is that an age that has all but forgotten Dewey is still governed by his analytical categories" (Cremin, 1976, p. 19).

17 Elliot Eisner claimed in 1990 that the American schools organisation and structure has changed very little in spite of the amount of writing and research on curriculum change in the last decades: "I submit that the 4,000 school I attended 40 years ago is not fundamentally different, structurally and organizationally, from the high schools operating today". (Eisner, Who decides what schools teach?, Phi Delta Kappan, March 1990, p. 523).

18 See Kohlberg, L.(1975), The cognitive developmental approach to moral education, Phi Delta Kappan, June; and Reimer, J., Paolitto, D., and Hersh,R. (1983), Promoting Social Growth: from Piaget to Kohlberg. New York: Longman Inc.

19 Portuguese curriculum reform, for example, which is presently being implemented, includes from grade 1 to 9 a specific discipline named "Personal and Social Development" intended to foster moral values and civic attitudes corresponding to the defined goals of education at these levels (Ministério da Educação: Programas do Ensino Básico, Lisboa: 1991).

CHAPTER THREE

Criticisms of the Theories that Support the
Conception of the Child as a Concrete Thinker

The previous chapter shows how existing curricula assumptions incorporate, while often distorting, diverse theoretical contributes.

It is sometimes difficult to differentiate the theories from their actual interpretations in curriculum. Such a difficulty is often invoked to disregard theoretical problems in curriculum debates. I think that it is worthwhile to clarify these two levels in order to get a better understanding of educational issues and to improve the degree of discrimination of educational knowledge. In curriculum debates, it is not rare to find circular arguments that typically assume the correctness of some theories by systematically attributing their inadequacies in practice to distortions and misunderstandings. The theoretical debate on critical educational issues is, then, frequently impoverished and narrowed. This process has occurred with well known and influential theorists such as, for example, Dewey or Piaget.

It seems to me that theories themselves, as much as their translations into practice, are to be examined and debated if one wants to understand them critically, to assess their adequacy to curriculum and teaching, and to generate new developments within the field of education. Consequently, although the focus of this study is not on the theories themselves but on their actual applications to curriculum and educational practice, I have considered relevant to review, in the present Chapter, some major criticisms of the theoretical constructs themselves. By doing so, I intend (1) to get a picture of contemporary perceptions and reevaluations of long accepted theories and (2) to understand and clarify to what extent the diverse modes of interpretation or translation of theories into curriculum discourse consider or fail to consider some apparently damaging criticisms directed at those theories.

Critical Views of Piaget's
Theory of Development

The abundant literature on Piagetian theory will be selectively reviewed, focusing on the underlying representation of children's modes and abilities of

thinking, and the very conception of knowing and learning which is implied or presupposed in the theories. The significance of the critiques to the purposes of the present study, and the consequent emphasis on some authors, will be considered insofar as they contribute to clarify and/or to question the description of the child as a concrete operational thinker.

Expansion and Developments of the Theory

Piaget's theory of development has been under criticism for the last three decades within the fields of both developmental psychology and education. New developments have also occurred within developmental psychology itself as it is the case with the neo-Piagetian movement. The effects of such debates or recent developmental perspectives on educational practice and curriculum assumptions are, however, very limited. Curricula and official recommendations for teachers assume the core of Piagetian constructs as uncontroversial scientific supports, as has been described in Chapter One. Reviewing journals of Psychology and Education of the last fifteen years ¹ many empirical studies can be found going on within

the more traditional frame of Piagetian theory and taking little account of the debate developed about the theory in the last years. A significant number of such studies are designed to test or to deepen implications of the theory in particular areas (e.g. development of map-reading skills, of understanding of adults' economic needs, of representation of large scale environments, of role-taking abilities, etc.) and have been developed on the basis of the acceptance of the overall framework of cognitive development. Some of them, however, point out the need for some revision (Bluestein and Acredolo, 1979; Hazen, Lockman et al., 1978; Siegel, 1978). Some explicitly focus on new or alternative developments of particular areas within developmental theory (Andreucci, 1990; Jahoda, 1981; Kosslyn and Kagan, 1981; Paour, 1990). Nevertheless, the influence of such research in current curriculum writing and teachers' discourse remains very limited. On the other hand the developmental approach has expanded to other areas such as moral, social and affective domains by applying the interpretive structure of cognitive development (Kohlberg, 1975; Hoffman, 1975; Higgins, 1981; Selman, 1979).

Several developments of the theory have been pursued

before and after Piaget's death (1980) by his Genevian colleagues and by other researchers from Europe and North America, keeping the majority of the central theoretical principles unchanged and increasingly emphasizing the educational implications (Kamii & De Vries, 1980; Inhelder, Sinclair & Bovet, 1974; Duckworth, 1987, 1991). Many American psychologists and educators became enthusiastic followers of Piagetian theory and sincere believers in its positive effects on education, e.g. Norman Sprinthall and Ralph Mosher (1978). The theory was expanded to other dimensions of human behaviour, thought improvable through education: moral development, social development, affective development. "Development as the aim for education", the title of an article by Kohlberg and Mayer (1972) in the Harvard Educational Review, became an expression of the recognition of the central value of the developmental contribution to a kind of neo-progressive conception of education that would remain as a creed - and gradually as a slogan - for some generations of educators till the present time.

The "American Question" and the Nature of the Developmental Perspectives

The acceptance of Piagetian ideas in the North American educational community came relatively late compared to Europe.² It was, however, accompanied from the beginning by some controversy. For his followers, Piaget's ideas represented a great contribution to education mostly by emphasizing the role of the learner as the active constructor of his or her knowledge, echoing and reinforcing progressivist doctrine. Developmental theory appeared to offer to educators a scientific basis, justified by empirical research, and the establishment of alleged universal laws of development. The constructivist conception of knowledge-acquisition seemed very precisely to support learner-centered curricula and active methods of teaching. Reflecting this perception, David Elkind (1981) commented on the Piagetian role in American education in the following terms:

. . . it is only within the past decade that his writings have come to be fully appreciated in America. This was due, in part, to the fact that until fairly recently, only a few of his books had been translated into English. In addition, American psychology and education were not simply ready for Piaget until the fifties. Now, the ideas that Piaget has been advocating for more than 30 years

are regarded as exceedingly innovative and even as avant-garde. . . . Perhaps the most significant and widespread positive effect that Piaget had upon education is in the changing of attitudes on the part of teachers who have been exposed to his thinking. After becoming acquainted with Piaget's work, teachers can never again see children in quite the same way as they had before. (Elkind, 1981, pp. 158, 159)

The aspects Elkind was referring to as innovative and educationally worthwhile were basically the emphasis upon the learner as the active constructor of his or her knowledge and the discovery of the gradual emergence of the capacities required to learn according to a constant and adaptive interaction between nature and nurture, as Elkind had already emphasized in other writings (Elkind, 1967, 1971). Part of this appreciation was associated with the expected positive influence of Piagetian ideas in the curriculum reforms of the time--the New Academic Reform Movement--in terms of a better adjustment of teaching practices to the improvement of the capacity of children at different stages of their development.

Other psychologists and educators were more critical towards Piagetian theory of development, even among those who accepted the core of the theory and developed research studies in the field of cognitive development. At this point it is useful to note the divergence between Jean

Piaget and his collaborators in Geneva and some American researchers who replicated his experiments looking for some practical effects of the theory in education. This debate, labelled as "the American question" by Piaget himself during the lectures that he gave in New York, in 1967, (cited by Elkind, 1981, p. 158), turned on the alleged concern of American psychologists, particularly those in the behaviorist tradition, (1) to look for processes of "accelerating" development and (2) to investigate the possibility to "teach" the structures that should spontaneously result, Piaget says, from a natural process of interaction between the child and the everyday environment. The American question appeared in many cases associated with the interest of American educational researchers in promoting higher achievement and efficiency within the Academic Reform Movement, in spite of some implicit contradiction between the perspectives of the proponents of the reforms and the educational views of the Piagetians.³ Piagetians looked at the question as reflecting a "cultural divergence" between the European genetic epistemological perspective and the utilitarian American interpretation. The problem was not, however, that simple. The controversy did not come merely from the

emphasis on "acceleration" or on "teaching the structures" that was pursued by some researchers in North America. Many other studies were intended to check the validity of the Piagetian description of intellectual development with respect to the presence or lack of specific features and particular operations in children's thinking, and seriously questioned the theory or aspects of it. That was the case, for example, with the notions of egocentrism and perspective, or with the emergence of the operations such as conservation and seriation, as will be described below. Piagetians and critics have not reached many areas of agreement and the bias associated with the American question worked sometimes as an obstacle to a more critical examination of the diverging positions.

Some criticisms came from researchers, educators and psychologists, engaged in the field of developmental psychology itself. Piaget's stage model is one of the controversial issues within developmental research, considered by some as one area in serious trouble (Flavell, 1978, p. 187). It may lead to an over-emphasis on what is lacking instead of looking at what is in place in children's thinking: "it will naturally be very important to try to discover the early competencies that serve as

building blocks for subsequent acquisitions rather than merely cataloguing the young child's metacognitive lacks and inadequacies" (Flavell, 1977, p.169). Flavell also calls attention to the limitations of developmentalist perspectives in themselves, when not appropriately balanced with nondevelopmentalist views of cognitive issues:

It is extremely tempting for most developmentalists to see the passage from birth to adulthood as a Horatio Alger-like increasing cognitive fortune, whereby growing older means growing wiser, more competent, and less prone to the follies of youth. For the nondevelopmentalist, by contrast, adults are not consequences of a grand and inexorable perfecting process. . . . Thus, where cognitive developmentalists look for sophisticated formal operational level thought, nondevelopmentalists find an ever-growing list of intellectual shortcomings. . . . Far from the essentially rational paragon seen emerging by the contemporary cognitive developmentalist, the adult is viewed as a creature whose most impressive intellectual triumphs are matched by equally impressive failures. The failures, moreover, are not simply regressions to childish modes of infancy; indeed, many are part and parcel of the same adult strategies that have been developing and becoming more pervasive over the lifespan. (Flavell, 1981, p. 310)

Flavell's criticism calls for a further consideration of the structural nature of the developmental models based on Piagetian theory. Structuralism as a method of analysis within the fields of social sciences, psychology and education has provided an alternative to the mechanistic

interpretations of behaviorism. It implies, however, a set of problems mostly related to the over-simplification of human and social reality. In a critique of Kohlberg's structural theory of morality, closely linked to Piagetian constructivism, Sullivan (1977) describes the components of Piaget's and Kohlberg's structural conceptions of cognition and their common affiliation in Kantian philosophy. Following Dagenais (1972), he defines a structure as "a system of transformations that, as a system, implies lawfulness of organisation independent of the elements that compose it" (Sullivan, 1977, p. 272). It is characterized, Sullivan says, "by it being a totality. . . by multiple transformations (stages) interdependent with each other and with the totality. . . and that is self-regulating, tending toward the conservation and enhancement of the system itself on the one hand, and closedness toward all other systems on the other" (p. 272). Although referring centrally to Kohlberg's theory, the analysis of Sullivan is quite illuminating of some of the problems brought about by the Piagetian interpretation of cognitive development in terms of its insensitiveness to the dialectic and tensions involved in the complexity of the process of learning and knowing. Sullivan argues that the

structural conception of morality, as well as the related theory of cognition,

tends to create dichotomies when treating the relationships between thought and action, form and content, abstract and concrete. . . tends to separate the "emotional" life from the "intellectual" life. . . the emotions are relegated to an epiphenomenal status in understanding and in morality. (Sullivan, pp. 272, 273).

As a result of the interest in the development of abstract and universal laws, cognitive-developmentalists disregard the role of both the "individual unique story" and the "specific cultural story":

It is explicitly clear from Piaget's (1971) own writing that he has an aversion to the concrete and contextual when he theorizes. . . . I am not arguing that there is no merit in this approach; rather I am trying to point to its one-sidedness--its one-dimensionality. . . . I would like to entertain the possibility that the issues of form/ content, abstract/concrete, and thought/action are all related. . . . [For Kohlberg] increasingly higher stages are more abstract, and as we approach the ultimate ideal (stage 6) we achieve a purer form of the moral. So it would follow that the lower stages are more content oriented and more concrete. . . . In the light of his theoretical thrust, abstract and formal as moral structures are more valued. Here Kohlberg follows Piaget and therefore shares some of Piaget's inherent Kantian formulations. (Sullivan, 1977, pp. 275, 276)

Citing Turner (1973, p.354), Sullivan notes that Piaget always associates the use of concrete imagery with less

mature stages of thought, and development is, in Piaget's view, intimately related to increasing abstraction. This abstract formalism, opposed for example to the phenomenologists' emphasis on the importance of the "concrete, idiosyncratic, and contextual", ignores the dialectical dimensions and often ambiguity of human thinking and acting, and constitutes "a systematic weakness in cognitive-developmental structuralism" (Sullivan, 1977, pp. 275, 276).

Analyzing the interactions between social and intellectual development, from a cognitivist point of view, Gustav Jahoda (1984) refers to the inaccuracy of collapsing any kind of knowledge, particularly knowledge about socio-economical areas, into the universal structures of cognitive development as initially defined by Piaget. Having noted the role of interpersonal components in social knowledge, Jahoda also points out the importance of educational background and previous information to reasoning about socio-economic systems, which Piaget himself would later recognize in part:

While (Piaget) had originally assumed that all necessary information is available to everyone within their environments, Piaget later (1974) conceded that at least as far as formal operations are concerned, the achievement of that level will be dependent upon educational and occupational

background. This means that individuals are likely to function at the formal operational level in certain spheres familiar to them, but not necessarily in others. (Jahoda, 1984, p. 87).

The Early Stages: Do Tasks Make a Difference?

Particular aspects of Piagetian theory have been reexamined by developmental researchers in a variety of areas, calling attention to the presence of capacities for thinking in young children that were assumed as non-existent at that stage according to Piagetian theory. Rochel Gelman conducted a series of influential studies investigating abilities of young children's thought that were supposedly lacking according to the Piagetian descriptions of the stages (Gelman, 1972, 1978, 1981; Gelman & Shatz, 1977; Gelman & Gallistel, 1978). Reporting a study with Shatz (1977), where they observed 4 years olds' speech with adults and with younger children, Gelman concluded that children in preschool who were presumed to be egocentric speakers were in fact capable of "adjusting their speech in accordance with their perception or conception of their listeners' different abilities and needs" (1981, p. 180). With respect to the concept of number and the alleged inability to deal with the abstractness of the counting operations, Gelman also found

that preschool children apply the principles that govern counting, as for example the "stable order principle"⁴ : "They may not apply them perfectly, the set sizes to which they are applied may be limited, and their count lists may differ from the conventional list, but nevertheless the principles are used" (Gelman, 1981, p. 181). The observations of "errors" in children's counting, such as inventing their own list of numbers, can be compared, according to Gelman, to the "errors" of young language learners (e.g. "runned, footes"): both result from a rule governed logic built upon the child's use of abstract norms in speaking as well as in counting.

Another problem for developmental descriptions of the stages derives from the Piagetian methodology for testing the cognitive abilities of the subjects, i.e. the influence of the nature and form of the tasks themselves on the observed results (Andreucci, 1990; Donaldson, 1982; Gelman, 1981; McGarrigle and Donaldson, 1974). With respect to the operations--such as seriation, classification, conservation--that, in Piagetian terms, characterize operational thought, young children typically fail in the "classical" tasks used by Piaget and his collaborators. These are generally characterized by a

formal question-answer model in decontextualized situations, relying largely on the interpretation of adults' and children's talk. The same applies to other experiments, as the perspective-taking tasks designed to investigate the egocentrism of the child.

A number of researchers have replicated these tasks in different contexts with remarkably improved performances and some of them will be examined here as critical to the clarification of children's thinking capacities. Gelman (1972) and Bullock and Gelman (1977) worked out the "magic task" as an adapted version of the "conservation task" where the questions were integrated in a game-format familiar to children, with winners and losers.⁵ They concluded that young children, having previously failed the classical task, showed in the magic task that they knew well that "lengthening or shortening an array does not alter the numerical value of a display" (Gelman, 1981, p. 163).

Hughes and Donaldson (1983) and Donaldson (1983) also developed an adaptation of the Piagetian "mountain task" for testing the understanding of others' perspectives. They labelled their version the "policeman task". As in the previous example, it consisted basically of the same

structural elements but contextualized in a situation which was meaningful for young children.⁶ According to Donaldson (1983, p. 230) it is "the interplay of motives and intentions (in the policeman task)" that allows children to perform intellectually very effectively, which they typically failed to do in a "disembedded" task such as the classical mountain experiment. The tasks gain "human sense" by introducing the motives and intentions of the characters.⁷ This makes the task

an entirely comprehensible situation. This ability to understand and identify with another's feelings and intentions is in many ways the exact opposite of egocentrism. (Hughes and Donaldson, 1983, p. 253)

This observation also conflicts with some descriptions of social and interpersonal development as studied by Robert Selman (1979) and Jane Loevinger (1979), among others.⁸ According to these authors it is expected that consideration of inner feelings and the intentions of others only emerges in later stages. In Loevinger's (1979) description of early development, external features are predominant in children's understanding of others' behaviors (p. 114).

Donaldson (1980, 1983) has also argued that the alleged inability of children to perform some cognitive tasks is

often a product not of children's cognitive incapacity, but of the confusing structure of the tasks themselves--e.g., in one case, "the perplexing features of the apparatus." (Donaldson, 1983, p. 233).

Whatever the explanation, what is relevant for the present study is that the conception of the child as a limited thinker derived from the developmental description and based upon the formal Piagetian experiments is clearly challenged by the above studies, even though they do not guarantee any alternative generalization. As Egan (1983) notes, "it is becoming clear that the ability to perform a particular task is a poor predictor of a child's ability to perform other tasks with the same logical structure in different circumstances with different materials" (Egan, 1983, p. 87)

Focusing on the potentialities of children's thinking must not, however, be viewed as encouraging an overemphasis on the power of children's minds or the denial of the qualitative changes of their thinking during development. As Gelman puts it:

Some might take the recent demonstrations of early cognitive abilities to mean that preschoolers are miniature adults. . . . What I do want people to realize is that we have been too much inclined to reach conclusions about what preschoolers cannot do,

compared with what their older cohorts can do on a variety of tasks. We must cease to approach young children with only those tasks that are designed for older children. The time has come for us to turn our attention to what young children can do as well as to what they cannot do. (Gelman, 1981, p. 164)

Logical Consistency and Educational Implications

Some of the essential concepts of the Piagetian description of children's cognitive development, such as egocentrism, realism and animism, appear as necessarily associated with each other. "Development" is thus interpreted as a result of the progressive differentiation and clarification from an early stage of confusion. On the other hand, the logic of development is built upon an underlying comparison with the final stage--the adult's way of thinking--and conceived in terms of the elements lacking in the prior stages. Children's thought is thus interpreted from the point of view of the adult. In addition, the whole complexity of cognition is collapsed to the dimension of logical-mathematical reasoning from which the description of cognitive development is derived.

Several researchers have criticized Piaget's work in terms of logical accuracy (Egan, 1983; Hunt, 1969; Philips, 1975; Siegel and Brainerd, 1978). A very detailed and careful examination of the inner consistency of the theory

which accurately considers some of the above issues has been developed by Sugarman (1987). She also analyzes extensively those works of Piaget which bear on the description of the concrete operational thinker.

Following her earlier studies of Piaget's work (1983), Susan Sugarman developed in Piaget's Construction of the Child's Reality (1987) a focussed examination and critique of six central works of Jean Piaget which are among those that more directly relate to the discussion undertaken in the present study with respect to the current educational perception of children's thinking: The Child's Conception of the World, The Language and Thought of the Child, The Moral Judgement of the Child, The Child's Conception of Number, The Construction of Reality in the Child and The Origins of Intelligence in Children.⁹

Sugarman's analysis concentrates on the theoretical framework of Piaget's work assuming that "his claims are empirically accurate" (pp. 3,4). Egocentrism, in the various senses defined by Piaget, particularly in terms of children's egocentric thought, is one of the central focuses of Sugarman's analysis:

In Piaget's customary phrasing, the question is whether children engage in "egocentric" thought. Piaget. . . came to use the term "egocentric" in

many different senses. In the usual sense, the word refers to the notion that children neither adequately distinguish between self and world, nor take account of other people's points of view. Egocentrism not only was important in its own right, but had immediate and far-reaching implications for the whole of children's cognitive life. According to Piaget, the ability to appreciate other points of view and to separate self from reality was necessary for an "objective" conception of the world as well as for logical thinking, successful communication, and the development of morality. (Sugarman, 1989, p. 6)

Egocentrism is, according to Piaget, the basis of children's animism, realism and magic, insofar as all these features of children's thinking result from the undifferentiation and absolutism of the child's view of the world. Sugarman examines critically the Piagetian "undifferentiation thesis" and "absolutist thesis" ¹⁰ which she claims are inconsistent. In fact, the undifferentiation thesis implies denying the child's awareness of the self as autonomous from external reality; but the absolutist thesis defends the claim that the child takes his or her point of view as absolute. These two principles treated by Piaget as intertranslatable are in Sugarman's view logically incompatible:

It would seem that to take one's point of view as absolute presupposes that one recognizes that one has a point of view, which presupposes, in turn, that one recognizes a self to which this point of view is attached. I would not talk about my point of view unless I had the idea that something could be

"mine", and "mine" makes sense only if there is "me". Thus, we find Piaget presupposing the existence of a self through the absolutist thesis while denying it through the undifferentiation thesis. (Sugarman, 1987, p. 25)

Other variants of the same kind of contradiction appear associated with the "egocentric" notions of subjectivity in children's thinking: the fact that children ignore the subjectivity of their views does not imply that they believe themselves to be the center of the world. "It follows virtually by Piaget's own definition that children do not believe themselves to be anything, because they do not know a self about whom to have beliefs" (Sugarman, 1987, p. 26). The point is that, because children do not conceive the self as adults do, this does not mean they do not differentiate self and world. As Sugarman points it, they have "a" concept of self which is not reducible to a typical adults' concept, but "may figure integrally in magic and animism. Compatible with this idea is the notion that this self might not know its proper boundaries. It might feel its influence where it should not (magic), and it might see its reflection where in fact none exists (animism)." (Sugarman, 1987, p. 37).

The confusion between inner and external reality implied in the definition of egocentrism does not either

constitute a necessary explanation of mistaken interpretations of the world appearing in children's interviews:

There is a similar problem with Piaget's example of children who think that the sun follows them. Piaget construes this error alternately as an inner-outer confusion (what is really only a product of perception is taken for reality) or as a conflation of self and world (or self and others; lacking the ability to take others' perspective, children assume that their own perspective is absolute). . . . Children are mistaking appearance for reality, but this is not necessarily the same thing as confusing inner-outer, or self and world. . . . Consider the illusion of the bent pencil in water. . . . Given that it would look bent to any observer, the illusion cannot be ascribed to a failure to take perspectives (or to its alleged converse of treating one's own perspective as absolute). . . . I am not mistaking an "inner" for an "outer" reality, I am lacking some knowledge of a further 'outer' reality." (Sugarman, 1987, pp. 29,30)

Piaget, by reducing the interpretation of his diverse observations of children to such very general concepts as egocentrism, failed to account for (1) conceptual contradictions as described above, and (2) a range of other possible interpretations of the data he collected. By doing so, the theory simplifies the complexity of children's thought to adjust to the interpretive framework. It leads to the result that

the very phenomena that Piaget treats as indicative of the general impoverishing of children's thinking i.e., profoundly "egocentric" behaviors such as magic

and animism attest instead to its complexity and richness. (Sugarman, 1987, p. 24)

Another focus of Sugarman's critique refers to the very conception of development in Piaget's theorizing. More mature ways of thinking occur by progressive differentiation which reduces or changes the previous egocentric modes of understanding ¹¹ and consequent dissociation of concepts that were confused before. In Sugarman's view, Piaget persistently presents a descriptive version of the "product" of development--the simple account that at a higher developmental level, children do differentiate and dissociate such concepts--assuming it to be the causal explanation of the "process". (Sugarman, 1989, p. 46) Piaget claims, for example, that the development of the physical concepts of chance and inertia depends on the repudiation of animistic views, both resulting from the abandonment of egocentrism. Such an assumption is, however, controversial and insufficient to account for the observable complexities in the development of thinking:

If children indeed go through a phase of repudiating their previous beliefs (e.g., in the purposiveness of movement), this repudiation might be prompted by factors or experiences having little to do with the process through which they achieve an understanding of chance and inertia. . . . To be sure, those views

are incompatible from our perspective. But that is, among other reasons, because we are explicitly juxtaposing them. It is not clear whether children do this, or to the extent that they do, it is not clear whether such episodes of focused conceptual analysis would be the primary motor of development. . . . The ultimate source of this development may be more diverse and more indeterminate, and its acquisition more detached than this image would suggest. (Sugarman, 1989, pp. 46, 47)

The too slight consideration of the complexity of the intervening elements in the process of development leads to an educational reductionism which is expressed by an emphasis upon promoting logical sequential steps in learning that is often inadequate to children's ways of making sense of reality.

The Piagetian interpretation of development as a spontaneous process of intelligent adaptation to the environment has provided a strong justification for overvaluing processes of learning by discovery and the exclusion of content and teaching strategies that are said to be inaccessible for students who had not reached a given stage of development. The spontaneous nature of development and the dependence of learning on development are critically examined by Egan (1983). Having extensively reviewed the Piagetian literature and its critiques and having critically examined the empirical evidence offered by Piaget and his collaborators, Egan argues that there is

neither evidence for the acceptance of the universality and necessity of Piagetian description nor do they take account of individual differences among learners; the role of culture in the identifiable sequence of cognitive development is not considered either; weaknesses of the educational applications of the theory are then pointed out:

We have considered some of the weaknesses of Piaget's distinction between learning and development. From that discussion we may conclude that a respectful waiting on the spontaneous development of Piagetian cognitive capacities involves a degree of non-interventionism that seems educationally counterproductive. We have seen evidence of the teachability of Piagetian developmental concepts. . . . We have seen that Piaget's theory is descriptive of a developmental process that is to some significant degree influenced or determined by forms of education and socialization. . . . We have seen that the individual's progress through the stages is not as regular and predictable as the theory asserts. . . . We have seen that Piaget's logico-mathematical concepts are only a part of the mental apparatus the child brings to making sense of the world and experience. (Egan, 1983, pp. 98, 99)

The implications of developmental theory in education are commonly valued by Piagetian educators as highly positive since the constructivist conception of knowledge and the principle of learning through action appear associated with a progressive view of education which encourages autonomy and creativity (Duckworth, 1991). In

contrast, Egan's critique calls attention to the limitations that the direct translation of a theory of psychological development into education brings about. In addition to his critique of the theory itself, Egan points out the misunderstandings that result from this "psychological fallacy" (the attempt to move directly from a psychological theory to educational practice):

. . . we read definitional statements such as "to educate means to adapt the individual to the surrounding social environment". . . . They are claims that, if acted upon, reduce and deform the process of education. This deformation of education seems to me the commonest result of Piagetians' common practice of accepting Piaget's theory as though it carried clear implications for education. That this "psychological fallacy" leads to a deformation of education might reasonably be expected, since Piaget's theory is properly concerned to exclude precisely the realm of cultural attainments which, again properly, forms a central focus to education. (Egan, 1983, p. 105)

Criticisms of Bruner and the New Curricula of the 1960s

The criticisms of Jerome Bruner's educational views, as already referred to in Chapter Two, are more insistently directed to the curricula that were developed and implemented under his leadership than to his theoretical conceptions. In this section the theory will, however, be tentatively examined, though it is sometimes impossible to

dissociate it from the curriculum programs of the 1960s and 1970s. The previous decade has been one of systematic evaluation and critique of those earlier curriculum projects, particularly within the fields of Maths and Science education.

The Educational Use of the Structure and Method of the Disciplines

One aspect of Bruner's thinking that is frequently criticized concerns the assimilation of methods of learning to the scientific method. In addition, Bruner's theoretical stances seem commonly to have been interpreted in practice in a narrow and simplified manner (Novak, 1977, 1978; Hodson, 1985; Santos, 1986, 1991; Valente, 1980). Hodson (1985) notes the risks of empiricist inductivism implied in that assimilation, noting that the need to oppose the traditionalist modes of teaching which used observation and experience as mere illustrations led the reformers to the opposite extreme, i.e. to present the gathering of empirical data as the prime source of a

simplified inductivist form of learning (Hodson, 1985, p. 35). As noted by Santos (1991), reviewing the criticisms of this orientation,

learning by inquiry is frequently associated with the simplified assimilation of the child's work to the scientist's work. The over-emphasis on laboratory work and on a naive imitation of the scientific method leads the children, according to some critics, to waste many hours gathering empirical data that in general simply demonstrate the obvious, to learn very little content, to deify the scientific method, and to over-generalize based upon limited experiments. (Santos, 1991, p. 34)

Social Studies and History curricula also exhibited considerable encouragement of the assimilation of students' work to the work of scientists. "Little historians" should also learn the discovery methods of the discipline by applying them to the topics they studied, working with simulated "original sources" and "raw data". It was believed that the process was more important than the product, the focus should be the mastery of the method not of particular content.

The "cover it syndrom" ¹² of the past was replaced by the relative insignificance of the content in favour of understanding the process of inquiry of each discipline. The separation of "process" from "product" implied in this perspective had undesirable educational consequences, that

are examined by Egan (1983) with respect to an evaluation study by Shemilt (1980) of the Schools Council History 13-16 Project (1976):

This kind of process/content distinction is another of those useful distinctions in psychology--where the content is incidental to discovering the underlying process--which when imported into education separates things which should properly remain together. The notion that our aim is to teach the rules of the game and that historical content is a means to this end seems to leave us open to a danger just as bad as the one from which the refocusing is designed to save us. It does matter whether the student is learning about Ancient Greece, or the Medieval Papacy, or local and recent history, and arguments must be made and good reasons given for composing a curriculum of some of these contents at one time and others at others. We are in significant part as educated people what we have learned. (Egan, 1983, p.68,; author's emphasis)

The Structure of the Disciplines and the Developmental Views of Children's Learning

Developmentalists were early involved in the Academic Reform Movement. Barbel Inhelder participated in the Woods Hole Conference and she was asked, as Bruner himself reports (Bruner, 1960), "to suggest ways in which the child could be moved along faster through the various stages of intellectual development in mathematics and physics" (pp. 40, 41). It was apparently expected that the idea of teaching the structure of the disciplines at any age would

be operationalized by means of adjusting the methods of teaching to the characteristics of each stage of development and that developmental readiness could be improved by appropriate strategies. The conceptions implied in both views had, however, less in common than it was supposed. Bruner's spiral curriculum and the role of instruction as he saw it, followed a logic clearly distinct from the constructivist perception of cognitive development: the former emphasized the instructional modes of promoting intellectual development and the latter called attention to the natural development of those abilities as a criterion for adjusting curricula and instruction to the levels of intellectual development. Duckworth (1991, p. 60) reminds us of Inhelder's insistence on the limits of instructional influences over a child's mind which result from his or her natural pace of development. Even though Piaget has admitted that some part of logical structures could be deliberately taught, he questioned the reasons for, and advantages of, doing so (ibid., p.61). Piaget and Bruner later came to develop and discuss their contrasting positions toward psychological development with respect to critical aspects of the theory (as, for example, in the controversial progression of conservation abilities as

defined by Piaget and criticized by Bruner).¹³

The evaluation studies of the reformed curricula of the 1960s and 1970s increasingly revealed this divergence; a significant part of the critiques referred to the maladjustment between the intellectual demands of the curricula when compared to the actual cognitive development of the students (Shayer and Adey, 1983). It is also noted by some authors (Domingos, 1984) that such maladjustment is more critical in children from poor socio-cultural backgrounds, contributing to increasing the differences of school achievement among students.

The gap between the philosophy of the Academic Reform Movement and the developmentalists is clear in the following analysis by Kohlberg and Gilligan (1979):

These curricula reforms were guided by the notion that more intellectual content could be put into high school and that this content should not be factual content and rote skills, but the basic pattern of thinking of the academic disciplines of mathematics, physics, or social science. The focus was to be upon understanding the basic logical assumptions and structure of the discipline and the use of these assumptions in reflective or critical thinking and problem solving. Clearly the new curricula assumed formal-operational thought, rather than attempting to develop it. Partly as a result of this, some of the most enlightened proponents of the new curricula became discouraged as they saw only a sub-group of the high school population engaging with it. The solution we have proposed is that the new curricula be reformulated as tools for developing principled logical and moral thought rather than presupposing

it. (Kohlberg and Gilligan, 1979, p. 92)

The focus of the developmentalists' analysis is on the readiness for understanding the concepts and structure of the disciplines which, in their view, require the mastery of the abilities of formal operational thinking. The perspective of Bruner and the academic reformers did not consider that kind of requirement as an absolute constraint on the students' ability to understanding the disciplines. They believed, in contrast, that there was no kind of particular prerequisite for learning "any kind of content honestly" (Bruner, 1960, p. 12). The adjustment was expected to occur at the level of the strategies for teaching appropriately a given scientific topic to students at different stages of development.

Critical Views on Dewey
and the Progressivist Orientation in Curricula

It is beyond the purpose of the present study to review the diversity of critiques of Dewey's educational thought and the whole debate on the diverse implications of his ideas for curricula. The criticisms that will be

considered relate to those of Dewey's theoretical principles that inform current curricular assumptions and constitute a strong component of the educational orthodoxy of today.

The Scientific Method and the Activity Principle

Criticisms of the Academic Reform Movement referred above, concerning the educational use of the scientific method and related strategies of learning by inquiry, also imply a criticism of the progressivist principles of active learning and educational uses of the scientific method. The actual convergence of curricular implications and mutual reinforcement of both theoretical perspectives do not mean, however, that they pursue a similar educational orientation. Dewey conceived the use of the scientific method as a means for developing critical thinking and a reflective and proactive attitude toward social reality, which was optimistically expected to be changed as a result of that scientific understanding. The academic reformers had in mind the fostering of intellectual abilities and the mastery of scientific concepts and methods in order to produce a higher level of intellectual achievement, and

consequently an "end product" of schooling which would be better equipped to face the technological and scientific challenges of the future. Dewey's and the progressivists' focus was on equity and social amelioration; Bruner and the academic reformers emphasized individual excellence and competences.

In present curriculum documents, as it was documented in the documents referred to in Chapter One, what appears more commonly is the uncontroversial acceptance of the superiority of inquiry methods, in a very much empiricist manner, over any other way of learning. Such methods are generally presented as automatically associated with both a sense of scientific understanding and of social and individual progress, without explicit consideration of theoretical justifications or internal contradictions.

Diversity of Interpretations of Dewey and Reinforcement of Developmentalist Perspectives

The educational application of Dewey's ideas offers a particular difficulty to critical examination as his ideas are associated with a broad range of reforms, interpreted in many different ways.¹⁴ A consistent examination of the

convergence and reconstruction of educational tendencies of the late 19th century in Dewey's thought and its reinterpretation and indiscriminated use in any kind of subsequent reforms has been analysed in detail by Herbert Kliebard (1982, 1985). He notes, referring to the Deweyan reconstruction of the main educational ideas emerging and conflicting at the turn of the century:

Given the subtlety and complexity of that reconstruction, it should not be surprising that Dewey's actual approach to curriculum reached fruition only during the period between 1896 and 1904, when he undertook to test his theory by establishing the Laboratory School at the University of Chicago. The Dewey School is without doubt a significant chapter in the annals of pedagogical history, but mainly because of the integrity of the theory that guided it and because it became a symbol of school reform in general rather than because the particular curriculum ideas Dewey developed there actually became translated into widespread practice. As his reputation grew, Dewey's name was continually invoked in connection with curriculum and general school reforms of all sorts whether or not they reflected his ideas. At the same time, the educational theory that Dewey so painstakingly developed during his Chicago period was either converted into a pitiful caricature, such as "learning by doing", or neglected altogether. (Kliebard, 1982, p. 23)

Reference to Dewey and the progressivists is in fact very common and influential in educational writing, particularly in North America. His name and his ideas are

invoked to support very diverse orientations, such as the focus on the interests of children as one of the sources for defining educational objectives within Tyler's operational recommendations for constructing instructional programs (Tyler, 1949), or the child-centered orientation, the community organization of school, and active learning techniques defended by Freinet and the Modern Education Movement (Freinet, 1962, 1969), or the defense of a liberal curriculum common to the twelve years of compulsory schooling as a condition for the accomplishment of a democratic education as proposed by Adler and the Paideia Proposal group (Adler, 1982).

Developmentalists also reclaim their affiliation in Dewey's theoretical matrix with respect to their central idea of education as a process of growth. Their interpretation of Dewey's thought emphasizes both promoting an alleged natural development and education for a democratic society (which is conceived differently from that espoused by the proponents of liberal education and the planners of the reformed curricula of the 1960s):

The difficulties and failures of the new curricula and of the general movement to democratize higher learning or liberal education, then, is not due to hereditary differences in capacity used to justify the two-track system. They represent, instead, the failure of secondary education to take developmental

psychology seriously. When stage development is taken seriously by educators as an aim, real developmental change can occur through education. In saying this, we return to the thought of John Dewey which is at the heart of a democratic educational philosophy. According to Dewey, education was the stimulation of development through stages by providing opportunities for active thought and active organization of experience. . . . Besides a clear focus on development, an aspect of Dewey's educational thought which needs revival is that school experience must be and represent real life experience in stimulating development. (Mosher, 1979, p. 93)

The Ends-Means Continuum: Social Consciousness and the Interests of the Children

This developmental focus on the natural process of growth is associated in Dewey's thinking with the rejection of pre-defined ends for education. Education is not a means for reaching particular ends external to the process, it is an end in itself, since it is defined as a process of continuous growth. Developing his view of the means-ends relation, Dewey called attention to the "fallacy involved in the position that ends have value independent of appraisal of means involved and independent of their own further causal efficacy" (Dewey, 1939, p. 99).

Isaac Berkson (1966) expressed his disagreement with such a perspective, insisting on the role of cultural values and societal ideals ¹⁵ when defining ends for

education: "If education is to be conceived of as growth, it is to be thought of not as the development of people's biological tendencies with no end in view but as growth toward the cultural achievements, toward the ideal of the community" (Berkson, 1966, p. 110). Another criticism presented by Berkson refers to the experimentalist interpretation of knowledge and intelligence associated with the nature of the scientific method:

Dewey's purpose, as stated in The Quest for Certainty, is to bring about "the realization that intelligent action is the sole ultimate resource of mankind in every field whatsoever" (p. 252). By "intelligent action" he means the experimental approach which has brought about the great advances in modern times in the natural sciences. . . . In this analysis there appears to be the following underestimation of the part played by abstract thought in the development of the sciences; failure to give due weight to previously accumulated knowledge and formulated principles; and inadequate consideration of speculative, imaginative constructions but little related to direct experience, or even which seem to contradict the usual experience. . . . Thinking is not only "intelligent action"; it involves the formulation of ideas and keeping them in mind as ideas. (Berkson, 1966, pp. 105, 106)

The strict experimentalist view which is implied in many existing curricula and the corresponding neglecting of other aspects and modes of learning more consistent with children's understanding of reality reflects, among other

factors, the Deweyan emphasis upon a pragmatist view of knowledge and learning. The discrepancy between, for example, the empiricist approach of social studies curricula and the way children engage and interpret imaginary and distant events provides a critical example of the inadequacy of those aspects of the theory (Egan, 1983, pp. 194-211).

In an analysis of Dewey's My Pedagogic Creed (1897), Bruner (1964) made some pertinent observations about the relation between education and society as defined by Dewey. He points out that the definition of education as a participatory process in "the social consciousness" of the race is a double edged truth "for all education, good and bad alike, is of this order" (p. 116). On the other hand, Dewey's emphasis upon the interests and capacities of the child is to be, in his view, critically understood in education since :

a point of departure is not an itinerary. It is just as mistaken to sacrifice the adult to the child as to sacrifice the child to the adult. It is sentimentalism to assume that the teaching of life can be fitted always to the child's interests just as it is empty formalism to force the child to parrot the formulas of adult society. Interests can be created and stimulated. (Bruner, 1964, p. 117)

Progressivism and American Values and Beliefs

The comprehensiveness and integrity of Dewey's thought have constituted important factors in the widespread acceptance and sometimes acritical translation of his ideas. It is important, however, to note the role played by the ideological values historically associated with his writing as representing the ideal of reform and change versus reproduction and immobilism. Yet it must be emphasized that Dewey's ideas reflect in many ways the particular system of beliefs of North American society of a particular time, and this has to be considered in discussing their implications.

The debate around his ideas and the progressivist movement in North America expresses those beliefs too, as noted by Reginald Archambault in his Editor's Foreword to John Dewey: Master Educator (1966), referring in particular to the debate of Dewey's ideas and progressivist curricula in the late 1950s and early 1960s:

Two important considerations seemed to escape the notice of most of Dewey's critiques at the time. One was that they themselves were committing the fallacy they attributed to Dewey; namely that he was involved so deeply in the solutions to immediate and short-range problems conceived in a limited context that he failed to recognize the persistent and universal issues that underly them. For these

critics were often not only oversimplifying the vastly complex issues involved as a matter of "closing the gap" between America and Russia, but also grossly misinterpreting the character and the causal efficacy of Dewey's philosophy in its alleged contribution to America's "Wasteland". The second consideration was more significant. These critics failed to recognize that Deweyan pragmatism does represent a strain of thought that is truly indigenous to the American character, partly because he helped to weave his views into the fabric of American belief, partly because he merely articulated what was there waiting to be systematized. (Archambault, 1966, pp. 4,5)

Conclusion

The above critical views of the theories that are invoked as a support for "concrete thinker" curricula show, at least, that such theories are controversial and open to criticisms. In many respects they have been, or need to be, reexamined and changed.

It is also clear that they correspond to different frames of analyses and reflect conceptions of the child and of education that, first, are debatable and, second, are not interchangeable. Nevertheless, the curriculum documents convey a mixed and interactive set of generalizations and concepts--such as the children's concrete thinking--, partially derived from such theories. These conceptions are then inadequately presented as legitimated by scientific support contributing to a sense

of "pedagogical correctness" that encourages the acritical maintenance of long accepted practices and ideas.

NOTES

¹ See specially Child Psychology, Educational Journal of Early Education, Child Development, European Journal of Psychology of Education.

² Piaget's work has been disseminated in Europe since the 1930s-1940s. His work followed the tradition of Montessori, Decroly, Wallon and educators from several countries studied in the Center for Genetic Epistemology in Geneva. Influences of his ideas can be found in experimental programs and literature of the time. In North America, however, Piagetian ideas came later but had a faster dissemination and more direct influence on official curricula than in Europe.

³ Eleanor Duckworth (1991, pp. 54-56) reports an experiment developed by Siegfried Engelmann (1971) within a behaviouristic perspective, trying to "teach" some notions--such as specific gravity--to young children; the study was observed and evaluated by Constance Kamii and Louise Derman (1971) from a Piagetian viewpoint. The interpretations of the results naturally differed: Engelmann concluded that children could, with more practice, effectively learn such notions; Kamii and Durrell in contrast claimed that children had simply learned a verbal organization without changing or improving their conceptual understanding.

⁴ Gelman says that successful counting involves the coordination of five principles: the one-to-one principle, the stable-order principle, the cardinal principle, the abstraction principle, and the order irrelevance principle. (1981, pp. 160,161) He found evidence supporting the conclusion that preschoolers honor these principles.

⁵ Gelman (1981, pp.162, 163) describes the "magic task" as follows: "The task involves two phases. The first establishes an expectancy for the continued presence of two sets of two given values, say, 3 and 2, despite the repeated covering and uncovering of those sets. To avoid reference to number or the use of ambiguous terms such as "more" or "less", one of these displays is designated "the winner" and the other "the loser". These are covered and children have to find the winner and tell us why they have or have not done so once they uncover a display. As luck

would have it, preschoolers decide on their own their numerical value is the determinant for winning and losing status. They thus establish an expectancy for two particular numerical values. Then, unbeknownst to the child, the second phase of the experiment begins when the experimenter surreptitiously alters one of the expected displays. Across different conditions and experiments, the changes involve addition, subtraction, displacement, change in color of the original objects, and even a change in identity of the original objects. Children who encounter a change in number produced by subtraction or addition say that the expected number has been violated, typically identify the number of elements and the number that should be present, and make explicit reference to the transformation that must have been performed--even if they did not see. In contrast, children who encounter the effects of irrelevant transformations say the number of elements is as expected despite the change in length of a display, or in the color, or in the identity of an element in that display."

⁶ Donaldson (1982, p. 229) describes the "mountain task" and the "policeman task" in the following terms: "In a famous experiment, Piaget established that children presented with a three-dimensional model of a group of mountains have great difficulty choosing a picture of how the model would look to a doll viewing it from another position. For the most part, young children given this task choose the picture that shows exactly what they themselves see. It seems, then, that they are notably lacking in mental flexibility, bound by the egocentric illusion that what they see is the world as it really is. If this were true, it would certainly have far-reaching implications for the ability to think and reason. Recent research has called this conclusion into question. . . . Martin Hughes placed before a group of children a configuration of two walls intersecting to form a cross. At the end of one of the walls he placed a wooden doll representing a policeman. The children were then given another wooden doll, representing a boy, and were asked to 'hide the boy so that the policeman can't see him'. (The policeman was not tall enough to look over the walls). . . . The arrangement made it easy to tell whether the children were able to escape from the domination of their own point of view, and the results were clear. Even three years olds were highly competent at the task."

7 Another experiment replicating the traditional conservation task, in order to test whether the young child's response was related to the priority of the meaning he or she gives to the situation was tried by McGarrigle and described by Donaldson (1989) in the following way: "McGarrigle's idea was to alter the events of stage two (when a transformation is introduced in the initial arrangement that 'destroys the perceptual similarity without affecting the critical attribute') in such a way as to make them seem accidental--not brought about deliberately by the experimenter, thus not relevant to what he meant when he moved on to stage three and repeated the initial question. To achieve this, McGarrigle introduced a character called "Naughty Teddy"--a small teddy bear who was liable to emerge from his box, swoop over the experimental material, disarrange it and thus "mess up the game". McGarrigle found that this version of the task--where the transformation was ostensibly accidental--was dealt with much more successfully than the traditional version: many more children between the ages of four and six 'conserved'--that is, continued to say that the crucial attribute was the same. This finding is dramatic and seems very difficult to explain in Piagetian terms." (Donaldson, 1989, p. 64).

8 In Loevinger's Stages of Ego Development (1979) the Conformist stage--that may be seen as current at the age level of schoolchildren, though not depending upon age--is characterized by seeing "behavior in terms of its externals rather than in terms of feelings, in contrast to persons at higher levels . . . concern for the externals of life takes the form of interest in appearance, in social acceptance and reputation and in material things" (p. 114).

9 The focus of the discussion will be on Sugarman's analysis of Piaget's The Child's Conception of the World since her central arguments are developed in her analysis of this book and retaken and elaborated in the examination of the other works.

10 Both the undifferentiation and the absolutist theses subsume, in Sugarman's view, a positive and a negative version: the negative thesis characterizes what children fail to do and the positive one characterizes what they do instead (Sugarman, 1987, pp. 23, 24).

11 Starting from the general Piagetian definition of

egocentrism as "lack of differentiation in some area of subject-object interaction" (Piaget, 1962), David Elkind (1982, pp. 383-387) distinguishes in Piagetian theorizing several and sequential forms of egocentrism: sensori-motor egocentrism (lack of differentiation between the object and the sense impressions occasioned by it), pre-operational egocentrism (failing to differentiate between words and their referents), concrete operational egocentrism (inability to differentiate between mental constructions and perceptual givens) and adolescents egocentrism (failing "to differentiate between the objects toward which the thoughts of others are directed and those which are the focus of his own concern").

12 The "cover it syndrom" is an expression used in educational jargon to refer to the overemphases on the content of traditional curricula and teaching practices.

13 Elkind (1981, pp. 157,158) describes in some detail the divergences between Bruner and Piaget with respect to conservation ability. Bruner argues that Piaget has "missed the heart" of the problem, since "that is not reason or mental operations but some internalized verbal formula that shields him (the child) from the overpowering appearance of the visual displays."

14 The difficulty of discussing the Deweyan assumptions themselves given the variety of interpretations has persistently led the critiques to a position of ambiguity with respect to the theory. If it is true that his thought has been frequently distorted or misunderstood, it does not follow that critical ideas such as the principles that were described in Chapter One are not clearly identifiable in Dewey's writing. On the other hand, the fact that they have been innovative and valuable does not mean either that they are not open to criticism by themselves, relatively independent of the derived interpretations.

15 Berkson writes from a liberal education perspective, placing a high value in the cultural heritage of a society as worthwhile to integrate education. A similar objection--i.e. that society establishes some pre-defined ends to education--can be argued from completely different perspectives, as for example some sociological analyses of the reproductive role of schools. See Bourdieu, P. and Passeron, J.C. (1970), A Reprodução. Elementos para uma

Teoria do Sistema de Ensino (The Reproduction. Elements
for a Theory of the Educational System), Lisboa: Editorial
Vega.

CHAPTER FOURAlternative Views on Development and
Children's Thinking

In the previous chapters the dominant representations of children's modes of thinking in education have been reviewed and criticized. They are, however, currently conveyed in curricula as universal and undebatable. The purpose of the present chapter is to enlarge the discussion by examining other theories about how children come to understand and to learn, along with, in some cases, their authors' explicit criticisms of the predominant ones. By doing so, I expect, on the one hand, to provide a deeper and more critical view of the complexity of problems implied in the modes and development of children's thinking and their relationship with education. On the other hand, the discussion of such theories will take into account social and cultural dimensions that, in many cases, have been ignored in educational and curriculum debates.

A brief account of historical and cultural factors that inform conceptions of children's thinking will be first discussed insofar as it seems to be a largely forgotten

dimension in much educational theorizing, and ignorance of that dimension is responsible for distortions and dogmatic views of children's thinking. Various theories of development will then be compared, using a diversity of classificatory criteria, in order to provide a more critical overview of the complex issues concerning development than is common in the simplistic reduction of Piagetian theory and Deweyan ideals that curriculum documents persistently exhibit. An examination of the critical relation between education and development as perceived and debated by different authors will follow. A last section will consider the contributions of scientific disciplines, such as Linguistics and Anthropology, to a better understanding of children's thought.

Cultural and Historical Perceptions of Children's Thinking

A look at some conceptions of the child in different historical periods or in other cultures seems useful in order to reconsider present Western educational ideas about children and their thinking. Such an examination leads us to recognize that these conceptions are value-laden

interpretations, always influenced by beliefs and cultural conditions, by visions of man and society at a given time. I share with John Cleverley and Denis C. Philips, in the preface of their book Visions of Childhood (1986), "the conviction that it is unsatisfactory to leave important beliefs and practices unexamined" (p. viii). The influence of such socio-historical interpretations is illustrated by these authors by means of various examples. They point out how the diverse ways children have been represented, for example in works of art, reflect the various conceptions of the child throughout the history:

Brueghel the Elder depicted his subjects as small adults A similar phenomenon can be seen in medieval paintings of the Nativity. . . . A different example is the way children were seen by the painters and magazine illustrators of the Victorian era: children from the slums of London were depicted as unkempt but angelic, in marked contrast with the appearance of children of similar background today. . . . They did not think of children as we do now, and they did not see them in the same way. (Cleverley and Philips, 1986, p. 3)

The same authors note the role played by scientific models in generating frames of interpretation of reality that emphasize some features but hide some others:

Another line of argument leading to the same general direction has been presented by those philosophers of science who are interested in the role played by models

. . . . Models channel attention in certain directions; they are sources of hypotheses and thus help to open new areas of research. . . . Significantly, too, a model that opens up possibilities for inquiry in one direction may close off a scientist's mind from other possibilities; models, in other words, may help to hide phenomena. . . . Observers of children, whether they be parents, teachers, artists, or psychologists, have often adopted loose theoretical frameworks that play roles very similar to those of models in physical science; . . . another example is the work of A.S. Neill, late headmaster of the internationally famous progressive Summerhill School in the United Kingdom. His theoretical model incorporated the assumption that children are naturally good, and this led him to view children in certain ways and to ask certain questions that may not have occurred to an observer who adopted a rival model, such as one incorporating the doctrine of original sin. (Cleverley and Philips, 1986, pp. 3,4)

Commenting particularly on Kuhn's conception of scientific paradigms--which has been criticized for allegedly oversimplifying the history of scientific thought and also for encouraging a certain kind of relativism ¹ -- Cleverley and Philips emphasize the role of paradigms in the historical representations of the child:

Nevertheless, Kuhn's work has had tremendous suggestive or heuristic power, and it is particularly revealing to apply his ideas to the way children have been observed and written about through the ages. It becomes evident that there have been many paradigms or theoretical frameworks (to use Kuhn's notions loosely) that have shaped the way children were seen and treated. (1986, p. 6)

The acknowledgement of a culturally-laden component in the social perception of the child does not mean that

psychological or educational theories about children have not promoted a better understanding of their thinking, behavior and development. The overvaluing of such explanations will only become a problem if wider cultural and social frames of analysis, that make them meaningful at a particular time, are not taken into consideration.

According to the historian Philippe Ariès (Centuries of Childhood, 1962) the conception of childhood as a distinct step in life only emerged during the sixteenth and seventeenth centuries. This new conception has been related to the particular economic conditions and social constraints of pre-industrialized societies. Changes in family structure had as a consequence a greater attention paid to the child. The increasing interest in the education of children, the promotion of their longer attendance to school, especially among the upper classes, related, according to Lebrun (1983), to the profound changes in the social and economic functions of the family:

The emergence of new functions for the family and the gradual disappearing of its traditional economic role are the main features of this transformation. The discovery of the child was certainly the first step of this process. . . . Education of children, before and after schooling, became a major concern for upper class families. . . . About 1780, there was even enthusiasm in the debate on children and their specific problems. The expansion of this interest

into the middle and working classes moved slower. It went along with the increasing disintegration of the ancient social order that used to be based upon the integration of the family in a wider economic and relational system. In the big industrialized cities of the 19th and 20th centuries, the family of the working class is no longer the traditional economic unit of production and its social role is broken. . . . Facing the challenge of the new and hostile conditions of the outside world, the family has been playing more and more the role of a protective refuge. (Lebrun, F. La Vie Conjugale sous l'ancien Régime--The Family Life under the "Ancien Régime", 1983, p. 160; author's emphasis; my translation)

Considering historical, economic and cultural influences on the perception of childhood should, at least, protect educational researchers and curriculum planners against over-simplified generalizations. Furthermore, such generalizations, though seeking to attain scientific status, risk, in fact, serious distortions. The complexity of cultural and historical factors that influence the conception of children and childhood cannot be disregarded. Focus on the individual in cases where individual characteristics are a function of social and cultural influences is clearly inadequate (Wertsch, 1991).

Cleverley and Philips (1986) have critically examined some historical paradigms of the perception of children within various theoretical frameworks. The Lockean "tabula rasa" and consequent emphasis on external agents in filling children's minds with information is compared to Rousseau's

ideal of the innate innocence and perfection of human nature, associated with the belief in the spontaneous impulse for learning (pp. 13-41). They reexamine the recapitulationist theses of Spencer and Stanley Hall within the scientific views of the time (pp. 42-53). The various genetic interpretations of the child's stages of development from Wilhelm Preyer to Darwin and, more recently, to Piaget, are critically reviewed emphasizing their common affiliation in a biological model of development (pp. 80-96). The dominance of social aims in educating children is identified and discussed by the authors in Marx and Dewey's theorizing (pp. 97-113).

It is beyond the purpose of this study to examine all of these in detail. It is, however, relevant to understand something of these diverse theories, since each of them has had some influence on the conceptions of children's thinking today. As Cleverley and Philips note "it is not an individual's acceptance of his or her times that requires explanation, for this is the norm. Puzzling, rather, is why he or she came to develop a new paradigm" (p.12).

The present perception of children and their thinking within the majority of Western educational systems, as

analyzed in the previous chapters, appears to be organized around a dominant paradigm² that interconnects the following central components:

- the genetic view of cognitive development through stages taken as natural and universal;
- the reduction of children's modes of thinking to the logico-mathematical;
- the assimilation of children's ways of learning to positive activity and quasi-autonomous discovery;
- the close similarity between the processes of learning and the processes of scientific activity;
- the necessary association of learning with some kind of practical utility and with the pressure for solving real life problems--"linking education to life" as a modern version of the traditional idea of "preparing for life".

Comparing Conceptions of Development

Not many theorists of psychological development have been concerned with comparing theories within the field. The implications of those various theories on the interpretation of children's behaviors are also rarely

considered in educational research and curriculum writing. Robert Murray Thomas (1979) provides a comparative and extensive overview of various conceptions of development, their theoretical premises and their educational uses and potentialities. Thomas calls attention to the diversity of interpretations of educational issues that result from applying different theoretical frames of analysis.³

With respect to the relation between theories and facts Thomas states his view as follows:

I consider facts or data to be either (1) discrete observations and measurements of children and their actions or (2) summaries of such observations and measurements. . . . I define theory as an explanation of how the facts fit together. More precisely, I intend the process of theorizing to mean the act of proposing (1) which facts are most important for understanding children and (2) what sorts of relationships among facts are most significant for producing this understanding. Theory is what makes sense out of facts. Theory gives facts their meaning. (Thomas, 1979, pp. 2, 3; author's emphasis)

Thomas includes in his comparative analysis several theories of development, such as Freud's, Piaget's, Lewin's and Vygotsky's, and tentatively proposes an eclectic use of them in educational activity. Following a detailed analysis of each theory or group of theories, in terms of major emphases and developments, Thomas assesses the theories by means of their ranking according to a set of standards:

1. Reflects the real world of children
2. Is clearly understandable
3. Explains the past and predicts the future
4. Guides child rearing
5. Is internally consistent
6. Is economical
7. Is falsifiable
8. Stimulates new discoveries
9. Is self-satisfying

(Thomas, 1979, p. 327)

In doing so, Thomas tries to create an instrument for evaluating both the intrinsic value and the educational usefulness of the theories of child development. This intent appears to be unattainable insofar as each theory operates within its specific frame of interpretation which is not good or bad in itself. On the other hand, criteria for educational utility also vary with the theoretical view of education that is taken. In addition, there is some contradiction in terms, since criteria of consistency, falsifiability or clarity may be of some help in assessing the intrinsic quality of the theory as such, but have little to do with its practical effects such as "being economical", "guiding child rearing" or "reflecting the real world of the children", which appear to remain as vague statements of intention.

There appears to be two kinds of criteria implied in the standards described above--those referring to the

quality of the theory and those focussing on its practical utility. It would be more helpful for a critical analysis that these two types of criteria would be presented separately and clearly operationalized. A theory could, for example, be extremely consistent, falsifiable, and clear, and still entirely inappropriate for educational purposes within a given conception of education. The more interesting contributions of Thomas's discussion to the present study are, first, the integration of the prevalent Piagetian theory of child development in the wider picture of the diversity of existing theories and, second, the demonstration that any of these theories can offer empirical or conceptual evidence to legitimate its universality or prevalence in education.

Psychological theories of development, considering their multiplicity, the variety of their focuses, and the specificity of their perspective, are difficult to transpose adequately into education. Problems arise exactly because they should not be "transposed" but rather carefully and critically "taken into account" in the field of education. Most of the time, however, education has been constrained by psychology, especially with respect to Piagetian developmental theory. The critical points of the

theory that have been influential in current educational beliefs are, in my view, the following:

1 . the alleged invariance of the sequence of stages and the related "spontaneous" nature of the process of development;

2 . the hierarchical nature of the stages of development;

3 . the unclear explanation of the modes of transition between stages;

4 . the unclear explanation of gains, losses or permanence of features from one stage to another;

5 . the lack of distinction between natural and cultural aspects of development as it is actually observed;

6 . the mixing of description--"what usually happens"--and generalizations--"what will necessarily happen".

The Nature of Development

Questioning the Hierarchy and Universality of Stages

In a critical article on Hierarchical Theories of Development and Education (Harvard Educational Review, August, 1975), Denis Philips and Mavis Kelly examine

several theories of development--Piaget and Inhelder, Kohlberg, Jensen, Erikson and Gagné--looking at the conceptual and empirical justification for their assumed status as hierarchical theories. Some of the important points made by Philips and Kelly relate to the diversity of perceptions of the relations among the sequential stages and the inaccurate assimilation of hierarchical theories to developmental ones:

While these theories are similar in certain respects, one dimension along which they vary is the relationship between levels or stages. Some postulate temporal sequences without specifying any particular relation between levels. Other hierarchies are based on substitution or replacement of one stage by another. There are theories which assume that higher levels incorporate the lower levels. Still others attempt to provide a causal explanation of higher levels in terms of lower levels. And of course there are various combinations of these theories. All such theories fall within the scope of the present discussion, provided that they embody the assumption that their classificatory scheme also reflects a developmental sequence. Clearly, however, a hierarchical theory need not be developmental. (Philips and Kelly, 1975, p. 352)

The alleged universality of such hierarchical sequences does not, however, get enough support, even in Piagetian cross-cultural studies that provide the main empirical data intending to document the universality of stages of cognitive development. According to Kieran Egan (1983) such studies "offer no explanation of why some interactions

with some environments should so powerfully stimulate development, as in Geneva or New York or London, and other interactions with other environments stimulate virtually no development beyond the earliest stages, as in some parts of Australia or in Africa" (1983, p. 78).

The universality of Piagetian stages is discussed by Cole and Scribner (1974) through an examination of several cross-cultural studies on the Piagetian notion of conservation. They describe, for example, a study developed by Dasen, in Australia, that is relevant to the present discussion (Cole and Scribner, 1974, pp. 152, 153). Dasen applied tests of spatial ability and tests of measurement (including tests for conservation of weight, volume and length) to three groups of schoolchildren: one of Aborigines with little contact with Australian-European culture (low-contact group), a second one of children with some contact with that culture (medium-contact group), and a third one formed by lower middle-class children from Canberra (Australian-European culture). Considering the cultural features of the traditional Aboriginal life, depending on hunting and travelling for gathering food, Dasen hypothesized that the Aboriginal groups would perform better in the spatial tests than in the measurement ones.

The results confirmed this prediction but he also found that it is not simply because the spatial tests are generally easier, since the Camberra children performed significantly better on the measurement tests than on the spatial tests. "This pattern of results fits very well with Dasen's hypothesis about the relation between environmental demands, culturally valued skills, and individual cognitive skills" (Cole and Scribner, 1974, p. 153).

The same authors also call attention to the artificiality of testing conservation in isolation from other related skills. The diverse cultural features of adult population in different societies should also be studied before any judgement or prediction is made about the "developmental level" of the subjects:

Until some relation between conservation performance and other cognitive skills is demonstrated in non-Western cultures, it is difficult to arrive at any judgement of its significance. This is especially true in light of coming to grips with what nonconservation might mean. In Europe and the United States, where all normal children eventually come to respond correctly across the whole spectrum of conservation problems, such a statement as "55 to 60 percent of the 5- to 6-year-olds conserve" has a relatively clear interpretation--55 to 60 percent of the children have entered the concrete-operational stage that all children will eventually enter; the culture is homogeneous with respect to adults performance. But the various traditional societies we have been studying are not homogeneous with respect to their level of cognitive maturity as measured by conservation performance: some adults conserve, some do

not. What does it mean to claim that "tribe X does not mature past the European 11-year stage" if 50 percent of the members of tribe X conserve and 50 percent do not? No one in tribe X is operating at the "11-year-old-level" and to speak of "leveling off of cognitive development" as if the statement applies to individuals is a serious mistake. (Cole and Scribner, 1974, pp. 155,156; authors' emphases)

According to David Ausubel (1970, 1978) the process of learning and developing knowledge is essentially one of concept formation; it starts always with previous general and often abstract ideas which then incorporate new and more particular informations. A previous general concept is clarified by more particular information. The more particular information, in turn, only makes sense in the light of that more general and prior concept--the "advance organizer"; in his own terms:

The essence of the meaningful learning process is that symbolically expressed ideas are related in a nonarbitrary and substantive (nonverbatim) fashion to what the learner already knows. By substantive and nonarbitrary relatedness we mean that the ideas are related in some specifically relevant existing aspect of the learner's cognitive structure, such as an image, an already meaningful symbol, a concept or a proposition. . . . The second factor determining whether learning material is potentially meaningful is a function of the learner's cognitive structure rather than of the learning material. The acquisition of meanings as a natural phenomenon occurs in particular human beings--not in mankind generally. (Ausubel, Novak and Hanesian, 1978, pp. 41, 43; authors' emphases)

Ausubel's perspective is focused on the processes of

learning specific content rather than on the development of cognitive structures per se. Ausubel, differently from the Genevan developmentalists, emphasizes the role of transmission of information in the development of cognitive structures. These structures are not perceived by Ausubel as forms or operational instruments of the mind, but as a frame for organizing knowledge, hierarchically structured from the more abstract concepts to the more specific ones.⁴

Also it should be noted that the empirical tasks in which children are asked to provide evidence of their stages of cognitive development frequently follow the hierarchical order of complexity of the subject-matter taught (for example, basic and higher mathematics). This being the case, it is possible that child development does not follow such a sequence, as is currently assumed (Philips and Kelly, p. 359).

Another interesting debate on the notion of hierarchical development and on the universality of the Piagetian stages has been recently developed between Mansoor Niaz and Anton E. Lawson (1991). Niaz argues in favour of universal logico-mathematical characteristics evident in individuals, characteristics which would be actualized differently in various conditions and personalities. Thus, he supports the Piagetian distinction between the "epistemic subject" and the "psychological subject" ⁵, emphasizing his structuralist perspective:

the epistemic subject being an abstract, ideal knower, (exemplified by every normal individual). . . . Piaget's theory is based on the assumption that under ideal conditions, every individual, that is, psychological subjects, could perhaps attain the level of competence exemplified by the epistemic subject. . . . Piaget is not concerned with how the individual comes to have particular factual knowledge, (knowing that). . . . "he is more concerned with the form (knowing how) or structure of knowledge (with Kant) which is universal" (Kitchener, 1986). (Niaz, 1991, pp. 570, 572; author's emphases and quotes)

In Niaz's constructivist-rationalist view, there is no doubt about the universal nature of this "normal" ideal thinker. In addition, he says, the notion of the epistemic subject can improve the theory, as a general model that allows for further elaboration, in a way that Niaz relates to the evolution of any scientific theory (as, for example, the "ideal" gas law of Boyle):

it is concluded that just as the ideal gas law (in spite of the deviations) has been retained in scientific theories, which facilitated the advance of our knowledge about the matter, similarly by retaining the epistemic subject as an ideal knower, we can facilitate the development of cognitive theories with greater explanatory power. (Niaz, 1991, p. 577)

Lawson criticizes the weakness of the two major arguments presented by Niaz: first, even though the gas law is not obeyed in many cases and many human beings do not think as predicted by Piaget, we should continue to believe in Piaget's ideal knower; second, even if the

theory concerning the epistemic subject cannot be empirically tested, nevertheless it should be maintained (Lawson, 1991, p. 581). The first argument is based on an analogy that does not necessarily apply: Lawson demonstrates that the epistemic subject, at the stage of formal operations, is obviously defined by Piaget as a "logical" thinker. After discussing the modes for testing theories, Lawson provides examples from the results of an empirical study designed to test a postulate concerning Piaget's epistemic subject ⁶ that contradicts his description of the epistemic subject (ibid., p. 582). With respect to the second argument, Lawson states that

even if we grant that theory testing is difficult, we certainly are not, therefore, compelled to accept any particular theory as valid. Rather, it is far preferable when faced with the difficulty of putting alternatives to the test, to adopt a position of neutrality or at least one of only tentative acceptance until convincing evidence becomes available. . . . In my view they (the key postulates regarding Piaget's epistemic subject) have been sufficiently tested and the reasonable conclusion to draw is that no such animal exists. (Lawson, 1991, pp. 582, 583)

The concepts of epistemic subject and psychological subject correspond to the assumption of universal features and stages of cognitive development in an ideal form--the epistemic subject--that are differently actualized in each individual--the psychological subject--in various ways,

depending upon personality, culture, experience, etc. The theoretical discussion is precisely centered on the universality of the epistemic subject, and related empirical questions refer to the lack or insufficiency of evidence to support such a universal ideal description of stages of cognitive development. Thus, the Piagetian distinction between epistemic and psychological subject does not appear to be very helpful for supporting the alleged universality of the stages. It is instead presented as an uncontroversial and aprioristic principle following the belief in a "natural" development that can be accelerated or retarded by virtue of the interaction with the environment, but rarely changed (Inhelder, Sinclair, Bovet, 1974, p. 24).

It can be hypothesized that all individuals have the intellectual potential to pass through the sequence of stages predicted by Piaget, given certain cultural and social demands and appropriate stimulations. It can, however, be also hypothesized that other forms and sequences of thinking identified in some oral cultures and not appearing as significant in Western societies, will possibly be equally universal in humankind but only developing under particular cultural conditions and

demands. This would mean that in Western societies a particular dimension of "universal" thinking abilities--logico-mathematical reasoning--is the one which is socially more encouraged and valued. In other cultures that dimension is relatively less important for the conditions, needs, and values of the society. Some other modes of thinking, plausibly also "universal"--such as those associated with oral cultures--, but apparently less relevant in Western culture, are more valued in such cultures. Being socially stimulated, they play a central role in the development of cognition and possibly originate different sequences of cognitive "stages".

This line of research has been developed only recently, probably because cross-cultural studies on development have followed a Western orientation: other cultures are analyzed in terms of having in place or lacking the features of the dominant Western modes of reasoning.

Recapitulationism and Development

A significant number of developmental theories, influenced by 19th century evolutionary views, have claimed a connection between phylogenesis and ontogenesis. They have postulated several kinds of recapitulationism,

which have been later criticized for their lack of any adequate scientific basis. William Kessen (1965), cited by Philips and Kelly, (1975, p. 354) claims that "nothing much is left of this radical notion now. . . . The late nineteenth-century notion of parallels between animal and man remains in the academic literature only as a half-joking reference." (Kessen, 1965, p. 116).

Recapitulationism, defended in North America by Stanley Hall among others, also extended to the cultural field and has generated several "culture-epoch" curricula, specially in Germany at the turn of the century. In these schemes culture was taken as synonymous with Western culture.⁷

Ausubel and Sullivan (1970) criticizing recapitulationist theories point out that

biogenetic theories of recapitulation, hypothesizing specific parallelisms between successive stages in the psychological development of the individual and various inferred stages in the cultural evolution of mankind, are insupportable on both empirical and theoretical grounds. They rest on the discredited assumptions that cultures everywhere evolve in parallel sequence and that cultural acquisitions of a people are genically transmissible to their offspring. (Ausubel and Sullivan, 1970, p. 47)

John Dewey was also initially attracted by some of these recapitulationist ideas but he discarded those conceptions as they proved to lack scientific support and also as a result of his theoretical emphasis on present

problems and actual life situations as priorities for progressive education (Egan, 1988, pp. 168, 169).

In spite of the scientific critiques of such recapitulationist views, Piaget himself was, as a biologist and as a researcher of genetic epistemology, significantly influenced by the recapitulationist frame of analysis. This, in Philips and Kelly's perspective, led to his casual concern for the requirements of experimental research: "Since the development of logic in all individuals is assumed to follow the pattern of the evolution of knowledge, then any child can be used to provide the data for his theory. Piaget's basic assumptions make it unnecessary for him to seek a larger data base." (Philips and Kelly, 1975, p. 354).

A different recapitulation perspective is proposed by Egan (1988). He represents development as a process located in a particular culture, enhanced by education, and constrained by genetic, psychological and logic factors. He points out the attractiveness of recapitulation ideas in general for education and curriculum, noting that

logic and/or nature are attractive bases for a curriculum, so recapitulation schemes have an obvious attraction. Aristotle makes the basic point simply: "What has not happened we do not at once feel sure to be possible, but what has happened is manifestly possible" (Poetics, Ch.IX) Most commonly a marriage of Rousseauian and

Darwinian ideas led to the belief that evolutionary theory provided nature's guidance for the curriculum. (Egan, 1988, p.168)

Egan refers to recapitulationism in terms of educational development focussing on the appropriateness of recapitulating what he calls "sense-making capacities". He insists in differentiating clearly his perspective from the biological and cultural recapitulationism that enjoyed such a vogue at the turning of the century. Egan's conception of a certain kind of recapitulation is limited to sense-making capacities. This recapitulation is restricted by the sense-making capacities that are available and have been accumulated in a particular culture. The links between cultural history and individual development are then justified by the similarity of constraints of both processes--the cultural and the individual. In his own terms,

what is recapitulated in this scheme is sets of sense-making capacities, bonnes à penser, forms of understanding--the constituents of the general layers I am calling Mythic, Romantic, Philosophic, and Ironic. I am calling them sense-making capacities because they are not simply mental characteristics nor simply forms of knowledge; they are capacities that are evoked, stimulated, and developed in becoming initiated into the forms of sense-making available in a particular culture. Education in this scheme, then, is the sequential accumulation of the sense-making capacities, and associated capacities available in our culture. This is a recapitulational scheme because it embodies an argument that the sequence in which these

capacities can be accumulated by the individual reflects the sequence in which they were generated in our cultural history. The tie between the two--cultural history and individual development--is located in the logical and psychological constraints that have influenced the historical generation of these capacities and which also constrain the sequence in which the individual can accumulate them. (a) The dynamic of the process of educational development is not located in either of the constraints, however, but in their complex interaction with the range of sense-making capacities available as a result of our particular cultural history. (Egan, 1988, pp. 168, 170; (a) my emphasis)

Egan conceives these layers as a sequence observable in children in Western societies. They are not necessarily hierarchical, but rather represent a coalescence of accumulated meaning-making abilities:

However sophisticated might become an individual's understanding of astronomy, the foundational capacities evident in astrology will ideally remain as constituents of that understanding. The imaginative search for meaning, that is to say, is as much a proper part of the most advanced astronomical research as it is the foundational access to the subject. Its absence or repression might indeed permit the accumulation of knowledge and refinement of theory, but the resulting research would likely be characterized by an inability to find imaginative engagement in the work and an absence of the energetic imagination that can break through and refashion theory. (Egan, 1988, p.174; my emphasis)

Egan's view provides an interpretation of development as a psycho-cultural process where education plays, consequently, a significant role.

In Philips and Kelly's view, the rhetoric of the

evolutionary and recapitulational theories developed during the 18th and 19th centuries still remains underlying modern hierarchical conceptions of development. When these are translated into education, they frequently encourage scientific misunderstandings and logical inaccuracies:

Lamarck's hierarchical classification of animals, ranging from the simplest to the most complex, embodied a second major assumption. He believed that a classificatory scheme should reflect the order in which the entities under examination came into being. However, this is not mandatory. It is possible to classify or organize entities into a hierarchy that is based on some characteristic other than their order of creation--some structural or behavioral feature, for example. The fact is that if by some criterion of simplicity A is simpler than B and B is simpler than C, it is not necessarily the case that these three have been produced in the order A-B-C. It is quite feasible that they have been produced in some other order, say C-B-A. This possibility is illustrated by the case of the tapeworm which, according to modern evolutionary theory, is one of several relatively simple degenerate parasites that evolved from structurally more complex precursors. Thus, if it is found that three entities were produced in the order X-Y-Z, it does not follow that X is simpler than Y or Z. Yet, the danger exists that the order of production will become the criterion of simplicity, making the whole analysis self-supportingly circular. . . . There is a danger that the order of appearance of abilities in development will become the criterion of complexity. (Philips and Kelly, 1975, pp. 355, 357; authors' emphasis)

The authors' observation of the circularity of the hierarchical argument seems particularly appropriate to the analysis of the sequence of concrete operations to abstract operations as claimed by Piaget. He does not limit his

claim to the lack of empirical evidence contradicting that sequence but extends his conclusions to the logical necessity of such a sequence: "a stage system. . . makes up a sequential process: it is not possible to arrive at concrete operations without undergoing some sensorimotor preparation. . . . It is also impossible to progress to propositional operations without support from previous concrete operations, etc." (Piaget, 1971, p. 18, cited by Philips and Kelly, 1975, p. 365).

Philips and Kelly argue against the claim for the necessity of such a sequence. They conclude that Piagetian "invariance" implies an "ambiguous mixture" of the necessary and the empirical:

it is possible to interpret abstractness and concreteness in such a way that one must not necessarily occur before the other--the possibility can be left open that a mode of reasoning in abstract cases could be mastered before concrete instances were met. . . (After all, blind people can learn to master color concepts--"red and yellow give orange, red is a warm color", and so on--without having met concrete instances of these concepts). (Kelly and Philips, 1975, pp. 365, 366).

If, say, examples of abstract thinking are not verbalized by the child, it does not follow that his or her "concrete" modes of thinking are necessarily simpler or do not contain equivalent complexity or do not use abstract elements allegedly reserved to the higher levels of the

hierarchy. Powerful abstract concepts, such as love-hate, sorrow-joy, fear-security, built from the early experiences of the child, may be used to interpret reality and make sense of new experiences (Egan, 1988).

The current meaning of the word "development" thus appears associated with a number of ideas that frequently are ambiguously related to each other. There is the unconfirmed assumption of the dominant conception of cognitive development as, first, a spontaneous, universal and hierarchical process; second, as essentially independent of, though influenced by, actual specific cultural features, values and demands; third, as associated with the recapitulation of genetic and historical evolution; and fourth, as possibly assimilated to the sequence and organization of subject-matters currently learned or embodied in experimental tasks.

The Relation Between Development and Education

The acceptance or rejection of the "spontaneous" nature of a developmental process that follows a universal pattern, is at the heart of the theoretical debate about

development in education. Ausubel and Sullivan (1970, pp. 27-30) noted the important role of cultural relativism in correcting the foundations of alleged universal modes of cognitive and personal development--though recognizing the limitations imposed by human biology and psychology:

Cultural relativism, of course, provided a much needed corrective against the ethnocentric social instinct and biogenetic doctrines. . . . It denied that a complex sort of behavior is ever innately patterned by virtue of universal instincts or that intra- and intercultural uniformities ever reflect the operation of an identical species-wide genotype with prepotent and invariable directional influence on the content and sequence of development. . . . Most important, however, by demonstrating that the cultural patterning of innumerable aspects of behavior and development is characterized by an extremely wide range of variability, it completely demolished the ethnocentric preformationist view that distinguishing features of personality structure in Western civilization are manifestations of an immutable "human nature" and hence must be universally distributed. (Sullivan and Ausubel, 1970, p. 44)

With respect to the nature of development, particularly the alleged unidirectional and hierarchical progression of thinking from "concrete" to "abstract", Bruner (1986) made a very illuminating point when he noted that "much of the process of education consists of being able to distance oneself in some way from what one knows by being able to reflect on one's own knowledge". He points out that this

assumption has currently been associated in developmental theories with "the achievement of more abstract symbolic systems" (pp. 127, 128). Bruner, though also defining himself as a constructivist--"we construct or constitute the world. . . . I believe too that Self is a construction, a result of action and symbolization" (p. 130)--makes a very accurate criticism of this current assumption, properly locating the question in the education ground:

One does indeed come to see arithmetic as a special case when one reaches the more abstract domain of algebra. But I think it is perilous to look at intellectual growth exclusively in this manner, for one will surely distort the meaning of intellectual maturity if one uses such a model exclusively. It is not that I now understand "Othello" more abstractly than I did at fifteen when I first encountered that dark play. It is not even that I know more about the pride, envy, jealousy than I did then. . . . I do not think that my interest in theater and literature has made me more abstract. Instead it has joined me to the possible worlds that provide the landscape for thinking about the human condition as it exists in the culture in which I live. . . . The play is not simply about a Moor trapped into jealousy of his wife. . . . Its language and craft as a play. . . makes the drama reverberate in our reflection. It is an invitation to reflection about manners, morals, and the human condition. This is not abstraction but rather a sense of the complexities that can occur in narratives of human action. . . . the language of education, if it is to be an invitation to reflection and culture creating, cannot be the so-called uncontaminated language of fact and objectivity. It must express stance and invite counter-stance and in the process leave place for reflection, for metacognition. It is this that permits one to reach higher ground, this process of objectifying in language or image what one has thought and then turning around on it and reconsidering it. (Bruner, 1986, pp. 128, 129; author's emphases)

Bruner questions several current assumptions of educators and curriculum theorists, namely the simplification entailed in the reduction of reasoning to logico-mathematical "operations", and the lack of consideration of the complex interactions of various cultural, intellectual, affective, moral, reflective elements in the development of higher and more sophisticated levels of thinking. Earlier in Bruner's academic writing (1968, pp. 7, 21, 27), he recognized that "influences from outside the developing child are so crucial that unless a theory of development is linked to both a theory of knowledge and of instruction, it is bound to be trivial" (Bruner, 1968, p. 26)

The literature considered so far has focused mostly on alternatives to and critiques of the Piagetian theory of development. This is not surprising since Piaget has provided the most complete and structured basis for the dominant current conception of the child as a "concrete" thinker. Nevertheless, as was discussed in Chapters Two and Three, this particular conception also reflects the interaction of developmental theories with other educational ideas such as Dewey's notion of active learning, and the emphasis on learning by discovery in the

Academic Reform Movement. Consequently, the majority of the criticisms above also apply to principles derived from those other theories that support the educational representation of the child as a concrete thinker.⁸

The principle of active and spontaneous discovery by the learner appears as one of the clearest examples of such a combination and mutual reinforcement of quite different theoretical positions. They became seemingly inextricably intertwined in educational discourse. Acceptance of a theory, at a given time and in particular conditions,--e.g. the "educational crisis" related to the explosion of school attendance in the 1950s and 1960s in Europe--also reflects the social constraints of that time. The French sociologist Raymond Boudon (1986), discussing the success of some educational and psychological theories, considered innovative at the time, points out the importance of the representation of the social role of the teacher in the acceptance of such theories:

Whatever the reasons, the fact is that those various factors generated a dramatic change in the traditional image of the teachers. They no longer knew what they were expected to do. They no longer felt clear about the goals to pursue, about their rights and their duties. That's why some educational and psychological theories enjoyed then a considerable popularity among teachers: appearing to be supported by empirical studies and scientific research, those theories offered the means for overcoming students'

failing, for awakening the children's minds, for keeping their attention, for leading them to learn easily and in a happy atmosphere. . . . Since their role was no longer defined as the transmission of a given kind of knowledge, but rather as the sensitizing of students' minds to the problems of their time, the fact that their academic qualifications as teachers were unclear or inadequate became less serious. The theories, in this example, provided them not only with a definition of their new role scientifically supported, but also made them feel confident about the appropriateness of their qualifications for the profession. (Boudon, 1986, p.175; author's emphasis; my translation)

With respect to the overvaluing of self-discovery methods of learning, Brainerd (1978), among many other researchers, particularly within the cognitivist orientation, describes several experiments in order to compare the results of tutorial methods to self-discovery processes.⁹ These latter are commonly recommended as ideal by developmentalists, progressivists, and some academic reformers of the 1960s and 1970s. He concludes, emphasizing the Rousseauian ideals of "good nature" (Brainerd, p. 79) that underly such ideas:

We examine logical and empirical objections to, first, the general thesis that training treatments must reflect laws of spontaneous cognitive development and, second, the specific emphasis on self-discovery training. Concerning the former, the thesis rests on some Rousseauian predispositions whose validity is considerably less than obvious. Considering the latter, existing experiments provide no support for the claim that the learning of Piagetian concepts takes place exclusively or primarily under conditions of self-discovery. . . . The available data on these procedures suggest that they work at least as

well as, and probably better than, self-discovery training. (Brainerd, 1978, pp. 78,79)

Sheppard (1974, pp. 717-730) also replicated unsuccessful Genevan experiments on training children to conserve quantity, using an apparatus of containers and water, and attained different results. His subjects were passive observers and they were given feed-back in responses, thus following a "tutorial" method. Sheppard recorded that between thirty and forty percent performed well in the post-test and almost all the subjects revealed some progress. These and other similar data do not seem to have generated a critical self-reexamination of the Piagetian ortodoxy concerning the claimed dependence of learning on development. As Egan (1983) points out, "the crucial test of a theory is not how much of the data it can account for, but rather whether it fails to account for significant data" (p. 86).

Ausubel and Sullivan (1970) in their examination of the main theoretical trends underlying the various conceptions of development ¹⁰ classify Piagetian theory as in a "predeterministic orientation", noting his minimizing of educational influences on development. They base their argument upon

the Piagetian emphasis on the spontaneous aspects of

development and his complete subordination of learning to this unfolding of genic factors and spontaneously occurring self-regulation. . . . At the same time, the convergence of thought in Piaget and Rousseau are rather striking; both center on the idea that the role of the external environment is simply in avoiding serious interferences with the process of self-regulation and spontaneous maturation. . . . This characterization of Piaget's position is made with certain reservations. . . . The confusion arises because Piaget's (1964,1965) conflicting statements about the four factors which influence cognitive development. At first, he seems to adopt an interactive point of view, and then constantly undermines the role of social transmission (previously noted), as well as physical experience. (Ausubel and Sullivan, 1970, pp. 29,30; authors' emphasis)

Disputes about modes of thinking and their development are essentially defined by the role attributed to those quite undefinable notions of "culture" and "nature". In simple terms, the perception of human thinking as a natural process where genetic structures and environment interact producing cognitive development rather like a process of biological adaptation is at the heart of Piagetian theory of human intelligence and is common in the field of Developmental Psychology. Such conceptions also underly other educational theories that share a common philosophical root in Rousseauian ideas of man, nature and society. It is interesting to note, in this respect, the Preface that Piaget wrote to the work John Amos Comenius on Education (1963; New York: Teachers College Press). Piaget connects the ideas of the author of the "Great Dydactic" to his own. Comenius anticipated, Piaget says,

even before Rousseau, the notion of education as a facilitator of the spontaneous development of "good" human nature, in accordance with the principles of the genetic psychology to come:

But the statement which probably gives the clearest indication of the genetic trend in Comenius ideas on education is Principle I itself: "Nature awaits the favourable moment". After recalling that animals reproduce, and plants grow, according to the seasons, Comenius urges that the favourable moment for exercising the intelligence be seized upon, and that exercises "all be performed gradually following a fixed rule". This is again tantamount to stressing what, in modern parlance, would be called the sequence of stages of development. (Piaget, Preface to John Amos Comenius on Education, 1963, p. 15)

A completely different perception emphasizes the specificity and importance of cultural components within environment, which is usually interpreted by developmentalists in a narrower sense. Human beings are, within this kind of theoretical perspective, mostly seen as bio-cultural individuals and their development is a result of the relation between genetic potential and cultural environment. Such views vary from social deterministic theories and from cultural relativism to interactive conceptions of development in which biological nature and cultural factors interplay in various ways in both a given culture and in each individual. It is, however, the

developmentalist orientation associated with progressivist ideas that has been predominant in education and curriculum up to the present. Bruner appropriately notes that:

Theories of human development, once accepted into the prevailing culture, no longer operate simply as descriptions of human nature and its growth. By their nature, as accepted cultural representations, they rather give a social reality to the processes they seek to explicate and, to a degree, to the "facts" that they adduce in their support. (Bruner, 1986, p. 134)

This certainly seems to be the case with the considerable and persistent influence of developmental theories in current "commonsense" educational principles.

Enlarging the Horizons of Development
and Thinking

In a recent examination of Piagetian theory, Bruner (1986) includes it within the more influential theories of development of this century, along with Freud's and Vygotsky's. Such an appreciation indicates both the recognition of the undeniable contributions of such theories to present culture. It also reflects the personal evolution of Bruner's thinking on the very concept of development ¹¹ :

For Piaget, growth happened naturally. . . . The drama consisted in honoring its natural growth, not in comparing its present status with what it would later be or might become under some special curricular dispensation. It is this respectful explication of the self-sufficiency and dignity of the child's mind in terms of its own logic that is now finding its way into the canonical forms of the culture. It has begun to have a profound effect on commonsense education. Piaget's motto, "To learn is to

invent", may yet alter the view that to teach is simply to transmit, to fill a vacuum. (Bruner, 1986, p. 141)

One of the positive effects of Piaget's study of children's thinking, particularly in education, was, in fact, to call attention to the differences in thinking at various periods of one's development. My own interest in Developmental Psychology actually emerged as a first answer to the search for the explanation of distinctive characteristics of children's thinking that I have been observing throughout my professional life. According to Bruner, this sense of respect for "the dignity of children's mind" has influenced--apparently positively--what is taken to be commonsense educational discourse. Nevertheless, two objections can be raised: (1) Piaget's theory of cognitive development has overemphasized adults' logico-mathematical reasoning as the model of thinking; the differentiation of stages is thus predominantly defined in terms of the lack or presence of those abilities rather than in terms of children's cognitive characteristics; (2)

the respect for the autonomy and difference of children's thinking had led to simplifications and distortions of the processes and content of learning that actually ignore the potential of children's minds.

Bruner, however, views development in a more comprehensive way than the Genevan school. He recognizes a variety of directions of development, emphasizing the interdependence between the individual and the cultural environment:

Human culture, of course, is one of the two ways by which "instruction" about how humans should grow are carried from one generation to the next--the other being the human genome. The plasticity of the human genome is such that there is no unique way in which it is realized, no way that is independent of opportunities provided by the culture in which an individual is born. (Bruner, 1986, p. 135)

It can be argued that Piaget also emphasizes interaction in his constructivist conception of development. I would note that the Piagetian idea of interaction refers merely to the relation between a biological subject and the environmental conditions that may or may not facilitate his or her development. Such development will, however, occur in a unique direction, though at different rates. Bruner, in contrast, points out

the possibility of a variety of development processes that can occur as a consequence of both the "plasticity of the human genome" and the variety of cultural influences that interact with the genetic potential of each individual.

Bruner also examines critically Piaget's and his own earlier and present views on the relation between development and education:

Some years ago I wrote some very insistent articles about the importance of discovery learning--learning on one's own, or as Piaget put it later (and I think better), learning by inventing. What I am proposing here is an extension of that idea, or better, a completion. My model of the child in those days was very much in the tradition of the solo child mastering the world by representing it to himself in his own terms. In the intervening years I have come increasingly to recognize that most learning in most settings is a communal activity, a sharing of the culture. It is not just that the child must make his knowledge his own, but that he must make it his own in a community of those who share his sense of belonging to a culture. It is this that leads me to emphasize not only discovery and invention but the importance of negotiating and sharing The pupil, in effect becomes a party to the negotiatory process by which facts are created and interpreted. He becomes at once an agent of knowledge making as well as a recipient of knowledge transmission. (Bruner, 1986, p. 127)

Three important concepts for education play a role in Bruner's present perspective of learning: discovery or invention, transmission, and negotiation. It seems sensible to look for a proper combination of these three

elements in curriculum and teaching practices. We cannot forget, however, that they have to be adequate to the purposes of education assumed by a given society.

The relationship between development and education was also discussed in Lev Vygotsky's theory, in the 1920s and 1930s. Despite having opposed the early writings of Piaget on this subject, Vygotsky's own ideas had relatively little influence in Europe and North America during the decades that followed his death, in 1934. A renewal of interest in his thinking emerged as a result of more recent studies in the domains of Psychology and Language, along with the increasing questioning of the developmentalist interpretations and their direct transfer to education.

The originality of Vygotsky's thinking is evident in the way he looked at development. He reflected the principles of dialectical Marxism in terms of providing an explanatory link between nature and culture, and implying a constant emphasis on process and change as the bases for development. As Cole and Scribner note, Vygotsky considered that, "in terms of the subject matter of psychology, the scientist's task is to reconstruct the origin and course of development of behavior and consciousness" (Vygotsky, 1978, p. 7). Those principles

led him to a socio-cultural theory of higher mental processes. This provided a brilliant and innovative interpretation of development that contrasted with the apparent sterility of introspective processes and the objections raised to them by both the Gestaltists and the stimulus-response theorists.

Vygotsky explained human conscious activity as a process that results from the natural history of each psychological phenomenon, with the changes both qualitative and quantitative that characterize that history. By doing so he offered a theory that tried "a comprehensive approach that would make possible description and explanation of higher psychological functions in terms acceptable to natural science" (ibid., p.5). Vygotsky considered as factors of explanation of human psychological functions, first, the brain mechanisms implied in any given mental function, second, the developmental history of that function, and third, the socio-historical conditions under which it had developed.

"Development" in Vygotsky's terminology had then a considerably wider and more integrative meaning than the one that developmentalists and educational theorists later made current in education and curriculum. It was thus the

first theory that tentatively established an integration between cultural and natural phenomena in the understanding of development. This led to implications for education, that, along with medical practice, constituted the great concerns of Vygotsky's investigative work.

In order to understand the divergences between Vygotsky and the developmentalists' perspectives on education, some of his critical concepts have to be considered in some detail:

[The investigator's] task is to uncover the real relationship, not the figurative one, that exists between behavior and its auxiliary means. . . . We seek to understand the behavioral role of the sign in all its uniqueness. This goal has motivated our empirical studies of how both tool and sign are mutually linked and yet separate in the child's cultural development. . . the basic analogy between sign and tool rests on the mediating function that characterizes each of them . . . A most essential difference between sign and tool. . . is the different ways that they orient human behavior. The tool's function is to serve as the conductor of human influence on the object of activity; it is externally oriented; the sign, on the other hand, changes nothing in the object. . . it is a means of internal activity aimed at mastering oneself; the sign is internally oriented. . . . The mastering of nature and the mastering of behavior are mutually linked, just as man's alteration of nature alters man's own nature. (Vygotsky, 1978, pp. 53-55; author's emphases)

Based upon this central assumption, Vygotsky describes the whole process of development and the qualitative changes that operate throughout the process. It is this

interaction through mediated activities that provides the limitless ability to improve all psychological operations¹² as well as the kind of activities that can be performed through the new functions, leading to the definition of "higher psychological functions": "In this context, we can use the term higher psychological function, or higher behavior as referring to the combination of tool and sign in psychological activity" (ibid., p. 55)

Development proceeds, according to Vygotsky, as a spiral, passing through the same area several times, while advancing to deeper and more complex approaches. This process is one of constant construction of meaning by changes between the individual and the socio-cultural environment.¹³ That constant process of development is summarized by Vygotsky in the following steps:

(a) An operation that initially represents an external activity is reconstructed and begins to occur internally. . . . (b) An interpersonal process is transformed into an extrapersonal one. Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological), and then inside the child (intrapsychological). . . . All the higher functions originate as actual relations between human individuals. (c) The transformation of an interpersonal process into an intrapersonal one is the result of a long series of developmental events. . . . For many functions, the stage of external signs lasts forever, that is, it is their final stage of development. Other functions develop further and gradually become inner functions. However, they take on

the character of inner process only as a result of a prolonged development. . . . Psychological processes as they appear in animals actually cease to exist. The internalization of socially rooted and historically developed activities is the distinguishing feature of human psychology. (Vygotsky, 1978, pp. 56, 57; author's emphases)

Vygotsky's theory of development brings to light aspects that have been opposed or ignored by developmental psychologists, namely (1) the "construction" of human ways of behaving and thinking as a socio-cultural process that influences the direction of development of each individual; (2) the consequent rejection of a definition of human intelligence as a merely "natural" process of adaptation to the environment similar to other biological species and developing in a parallel way. The opposition concrete-abstract loses sense in such a spiral progression where what actually develops is the ability to integrate and to articulate the internalized interaction among levels of mediated meaning

Within Vygotsky's theory, education is not dependent upon the natural sequence of developmental stages as Piaget claims, nor a mere facilitator of spontaneous and continuous growth in an alleged natural direction, as argued by Dewey and progressivists.

The potentiality of education as an active factor in

promoting intellectual development is implied in Vygotsky's ideas. This influence is particularly evident in school activities. According to Vygotsky, school provides the opportunities for developing several kinds of cognitive and metacognitive abilities; it demands awareness of rules and roles, disciplined thinking and reflective control that contribute to improve "consciousness and deliberate mastery--the hallmark of higher functions of mind"

(Donaldson, 1983, pp. 22, 23). He points out explicitly:

that the development of the psychological foundations for instruction in basic subjects does not precede instruction but unfolds in a continuous interaction with the contributions of instruction. (Vygotsky, 1983, p. 266)

Another of Vygotsky's constructs with implications for education, is the concept of the Zone of Proximal Development (ZPD). This was based upon a series of studies carried out with groups of young children at the same mental level. One group was asked to solve a set of tasks by themselves, and another was presented with the same task but could do it with the help of children at a higher level of mental development. Vygotsky found consistent improvements in the second situation:

Most of the psychological investigations concerned with school learning measured the level of mental development of the child by making him solve certain standardized

problems. The problems he was able to solve by himself were supposed to indicate the level of his mental development at the particular time. But in this way only the completed part of the child's development can be measured, which is far from the whole story. We tried a different approach. Having found that the mental age of two children was, let us say, eight, we gave each of them harder problems than he could manage on his own and provided some slight assistance: the first step in a solution, a leading question or some other form of help. We discovered that one child could, in cooperation, solve problems designed for twelve-year-olds, while the other could not go beyond problems intended for nine-year-olds. The discrepancy between a child's actual mental age and the level he reaches in solving questions with assistance indicates the zone of his proximal development. In our example, this zone is four for the first child and one for the second. Can we truly say that their mental development is the same? Experience has shown that the child with the larger zone of proximal development will do much better in school. This measure gives a more helpful clue than mental age does to the dynamics of intellectual progress. (Vygotsky, 1983, p. 267; my emphasis)

The measurement of the mental level appears, in the reported studies, linked to the performance in school tasks. This is different from Piagetian tasks intended to check mental operations. Nevertheless, such operations are implied in the tasks presented by Vygotsky. If children perform them well with some support, it is difficult to argue that they do not have them in place. Furthermore, the different levels of "proximal development" found in children that were supposed to share the same mental stage, challenges the idea, later expanded by Piagetian educationalists, that education must "wait" for the

spontaneous process to occur.

Vygotsky's concept of the ZPD provides support to the assumption that education modifies development in terms of improving potential abilities rather than merely accelerating the pace to a further step. Referring to the concept of "sensitive periods", which was new at the time, propounded, among others, by Maria Montessori, Vygotsky argues that such periods "cannot be explained in purely biological terms" (1983, p. 269). Instruction, again, in his view, provides the cultural mediation that can enhance specific abilities in those "critical periods" that would otherwise remain inactive or poorly developed. In the example of imaginative writing, he notes:

Our investigation demonstrated the social and cultural nature of the development of the higher functions during these periods, i.e., its dependence on cooperation with adults and instruction. Montessori's data, however, retain their significance. She found, for instance, that if a child is taught to write early, at four and a half or five years of age, for example, he responds by "explosive writing", an abundant and imaginative use of written speech that is never duplicated by children a few years older. This is a striking example of the strong influence that instruction can have when the corresponding functions have not yet fully matured. (Vygotsky, 1983, p. 268)

Though some assumptions about critical periods and the "ideal" time for learning to write have been controversial, Vygotsky's claim remains accurate insofar as the cultural

stimulation appears to work as such a powerful factor in the development of children' s minds. Margaret Donaldson would better describe this as "the development of the educated mind in our kind of culture" (1980, p. 104).

Children's Minds in the Interface
of Other Disciplines

I have argued earlier that education has long suffered from the overdominance of Psychology especially with regard to teachers' beliefs about children's ways of thinking. Sociology has been another powerful influence, especially after the 1960s and particularly with respect to the study of environmental and socio-economical effects on education. Epistemological problems related to defining the so-called Sciences or Science of Education, or the status and nature of a Theory of Education, are not in themselves the object of present concern. I will limit the discussion in this chapter to the implications of the overdominance of these two disciplines. Their excessive influence is responsible for two major obstacles to a better understanding of such central educational questions as children's ways of thinking and learning. First, it has led to what have been

called "psychological and sociological fallacies", that is, direct transpositions of psychological or sociological constructs to educational theory and practice without adequate consideration of its distinctive nature; second, it has led to neglecting other disciplines that may contribute to illuminate the complexity of the phenomena that education deals with.

I want briefly to consider the kinds of insights that have recently been suggested by two such neglected disciplines, linguistics and anthropology.

Within the field of linguistics and psycholinguistics it is seemingly important to analyze the divergence between Piaget and Vygotsky on the relation between thought and language. It seems also relevant to consider some new questions brought about by the studies of Noam Chomsky and his followers about the origin and development of human language. Such studies have contributed to the understanding of the modes of mental operation. An extensive discussion of such theories would be beyond the scope of the present work, but there are some relevant points that must be emphasized since they may be useful for the reexamination of the educational assumptions that are being discussed.

Piaget made his claims clear about the priority of thinking over language; he considered the early manifestations of human language as "egocentric speech". In his view, language emerges correlatively to other symbolic expressions. It is a necessary but not sufficient condition for expressing thought. Thinking structures are built upon action and "remain for a long time relatively independent of language" (Piaget, 1976, p. 126). In his debate with Chomsky (Piaget, 1983), he argues :

the conditions for the emergence of language are part of a larger process, prepared by the various stages of previous sensori-motor intelligence. . . . Thus, I do think there is a reason for the synchronic appearance of language and symbolic function and a relation between socio-motor intelligence and language emergence; it is the acquisition of the symbolic function, derived from sensorio-motor intelligence, that allows for the acquisition of language. (Piaget, 1983, pp. 214, 215)

Vygotsky, based on his experiments on the evolution of language in young children, maintains a quite different position, emphasizing the social features of speech from its earliest manifestations:

For Piaget, the development of thought is the history of progressive socialization of autistic, deeply personal mental states. . . even social speech is perceived as subsequent, not prior, to egocentric speech. Our hypothesis reverses such progression. . . . We think that global development occurs in the following way: the prime function of speech, in children as well as in adults, is

communication, social contact. . . . The earliest manifestations of language are, thus, essentially social. It is first global and multifunctional; later its functions differentiate in egocentric and communicative speech. . . which are both social though performing different functions: the egocentric speech emerges when the child transfers social and cooperative functions into the realm of inner psychological functions. . . . Piaget describes how the discussions among children originate the first forms of logical reflection. . . . We think that a similar process occurs when the child starts talking to him/herself in the same way. . . when the circumstances lead the child to stop and think, it is normal that he/she thinks loudly. (Vygotsky, 1989, p. 17; my translation).

As Vygotsky himself notes, his conception implies an interrelated perception of language and thinking development. The child develops as a thinker and as a speaker, in an interactive way. The whole theory of the development of language and thinking depends, in Vygotsky's view, upon the role attributed to egocentric speech. Different conceptions of egocentric speech reveal different conceptions about the nature and development of thinking and language.¹⁴ Vygotsky compares the behaviorist sequence--from oral speech to inner speech--to the Piagetian one--from non-verbal, autistic thinking to socialized speech and logical thinking through egocentric thinking and speech--to his own perspective where thinking and language interrelate in their development. In his view, speech is social from the beginning, later becomes egocentric, and finally is internalized: "in our

conception, the real development of thinking does not move from the individual to the social, but rather from the social to the individual." (1989, p. 18).

Chomsky's studies (1983) in the area of linguistics are also relevant for the perception of mental development. His innatist theory of a pre-programmed genetic element in the human brain for language ability--LAD, Language Acquisition Device, in Chomsky's original formulation--raises new questions about the functioning of mind:

The study of human language led me to recognize that a capacity for language genetically determined, which constitutes a component of the human mind, specifies a certain class of--or a system of--"grammars accessible to human beings". The child gets into one of those grammars available within his environment. . . . As for the physical organs, it doesn't seem possible to describe the nature and origin of basic mental structures in terms of simple interaction organism/environment. Mental organs as physical ones are both determined by properties pertaining to the species and genetically programmed, although in both cases, the interaction with the environment will be required to generate the development, and will influence the developing and modelling of the structures. (Chomsky, 1983, pp. 50; 69; my translation)

Chomskyan theory has stimulated a large controversy but has become widely recognized in the linguistic community. Though Chomsky's theory deals exclusively with language, its findings may extend to other cognitive functions. The search for similar "devices" for other cognitive functions, as the LAD for language, would constitute a challenge to

the accepted beliefs of developmentalists with respect to the genesis of cognition.

Bruner, who has devoted a considerable part of his investigation to the problems of language acquisition and development, was very critical of Chomsky's inatism, emphasizing instead the function of communication between partners, particularly mother and child in the early period of life. The partners' cooperation in this communicative process are, in his view, responsible for the emergence of human language, through a continuous process of construction and shared interpretation of meanings. (1981, p. 116). Later, (1987, pp. 4,5) Bruner reinforced his interactive interpretation of the acquisition of language and other psychological competences. Based upon communicative situations with young children that he observed, Bruner concluded that "language, interaction and cognition are interwoven" (1987, p. 4). His empirical observations of those children illustrate the importance of "developing intersubjective interpretation of what is going on" (ibid.).

Vygotsky's influence and reinterpretation appear as supporting many of the more recent approaches to cognition, language and learning. Nevertheless, none of these

explanations for language acquisition responds to the question of the genetic basis of such potentialities in human beings, nor contradicts Chomsky's claims in that area, since they refer essentially to the genetic basis of human ability for speaking, and do not establish any definite findings about the process of language acquisition.

What appear as significant implications from linguistics research to the study of children's thinking and cognitive development is rather the possibility of existing genetic bases for thinking that would be programmed in the brain, following Chomsky's controversial research on a specific language device. On the other hand, educationalists should learn from Vygotsky's investigation how relevant is the role played by the interaction of individuals with their socio-cultural environment in cognitive development

Anthropological studies have also brought about significant research that can contribute to enriching the perception of the diversity of modes of operating of the human mind. Studies of different cultures led to the identification of several ways of thinking about the world and making sense of it that does not seem reducible to a

universal and hierarchical representation of intellectual development.

A major distinction that was first established within anthropology tended to divide cultures called "primitive" or "pre-scientific" from "modern" and "scientific" ones. Many classical studies helped to reinforce that distinction, establishing a hierarchy between mythical and rational thinking, and attributing to the Greeks the immense accomplishment of replacing the lower level of thinking--mythical-- by higher forms of reaching the "truth"--rationality. As Egan (1988) notes: "the evolutionary ideas of the nineteenth century encouraged a simple story in which the newly discovered 'primitives' represented a stage of cultural evolution equivalent to the archaic or pre-archaic Greeks" (p. 38).

The idea of the "Greek Miracle" was soon challenged by historians who emphasized rather the continuity and complex links between the intellectual activities of the Greeks and the cultural work of previous civilizations. Among classical anthropologists who have also contributed to clarifying this issue, Cornford (1912) argued in favor of a "structural continuity" underlying the evolution from mythic to rational thought. Commenting on Cornford's

arguments, and while recognizing some inadequacies, Egan emphasizes that "What is elaborated, however, is the understanding that myth has its own complex logic and that this logic is not an opposite to rational thought. Rationality does not simply displace myth; it arises from, and is developed "on top of" mythic thinking." (Egan, 1988, p. 39).

The structuralist Lévi-Strauss (1966) though building his analysis on the mythical-rational distinction, shows that both modes of thinking interweave till the present time:

The relation between the dyachronic and the synchronic is therefore in a sense reversed. Mythical thought . . . builds up structures by fitting together events, or rather the remains of events, while science . . . creates its means and results in the form of events, thanks to the structures which it is constantly elaborating and which are its hypotheses and theories. But it is important not to make the mistake of thinking that these are two stages or phases in the evolution of knowledge. Both approaches are equally valid. Physics and Chemistry are already striving to become qualitative again, that is, to account also for secondary qualities which when they have been explained will in their turn become means of explanation. . . . Mythical thought for its part is imprisoned in the events and experiences which it never tires of ordering and re-ordering in its search to find them a meaning. But it also acts as a liberator by its protest against the idea that anything can be meaningless with which science at first resigned itself to a compromise. (Lévi-Strauss, 1966, p.23)

The role played by the emergence of writing in the predominance of one or another mode of thinking has become

a particularly critical point in the comparison of cultures. Jack Goody (1977) pursues the analysis of this problem in terms of (1) arguing that the distinction between "primitive" and "modern" societies cannot be based upon two different modes of thought, since elements of each are always identifiable in the other; (2) defending the explanation for the differences as due to particular technologies of communication, especially the technology of writing; (3) claiming that the observed differences do not represent different forms of thought, but rather different strategies of thinking appropriate to the demands of each society (1977, pp. 147, 148).

If we think of changes in communication as being critical, and if we see them as multiple rather than single in character, then the old dichotomy between primitive (or prior) and advanced disappears, not only for thought but for social organisation as well. (Goody, 1977, p.10; author's emphases)

Anthropologists' contributions to education rest on their calling attention to the variety of processes or strategies of thinking. They also show that the dominant and valued processes of thinking in Western cultures are associated with the nature of their literate societies.

The overemphasis on logical reasoning and scientific models of thinking that curricula currently exhibit has the

counterpart of neglecting other strategies and processes of understanding that are certainly vivid in young children. In fact children come to school bringing considerable experience of non-literate modes of understanding--though influenced by a literate environment--that are little taken into account in teaching and curricula. The perception of children's thinking according to the "concrete-operational" description, the belief in a pre-determined natural direction of development, certainly contribute to the neglecting of other powerful abilities of the child as a thinker, whose oral abilities are important tools for understanding the world. Stories as a means for making sense of reality is just an example of the importance of oral intellectual tools children can use efficiently ¹⁵

Logico-mathematical thinking in education offers seemingly a narrow and unidirectional way of looking at the multiple relations between concrete and abstract thinking that does not account either for the variety of meanings that may be associated with abstraction:

Scientific concepts are abstracted from concretely described facts by a sequence of widening generalizations; progressive generalization systematically pursued can yield all the powerful and rarified abstractions of physics, mathematics and logic. . . (generalizing abstraction). . . . Artistic abstraction is, in fact, of many kinds; some of these are peculiar to art. . . and some are common to many

mental activities and occur even in the ordinary use of language for social communication . . . abstraction is involved in all symbolic functions . . . (presentational abstraction). (Susanne Langer, 1967, pp. 153. 156; my emphases)

Conclusion

The examination of above theoretical perspectives on children's thinking and cognitive development has suggested some questions to the accuracy and educational value of the current conception of the child as a concrete thinker. Several contradictions and insufficiencies have been identified in the dominant educational "paradigm", and discussed in the present chapter. The more relevant theoretical questions that emerged from the discussion may be synthesized in the following terms:

- It is debatable whether or not development of thinking necessarily moves from concrete to abstract modes of reasoning.
- Children do not appear to be unable to use abstraction and logical reasoning, given the meaningfulness of activities or tasks.
- Not the whole process of thinking and understanding can be collapsed into logico-mathematical forms of thinking through the various steps of mind's development.

- Cognitive stages appear to evolve differently according to the opportunities and demands faced by individuals in different cultural settings.

Educational implications inferred from the dominant theory of cognitive development become, thus, questionable:

- If the concreteness of children's thinking is debatable, are the associated issues--immediacy to everyday life, direct active involvement, focus on local environment, "expanding horizons", etc.--adequate criteria for selecting educational content and recommending learning strategies?

- If the progression of thinking does not necessarily follow a unidirectional orientation--from concrete to abstract--, does the current neglect of abstract thinking¹⁶ provide an adequate basis for children's learning at the early levels of schooling?

- If thinking is not reducible to logico-mathematical thinking, does the relatively little attention paid to imaginative activities and affective dimensions of learning hinder children's attempts to make sense of reality?

- If cultural environment makes a more significant difference in cognitive development than the dominant theories suggest¹⁷, are there likely to be educational

losses resulting from the neglect of components of oral culture present in children's experience and thinking before entering school?

NOTES

¹ Cleverley and Philips call attention to the possibility of emphasizing from Kuhn's theory a relativistic conception of knowledge: "in his view it cannot be said that one paradigm is better than another--paradigms cannot be compared in this way for they focus differently on different issues and thus are technically "incommensurable" (1986, p. 6).

² See the analysis of the educational "orthodoxy", as an internalized normative model even when not consistent with teachers' practice, in Chapter One.

³ In order to illustrate how theories work as "lenses" that make a difference in the explanation of any fact or situation, Thomas describes a little sketch where five people--children, adolescents, adults--interact. Afterwards he presents the interpretations of the episode that would result from four developmental theorists: Piaget, Freud, Lewin, and Skinner (pp. 2-11).

⁴ The concept of meaningful learning is critical within Ausubel's educational psychology. See also Santos, M.E. "Conceptual Change in Classroom" 1991, Lisboa: Livros Horizonte, and Valente, M.O. "A Study of the Ausubel Advance Organizer Paradigm in an Inquiry Physical Science Course", 1976, PhD Dissertation at the University of Texas at Austin.

⁵ Piaget defines epistemic and psychological subjects in the following terms: "[epistemic subject]. . . that which is common to all subjects at the same level of development, independent of individual differences, e.g. the activities of classifying., ordering, numbering are common to all normal adults" (Piaget, 1967, p. 14); "(psychological subject) that which is unique to such an individual, e.g., each may symbolize this series of numbers by a particular

mental image which differs from one individual to another" (ibid, pp.14,15).

⁶ See the description and discussion of the study in Lawson, 1991, Journal of Research in Science Teaching, 586-590.

⁷ For a detailed examination and critique of

recapitulationism in general and particularly the movement of cultural recapitulation, see Egan, Primary Understanding (1988), Chapter 5, especially pp. 167-169.

⁸ This interaction and mutual reinforcement of theories in their translation into practice has been discussed in Chapter Two.

⁹ Egan (1983, pp. 76-82) provides a detailed description of several studies relating to the problem of "teachability" of operational competences.

¹⁰ In their examination of the theoretical foundations of child development, Ausubel and Sullivan (1970, pp. 19-45) group the different perspectives in the following categories: preformationist approaches, predeterminedistic approaches and "tabula rasa" approaches.

¹¹ See previous arguments of Bruner and related criticisms in Chapters Two and Three.

¹² The term "operation" is used by Vygotsky to refer to the mental functions in general. It has no similarity with the specific meaning of "operation" in Piaget's terminology.

¹³ Vygotsky (1978) illustrates the process of internalization with the example of the development of pointing:
"The child attempts to grasp an object placed beyond his reach; his hands, stretched toward the object, remain poised in the air. . . . When the mother comes to the child's aid and realizes his movement indicates something, the situation changes dramatically. . . pointing becomes a gesture for others. . . the primary meaning of that unsuccessful grasping movement is established by others. Only later, when the child can link his unsuccessful grasping movement to the objective situation as a whole, does he begin to understand this movement as pointing. At this juncture there occurs a change in that movement's function: from an object-oriented movement it becomes a movement aimed at another person, a means of establishing relations. As a result of this change, the movement itself is then physically simplified, and what results is the form of pointing that we may call a true gesture. . . . Its meaning and functions are created at first by an objective situation and then by people who surround the child." (p.

56)

14 A quite useful diagram for understanding Vygotsky's view of speech and thought development is available in Murray Thomas, 1979, Comparing Theories of Child Development, p. 335, figure 14.1.

15 For the analysis of the function of stories in making sense of reality see Egan, Primary Understanding, 1988; Teaching As Story Telling and also, in a quite different perspective, Applebee, The Child's Concept of Story, 1978).

16 For a detailed discussion of various meanings of "abstraction" and of the different ways of operating of human mind, basically based upon symbolization, see Susanne Langer, 1967, Mind: an Essay on Human Feeling (Chapter 6, A Chapter on Abstraction, pp. 153-157).

17 Western literate societies, by reason of their cultural roots and philosophical traditions value logico-mathematical thinking. Oral cultures use very different meaning making tools such as myth, story, emotion-laden memory and ritual forms of learning. The child entering school has experienced, in the Western world, elements of both approaches to reality, with the emphasis on the oral culture of childhood, even in literate settings. This is currently ignored by school curricula as a basis for understanding and making sense of reality. See Cole and Scribner (1974), Goody (1977,1987) and Olson (1978).

CHAPTER FIVE

Children's Thinking at Work:

Discrepancies with Dominant Curriculum Conceptions

The purpose of the present chapter is to document empirically features of children's thinking that appear discrepant with the dominant theories that inform curricula. The implications of these discrepancies, when compared to the theoretical views discussed in Chapters Three and Four, would seem to require a critical reexamination of the current educational beliefs about children's "concrete" thinking.

The Role of Empirical Data within the Study:What Counts as Disconfirming Evidence

It is important to note, at this point, that the data examined here are presented as documenting the criticisms of the current paradigm of the concrete thinker. They are not, obviously, intended to provide empirical evidence to support an alternative theory of children's mode of thinking. Such a purpose would require an extensive and

systematic empirical research that is clearly beyond the scope of the present study as it was defined in the Introduction: a theoretical study, based upon the conceptual analysis of the concept of "concrete" thinking and the critical examination of its educational implications. Consideration of empirical data and their critical comparison to theories integrate, in my view, the intended reflective analysis of the concept.

In fact, this study started with my reflection on empirical data informally observed and experienced that have originated the theoretical questions that orient this thesis and have been discussed so far. The clarification and discussion of the alleged theoretical supports for the curriculum conception of the child as a concrete thinker and their comparison with different views of children, development and thinking have, in turn, required a new and more systematic search into the empirical field. Are there data found in behavior, talk and reactions of children consistent with the criticisms discussed in prior chapters? Are there any discrepancies to the current theory empirically identifiable? What are the links between the above theoretical debate and actual observations and descriptions of children's thinking at work?

Because this study has been developed based on this interaction theory/practice, I found appropriate at this point to analyze descriptions and observations of children in a variety of settings, in order to compare them to the current theoretical claims. By doing so, I hope to document empirically some of the critical questions that may be raised to the predominant educational conception of the child as a concrete thinker.

Given the fact that the current curriculum theory claims the universality of the features of the "concrete thinker", any kind or number of observed behaviours, responses or modes of reasoning inconsistent with that description will count as disconfirming evidence. The presence or absence of similarities among the observed discrepancies will provide an additional contribution to the re-assessment of the concept.

Disconfirming data will not allow, obviously, to discredit the whole dominant theory. But they certainly will show empirically that there are facts not explainable within such a theory that, consequently, requires a critical reexamination.

Such data must also be compared to the alternative conceptions discussed above, contributing to reformulate

and refocus theory about children's thinking. In Denzin's (1970) terms, empirical data, qualitative or quantitative, may have several functions for theory: "they initiate new theory or reformulate, refocus and clarify existing theory." (p. 120; author's emphases).

The Selection of the Situations and Subjects:
Purposes and Criteria

Two types of situations will be examined and discussed here: (1) observations of children's behaviours and conversations as described in educational research literature and (2) direct observation of a 2nd and 3rd grade class, during a period of five weeks.

These two groups of data were selected according to the following criteria that should, in my view, make them meaningful in the context of the study:

1 . Consideration of empirical situations viewed through different lenses: those of various researchers interested in children's thinking and development, and that of the author, as an external observer of a group of children in class, oriented by the particular research questions raised in the present study.

2 . Diversity of observed situations with respect, for example to sex, age, school achievement, social and cultural background, areas or countries of residence of the subjects.

3 . Consideration of two kinds of observed or reported data: children's spontaneous behavior and talk and children's behavior and talk in structured or semi-structured environments.

Consequently, there was no purpose of constituting a representative sample of any given universe with the objective of drawing general conclusions. My main purpose was, differently, to check the validity of the current claims about children's concrete thinking by examining eventual discrepancies to the dominant theory in a number of subjects, at a variety of empirical settings, and observed from various points of view.

Methodological Guidelines

The research has followed an interpretive-descriptive model, using--or reporting--predominantly qualitative and ethnographic procedures. The discussion has developed along with the description of the empirical situations,

commenting and summarizing, in each section, the discrepancies identified.¹

In both groups of data (reports collected in educational research literature and observation of a class during five weeks) I selected from the overall descriptions critical episodes according to the criteria of the relevance and significance they assume to the discussion.

Children's Thinking in Educational Research Literature

The following reports were selected from relevant educational research literature about young children's thinking that was reviewed for the purposes of this thesis. The dominant focus was on children in early schooling, including both pre-school and early school levels. Children at elementary school were the main concern, given the present study's focus on the concept of "concrete thinker". Some descriptions of younger children were, however, also included; it was considered that they may provide some further relevant data about the sequence of developmental stages implied in the description of the child as a concrete thinker. If the supposed lack of

logical abilities is challengeable even in pre-operational children, a fortiori their absence in concrete operational thinkers must also be debatable.

Do Children Lack the Capacity for Inference? Donaldson's Studies

Analyzing the question about the presence or absence of children's capacity for deductive reasoning, Donaldson (1983) describes children's performances that challenge both Piagetian and behaviourist theories that claim children under the age of six or seven are incapable of reasoning deductively.² Here are some of the examples she reports that appear to contradict children's alleged inability to infer:

This exchange took place shortly after the death of Donald Campbell when he was trying to break the world water speed record, and some months after a visit by a research worker called Robin Campbell to the school where the conversation took place. The speakers were a little girl of five and another research worker:

Child: Is that Mr Campbell who came here--dead?
(dramatic stress on the word "dead".)

Research worker: No, I'm quite sure he isn't dead.
(much surprised.)

Child: Well, there must be two Mr. Campbells then, because Mr. Campbell's dead, under the water.

(Donaldson, 1983, p. 233)

The child's conclusion implies that she has inferred the logical necessity of the existence of two different people, otherwise there would be a contradiction between her premise and the conclusion presented by the research worker.

Another set of examples was selected by Donaldson from spontaneous comments made by four- and five-year-olds and questions they asked when listening to stories and looking at the corresponding pictures in the books.

"What a lot of things he's taking! He wouldn't have . . . he's only got two hands and he wouldn't have space for his two hands to carry all these things."

(Premises: (1) Peter has more to carry than two hands can carry; (2) Peter has only two hands. Conclusion: It is not possible for Peter to carry all that he is represented as carrying. Implied criticism of the story.)

"But how can it be (that they are getting married)? You have to have a man too." (The book contains an illustration of a wedding in which the man looks rather like a woman. The child thinks it is a picture of two women.)

(Premises: (1) You need a man for a wedding; (2) There is no man in the picture. Conclusion: It can't be a wedding.)

"I think you have missed a page. You didn't say that he cut out the leather."

(Premises: (1) There is a page on which the story tells of cutting out leather; (2) No reference has been made to

cutting out leather. Conclusion: A page has been missed.)

Child: You're not looking.

Teacher: Pardon?

Child: Why are you not reading it?

Teacher: Because I know it.

(Premises: (1) When you read a book you look at it; (2) The teacher is not looking at the book. Conclusion: She is not reading the book.

(Donaldson, 1983, pp. 234-235)

These described "if...then" arguments are not consistent with the limitations that young children are thought to exhibit in the pre-operational stage (or even in the transition to the concrete operational stage). Ability for hypothesizing based on abstract or verbalized premises can be observed, for example, in the first situation, where the child is perplexed about the logical impossibility of Mr. Campbell being alive and simultaneously "dead under the water". She then concluded that there had to be two different people with the same name. She hypothesized based on her recalling of Mr. Campbell (the research worker) and information verbally conveyed about another Campbell (the racer). This child easily inferred the logical inconsistency of both pieces of information if referred to the same person, based on hypotheses and verbalized information, what is said to be impossible for a child at the concrete operational stage (Piaget, 1982, p.277).

These examples are hardly conclusive, but certainly perplexing when compared to the dominant beliefs, and inviting the researcher to pause and to question the long accepted representations of children's thinking. As Donaldson notes, "it is impossible to take account of this evidence and at the same time to maintain that children under the age of six or seven are incapable of reasoning deductively" (Donaldson, 1983, p. 235). She rather emphasizes the importance of meaningful contexts in children's reasoning. The concept of "embedding" is, in her view, critical in the development of thinking and understanding. Donaldson establishes several levels of "embedding" that are intimately linked to the development of language use and comprehension:

At first, in their very beginnings, language and thought are entirely embedded in the here and now of personal activity and interaction. This is "present moment embedding". The next step comes with extension into the past and into the future, but still the focus is on the personal life--plans, memories, hopes and fears. We may speak now of "own-life embedding". Beyond this again, progress lies in the growth of ability to think and talk about things that are not only further off in space and time but remote from the thrust of one's own concerns. (Donaldson, 1980, p.106)

Thinking and Talking of Young Children: a Study by Hughes and Tizard

Martin Hughes and Barbara Tizard (Young Children Learning, 1984) describe a series of conversations with pre-school children in a study intended to compare children's talking and thinking at home and at the nursery school. Conversations of children from various socio-economic backgrounds (four-year-olds) were tape-recorded, both at the nursery school and at home with their mothers, in order to find out what and how they learned from the two situations. The overall results have shown a considerably higher level of opportunities for children to learn and better performances in expressing themselves at home than in school. Hughes and Tizard explain these differences by the greater attention paid by mothers to the spontaneous ways of children's thinking and making sense of reality and to the meaningfulness of the situations at home: "A further characteristic of the learning environment at home is that the learning is often embedded in contexts of great meaning to the child." (p. 251).

These results are reinforced by similar ones obtained with larger and more diversified groups of children in studies developed by Tizard and Wells and Davie (p. 259). The study is documented by a detailed statistical treatment

of categories of behaviors and talking topics, frequency of questions, interactions and talking turns, adequacy of questions and responses, frequency of cognitive demands, etc., presented in a statistical appendix (pp 269-275).

The characteristics of the interactions in the home environments described by Hughes and Tizard (1984) were present in working-class as well as in middle-class homes. The differences identified between the two kinds of environment seemed to the authors "to amount to a difference in language style and educational approach, rather than to a "language deficit" in working class homes. All the basic language uses were observed in all the homes; the social class difference was in the frequency of the usages." (pp. 252, 253).

The behavior and talking of the same children in the nursery school revealed a considerably lower level of proficiency. The environment there was child-centered, focussed on play, and provided a variety of physical materials for children to manipulate, in accordance with the Piagetian model of learning for children at this stage. Hughes and Tizard comment on the advantages and limitations of this kind of educational environment:

A child-centered play environment has obvious advantages for children, in addition to the learning opportunities it

provides. Society in general is designed for the needs of adults and does not provide for children's needs to explore, run around, make a noise, play with 'messy' materials and so on. The inevitable disadvantage, however, of providing an environment entirely geared to play is that the possibility of children learning by watching and taking part in the adult world is thereby excluded. The staff's role becomes one of watching over and talking to the children, rather than themselves engaging in adult activities, which might serve as interesting and challenging models to the children. (p. 255)

In addition, in the school environment, language is very largely stimulated by adults' questioning children about their actions and playing. The dialogue is actually adult-oriented and the results somehow artificial. Children frequently feel confused and fail to answer or contribute to the conversation. This kind of dialogue is very different from the conversations at home where the child interplays with adults in talking about a diversity of issues. As Hughes and Tizard note:

The puzzling mind of the four-year-old has no outlet in a setting where the child's basic role is to answer and not ask questions. Further, because staff-child conversation focuses on play, it tends to be concerned with the "here and now" to a greater extent than conversations at home. This situation is somewhat paradoxical, since one function of schooling is to extend the child's intellectual horizons. It was, however, the mother who linked the child's present to her past and future, and to the world beyond her own experience. (p. 255)

The difficulty of adequately stimulating talking and

thinking in children is frequently found in research studies about young children. Such difficulties have supported many of the conclusions about children's limitations as thinkers that are conveyed into curricula and teaching. Hughes and Tizard, in the study we have been examining, point out that frequently the researcher runs the conversation according to the adult's logic and does not pay enough attention to the logic of children and to the importance of their apparently meaningless comments. As an example of the lack of consideration of the specificity and possibilities of children's thinking and talking, they describe and comment on the following situation:

Joan Tough, an educational psychologist who has a powerful effect on inservice training for British teachers, cites the following conversation between a teacher and a five-year-old child, Paul, who is playing with a toy farm, to show "the difficulty that many children have in taking part in conversation":

Teacher: Tell me what is happening, will you?

Child: That's a farm.

Teacher: Oh, that's a farm here, is it? Who lives in the farm, I wonder?

Child: Them lot (points).

Teacher: Oh, who are they?

Child: The people.

Teacher: What sort of people live in a farm? (Child shrugs) What do we call the man who lives in a farm, do you know?

Child: Farmer.

At no point does Tough consider the possibility that Paul's limited contribution to this conversation might reflect his social unease or defensiveness, rather than his

limited grasp of language, or suggest that the teacher might learn from listening to his conversation in an out-school setting, or by transforming the social situation between teacher and child. (Hughes and Tizard, 1984, pp. 258, 259)

We should add that, in the above example, the questions start from the obvious for the child (it was evident that it was a farm, why the question?) to the typically logical and formal format of adults' questioning with the corresponding indifference of the child, clearly bored with those meaningless (for him) questions : "Who lives there, what kind of people, what do we call them, etc". If the teacher had asked the child to tell the story of that farm, or what happened to the people there that day, or why this or that person looked a little sad or angry, he would probably get a quite different kind of conversation and the development of a more articulated description.

With respect to their analysis of the child as a thinker in the observed situations, Hughes and Tizard found that children reveal a remarkable persistence in trying "to make sense of a world they imperfectly understood. Because of their inexperience they could rule out few inferences or explanations as implausible: almost everything had to be treated as possible until shown to be otherwise" (p. 253). The authors come then to question some of the central

assumptions of Piagetian theory of cognitive development:

while we agree with Piaget that the young child's thinking differs from that of an adult, we do not accept that they are incapable of "decentered" or "logical" thinking. The model of the world with which they operate seems to us limited and distorted by their lack of experience and knowledge, and by their incomplete conceptual framework, rather than by an absence of logic. (p. 254)

These observations support the claim that the development of more complex forms and skills of thinking depend significantly on the quantity and quality of information the learner has previously got on a particular area of knowledge and from its personal and social meaningfulness.³ Different levels of performance in adults and children, that were attributed by Piaget to qualitative differences in cognitive functioning, are presently seen by some cognitivists (Keil, 1981) as probably due to children's lack of experience and knowledge in many domains (Sim-Sim, 1992, p.3).

Hughes and Tizard (1984) also discuss the view of some psychologists about the need to have the child facing new and different challenges in nursery school as a necessary step to enlarge both their socialization and their thinking abilities:

We would not want to argue with the view that "disembedded" thinking and academic skills are important

goals of education. Our objection is to the notion that these goals are best served in ignorance of the skills and interests that children manifestly possess at home. Our observations of children at home showed them displaying a range of interests and linguistic skills which enabled them to be powerful learners. Yet observations of the same children at school showed a fundamental lack of awareness by the nursery staff of these skills and interests. There is no doubt that, in the world of the school, the child appears to be a much less active thinker than is the case at home. (p. 264)

Hughes and Tizard's study points toward the need for a closer integration of home and school activities, which has to be done without disregarding the purposes and demands of the school. As Donaldson accurately observes, commenting on the progressivist metaphor of the child as "a growing plant" which would risk being destroyed by the "unnatural" environment of the classroom:

the risks are real enough. But human children are not plants with only one "natural" way of growing. They are beings of richly varied possibilities, and they are beings with potential for guiding their own growth in the end. They can learn to be conscious of the powers of their own minds and decide to what ends they will use them. However, they cannot do this without help--or at least it would be a long slow business and few would make much headway. (Donaldson, 1980, p. 122)

What seems, however, a very sensible point to keep in mind is the need of taking into account, both in school and in pre-school, the modes of thinking and expression that are specific to young children. Children's modes of

thinking and expression when they come to school integrate many components of the oral culture of childhood as well as a diversity of modes of making sense of the world that Western school systems have historically ignored. The overemphasis on logico-mathematical reasoning--which must of course be encouraged and developed--has led school systems to neglect other rich potentialities of the human mind.

Children's Philosophizing: the Research of Gareth Matthews

Gareth Matthews (1980, 1984) has conducted significant research in the field of the intellectual activity of children. In his studies, Matthews has particularly investigated the ability of children to ask, debate, hypothesize and theorize about a variety of topics, usually perceived as "philosophical", such as, for example, death, identity, happiness, ethics, and so on. Matthews argues that adults, especially developmental psychologists, interpret children's talking and thinking according to their own stereotypes and previous theories. They forget to look at the depth of some of children's questions and claims. In his own words, most of adults, Piaget included,

"are immune to philosophical puzzlement." (1984, p. 53).

Gareth Matthews developed a project at St Mary's Music School in Edinburgh, Scotland, during the school year of 1982-83, "doing research into conceptions of childhood and into models of human development, especially cognitive development" (1984, pp. 4,5). This is a small school for "musically gifted primary and secondary school children" (p. 5). Throughout the school year Matthews worked once a week with a class of eight-to-eleven-year old children developing a project of writing with them what he called "philosophical stories". In each class he used to start with a little sketch or incomplete story that was prepared in order to provoke the debate. It is the report of these discussions that are collected and commented on in Matthews' book Dialogues with Children (1984).⁴ The following discussion developed about happiness. They started by listening to the beginning of a story, told by Matthews, in which two children disagreed about the possibility of flowers being happy:

"Why don't you think flowers can be happy ?" I asked.
 "They haven't got a mind", said Daniel, quickly, clearly and decisively. At eight and a half, Daniel was, by a day, the youngest member of the class.
 "Any other reason?" I asked.
 "They have no feelings", he added.
 David-Paul, who was ten then entered the discussion. "There is a plant ", he said, "which is constructed so that its

leaves can come together and catch flies." ("A flytrap", someone said.)

. . . "That's like a butterfly," Esther put in. At eleven, Esther was the oldest member of the class.

"But isn't it like a reflex?" David-Paul asked. "It's like a spring; when you touch it, it curls up."

I asked whether, if what the sensitive plant does is like the action of a reflex, that means the plant doesn't have any feelings.

"Well, it's got to be sensitive anyway," said Esther. "If it can curl up, it's got to be sensitive." "In a sort of a way the plant shows that it's happy by blooming," David-Paul said. The kids then discussed gestures as the expression of mood or feeling. . . . "It doesn't necessarily mean you're unhappy if you're bowing down", Ise pointed out. "You could be in a bad mood just standing up straight."

"Does a plant have a brain?" asked Daniel.

I said that his question was a good one and asked why knowing whether a plant has a brain might help us determine whether plants can be happy.

"Without a brain you couldn't be sad or happy or anything like that," said Martin, who was almost ten. "Without a brain you wouldn't even exist." (Matthews, 1984, pp. 5,6)

Writing a follow-up to the initial story, based upon the taped children's discussion, Matthews tried out a consensus, suggesting possible different meanings for "happiness" appropriate to different kinds of beings. He was taking on Aristotle's definition of "eudaimonia"-- happiness or "human flourishing". He got general agreement about this ending of the story.

Donald, however . . . was apparently dissatisfied . . . there was a question he couldn't get out of his head. He thought flowers could be happy and that what Aunt Gertie (one of the characters of the story) said about their being happy when the sun shone was, in a way, quite true. "But," he added with great emphasis, "how can they possibly be

happy without a mind?" He was not suggesting that I should solve his problem for him . . . He accepted the problem as his own. (Matthews , 1984, p. 10)

This description provides a set of challenges to the current conception of children's thought. My first observation refers to the ability of these children to hypothesize and compare the possibilities of, and objections to, a given hypothesis--do flowers experience happiness? In addition, this hypothesis has little to do with concrete issues, it is rather an abstract question. Such an hypothesis involves a complex of factors that children were able to identify: e.g. the variety of degrees of sensitiveness; the difference between reacting positively to a stimulus and feeling happy; the relation between mind and affective states like happiness; the impossibility to determine inner feelings through mere observation of external attitudes or gestures. And even a higher level problem emerged: what is mind and how does it relate to life and death? The whole discussion shows the capacity of children for trying out temporary conclusions, testing their logical consistency, rejecting some initial ideas, reexamining some others, raising new questions,

progressing to wider conclusions.

Other educators have done research in the field of children's ability to philosophize (Lipman et al., 1980; Lipman, 1987; Splitter, 1988; 1989). Recent research programs in the area of teaching for thinking, emphasizing particularly the role of metacognition in promoting thinking abilities, are also presently implemented in several countries both in North America and in Europe.⁵

It is important to note that the neo-cognitivist orientation, which supports "teaching to think" research, reemphasizes the logical dimensions of cognition. The belief in the limitations of the "concrete Piagetian children" has somehow been replaced by a ready acceptance of their early intellectual potential for abstract and critical reasoning. This is, of course, a positive step. But other themes elaborated in the writings of Matthews and Splitter, among others--such as the use of imagination as a tool for thinking, the links between understanding, feelings and personal meaning--risk remaining of little influence within the variety of "teaching for thinking" programs.

The educational implications of this wide area of research have frequently appeared associated with specific

programs for teaching hierarchical sequences of critical thinking skills. But the procedures of these programs have been quite controversial.⁶ The main criticisms of some of those programs have focused on (1) the emphasis on formal abilities disembedded from the nature of the content where they apply, and on (2) the assumption of generality and possibility of transfer of such "thinking skills" taken in some programs as relatively independent of particular content areas and previous information about them (Barrow, 1988).

Young Meaning-Makers at the School of Vivian Paley

"He did that on purpose! You knocked my tower down on purpose!" Fred grabs Wally's leg and begins to cry. Wally pushes Fred away. "I'm a dinosaur. I'm smashing the city."

"You didn't ask me. You have to ask." The tears have stopped.

"Dinosaurs don't ask."

(Paley, Wally's Stories, 1981, p. 5)

This episode took place in a kindergarten class and the logic of Wally's reasoning is undeniable.

Vivian Paley has written extensively and reflected about her experience with young children, their talking and interactions, their particular logic, their specific ways of making sense of reality. She listens to them and tries

to understand before "correcting" (Paley, 1981,1986). She describes, in Wally's Stories (1981), her daily experience throughout a school year with a group of five-years-olds at the Laboratory School of the University of Chicago. She provides a fascinating and intriguing picture of kindergarten children's trying hard to understand the world around them. As Courtney B. Cazden points out in the Foreword to this book:

When you are five, there is much in the world that needs to be accounted for, and these accounts are "stories" to us adults when children prefer their magical explanations to those we call "true" . . . Instead of confrontation, it may be more useful for teachers to go beyond their own adult egocentricity and explore the ideas that flow from the children's own premises. That is what Paley has done, with rich gains in language and behavior in this five-year-old community. (Paley, 1981, iv,v)

From the variety of episodes described and commented on by Paley, the following one seems particularly useful to the present analysis. It is based upon a story told by the teacher. The children's discussion occurs at two different times during the year:

First Time.

Imagine an enormous turnip in a row of ordinary turnips. Grandfather tries but fails to pull it up. Grandmother comes to help, but together they cannot do it. First a grandchild and a black cat join the others, but the turnip

stays firm. Only when a brown mouse adds his effort does it come up. How can a tiny mouse make such a difference? Hear five-year-olds who have just entered kindergarten as they discuss "The Tale of Turnip".

Teacher: Why did the turnip come up when the little brown mouse pulled?

Warren: Because the grandfather and grandmother couldn't pull it up.

Teacher: They couldn't. You're right. Then the mouse helped and it came up. Why?

Warren: He was stronger.

Deanna: If all of them pulled, the enormous turnip would come up.

Wally: That was only the strength they needed.

Eddie: If just some pulled it wouldn't. But they needed all to pull.

Wally: Maybe the mouse lived down there.

Jill: Under the turnip? Is that where he lives at night?

Wally: Maybe he pushed it up when it was coming out.

Jill: Maybe he was stronger than they were.

Eddie: Animals could be stronger than people.

Deana: Maybe the roots got stuck to the bottom of the ground and when the mouse came he could pull the roots.

Fred: If the cat and mouse pulled themselves it comes up.

Teacher: Why?

Fred: They're stronger. But if the roots stuck they might need help.

Wally: Maybe someone was inside the dirt and he saw the roots and he pulled it so they couldn't pull the turnip.

Tanya: If the mouse pulled it up by himself it would work.

Wally: What if two people were underneath pulling?

Teacher: How would they happen to be under the ground?

Eddie: They dug a hole.

Tanya: But the mouse has the most power. Right?
(Everyone agrees.)

(Paley, 1981, pp. 1,2)

Paley comments that children consider magical explanations as good as, or better than, realistic ones: "when a magical idea is presented, the common-sense approach is looked at but then discarded" (p. 1). She also notes their understanding of the difference between the two kinds of explanation but they still do prefer "their" magical logic: "The mouse's size is not important. A mouse can push up a huge turnip because the child can see him do it in his mind. The child can also see the other story characters pulling on the turnip, but he would rather think about the mouse." (pp. 2,3).

Second Time.

Some months later the turnip's story came up again when the group tried to move a heavy piano and they couldn't manage it. They finally got the piano moved away from the wall when Jill joined the group and all of them pulled together. The teacher reminded children of the turnip discussion and invited them to compare the two situations. She wondered whether or not they maintained the initial version:

Teacher: Do you remember [the mouse and the turnip]?
 . . . Why did the turnip come up?

Tanya: The mouse is so strong.
 Deana: All those people were there. So the brown mouse came and there were more people.
 Jill: There were more people so it was too hard to keep it in.

 Teacher: Remember before, when we tried to push the piano and it wouldn't budge? Then Jill came to help us and it moved. Is she stronger?
 Wally: We just needed a little extra.
 Jill (modestly): Everybody helped the same.
 Teacher: Did everyone helped the same in pulling up the turnip?
 Fred: Yes. But not if the mouse has superpower.
 Teacher: Does he?
 Fred: Maybe he has. Maybe not the one in the book. Maybe a different one.
 Jill: He means like if there was a real giant turnip and a real supermouse--not in a book.
 They were telling me that they knew the author did not intend the mouse to be a supermouse, but that such a phenomenon could exist. An idea could be examined on two levels: the obvious fact seen by the adult and the possibilities seen by the child. (Paley, 1981, pp. 201-203)

The above discussions bring to light features of children's thinking that are discrepant with theories that assert their lack of logical reasoning and ability to deal with abstract hypotheses. From a careful examination of both discussions, it is possible to note some examples of such capacities:

1. The children developed a series of explanatory hypotheses about the problem under analysis. Some followed a magical interpretation, some a realistic one. But the two kinds of explanations were always understood as different,

and within each of them there was a different kind of inner consistency.

2. The object of the discussion was the same in both situations--what explains the success or failure in making an object move? The turnip story was, however, an imaginary situation without connections to observations of reality. In a sense it was abstract because dissociated from actual perceptions or experiences. The second one---the piano problem--was a concrete situation of actual daily life, directly observable and experienced. The presence or absence of "concrete" features in the two situations. does not seem to have made any fundamental difference to the level and nature of children's reasoning.

3. The logic of the interpretations implies a similar line of causality in both the magic and the realistic explanations; the difference stays with the premises and children are well aware of it.

4. There are abstract concepts framing the whole process of reasoning in any of the explanations, such as power, superpower, success, cooperation, competition. There are also some conceptually abstract relationships--small does not mean weak, numbers do not guarantee success, cooperation helps, intentions differ from appearances.

5. The acceptance (by the teacher) of the two different logics helped to increasing the interaction between them and led to a better level of discrimination and understanding of reality--as is well documented in Jill's last comment .

Observations of Children in Class

The behavior and talk of children discussed in the previous section were selected from published research literature. They provided examples of spontaneous or semi-structured situations where children were largely free to express themselves outside the constraints of curriculum and structured classrooms.

A second set of data I wish to draw on were collected in a structured classroom situation. In class, children are less spontaneous and more constrained by the school environment, the teacher, the rules, compulsory learning. That is, however, a scenario which provides the possibility for a different kind of research on the same problem. It allows for another dimension of empirical observation: how do children respond to curricula and teaching oriented according to the conception of the child as a concrete

thinker? Do they actually behave and respond as concrete thinkers, as it would be expected? In other words, do their talk, behavior and reasoning in class confirm or disconfirm such a description of their ways of thinking?

The classroom that was observed was a 2nd and 3rd grade class in a school of a suburban neighborhood of Lisbon, during five weeks, in January and February 1991. The classes were videotaped, and detailed field-notes were taken by the observer, then coded and classified. Class episodes were selected for description and analysis, according to the criteria of their significance and relevance to the problem under examination.

The report of the observation of the classes was organized according to curriculum areas: Language, Maths and Social Studies. The selected episodes examined below involved a diversity of topics and activities. They are described in some detail, in order to get a picture of the context of daily school life. A particular attention was paid to the kind of children's responses to the various learning activities (e.g. understanding or not understanding; finding easy or difficult; engaging or getting bored; finding consistent or inconsistent). Puzzling features of children's reasoning, appearing in

their talking to each other and to the teacher, were also examined and discussed.

The Class: the School and its Environment.

The class was small: twelve students. It was, however, heterogeneous, since it included both 2nd and 3rd graders. It included predominantly students who had attained only low levels of success in previous years: six of them were in 3rd grade for the first time, two others for the second time; the four children in grade two had also failed once in previous years.⁷ The school had a total of four classes, working in a small building with very little space for children playing and little resources in teaching materials that are mostly supplied by the cooperative work of the teachers.

The population of the neighborhood may be characterized as of low socio-cultural status but not always of a low economic level.⁸ There are some monoparental families, but they represent a minority. Being a peripheral area, parents are commonly absent at work all day. Some of the children are alone till dinner time. Most of them stay with their grandmothers who live with the family and are

responsible for housekeeping and child-care.

The organization of the class was mainly teacher-centered. She proposed very structured tasks and diversified them according to her sense of the needs of the various groups. The most common teacher procedures included the following:

- explanation of topics by the teacher and dialogue to check the children's understanding;
- question-answer techniques to promote reasoning and discovery of conclusions;
- exercises of repetition and training;
- memorizing techniques (e.g. decimal numbers);
- discussion about pictures, books and other materials, some of them previously produced by children;
- utilization of elements observed in the natural environment and recalled from field trips.

The teacher interacted with children in a very individualized way, spending the majority of the class time working directly with particular groups, while the others engaged in different tasks. According to her own words "there was no other way to help their difficulties and have them learning something". A few tasks were participated in by the whole class, particularly in some Language and Arts

activities. The relationship between teacher and children was quite warm. In class, the affective interaction among children was, however, weak. The fact that children worked very often in separate small groups possibly contributed to that relative lack of communication.

In terms of social interactions and opportunities for developing cognitive abilities and for accumulating cultural background, this population might certainly be considered disadvantaged. If the developmental theory applies, these children had few favourable conditions that would explain discrepant abilities relative to the stage of concrete thinking.

Analysis of Selected Episodes

Language: interpretation of texts and grammar issues.

Three texts analysed in class were compared in terms of their main features and of the reaction of the children.

The first one was a very detailed description of a clown, emphasizing the colors and the ridiculous pieces of his dresses. He ate a lot and was very fat, so people called him "Mr Belly". This text had a large number of

sensorial descriptors, many concrete details, some of them funny, though lacking any action or narrative. It was more like a portrait of a figure quite familiar in Portuguese children's experience. Every child goes to the circus, mostly at Christmas time, and circus shows appear frequently on T.V.

The response of the children to the text was dominantly indifference. They had some trouble reading it and answering simple questions about the clown. The teacher tried to emphasize the funny figure of the man and reminded them of the real clowns they had seen frequently in circus shows. The majority of the children remained indifferent or even bored.

The second text related to the topic of transportation. It was the story of the adventures of a little old plane presented as a human character--talking, recalling, feeling fear. The text had little emotion and no action; nothing actually happened. The little plane claimed to have been scared by an insignificant change of the weather that did not seem very convincing (children laughed at this point). Its "humanizing" features were quite childish: for example he had very lively eyes, a baby smiling face. He recalled his friend, the pilot, but said very little about him.

Again there was no action and children responded slowly to the teacher's questions about the age, the feelings and the past of the plane.

A third text was a report of the first Atlantic crossing by plane, an exploit performed by the Portuguese aviators Gago Coutinho and Sacadura Cabral. The trip and the plane were described in some detail as well as the actual dangers they went through on that memorable flight. It culminated with the landing in Brasil and the celebrations that followed the event. This text was followed with more enthusiasm and the reading appeared easier, although some of the vocabulary was not familiar to the students (e.g. the technical names of the instruments). Unlike the "teacher asking-child answering" format--that in this group used to be a routine--some children had the initiative to ask questions to get further information.

From the comparison of these three situations, it seems to follow that:

1. The concrete aspects of a description are not a sufficient condition to make it more accessible to discussion and analysis; such details become helpful for thinking and discovering when they convey personal meaning to the child.

2. The personification of characters--presumably intended to get closer to the affective and intellectual features of a eight-year-old--is not a generalizably adequate strategy; it only works when it is credible and connects with "true" emotional experiences.

3. The simplest is not necessarily the easiest to understand, even considering children with cultural limitations. The complex adventure of the Portuguese aviators proved to be easier--and more engaging--than the simple story of the old talking plane. I should note that the former involved human action, emotions, risks, fears. It also provided new, unfamiliar information. The latter reported merely trivial aspects of a plane and a trip, though put in imaginary terms.

In the grammar questions a difficulty was frequent: the recognition, in a text, of adjectives, defined by the teacher and in the text-book (apparently well known by children) as "a word which attributes a quality to a noun". Some quite concrete and familiar examples had been previously elaborated by the children and the teacher in class, applying qualifying terms to a portrait of a student and to a description of the classroom, for example. The "errors" made by children, when asked to identify

adjectives in a text, were of two kinds, as in the following: (1) "the horses were running"--running was said to be an adjective; (2) "the flight was difficult"--difficult did not appear to them as an adjective.

The further discussion between the teacher and the students about their difficulties with these examples provided some understanding of their thinking. One child said that "running" was what actually explained "how" the horses were (could be quiet, or sleeping, etc.). Another one argued that "difficult" was not a quality, rather a complication... These justifications demonstrated that the first child abstracted the definition in a wide and justifiable sense, though not considered correct according to Portuguese grammar rules. He meant by an adjective the word or expression that "characterizes" something. The second one abstracted the notion of adjective in terms of "positive" features, as it could have been induced from the word "quality" and from the examples previously studied in class, that occasionally contained only positive characteristics. In some way, both have reasoned in "concrete" terms, within the context they were familiar with. Nevertheless, in both cases there was an abstraction that followed the inner logic of an inductive process.

Both applied their generalizations to new situations, which explains this particular kind of "error", i.e. the application of the general rule, as it was perceived, to an hypothetical situation. Though with some differences, it is interesting that this mental process appears to have similarities with the verbal errors of early speakers, when dealing with irregular verbal forms.⁹

It would certainly be foolish to infer too much from such examples but it is useful to note that what one may casually observe hardly supports the dominant theory.

Mathematics: computing and solving problems.

The majority of the children did not compute without the help of "counting by fingers". The teacher made several attempts to have them perform mental computation and to memorize calculation tables. She largely based her teaching of computation on concrete examples, often accompanied by drawings, counting objects in class or observing pictures.

A child, one day, was in trouble trying to calculate how many legs five ducks had, though knowing very well that each of them had two. In front of a picture representing

the ducks, she could count to six legs in three ducks, but after that she came back to her fingers, even having the "concrete" representation of the animals in front of her eyes. This was a rather puzzling situation, since counting of the ducks' legs in the picture did not seem to be very different from counting with the fingers. Maybe it can be hypothesized that counting by fingers has, at that level, become for the child an internalized technique, supported by a constant measurement unit--the ten fingers. It has been applied so many times by the child to different concrete situations, that it appears as more efficient to her than counting directly the elements she is actually seeing. In her mind it seemed to work as a generalizable technique in a certain way "abstracted" from concrete realities and generalizable to all of them.

Whatever the explanation, direct observation of the objects, which should apparently be closer to the alleged concreteness of their thinking, did not help this child to perform that simple counting task. Such a puzzling behavior cannot then be explained within the Piagetian description of the concrete operational stage.

Math problems that were presented offered generally a high level of difficulty to the children. Their difficulty

in dealing with abstract mathematical operations was quite evident, their lack of mastery of mathematical skills and their trouble transferring information from the linguistic code to mathematical symbols. I wondered whether part of the problem would be a real developmental limitation to deal with abstraction or a result of the meaninglessness of the problems. To illustrate this point I will summarize three Math problems, with a similar level of complexity, that resulted in very different performances:

First problem:

Teacher: Yesterday we went on a field trip to the Dress Museum, remember? The distance from our school to the Museum is 8 kilometers. Each kilometer, as you already know, corresponds to 1000 meters. So, how many meters had we to cover in the whole trip?

All the children had enormous difficulty in solving this. They did not seem to realize that they had covered the same ground twice. The conversion from kilometers to meters was an extra obstacle, but apparently easily overcome by most of them. The main problem was the calculation of the whole distance, whose solution was presented by the teacher.

Second problem:

Teacher: Remember what we saw at the Dress Museum? (They kept talking and recalling the objects, dresses and so on, for a while, with enthusiasm). There was one ancient loom there, remember? Well, the owner of that loom once weaved 28 meters of cloth and sold it at 10.500\$ each meter. How much money did he get? Could you calculate how much would he charge for 500 meters? And for 1000 meters?

Surprisingly, the majority of the children solved the various steps of the problem quite easily.

The more evident difference between the two problems seems to be, basically, that the first one implied the combination of two different kinds of operations: the calculation of the whole distance--multiplying the distance by two--and the reduction to a different unit of measurement. The second one asked for the same kind of solution--multiplying the price of each meter by the number of meters--though repeated in the same fashion for three quantities of cloth.

One possible explanation for the different responses would be that the difficulty in the first situation had resulted from the lack of ability to "decenter"--considering more than one feature simultaneously, in Piagetian terms. Such a characteristic is, however expected to be overcome by concrete operational thinkers, but these children could possibly have been exposing a "d calage" in this particular ability. The sum of the two

distances implied also the consideration of a reversible situation which could have caused an additional difficulty.

These kinds of explanation could be considered reasonable within a developmentalist description of concrete thinking. But it still is discrepant that a situation directly experienced and observed did not help children's reflection.

Another fact, that was possibly more influential, was the evident lack of personal interest in the first problem. The bus drove children both ways and they rarely paid attention to the length and environment of the trips, and used the time for playing and talking. They were possibly not even aware of the similarity between the two trips, which could actually have been different, for reasons of traffic, for example.

A third problem, still related to the same field trip, presented also great difficulty to the children. In this case no decentering or reversibility problems could possibly have confused the children.

Third problem:

Teacher: The room where the children's dresses were was a square (The shapes were already familiar to them and the children drew the square plan of the room in the

board). The length of each side was 45 decimeters. Can you calculate, in decimeters, the perimeter of the square, i.e. how long is the sum of the four sides?

It asks for one mental operation only, and does not require any type of reversibility. The children did not solve it; they tried basically to guess which operation was necessary: multiplication? addition? subtraction? The teacher called attention to the drawing of the square in the board, several times, but the difficulties remained, and she had to explain the solution, since none of the children got it. The possible developmental explanations of the difficulties of the first problem are less convincing when applied to this one.

It should be added that the situation presented in the second problem seemed more engaging. The teacher "told" it as a narrative, with a bit of fantasy. Children imagined the kinds of clothes they could weave and make money with. There was some conversation about luxurious dresses and their uses in the past, and so on. This fact does not, of course, explain the difficulties with the third problem which revealed severe limitations in the mathematical reasoning of those children. But it may contribute to understand the greater facility they had in solving the second problem. It may possibly indicate that the

humanizing of a mathematical problem in a significant and more vivid context helps but is not obviously enough for the mastery of the required algorithms. It seems to suggest, however, a rather more successful strategy to make personally meaningful, and so understandable and more accessible, abstract content or relationships.

Social Studies: transportation.

According to the recommendations of various curricula, Social Studies content follows an expanding horizons orientation and emphasizes the student's local environment. This topic was approached in class as usual, starting with asking children about the transportation they commonly observed in their neighborhood. Bearing in mind that these children live in a suburban area, it would be expected, given "concrete thinking logic", that the more familiar transportation to them would be the bus, the metro, the train. Answering the teacher's question "Which transportation do you know better?", the following responses occurred, in the following order: "yellow" trams (almost non-existent in Lisbon today, except in the old areas of the town), planes (the majority of the children

have never entered one), motorcycles (with some insistence and excitement), buses, metro, boat, taxi, and then the auto (every family represented in the group owned one).

This ordering revealed that the physically closer features of this environment were not necessarily the more significant in terms of these children's experience. Such a conclusion implies that we should reexamine the current educational meaning of "child's experience". The yellow trams, the planes, the motorcycles--the first three in the ranking of spontaneous references--constitute certainly part of the lived or imagined "experience" of the children in particular ways: they appear to be related to some sense of adventure, of travelling away, or moving back to a distant time in the life of the town. These can be strong inner experiences involving imagination, discovery, dream, fear, emotions, excitement, though not being present in the concrete environment of their daily life. In addition, it should be noted that all the means of transportation are familiar to them through the T.V, the movies, the news, etc. which makes somewhat arbitrary the curriculum and text-books references to "transportation in the neighborhood where you live".

The discussion of transportation during several days

also provided occasions to check children's modes of classification. When asked to group the modes of transportation that they had listed earlier, according to their main common features, a group of children insisted on not including taxis with cars. They justified it by saying that one does not own the taxi, but one does own the family car. The teacher had in mind a classification based on the similarity of the modes of transportation associated with the kinds of "routes": air, water, land. At a first sight, the children seemed unable to grasp that classification. In fact they were classifying, but according to a different logic--private versus public transportation. This classification implied, it should be noted, more abstract categories than the one that the teacher was asking for.¹⁰

During this same lesson on classification of modes of transportation, and after the routes-criterion was made explicit, another doubt was raised by one child. "Is the train a terrestrial transportation--he asked--since the train does not roll directly over the land, but on two metallic trails?" He seemed to suggest the need of a fourth category or sub-category of the terrestrial transportation, for a more accurate application of the

criterion for grouping the kinds of transportation according to the routes they use. In fact, the metro or the sky-train do not move "on" the landscape, rather some meters under or over it.

The point to note here is that such responses cannot be simply seen as "errors" in the proper move towards a pre-defined logic model. They demonstrate rather the children's ability to reason logically based on premises that frequently happen to be different from those that the adult had in mind.

Conclusion

The comparison of the data in the previous sections has provided an accumulation of small doubts, that together, constitute counterexamples relatively to the current curriculum conception of the child as a concrete thinker and support its reassessment. The discussion of the above two groups of data show a representation of children as logical and imaginative thinkers, capable of hypothesizing and abstracting, and not confined to the narrow limits of concrete observation and direct experience. At least it seems fair to conclude that such data are so much at odds

with the predictions of the dominant beliefs about young children's thinking that one is inclined to want to re-examine them.

NOTES

¹ For characterizing the procedures, the settings and the subjects, for formulating research questions, organizing the collection of data, coding field notes and categorizing the results, I followed basically the procedures recommended in Miles and Huberman, Qualitative Data Analysis--a Sourcebook of New Methods (1984).

² "Piaget has not been alone in claiming that young children are incapable of inferences which, to an adult, seem elementary. From a type of psychological theory utterly opposed to his own, precisely the same conclusion has been drawn. One of the most eminent of the associationist--or behaviourist--psychologists, Clark Hull, claimed that the essence of reasoning lies in the putting together of two 'behavior segments' in some novel way, never actually performed before, so as to reach a goal" (Donaldson, 1983, p. 231). Pointing out the limitations of such a definition of reasoning, Donaldson pursues however a description of several replications of Hull and his followers Howard and Tracy Kendler, namely by Simon Hewson (1978), and Barbara Wallington (1974) that provide evidence that it is not impossible to get children to reason deductively, even in the circumstances of an experiment, if some changes are introduced in the presentation of the task. See Donaldson, 1983, pp. 231-236.

³ An interesting discussion on "situated cognition" is available in Brown, Collins and Duguid (1989), "Situated cognition and the culture of learning", Educational Researcher, 18, (1), pp 32-41.

⁴ Matthews also includes in Dialogues with Children some interesting descriptions of another course he taught to young adults in Boston the year before his staying in Edinburg. He presented his adult students with some puzzling dialogues among children and asked for their discussion. He generally found that his adult students interpreted children's "logical" conclusions as mistakes, viewing them from an adult's point of view. And he comments: "I think the explanation is this. The 'idea' of developmental psychology has had a greater influence on the way adults think about children than have any specific findings of developmental psychologists, or any specific theories as to how children develop. Adults who have very little notion of what a child of age so-and-so is supposed

to be capable of thinking accept the idea that children's thinking goes through various stages and that, roughly speaking, the changes from stage to stage are changes from relative inadequacy to relative adequacy One unfortunate result of this is that it predisposes one to ignore, or misunderstand, the really imaginative and inventing thinking of young children" (pp. 32,33).

⁵ The DIANOIA project, emphasizing the educational role of metacognitive strategies, is being developed in Portugal at the Department of Education of the Faculty of Science of the University of Lisbon, under the supervision of Odete Valente. "Educators are increasingly trying to introduce into the school curriculum strategies to improve the quality of thinking in the various disciplines. It is within this more recent perspective that the DIANOIA Project sees its contribution to the students success in school, a succes that will be based upon the search for quality and appropriateness of educational experiences, having in mind the priority of the intellectual development of the students" (Valente, 1989, p. 41).

⁶ See an extensive analysis of the concept of critical thinking in education in Barrow, The Philosophy of Schooling, 1981, pp. 37-49.

⁷ Within the Portuguese educational system, students at elementary school are evaluated in terms of their achievement when finishing grade two and grade four. Those who are considered not having met the minimal conditions to move to the next grade, have to stay back. A modification of the whole evaluative system is presently being prepared, within the Reform of the School System that is being implemented.

⁸ It is relatively common to find, in the suburban areas of Lisbon, working class populations, who have moved from the interior of the country to the town. They commonly have a low cultural level but some manage a quite reasonable family income.

⁹ The "errors" of young children when first dealing with grammatical exceptions result from their assimilation of an abstract and general rule that is "correctly" applied to particular cases (e.g. "I finded, we goed"). Something similar seems to occur in the way the children apply the notion of adjective associated with any kind of

characterization.

¹⁰ Children's criteria appeared to relate to the concepts of ownership or private versus public (e.g. separating taxis and cars in different classes). If this is true, they may be considered more abstract than the criteria of physical similarity or kinds of routes, as suggested by the teacher. Nevertheless the former classification had probably a stronger meaning to the children, given their experience as users of those forms of transportation.

CHAPTER SIX

Conclusions and Implications for Curriculum

It was my purpose, at the beginning of this thesis, to analyze a currently prominent concept in curricula and teaching practice--the child as a concrete thinker--in order to discuss critically its accuracy as a description of children's modes of thinking and to examine the appropriateness of its educational use.

In my final comments I intend to review the intervening discussion in order to relate my findings to my initial purposes. Some implications for curriculum and teaching will be obvious.

The Identification of the Educational Paradigm of
the Concrete Thinker

The investigation of curriculum documents, reinforced by the interpretation teachers currently give them, led to the identification of the concept of the child as a "concrete thinker" as a powerful educational paradigm in present curriculum discourse and practice. As explained in Chapter Four, I have taken the concept of paradigm, in a

loose sense, from Kuhn's terminology, though not necessarily adopting his view of the role of paradigms in science. I have considered the concept of concrete thinker as a paradigm insofar as, first, it is consistently used as an implicit justification for curriculum organization and practice, second, it appears to be shared, with slight nuances, by the community of educational theorists, curriculum planners and teachers, and, third, it is presented in documents, and generally accepted by practitioners, as credible in scientific terms.

The fact that this concept works as a paradigm was inferred from the following analysis of curriculum documents, discussed in Chapter One:

- The concept appeared as underlying--and implicitly justifying--the selection and organization of content and the recommendations for teaching practices across the curriculum in every document that was analyzed.

- No objection or alternative to children's concrete thinking was identified in the documents. Eventual references to other modes of children's thinking were very rare and playing a secondary role. Imagination, for example, or encouragement to creative thinking implying some kind of abstraction, were frequently suggested, for

example, in Language Arts curricula. They appeared, however, with respect to the whole curriculum, as generally complementary to the highest priority commonly attributed to the promotion of logical reasoning abilities in accordance with the concrete operational model.

- The concept of the child as a concrete thinker was taken as uncontroversial in the documents analyzed, supposedly supported by scientific evidence. Yet such evidence was neither clarified or discussed anywhere.

- The assumption of such a characterization of children's thinking was more often found to be implicit rather than explicit. Elaboration of the concept and the explicit reference to the authors whose theorizing is thought to support it, was rare and appeared less in more recent documents. Apparently, the concreteness of children's thinking is increasingly taken for granted.

In teachers' representation of their students, behaviors discrepant with the paradigm of the concrete thinker tend therefore to be interpreted as failures or limitations of the subjects. The predominant acceptance of the validity of the concept was clear in the responses of the teachers formally interviewed in the present study and analyzed in Chapter One. It could also be observed in the

practice and opinions of many other teachers that I have observed and listened to in my professional activity as a teacher-educator, and reported also in Chapter One. Many teachers noted that children's behaviors did not reflect the expectations or predictions of the "concrete thinker" paradigm, but this did not move the majority to question the dominant paradigm in any serious or systematic way.

My interpretation of this attitude rests on the powerful influence of the reproduction of the concept in curriculum documents, persistently reinforced in recommendations for practice, in textbooks and in teacher education programs. Teachers are therefore socialized in their profession through an ideological process that conveys powerful value judgements relevant to their practice. This process was identifiable in the teachers' responses and practices mentioned earlier.

Acritical attitudes towards what is really going on in teaching and learning are consequently encouraged in teachers. The widespread acceptance of this representation of children's thinking and learning is associated with the inadequate development of alternatives. A narrow conception of appropriate curricula for early schooling has therefore become dominant, which explains why this

representation of the learner has remained practically unchanged through several curriculum reforms in various countries. In addition, teachers' reflective analysis of their teaching has been impoverished by the belief in their students' limited thinking capacities.

It should be noted here that some other concepts work in a similar paradigmatic way within curriculum discourse, e.g. "integration" or "active learning". They have in common the fact that, first, they are seldom clearly defined, second, they are presented as educationally "right" without any critical analysis, and, third, they are commonly associated with modern, progressive, innovative educational practices, even though they do not provide any convincing justification for such practices. The links among those various concepts constitute the complex network of a dominant educational orthodoxy that is rarely examined as such. Curriculum research and theory reflect this orthodoxy, based upon a set of axiomatic principles that remain largely unquestioned. At the levels of curriculum planning and of teaching, such undebated principles and concepts are translated, with simplifications and distortions, into unexamined curriculum assumptions and teaching practices, in spite of the current claims about

innovation and change that characterize curriculum discourse.

The first conclusion I raise from the present study is thus that the concept of the child as a concrete thinker has been and remains one of the central paradigms, among a few others, that persistently have influenced curricula, mostly over the last four decades. These concepts typically lack both an adequate theoretical analysis and a consistent empirical justification. The effects are largely negative, mostly in terms of the consequent lack of attention by school and teachers to what children would be able to perform if imaginatively engaged with forms of thinking currently depreciated.

Clarification and Debate of the Theoretical Sources
of the Concept of Concrete Thinker

My second concern was precisely to bring to light and to debate the foundations of such a persistent and influential conception. Where does it come from? How valid are its theoretical presuppositions and how have they been translated and conveyed into curriculum and practice? The fact that the concept appears in curricula

without explicit justifications does not mean that there are not theoretical supports for it.

I have investigated the alleged scientific basis for organizing elementary school curricula in accordance with such a representation of children's thinking. Comparative content analyses of curriculum documents and the examination of psychological and educational theories and authors that have shaped curriculum tendencies throughout the 20th century, have provided some clarification of the dominant influences that may be associated with the assumption of the child as a concrete thinker.

I started the study of the concept of concrete thinking having in mind mostly the overuse and misinterpretations of Piagetian theory in curricula. The examination of curriculum literature related to the subject has, however, expanded the boundaries of my analysis beyond the field of developmental psychology. In fact, I have found a set of theoretical influences operating together, though predominantly organized and verbalized in terms of the Piagetian description of the concrete operational thinker.

The major theoretical influences identified--that combine with developmental views in building up the paradigm of the concrete thinker--come from Dewey and the

progressivist school and from Bruner and the Academic Reform Movement. This association appeared to me as an intriguing one, since those theoretical views represent quite distinct tendencies in education and curriculum. I have found, however, that they reinforce each other in current educational translations.

Curriculum changes have frequently been described as a "swinging pendulum" moving alternately from progressivism to academicism and vice-versa. At a surface level it actually evolved that way. A more careful examination of curriculum evolution reveals, however, a remarkable persistence of the particular representation of the child we have been discussing across different curriculum movements. I am assuming here the definition of the child as a concrete thinker as initially operationalized in Chapter One, and further elaborated in Chapter Four. I have concluded that the various theoretical influences that converge in this particular representation have been considerably modified and/or simplified to adjust to each other. Being initially built upon a set of theoretical influences that evolved over time, the concept actually operates and develops independently of the theories themselves, though occasionally claiming their affiliation.

Educational and curriculum theories that are associated with the perception of the child as a concrete thinker appear to interact with each other in a circular mode: particular claims of one theory are isolated from its theoretical framework and articulated with principles of another in such a way that they look almost interchangeable. A number of assumptions appear then as implying each other, as in the following examples:

- (According to Dewey) the child learns better through active methods of discovery.

- (According to Piaget) the child, at the concrete operational stage, reasons based on concrete objects and cannot operate based on abstract hypotheses or verbalizations.

- (According to Bruner) understanding a scientific discipline implies becoming familiar with the methods of inquiry of that discipline.

These assumptions, that correspond to different educational theories with their own conceptual framework, appear in curriculum discourse subsumed in generic claims that inter-relate them in a circular cause-effect argument. For example, it is currently assumed, and therefore recommended, that children will learn best through

empirical activities and active involvement with their local environment because they are concrete thinkers, limited to observable realities. Such empirical activities are, in turn, also recommended because they introduce the student to the scientific method. Scientific inquiry activities are also thought appropriate for children because they are concrete thinkers. And so on.

None of these inferences is consistently supported. One could, for example question whether scientific inquiry procedures, involving hypothesizing and inference, would be appropriate for concrete thinkers as they are currently described. Or it could be argued that the eventual acceptance of the Deweyan active learning principle does not necessarily imply the emphasis on empiricist methods of learning.

Curriculum assumptions related to the concept examined here exhibit, then, a superficial linking of a set of distinct theoretical ideas which are apparently easy to associate with each other. Insufficient examination of the theories has generate a commonsense representation of the child that remains acritically accepted among teachers, curriculum planners, and even a significant number of curriculum researchers. The persistence of a similar

representation of the child can be exemplified in curriculum programs following different educational and curricular conceptions. Perceptions of the child as a concrete thinker--as operationalized in this study--can be found in progressivist curricula, in Science or Social Studies projects developed in the 1960s and 1970s under the Academic Reform Movement. They also appear in curriculum reforms going on at the present time such as, for example in British Columbia, Canada (1989), in California, U.S.(1989), as well as in European countries such as Portugal (1990) and Spain (1990).

The systematic critique of curriculum translations of educational and curriculum theorists' thinking developed in Chapter Three, questioned the validity of long accepted ideas about children's limitations as thinkers, that are neither theoretically consistent nor empirically sustainable. Both the curriculum claims and their theoretical supports have been extensively discussed and compared to other perspectives. From this examination, it seems reasonable to conclude that a critical revision--by educational theorists, curriculum planners and teachers--of the presuppositions about children's thinking and of their educational implications is urgently required.

Are the Theories Merely Distorted?

In the curriculum research literature I have found some criticisms of the distortion of educational theorists' ideas that takes place in their translation to teaching and to curriculum programs. Critiques of the misunderstandings of some progressivist curricula, of the excesses of many Academic Reform Movement programs or, more recently, of narrow translations of Piagetian ideas in curricula are not uncommon. Nevertheless, the critiques, at the same time, typically honour the worth of the principles that unfortunately are misunderstood by curriculum planners and are misapplied by teachers. This tendency was documented, for example in Bruner's critique of Dewey's principles, and in Kohlberg and Gilligan's criticism of the implementation of the New Maths, New Science and New Social Studies projects, discussed in Chapter Three.

As a counterpart to the emphasis on discussing the inaccuracies of the translation of theories into curriculum and practice, a relatively weak appreciation of the theories themselves characterizes much of curriculum debates. When we consider the theories identified as major

sources of the concept of concrete thinking, Dewey's, Bruner's and even Piaget's theoretical views about education and curriculum have been over time less examined in themselves than criticized through the particular curriculum programs and teaching practices they have inspired. It is worth noting that Piagetian theory has generated, in the last two decades, however, a more lively theoretical controversy than Dewey or Bruner's educational ideas. Nevertheless, such a debate on Piaget has been predominantly focused on cognitive and epistemological issues rather than on his critical theoretical conception of education as depending on, and adjusting to, development.

It is certainly beyond the scope of the present study, as I noted before, to develop a systematic critique to those major figures of 20th century curriculum history. They represent hallmarks in the development of educational thought and will remain, in my view, as fundamental sources of educational ideas. It is, however, relevant for the improvement of curriculum planning and research to engage in a wider debate of the theoretical principles as such. The weakness of this theoretical debate creates a permanent ambiguity between theories--generally little debated--and

the variety of interpretations they have been given in practice. Weaknesses of a given curriculum principle, as for example the one we have discussed in the present work, are thus typically assumed as resulting from misinterpretations of theories than to the theories themselves.

A critical discussion of theoretical foundations is currently more intensely engaged in most disciplines other than in education. Sociologists, for example, would not obviously discard Durkheim's contributions to his field, nor would psychologists ignore the role of Freud or Gesell, whatever the present appreciation of them might be. Nevertheless, the attitude of the scientific community towards those great thinkers is not anymore one of acceptance or rejection. Such theorists constitute a significant part of the background of those particular disciplines but their thinking is discussed and reexamined in light of the present state of the respective disciplinary or interdisciplinary research and theory.

Curriculum theory and educational discourse generally seem different in this regard. Maybe because they are, by definition, theoretical-practical fields, a tendency to consider theorists in a more dogmatic way can be observed.

Educational theorists are frequently referred to without much consideration of the particular conditions and concerns of their time. Some of the principles articulated by Dewey, for example, are sometimes invoked in present curriculum writing in the very same terms as he put them at the turn of the century. Examples of this curriculum tendency were referred to in Chapters Two, Three and Four. This particular form of educational anachronism leads frequently to the repetition of slogans in curriculum documents instead of the critical analysis of theoretical principles.

Curriculum theory would benefit more from critical reexamination and reconstruction of principles than from acritical acceptance and reproduction of undebated ideas. Insufficient debate at the theoretical level has, in my view, contributed to the persistence of inadequate paradigms in curriculum, such as the one I have discussed in this thesis.

The Child as a Complex Thinker:
the Paradigm Lost

Having discussed theoretical critiques of the currently

dominant educational perception of children's mode of thinking, and having examined a set of empirical data that cannot be explained within that theoretical frame, I have to move back now to my initial questions: are young children concrete thinkers, as it has been assumed up till now? If not, what have I added to the understanding of their thinking? Have I provided any clues to conceive of an alternative view?

The pervasive critiques of the current perception of children's thinking and alternative theoretical perceptions of thinking and development that were discussed in Chapters Three and Four do not allow for the maintenance of the paradigm of the young learners as concrete thinkers, limited to the narrow range of observable objects surrounding them, and waiting for further steps to discover abstraction and inference. Neither does it seem logically and psychologically acceptable to overvalue empiricist procedures as necessarily more appropriate for discovery and meaningful learning than other teaching procedures, looking at the descriptions of children's behaviors and responses that were analyzed in Chapter Five. The review of alternative theoretical perspectives on children's thinking and the observations of children have quite

consistently supported each other in questioning and disconfirming the prevalent perception of the child as a concrete thinker. This consistency should be noted, for example, in the identification of the importance of previous knowledge and inner experiences in fostering children's understanding of reality. The liveliness of children's thinking and hypothesizing about distant and abstract topics (Egan, 1989, 1990) and the role of personal meaningfulness in enhancing intellectual performances thought inaccessible to them (Donaldson, 1979)--discussed in Chapter Four--were also found to be consistent with the data described in Chapter Five.

Children's thinking is thus clearly not confined to the supposed limits of the concrete operational stage. Stages of development, as described by Piaget, isolate logico-mathematical reasoning and do not cover the complexity of the whole process of thinking. They cannot either be assumed as universal descriptions of a natural process of cognitive development.

The approaches of other disciplines, particularly linguistics and anthropology, have enriched the picture of the complexity of the development of thinking processes. Dimensions so far neglected in developmental literature,

such as the controversial role played by genetic components or cultural influences in modelling preferred cognitive strategies, have provided critical arguments to support a richer and more complex representation of children's thinking.

The differences between children's and adults' thinking are then to be reexamined in the light of the more recent cognitive research. Abstract concepts are seemingly early built up in children's minds and operate as lenses that attribute sense to reality, as was discussed in Chapters Four and Five. Thinking seems, then, to be better understood as an interactive process, involving abstract concepts, imagination, affective meaning, new information and concrete experience. Abstract conceptions and concrete data constantly interact in children and adults' thinking alike, though the complexity and articulation of concepts and the depth and richness of understanding increase with the accumulation of experience and knowledge.

It seems urgent, then, to reexamine current curriculum assumptions in order to represent more accurately children's modes of thinking. The present study was not intended to articulate an alternative theory. Rather, educationalists should work out an open paradigm of

children as powerful thinkers, equipped with a variety of potential modes of understanding and making sense of reality and of themselves.

Implications for Curriculum and Teaching

The conclusions stated above would imply a considerable shifting of predominant curriculum principles and organization. The theoretical criticisms and the disconfirming evidence provided about the model taken as undebatable for decades challenge several principles that have supported curricula for elementary school. I would like to point out those which, in my view, should be first reviewed: i.e., developmental goals, the nature and organization of content, and recommended teaching procedures.

Developmental Goals

Goals for elementary school typically emphasize "development" and "growth" as ends in themselves, as documented in Chapter One. Such an emphasis clearly reflects both the developmentalist and the Deweyan views of

education as a facilitating factor of a spontaneous developmental process.

If there is no such "natural" process and educational development significantly reflects cultural and social constraints, demands and influences, then it has to be assumed that curricula and teachers play a critical role in directing and modelling it instead of merely supporting a "natural" growth, as developmentalists and progressivists generally maintain.

Questioning the current conception of development suggests a more interventionist role in education and schooling, as well as consideration of development as something that will not necessarily happen spontaneously in a predicted sequence. Statements of curriculum goals should, then, avoid the exhaustive repetition of what has become the developmental jargon that is presently so common and increasingly empty. Goals should instead state--and justify theoretically--clear educational options, such as, for example, which abilities can be enhanced and how, what a well developed mind and a well developed person are supposed to mean, which are the priorities of schooling at this age level and why, etc.

The typical vagueness of curriculum goals-language

should be replaced by a more precise clarification of what will be done by school in order to get children, perceived as complex thinking beings, stimulated to learn, properly educated and harmoniously developed.

The Nature and Organization of Content

It follows from the view that I have been defending so far that a much wider variety of topics, especially those that adjust better to the way children make sense of the world and of themselves, should fill the elementary school curriculum. There is no sustainable argument, according to my investigation, that consistently supports the predominance of local content and daily life activities or constant "hands-on" tasks. No justification was identified to avoid the study of distant or past civilizations, of modes of living and natural settings all over the planet. Opportunities for dealing with personal and human meaning embedded in scientific subject-matter, to listen to, and to look for, new informations, to imagine and to hypothesize about challenging topics, to learn about known and unknown environments, should be offered to young children in school curricula rather than overwhelming them with local trivia

and empiricist tasks. The study of the environment is to be taken merely as one instance among others of interesting natural and social phenomena to be understood. Direct observation and experience--"learning by doing"--are to be used when appropriate to particular purposes instead of recommended as the best ways of learning.

The developmental logic and the alleged concreteness of children's thinking implied in the prevalent expanding model of organizing content makes little educational sense in face of the real possibilities and intellectual interests that are in place and can be stimulated in children.

Recommendations for Teaching

Curriculum documents typically recommend teachers to engage in procedures thought adequate to concrete thinkers, and that reflect a perception of education as accumulating to and facilitating development. A strong empiricist influence is again and again reinforced in curriculum recommendations, along with claims about the child as directing his or her own construction of knowledge. Experience-oriented activities, hands-on tasks, quasi-

autonomous inquiry in local environments, with minimal intervention by the teacher, are recommended as better meeting the developmental features of the young learner.

The previous critical discussion of the presuppositions that support such recommendations has repeatedly called attention to their limitations and inaccuracies. There seems to be a contradiction between the supposed limitations of children's thinking and the emphasis on their autonomous self-discovery. Children are, as I have been claiming as a conclusion of this study, powerful, complex and imaginative thinkers. They do not, however, have in place the information, the experience, or the autonomy of an adult. They are keen to listen to teachers' explaining what they do not know, and to explore and discuss the questions they raise. Their ways of creating meaning have to be attended. They also have the right to be supported and directed in their learning. Teachers are expected to do that.

It would, again, be judged appropriate for curriculum researchers and planners, as well as for people and institutions in charge of teachers' education, to reexamine the foundations of current beliefs about "good" teaching practices. Teachers have a right to be equipped with a

more consistent theoretical basis for promoting a more efficient, enjoyable and adequate education of elementary school young thinkers. Teaching means to enrich students with knowledge, skills, and also habits, that will be required of them as educated people. Assisting their natural growth and facilitating their spontaneous discovery does not seem enough as a definition of the professional role of the teacher. It is, however, one of the commonest statements found in curriculum recommendations for practice.

A Final Word on Theory

My personal engagement in this work has frequently led me to reflect on the never-ending academic discussions about the complex relation between theory and practice in education and educational research. I want to consider here how much they have worked together through every line I have written.

A teacher and a researcher share a common search for clarification and improvement in education, though each of them pursues different objectives and develops different procedures. There is however, in my view, an inextricable link between them, especially when the writer is

simultaneously, as happens to be the case, a teacher and a researcher. My interest in the characteristics of children's thinking is as old as my teaching. Many of my perplexities, that I attempted to clarify in this study, have originated a genuine search for educational knowledge, coming largely from practice. It was, however, the theoretical examination of my own questions, the discrimination of the various levels and modes by which theories influence education and curriculum, the conceptualization of the way curriculum tendencies evolve into orthodoxies, that improved dialectically my own analysis and changed some of my previous views. This will, in turn, certainly affect my future educational practice and thinking.

This personal reflection is added here also because it reinforces my last conclusion: the curriculum field has seemingly become too practice-oriented. Curriculum planning, along with teachers education, emphasizes excessively, in my view, the "how to" dimensions. Planning and assessment techniques, definition and attainment of formal objectives, modes of organization of school and class activities, are important priorities always elaborated in curricula and also emphasized in teachers'

education programs. Comparatively, "what" is taught and learned and "why", appear to be less prominent in curriculum debates. Curriculum reforms typically do not engage in a critical analysis of the theoretical foundations of previous programs, and so tend to simply keep them unchanged. Claims for innovation, for more or less integrated subjects, for more or less structured models of teaching, for modes of preparing to face a fast-changing world, are overstated in curriculum documents. Theory as such, has, in my view, played a secondary role in curriculum changes and research.

I hope I have made clear that theory, i.e., a particular and coherent interpretation of reality, is at the very heart of any educational debate.

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