



## Piaget's Theory of Human Development and Education

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### Abstract

The article examines and reinterprets Piaget's central theoretical tenets and their implications for contemporary educational practice. The author argues that Piaget's theory posits human activity as the basis of human knowledge and human development. For Piaget, human activity drives and generates development, at each stage, creating qualitatively new ways of knowing and relating to the world. This interpretation emphasizes the connectedness of mental processes to the world in which, and through which, development takes place and the agentive role played by subjects who transform their world through active engagement. The implications that the theory has for education and the applications that derive from Piaget's theoretical formulation is examined.

### Introduction

Born in Neuchatel, Switzerland, in 1896 – and having a solid background in the biological sciences and obtaining a PhD at the age of 22, after studying the behavior of molluscs, Piaget's theory of human development grew out of the contradictions of his early to mid-twentieth century society, contradictions that characterized the apparent tranquility of the society in which young Piaget grew up. Perret-Clermont (1997) provides an examination of the sociocultural context in which Piaget developed his theory to illuminate the meanings Piaget placed on his system of theorizing, most of which may remain implicit in contemporary debates of this theory. The social context of Piaget's Switzerland, as Perret-Clermont suggests, was characterized by conflict between religion and science as well as forms of traditional authority structures. Meanwhile, scientific Darwinism was in its ascendance and provided supposedly rigorous scientific account of biological and social processes (see Stetsenko, 2008; Perret-Clermont, 1997).

Piaget formulated a theory of human development that derived its explanatory principles from biological processes without, however, reducing complex human psychological phenomena to purely biological adaptation (Piaget, 2001). Therefore, Piaget sought to provide an account of the origin and development of knowledge that emphasizes relational processes between the individual and his or her environment or social situations. The relational processes are based on activities carried out simultaneously in the social and material world in which, and through which, development occurs; leading to transformation of self and – at the same time and within every stage – acquisition of qualitatively new modes of relating to the world; as well as new modes of knowing.

This article provides a general outline of Piaget's theory of human development and examines the implications this theory has for education. The discussion begins with a brief outline of the behavioral accounts of learning and development to which Piaget's theory stands opposed. Piaget's theory of human development is examined in more detail, with the main tenets of the theory and its major conceptual grounding elaborated. Lastly, the application of the theory to education is

examined with a view to demonstrating the continuing relevance; and enduring significance, of Piaget's theory of human development to education.

### Piaget versus Behavioral Explanations

Piaget's greatest impact in the social sciences lies – arguably, in his critique of the behaviorist explanatory framework and its depiction of human psychological processes as comprising habit formation produced through reactions to the effects of environmental stimuli (see Piaget, 2001, 1964). Behaviorism, as psychological tradition, sought to explain human psychological functioning using the same explanatory principles as those used in the natural sciences; thus seeking to establish the causal relationships between environmental conditions on the one hand and human behavior on the other – with the former conceived in terms of stimuli and the later in terms of responses. The stimulus–response framework, as the behaviorist tradition was alternatively called, posited that human actions, including learning, were the result of conditioning or habit formation as a result of positively reinforced responses to stimulus effects. Thus, the human mind was conceived of in terms of external associative relations between responses or reactions to the effects of environmental forces termed stimuli. Behaviorism ruled out the existence of mind as it assumed this to be not amenable to scientific verification through experimental methods similar to those employed in the natural sciences. Only studying the growth of behavior as resulting from the process of habit formation; occurring through conditioning or habituation of positive experiences, could, according to behaviorists, lead to a valid, scientifically rigorous form of knowledge of the human condition (Piaget, 2001, 1964).

While Piaget's theory resonates with social learning theorists such as Bandura and Mischel, the position of the social learning theorists further supports the view of human subjects as purposive, goal directed, and self-regulative rather than driven by environmental influences. As in Piaget's assertion about the centrality of human self-regulative processes and, hence, active self-directedness, Bandura (2001) posits a view of human agency premised on the essential conditions of human intentionality, purposeful pursuits, and self-reflectiveness. This view, as in Piaget's system, contradicts the mechanistic view of

human nature; proposing a picture of human condition as essentially subordinate to, and arising as mere responses to, external forces of environmental stimulation. For [Bandura \(2001\)](#) human activity is essentially agentic and driven; not by nature itself, but by a new functional structure created through and out of human agentic conditions.

In this system, humans exercise self-control over their thoughts and actions rather than being mere reactionaries to external forces. Their actions and thoughts are agentic and therefore involve qualities of intentionality, purposefulness, goal-directedness, forethought, planful proaction, aspiration, self-appraisal, etc. These agentic qualities function within fundamentally active (rather than reactive) and self-regulative human essence.

In a similar vein, [Mischel \(1973\)](#) states that self-regulatory systems involve self-control through self-imposed goals and self-produced consequences for action. That is, persons have the capacity to set performance goals for themselves and react to these with self-criticism or self-satisfaction, depending on whether they deem their performance consequences as meeting their expectations and criteria. Achievement of performance goals will most likely lead to positive self-appraisal, self-gratification, and self-reinforcement, while perception of failure may result in self-condemnation, anxiety, and desperation. The essence of self-regulatory system, according to [Mischel \(1973\)](#), is the subject's adoption of contingency rules, which are important to guide action and specify which behavior is appropriate under specific conditions. Social learning theories resonate with Piaget's system and could be employed to expand on its explanatory power, especially where personality differences in cognitive performance are to be accounted for. Piaget's unparalleled contribution to developmental psychology resides in his account for the genetic origin of active; and self-regulative, essence of human condition through his theory of human development.

### Piaget's Theory of Human Development

Piaget posited an all-important construct of equilibration, on the basis of which internal mental processes can be comprehended. For Piaget, the child did not acquire knowledge through reacting to the effects of environmental forces and, as a result, building habits that become crystallized into forms of behavior. The construct of equilibration suggests that the subject is fundamentally active in his or her interaction with the social and physical environment and organizes his or her actions into schemas and structures, on the basis of which further construction of knowledge becomes progressively possible. That is, the subject regulates his or her own actions in the world and, in turn, these actions and the consequences they have, internally, into means for controlling own thinking; by establishing internal anticipatory schemas and structures on the basis of which further acquisition and development of knowledge becomes possible. The concept of equilibration, therefore, unlike the stimulus-response concept of behavior, resuscitates the idea of mind – an abstraction which defines complex forms of human consciousness. From Piaget's point of view, therefore,

a rigorous, scientific methodology (scientific – though not in positivistic sense) that employs observation and clinical experimentation could be employed to study the origin, development and functioning of the human mind; without need to resort to the causal explanation of the behaviorist framework.

Equilibration involves two complementary processes of assimilation and accommodation. Assimilation involves an active integration of knowledge into preexistent mental structures. Accommodation involves the internal balancing processes whereby modifications within the existent structure or mode of knowing are carried out, so as to comprehend new knowledge effectively and hence, retain a state of balance or equilibrium to the hitherto disequilibrated structures (see, [Piaget, 1964, 2001](#)). Accommodation happens when a state of necessity for change arises on the part of the subject or when the subject becomes aware of discrepancies between his or her state of knowing and new knowledge to be assimilated. Therefore, the two processes of assimilation and accommodation are complementary, the former accounting for the process of learning while the latter accounting for development. That is, development is accounted for as involving qualitative changes that happen in existing structures, necessitated by the realization and the internal need for change, brought about by the awareness of a state of imbalance or state of disequilibrium between new knowledge to be acquired and existing forms of knowledge on the part of the subject.

Piaget argued that learning is explained through the process of assimilation – which, although it involves an active; rather than passive, integration of knowledge into preexistent structures, does not, however, change the structures or existing modes of knowing. What changes, rather, is the knowledge being assimilated, as this is transformed so as to fit into existing mental structures. Thus, knowledge of the world is not imprinted into the subject and the environmental forces do not determine knowledge to be acquired, in the sense assumed within stimulus-response systems. Rather, the subject is active – not in an aimless, purposeless, and trial-and-error fashion characteristic of the operant conditioning models of later stimulus-response frameworks; that sought to explain human learning in ways similar to habit formation processes established through animal behavior-change or conditioning experiments. Piaget's subject, or a child, is active in a purposeful manner where he or she acts on the world to master and comprehend it, and this action leads to internal mental coordinations; a process explained through the concept of equilibration.

Equilibration is therefore a motor for human development and this self-regulatory process emphasizes an active role the subject has in the acquisition of knowledge; which, although arises externally through the relational processes involved during the subject's interaction with the world, is, however, coordinated from within, since it is the subject, ultimately, that acts and comprehends the world in terms consistent with his or her existing structural organization. There is a sense of a biological adaptation involved in this process. However, Piaget termed this functional adaptation, in that it is not adaptation to the external world per se, but to the evolving structural organization or internal coordination of knowledge ([Piaget, 2001](#)). That is, the subject does not adapt to fit his or

her existing knowledge to the form of knowledge encountered from the outside, in his or her context of learning and development. Rather, the subject adapts to his or her existing; and yet, evolving conception of the world that he or she continuously modifies as and when the need – or a feeling of necessity, arises because the present state of knowledge is now deemed inadequate and creates dissonance that needs to be compensated. Piaget (1964), using the language of the behaviorists to critic their model of learning, argued that the response was present long before the stimulus effects – in the sense that it is not the external environmental forces that determine; in an associative form, how the subject reacts, but the subject's own, already constructed modes of knowing or knowledge structures.

Therefore, Piaget provided a solid, genetic account of human intellectual development grounded on human activity. First, the explanation emphasized genesis or developmental origin and, therefore, solving the problem of nativists or philosophical frameworks that subscribed to the notion that knowledge was inborn. Second, the account emphasized developmental progression – conceived, not as a quantitative accumulation of knowledge; as the behaviorists have contended, but as involving qualitative transformation of knowledge from its simpler forms to its more complex forms; characteristic of adult forms that – ideally, enables elaboration of logical and scientific knowledge often privileged in social institutions such as formal schooling.

From a genetic point of view, action; according to Piaget, comprises the basis of human knowledge. Unlike the behaviorists, action – for Piaget, did not only involve the physical aspect of human behavior. Action is both concrete and physical, as well as mental and abstract. This account of action simultaneously elaborates on the essential nature of experience, which in the stimulus–response system has been assumed to constitute only the external aspect of human interaction with the physical and social environment. Piaget, on the contrary, argued that action comprises both the external experience of the world involving; first, the subject's interaction with concrete objects in the world and; second, the consequences of actions initially effected to objects in the world. That is, the subject experiences the world through his or her direct interactions with it but eventually turns these experiences inward into his or her internal plane, where coordinations are subsequently conducted mentally. The former type of experience is considered to lead to operative forms of knowledge – that is, knowledge of how to relate to the world externally while the later type of experience is considered to lead to figurative forms of knowledge, which enables the knowing of the world through mental abstractions. Therefore, experience of the former type is externally directed toward the world while the experience of the later type is internally directed, toward mastery of self. It is, therefore, this mental action that leads to mental coordinations. The coordination of a series of actions leads to what is termed a mental structure. A series of these structures combine to form an operation. Piaget defined an operation as a series of actions that are reversible; that is, actions that have been organized into a reversible structure. These operations become the basis of meaningful, reflective activity through which the human mind is able to engage in interpretive,

comparative, evaluative, and analytic activities (Piaget, 1964, 2001).

### Sensory-Motor Stage

The genetic approach traces the origin of operational knowledge from its developmental origin in the earliest forms of human activity – the sensory-motor actions, which serve as the early forms of mental coordinations. The coordination of sensory and motor actions leads to the construction of schemas or early structural organization of thought; leading to the acquisition of the concepts of space, time, causality, and object permanency. For example, Piaget found that children acquired the notion of object permanence around 18 months. That is, the child becomes aware of the fact that objects continue to exist even when they have been removed from its spatial field – and do not, therefore, cease to exist. The maturational processes of the nervous system are connected to the development of sensory and motor activities and therefore make possible; and are transformed into, developmental processes. The child progressively masters the world through interacting with it – assisted primarily by its sensory and motor activities and as a result begins to construct – mentally, the functional knowledge of the world around it.

Piaget (1964, 2001) provides an example of a sensory-motor child attaining the concept of object permanence through the coordination of experiences and hence the acquisition of a notion that objects do not disappear and cease to exist when removed from visual field. As evidence to the acquisition of this concept is the child's changed behavior with regard to his or her interaction with objects; where by 18 months the child begins to search for objects outside of its visual field, with the goal of finding them located somewhere. With this acquisition is, of course, also the acquisition of the related concept of space, which arises out of the special coordinations that characterizes sensory-motor activities.

The end of the sensory-motor stage heralds the dawn of preoperational thought around the age of two. By this stage, one begins to see the emergence of structural organization of thinking in the form of operations or systems of actions that are internally connected. However, these early forms of thought structures are characterized by the lack of 'mobility' or backward-and-forward movements – a fluidity that progressively resembles the logical and mathematical forms of thinking considered; within this theory, to constitute the apex of knowledge development. While the sensory-motor stage enables mastery of the physical world through coordination of experiences; a process that means the subject from greater dependence on the effects of environmental forces characteristic of perceptual processes, the preoperational stage increases this distance from reliance on the effects of the environmental forces. This process is primarily facilitated by the development of symbolic forms of relations that characterize the social world and; specifically, the use of language (Piaget, 2001, 1964).

### Preoperational Stage

Piaget posited that the preoperational stage emerges around the age of 2 years and concludes at around the age of 4/5 years.

There has been much debate of the actual age range at which this stage concludes. This is not surprising considering that Piaget's experimental work emphasized children's deficient performances on tasks that required reversible forms of mental operations for successful completion – an approach which, perhaps, was unduly influenced by his early work with children at Binet's laboratory. At this stage, Piaget found that children could not perform conservation tasks competently.

Piaget described the preoperational stage predominantly in terms of the child's inability to carry out operational thought or to understand conservation tasks – involving the ability to understand forms of knowledge that require reversible or reflective thought processes. That is, preoperational children were found to lack the ability to comprehend situations where two or more categories are to be held constant – in perspective, in order to arrive at valid conceptualization of a situation.

For example, Piaget presented a number of experiments in which preoperational children were not able to conserve or comprehend quantity, weight, volume, etc. One of the most common of these conservation experiments involved the conservation of quantity that is transferred from a shorter and wider glass container to a taller and narrower glass, thus showing a changed appearance in the taller container; falsely suggesting an increase in quantity. The transfer of quantity is performed in the presence of the child and the child is asked if we now have more or less quantity in the second container as a result of the transfer process. Preoperational children were found to lack full comprehension of the situation, focusing exclusively on the changed appearance of quantity in the taller glass and, as a result, insisting on the notion that there is an increase in quantity (Piaget, 2001, 1964).

Piaget argued that a preoperational child lacks the ability to hold two categories constant and to use full information to arrive at a solution to the problem. That is, the preoperational child is inclined to focus only on one aspect of the problem and to use only this to arrive at a solution of the problem because he or she does not as yet have cognitive ability to hold two or more perspectives constant and to use these simultaneously as cognitive resources for getting to a solution for the problem. This lack is necessitated by the nature of the developmental stage that characterizes the child's present cognitive functioning. The preoperational child must consolidate on his or her knowledge of the world that the sensory-motor activities have enabled him to construct and progressively integrate this knowledge with the form of knowledge that derives predominantly from his or her internal, mental coordinations – a form of knowledge that should lead, not just to mastery of the external world, but also to the mastery of self.

During the preoperation stage, the child's cognitive development is dominated by the need to master self and actions are predominantly directed towards self-mastery and, as a result, the child lacks the ability to 'decenter' (Piaget, 2001). That is, the preoperational child lacks the ability to see things from other people's perspective as he or she insists on own point of view. Therefore, the dominant mode of thinking during this stage is egocentric, making it difficult for the preoperational child to coordinate thinking to arrive; through analysis, at valid solution to the problem. This inability could indeed have negative impact on the acquisition of numeracy and

literacy skills should the preoperational child be placed within formal learning situations in school. This difficulty may arise, for example, from the inherent nature of formal learning such as the requirement in reading acquisition; simultaneously, to focus both on the phonemic (requiring the understanding of relations between speech sounds and letters of the alphabet) and the semantic (or meaning-making) aspects of the reading process.

However, an undue emphasis on the cognitive deficiencies of the preoperation stage, as was characteristic of the dominant approaches in Piagetian cross-cultural research, was unfortunate. Positive developmental milestones are achieved during the preoperational period, and this stage serves as good preparation for acquisition of operational forms of thinking. For example, preoperational children acquire the capacity for symbolic representation, of which language development is a crucial component. The preoperational stage is crucial for children to gain mastery of themselves in relation to their growing participation in the world of adults. The preoperational stage is characterized, among other things, by the development of language. Language development during this stage, however, takes a particular form that is consistent with the character of the stage itself. The child acquires language and its symbolic function, but the entire acquisition is oriented toward self-mastery. For example, the preoperational child uses same words acquired during interaction with adults but attaches idiosyncratic meanings to these. Also, the preoperational child may verbalize his or her thoughts as a way of controlling own actions, such as during situations when the child needs to commit something into memory. Meanwhile, the preoperational child plays with toys or objects in his natural environment in creative ways. For example, a brick may be turned into a bus; a piece of wood may become an airplane, etc. In this way, the preoperational child acquires the ability for symbolic representation, important both for language development and social functioning; as well as for learning the various subject matter during formal schooling later on when the child has reached school-going, concrete-operational stage. The significance of egocentric forms of language in particular; and thinking in general which characterize the preoperational stage, has – interestingly, been elaborated outside of the Piagetian framework (see Vygotsky, 1986 for this elaboration).

### Concrete Operational Stage

Fortunately, for the school-going child, the forms of thinking required for successful learning of the formal knowledge characterizing the subject matter has already appeared in the child's mental capacities. The cognitive capacities for reflecting on own and other people's perspectives; for comparison and analysis, has already made their first emergence into the cognitive repertoire of the child. That is, all the deficiencies that characterize the preoperational stage are overcome at the concrete operational stage. However, the child still needs the support of concrete activities to carry out operational processes comprehensively. The concrete operational child can, for example, make the necessary analysis of the situation; taking into account all the information available to him or her, and arrive at valid conclusions about the quantity transferred from one glass

container to the other as described earlier. The concrete operational child would insist that the same quantity remains after transfer to the second container because the activity of transferring from one container to the other did not comprise adding to; or taking out from, the available quantity. Therefore, quantity is conserved because all available information constitutive of the situation is taken into account in arriving at a solution to the problem. According to Piaget, this knowledge is not attained through simple accumulation of experience. It is the result of the internal self-regulatory activities of the human mind and comes about as a result of qualitative changes that comprise human mental development.

However, while the concrete operational child is able to understand conservation tasks such as the one involving the constancy of liquid quantity, his or her thought processes are still reliant on concrete activities. That is, thought coordinations that involve reflective and reversible systems of ideas and concepts still rely, predominantly, on concrete situations and objects in the subject's experiences. This idea of concrete operations has mostly been misinterpreted to mean learning through concrete objects. However, while concrete objects could be crucial in getting the preoperational child understand complex ideas, they should always be employed as a means to an end and not as an end in themselves; the end being to generate capacity for analysis, comparison, and reflective activities carried out mentally without dependence on external props. For example, teaching children to carry out basic arithmetic operations of addition, subtraction, division, and multiplication through use of pebbles or abacus (which is a form of employment of concrete objects) should always be aimed at getting them to master these skills 'internally' or inside their mind as abstract cognitive activities. That is, the learning that happens here should be oriented toward the interiorization or internalization of these concrete activities into the internal plane of cognitive functioning.

In terms of children learning in school, the concrete operational stage is critical for laying good foundations for successful learning. Many things could go wrong during this period in cases of poor teaching and learning provision. For example, Muthivhi (2010) and Muthivhi and Broom (2009) studied concrete operational and formal operational learners whose learning was characterized by the forms of teaching that did not prepare them adequately for; and elaborate on, the reflective processes necessary for successful learning of the formal subject matter knowledge. These studies found that, although these learners demonstrated levels of performance consistent with normal developmental stages, they tended to be overreliant on concrete manifestations of the tasks and often derived conclusions to problems from their perceptions of the concrete situation rather than from their conceptualizations of the situation; taking full account of all available information to arrive at valid conclusion.

### Formal Operational Stage

During the concrete operational stage, the child is consolidating a particular form of thinking that characterizes the social world of adults – the world of reflective, interpretative, comparative, and analytic activities; all of which are activities of the human

mind, which, of course – as Vygotsky (1978) has argued, are dialectically related to the activities of society and culture. Piaget termed this stage in human development, the formal operational stage and focused predominantly on the acquisition and development of the formal activities of the human mind, which he alternatively referred to as the 'logicomathematical' processes (Piaget, 2001, 1964). We can understand this specific emphasis to be influenced by the idea of the 'true forms' of human thought, unencumbered by social traditions and adult impositions, which; of course, had its history in the philosophical traditions of Emmanuel Kant's proposition of the basic categories of thought as involving 'number, space, causality, and time' (Piaget, 2001, 1964; see also Shayer, 1997).

Therefore, Piaget, sought to understand how human individuals – what is termed ontogenetic development – came to acquire the basic categories of the human mind that underlie the formal processes of human thinking; characteristic of the formal activities of scientific and mathematical practices. As a result, logical processes of thought; their origin and development from early adolescent to adulthood, became the main emphasis of Piaget's research. Where he included psychological processes other than those related to the logical processes; such as language development, the role of the social and emotional development, the focus was on how these processes were related to, and could be explained from the vantage point of the functioning of logicomathematical processes.

For Piaget, the formal operational thought, the onset of which begins in early adolescence, marks children's first entry into the world of adults; in the sense that children begin to acquire the forms of thinking and attitudes to the words that are primarily informed – not by how things appear in the world – but by how the world makes sense to them from the point of view of their own interpretations and analysis of situations. That is, they enter the world of thoughtful existence; the world of abstraction, of logical and propositional forms of thinking where the world – and knowledge – is; essentially, a product of mental coordinations. Formal operational children, or – more precisely, adolescence, may; for example, begin to question the status quo and existing social traditions as well as the taken-for-granted world of adults, even as they seek to enter and have meaningful existence in it – hence the radical changes often experienced in the behavior of adolescence.

Clearly, this stage presents positive challenges and opportunities for teachers as these learners are naturally very curious and inquisitive. Piaget's framework, therefore, points to a model of education that is explorative, investigative; as well as directed by the curiosity and inquisitiveness of learners, and curriculum development initiatives that could exploit this golden opportunity to engage learners and involve them in an ongoing quest for, and creation of, knowledge. However, young adolescents are often put off by the traditional forms of education, still widespread all over the world, which focuses on drilling of stale, factual knowledge, often putting pressure on learners to learn most of the subject matter by heart or through quasi-meaningful processes of committing rules and procedures to memory so they could remember them for use as tools to work out solutions to given problems (see Arievidt and

**Table 1** Major developmental stages, their approximate age ranges, and the dominant activities that characterize them

<i>Major developmental stages</i>	<i>Approximate age ranges</i>	<i>Dominant cognitive activities</i>
Sensory-motor	0–18 months	Maturation, sensory and motor coordination
Preoperational	18 months to 5 years	Self-mastery through egocentricism, symbolic representation and early language acquisition
Concrete operations	5–11 years	Decentration, self-monitoring, reflection, analysis, and comparison necessary for logical–operational activities applied to concrete situations and concrete objects.
Formal operations	12 years to adulthood	Logical thought processes proceeding from abstract categories and less dependent on concrete objects and situations. Self-monitoring, self-reflection, analytic and comparative activities, and increasing abstraction of thought processes.

Stetsenko, 2000 for a detailed discussion of traditional methods and their epistemologies). It was for this reason, therefore, that Piaget opposed and doubted the capacity of educational processes to contribute to children's development and their desirability as a means of accelerating development (Table 1, summary of the stages of development).

### Application of Piaget's Theory to Education

Piaget's theory has important implications for educational practice. Its influence on modern education is unparalleled. Importantly, Piaget's theory has contributed immensely in transforming the way in which children are conceptualized and hence, how they could more effectively be educated. For Piaget, as could be seen from the foregoing discussion, children are essentially active and do not therefore learn by passive reaction to stimulation around them. That is, they do not learn by passively receiving knowledge from the world around them but actively; through their own agency, transform the world in which they live in order to know it. That does not mean, as others assumed, that children should be left to their own devices or that adults have no role to play in the life of the developing child. However, Piaget cautioned against schooling, and related social systems that provided a child no room to come to the knowledge of the world through his or her own intellectual means; denying children their inherent disposition to know the world in ways that make genuine sense to them.

Piaget posited a child who is actively constructing his or her knowledge of the world through transforming it and thereby also transforming himself or herself. That is, the child knows the world through his or her existing but yet transforming (rather than just static) intellectual capacities. These capacities – as the discussion of the inherent connectedness of the stages to the dominant forms of the child's activity in the world has shown above – are not reducible to individual or social moments of their manifestations. Therefore, learning and development in Piaget's framework, although foregrounding the primacy of the individual in ontogeny, does not suppose a child or childhood as completely autonomous of, and discontinuous with, the society and culture in which children's learning and development take place.

Therefore, teaching informed by the Piagetian theoretical system would proceed from the assumption that children at specific stages of development; such as the age of 6 years, would be able to carry out reflective processes, provided that these are supported by concrete phenomena with which they engage and on which their cognitive functions are applied. The concrete nature of thought processes for the concrete operational child is, however, not limited to the use of concrete objects. Although the use of concrete objects is important and should be encouraged at this stage, this should, however, be employed as a means for getting the child master complex demands of tasks such as carrying out number of operations that may require the support of counters or abacus, for example. That is, the employment of concrete objects becomes a means to an end, the end being the transformation of the child's thinking towards abstract forms of thinking; where thought processes are increasingly carried out without the need for reliance on concrete support. That is, learners at elementary school levels such as those in the age ranges of 5.5–7.5 years could benefit from instruction that employs concrete objects and examples to illustrate complex ideas and models, as well as arithmetic principles and operations. However, such employment of concrete objects and examples should be employed as a means for helping learners to acquire an idea or principle that they would later employ on their own in solving related problems; and base their future learning of complex knowledge on the foundational ideas and concepts initially acquired through the help of concrete objects and empirical illustrations.

Symbolic or semiotic systems that underpin the learning of reading and writing as well as basic number operations could be acquired in this way. An understanding of the principles for a pedagogy that derives from Piaget's system may be crucial for educators to relate knowledge to early school learners more effectively in ways that contribute deep level learning and development. For example, Piaget's system posits that children during early formal school years are capable of employing complex mental capacities, involving holding two or more perspectives simultaneously. Contemporary research on school children's use of cognitive capacities; comprising the ability to hold two or more perspectives simultaneously during problem solving, suggests that while these capacities may owe their development in children's spontaneous

activities (everyday-life activities that do not necessarily involve teaching), their elaboration and conscious application to problem situations may be constrained if classroom instruction does not foster their conscious application to problem situations (see, Muthivhi, 2010; Muthivhi and Broom, 2009; Shayer, 1997).

For Piaget, the acquisition for this cognitive capacity demonstrates an important shift from self-centered, egocentric thought processes – where the child is not able to consider two or more relevant aspects of a situation to arrive at a valid conclusion – to a ‘decentered’, self-regulative and reflective form of thinking that characterizes operational thinking of school-going children. Piaget (1964, 2001) has posited symmetrical social relations as necessary for the development of self-regulative thought processes. Symmetrical relations involve relations of mutual epistemic respect and epistemic equality. Epistemic, in the sense that the equality and mutuality involved is necessarily in respect of intellectual engagement, exchange of ideas, adherence to the rules of engagement in pursuit of knowledge and novel ideas, as well as models of knowing the world and self. This view contrasts the assumption that the social in Piaget is solely, and exclusively, in respect of children’s relations to – and collaboration with, each other (see, for example, the discussion of the social in Piaget’s theory in Shayer, 1997; Perret-Clermont, 1997; Labouvie-Vief, 1996). Contrarily, the notion of mutuality can be employed by teachers to model forms of classroom engagement that foster relations of epistemic equity and mutuality that generate pedagogic situations conducive for genuine learning and cognitive development (see; for example, Ginsburg and Allardice’s, 1984 Piaget’s inspired model). Meanwhile, the notion of epistemic equity and mutuality can also be employed to organize group-based, collaborative learning activities that contribute to learners’ self-regulative, reflective engagement with the world and with novel ideas that come from the subject matter of their classroom learning.

### Vygotsky’s Framework as a Competing Paradigm

It was, ironically, in its capacity for application to educational settings; to provide solutions to most pressing challenges of educational underperformance, conceptual understanding, and task mastery, that Piaget’s theory of the origin and growth of knowledge has failed to make significant advances. Piaget’s theory was particularly critiqued for not taking adequate account of the social and cultural factors in its account of cognitive development and functioning and therefore as limited in its possibilities for application to classroom teaching and learning situations. Vygotsky’s theoretical system was, on the contrary, credited for doing precisely what Piaget’s theory was considered to have failed to achieve, that is, foregrounding the role that sociocultural processes play in human development (e.g., Matusov and Hayes, 2000).

The most powerful among current critiques of Piaget’s system probably relate to his view of development as proceeding by way of adaptation – as a form of biological adaptational process. Vianna and Stetsenko (2006), for example, argue that Piaget, by positing a view of children as

developing and learning in the spirit of adapting to existing conditions, and mind as evolving out of actions through which people adapt to the world, presents a limiting picture of the human condition. Vygotsky, on the contrary, positing a view of children developing and learning as they actively change the world they live in – simultaneously changing themselves and gaining knowledge of themselves and of the world, presents a position that transcends the constraining picture of humans as changing to fit in with the world into which they contribute nothing towards its transformation.

### Conclusion

Piaget’s theory of human development has made an enormous contribution to contemporary educational practice. By revealing that children think differently from adults; that children are not little adults in the making, and that their thinking differs from that of adults not only in quantitative terms but in the quality of thought processes involved, Piaget made a lasting contribution to our knowledge of how teachers could appropriately relate to learners, as well as how knowledge could effectively be organized at different stages during children’s development.

The theory inspired many educational models such as learner-centered approach, discovery-based learning, activity-based learning, collaborative learning, constructivism, exploratory learning, and active enquiry-based learning models. These, and related educational models that derived from Piaget’s theoretical systems, had an immense influence on many educational systems across the world. All of these models, inspired by Piaget’s framework, proceed from a common ontology, a worldview that learning is a process that is fundamentally driven, first and foremost, by the activity of the learner – and not necessarily by the actions of teachers or needs of society, with existing social structures serving as unalterable *telio* or end-point of human development.

*See also:* Cognitive Development: Child Education; Cognitive Development: Mathematics Learning and Instruction; Self-Regulated Learning: Theories, Measures, and Outcomes; Vygotsky’s Theory of Human Development and New Approaches to Education.

### Bibliography

- Arievitch, I.M., Stetsenko, A., 2000. The quality of cultural tools and cognitive development: Galperin’s perspective and its implications. *Human Development* 43, 69–92.
- Bandura, A., 2001. Social cognitive theory: an agentic perspective. *Annual Reviews Psychology* 52, 1–26. [www.annualreviews.org](http://www.annualreviews.org) (accessed 28.01.14.).
- Fontana, D., 1981. Early social development. In: Fontana, D. (Ed.), *Psychology for Teachers*. British Psychological Society & Macmillan Publishers Ltd., Leicester.
- Ginsburg, H.P., Allardice, B.S., 1984. Children’s difficulties with school mathematics. In: Rogoff, B., Lave, J. (Eds.), *Everyday Cognition: Its Development in Social Contexts*. Harvard University Press, Cambridge, MA, pp. 184–219.
- Labouvie-Vief, G., 1996. Knowing and relating: the lost dimension of knowledge in Piaget’s theory. *Culture and Psychology* 2, 323–332.
- Mischel, W., 1973. Toward a cognitive social learning reconceptualization of personality. *Psychological Review* 80 (4), 252–283.

- Matusov, E., Hayes, R., 2000. Sociocultural critique of Piaget and Vygotsky. *New Ideas in Psychology* 18, 215–239.
- Muthivhi, A.E., 2010. Piaget, vygotsky, and the cultural development of the notions of Possibility and necessity: an experimental study among rural South African learners. *South African Journal of Psychology* 7 (128).
- Muthivhi, A., Broom, Y., 2009. School as cultural practice: Piaget and Vygotsky on learning and concept development in post-apartheid South Africa. *Journal of Education* (47), 55–72.
- Perret-Clermont, A., 1997. Revisiting young Piaget in Neuchatel among his partners in learning. In: Smith, L., Dockrell, J., Tomlinson, P. (Eds.), *Piaget, Vygotsky and beyond: Future Issues for Developmental Psychology and Education*. Routledge, New York, pp. 91–120.
- Piaget, J., 2001. *The Psychology of Intelligence (Chapter 6: Social Factors in Intellectual development)*. Routledge Classics, London.
- Piaget, J., 1964. *Development and learning*. In: Ripple, R., Rockcastle, V. (Eds.), *Piaget Rediscovered*. Cornell University, Ithaca, NY.
- Shayer, S., 1997. Piaget and Vygotsky: a necessary marriage for effective educational intervention. In: Smith, L., Dockrell, J., Tomlinson, P. (Eds.), *Piaget, Vygotsky and beyond: Future Issues for Developmental Psychology and Education*. Routledge, New York, pp. 36–59.
- Stetsenko, A., 2008. From relational ontology to transformative activist stance on development and learning: expanding Vygotsky's (CHAT) project. *Cultural Studies in Science Education*.
- Valsiner, J., 1988. *Developmental Psychology in the Soviet Union*. Harvester Press, Brighton.
- Vianna, E., Stetsenko, A., 2006. Embracing history through transforming it: contrasting Piagetian versus Vygotskian (Activity) theories of learning and development to expand constructivism within a dialectical view of history. *Theory and Psychology* 16 (1), 51–80.
- Vygotsky, L.S., 1986. *Thought and Language*. M.I.T.Press, Cambridge, MA.
- Vygotsky, L.S., 1978. *Mind in Society: The Development of Higher Psychological Processes*. Harvard University Press, Cambridge, MA.
- Weiten, W., 2001. *Psychology Themes and Variations*. Wadsworths, Belmont, CA.
- Wood, D., 1988. Images of childhood and their reflection in teaching. In: Wood, D. (Ed.), *How Children Think and Learn: The Social Contexts of Cognitive Development*. Basil Blackwell, Oxford.