Piaget and his ideas on cognitive growth have direct relevance to the American educational situation.

Piaget: Experience and Cognitive Development

by Robert P. Craig

Piaget has often insisted that his psychology of cognitive formation did not have **specific** implications for education. This is interesting in that American educational methodology has been greatly influenced by Piaget's research. Piaget labels himself a "genetic epistemologist," and he even tries to avoid being called a psychologist.[1] Piaget is not unique in suggesting that his epistemological theories do not necessarily have practical implications. Many so-called "grand theories," to borrow Talcott Parson's term, are thought to be ends in themselves. Thus, we see the distinction between such areas as theoretical physics and applied physics, between theology and ministry, and between psychology and clinical practice. Yet, if a theory is to be valid, it is bound to have some potential for application.[2] It is this potential we seek in Piaget's theory of cognitive development.

First, though, how can one describe a theory of cognitive development? Such a theory implies that individuals proceed through a process leading to more sophisticated cognitive growth. Exactly what it is one proceeds through is a matter of dispute. Some thinkers discuss periods of intellectual growth; others, such as Piaget himself, refer to the concept of stages of development; and still others talk about phases of growth. This issue has been discussed elsewhere, so I will not belabor the point.[3] The main factor found consistently in all three expressions of epistemic development is that there occurs a movement from "lower" to "higher" cognitive stages as one proceeds to full intellectual maturity. And who would argue that the development of one's intellectual potential is not a positive goal? Perhaps only those who make a strict separation between cognition and effect, and find a cognitive-developmental position denying the importance of emotion in one's intellectual growth. This is certainly not Piaget's contention.

How, according to Piaget, can full intellectual maturity be accomplished? How can the educator aid in such facilitation? Piaget has suggested that there are three elements involved in the development of cognitive growth.[4] The first element is proper organic growth and maturation. With mere organic growth and maturation new vistas are opened for the student. With this development the body increases in size, sensory organs become more acute and there is more integration achieved by the central nervous system. But the fulfillment of the maturational process depends on more than physical growth; it is only through systematic experience that the individual progresses to maximum cognitive ability.

Let us examine how experience aids in the development of cognitive acuity. Piaget suggests that the child needs two kinds of experiences.[5] The first type is referred to as "physical experience." This means that as the elementary school student begins to manipulate and to examine objects, he/she also is actively involved in the process of cognitive development. When the student plays with pebbles of different sizes, for instance, the student learns something about smoothness, roundness and hardness. The student also begins to perceive the relationship between weight and volume, for the child begins to realize that the larger the pebbles are, the heavier they are. Thus, physical experience necessitates the exploration and manipulation of one's physical world. Much of this exploration is achieved in play, although the teacher can obviously construct activities which will help facilitate this growth in cognitive development.

The second type of experience Piaget considers is "logico-mathematical experience." Let us mention the pebble exercise again. The child can discover, for example, that if he/she forms a circle out of the pebbles, they can be counted from either direction within the circle (clockwise or counterclockwise) with the same results. Physical experience depends on a particular "object-manipulation." The roundness of the pebble differs from the roundness of a basketball, for example; while logico-mathematical experience can be derived from any set of objects. The student does not need pebbles to learn the process of counting.

The third element in the process leading to cognitive growth is the individual's involvement in social interaction. Anthropologists, such as Margaret Mead, have demonstrated that people who hold primitive beliefs do not necessarily engage in primitive thinking. By primitive we mean a lower phase of thought, such as that which is clouded by animism. Mead found that the beliefs of primitive peoples could not predict the level of cognitive development of which they were capable. Thus, for Mead, as for Piaget, there is no such thing as a "primitive mentality."[6]

How, then, do individuals' cultural experiences relate to levels of cognitive growth? Piaget has stated that any difference in cognitive ability between cultural groups is due to the types of situations to which cognitive processes are applied rather than to the absence of a cognitive process in one culture and its presence in another.[7] Thus, for Piaget, any student who is not up to his/her cognitive stage, which is roughly approximate to a chronological age-range, may still possess the structures necessary for cognitive development even though these may not be readily apparent from the results of psychological tests or achievement measures. Children with different racial, ethnic, or social class backgrounds do not necessarily suffer from a psychological or cognitive deficit just because they do not perform well on standardized tests, such as achievement tests in school. The teacher needs to find

Robert P. Craig is chairman of the Philosophy Department at St. Mary's College in Orchard Lake, Michigan.

proper conditions in which cognitive processes are manifested. Some of these specific conditions will be elaborated on later. The point here is that children's substandard performance on standardized tests does not imply substandard thinking on their part.

The process in Piaget's theory which leads to successful cognitive growth is equilibration—and by this term Piaget means "a process leading to self-regulation."[8] Self-regulation refers to the active engagement of the individual in regard to external disturbances which cause disequilibrium. When there is tension caused by environmental stimuli, such as being exposed to several alternatives by which to solve a problem, the individual achieves equilibrium by inventing a way of dealing with, or understanding, the tension. The individual may begin to use an abstract system of classification, such as that found in biology, to better achieve harmony in his/her thinking about the variety of objects within the experience.

David Elkind has an interesting explanation of how equilibration regulates one's interactions with the environment. It is due to equilibration that one is not enslaved by the environment nor by one's egocentrism.[9] The child assimilates, or "takes in," experience and, through his/her developing mental structures, also begins to accommodate that experience. The process or accommodation makes the experience intelligible to the student, for the student begins to view reality from another's perspective. Wadsworth makes an interesting distinction when he refers to assimilation as a quantitative change in one's thinking and accommodation as a qualitative change.[10]

If the process of assimilation doesn't lead to equilibration, the subsequent disequilibrium will cause discomfort and drive the individual toward making an attempt to recognize the point of view of others. For instance, when a youngster is just beginning to learn to add numbers, he/she experiences discomfort, which will lead to disequilibrium until the process of addition is mastered; that is, until the student is able to accommodate the concept of addition with a new cognitive structure.

However, in order for disequilibrium to be a factor in the developmental process, the student must be interested in the outcome. Without interest, in other words, there is no disequilibrium. In order to attain advanced cognitive structures, the individual must reorganize existing structures. And in order for this reorganization to occur, the student must perceive whatever conflicts are negating the reorganization. For example, conservation of number is developed as the result of disequilibrium the child experiences by observing inconsistencies between repeated observations of numerical quality. Yet, often such conflicts may not lead to even discomfort, for the student may not have the slightest interest in the entire project.

But there may be a slight awareness of the conflict on the student's part, and this can lead to a recognition of some concept of "sameness" regarding numbers, that they can be added in a number of ways, such as backwards and forwards, for instance. Finally, the process of conservation can be initiated when the student perceives that there is a coordination between number and length. Thus, experience is needed if changes in the qualitative order of things is to be recognized by the student. It is through interest and interaction that the student can dissipate disequilibration.

Some Practical Applications of Piaget's Views

1) Piaget has never tired of insisting that learning occurs only through active participation on the student's part. Knowledge is not "out there," as some educational thinkers have suggested; knowledge is not static in this sense. As teachers create the proper conditions for students to experiment, to try and personally "figure things out," and to discuss their findings and their feelings about them, students begin the active process whereby "higher" levels of cognitive growth can be realized. This process is a necessary condition for a student to develop to Piaget's stage of formal operations, for example.

2) Learning is not derived simply through verbal instruction on the teacher's part. Weingarten and Postman realized this a number of years ago; and the results of their reflections are found in **Teaching as a Subversive Activity.**[11] A teacher who has attempted to verbalize an answer to a particular question before the student has developed the cognitive structures to be able to assimilate it realizes how fruitless verbal instruction is at this point in the student's cognitive growth.

3) As was suggested before, social interaction is a necessary ingredient which can lead to the process of acquiring fundamental knowledge. Piaget insists that when students are free to interact with other students without restrictive rules imposed by the teacher, these children manage to accomplish a valuable degree of interaction—it is not merely a process of joking and "fooling around."[12] And it is from this interaction that the student can become aware of different points of view and of different approaches to whatever issue is being investigated. It is through such interaction that students begin to lose their exclusive egocentric approach to knowledge acquisition. At this point, teachers can raise questions about the student's experiences within the individual's world. This can lead the students to reflect on their experiences, and to "sort out" observations and thoughts.

4) The types of learning experiences that help develop fundamental knowledge, such as relating a historical period to subsequent social/political changes, cannot be considered an ad hoc or a "one shot" activity. This degree of learning experience must be part of one's complete schooling.

For example, mental manipulations by adolescents, such as their attempts to understand the basic concepts of biology, largely consist of the manipulation of symbols and abstract concepts, not merely the grasping of specific objects within experience; this type of manipulation of objects is necessary in elementary school. At any rate, far too often students are "told" or lectured about **the** meaning of such concepts as freedom and morality, as if there is **a** meaning to such important human concerns. They are not given the opportunity to explore, question or discuss such concepts. According to Piaget, without such exploration, cognitive development can be retarded.

5) If the student is at some transitional stage of cognitive growth, then teacher intervention is more likely to produce positive results in aiding the student toward "higher" levels of intellectual/affective ability. If the child is approaching the concrete operational level, but not quite there and not simply at the pre-operational stage of cognitive growth, then it is highly likely that, through teacher intervention, the student can make the transition to the next intellectual phase of learning—such as understanding the relationship between conservation and weight, for example.[13] This is an essential point, because it means that cognitive growth is not merely an ad hoc process; but

teachers can actually construct systematic exercises to facilitate movement from a transitional stage of cognitive development to a more complete one.

6) The degree to which a student's thinking is subject to adult influence is still problematic. We haven't settled the issue by the above remarks. Some psychologists, Holowinski, for example, have met with great success using strictly instructional models and methods to induce supposed cognitive growth in students.[14] Holowinski has insisted that after age four he has succeeded in facilitating the child's knowlege of processes as seriation. This is, perhaps, not a contradiction of Piaget's findings; rather, it may be an extension of Piagetian thought.

7) Finally, let us discuss one specific current educational movement, mastery learning, within a Piagetian framework.[15] The work of Bloom has supplied much evidence that most students can master the learning necessary for academic success and subsequent successful adult involvements, such as in the world of work. Proponents of the traditional concept of education, with whom Bloom disagrees, support the idea that one learns any given subject in a clearly defined instructional sequence. In mathematics education, for example, it was thought that students should learn such mathematical procedures as long division in a specified amount of time. Some mathematics educators insist that "a week spent studying long division is enough time for students to master the process."[16]

The exponents of mastery learning couldn't disagree more. They insist that mastery is not a time-specific concept. In fact, the reverse is true. Different students need more or less time to begin to master a specific process, or to systematically reflect on a particular idea, such as one introduced in a philosophy or an art class. It is contended by the exponents of mastery learning, then, that time spent on a particular academic-vocational activity does not predict success at that activity.

Piaget would quite agree with Bloom's assessment. For Piaget, it is precisely the **rate** through which students acquire knowledge and problem-solving ability that must be considered in any educational program. Most students can master almost any academic skill (other conditions being equal, such as genetic potential); but the rate of such progress cannot be directly specified.

The implications of Piaget's theory and mastery learning theory are promising. Through the concept of mastery learning, students can progress to their full potential, and thus meet with academic success. Time is an important element in any educational endeavor, and the Piagetian/mastery learning concepts of schooling demonstrate that the time it takes a student to proceed through an educational program should be determined by the student's progress—there should be no absolute sense regarding a time reference for all students to develop to a specific cognitive level.

Finally, a Piagetian program which we have outlined supports Piaget's basic contention that only if students are allowed to act on new materials and are permited to develop new symbols to understand the consequences of such object-manipulations will students be able to acquire various facets of fundamental knowledge.[17]

As much as Piaget contended that his genetic epistemology has little, if any, specific application for the educational process, it is obvious, and fortunate for us as well, that he was mistaken. Piaget's views can be so helpful in finding a middle ground to criticize many current educational fads, such as behavioral modification and strict competency-based educational programs. It is my belief that Piaget has much thought which will continue to illuminate the educational process. Piaget and his ideas on cognitive growth have direct relevance to the American educational situation.

Notes

1. Piaget suggests this in a number of places; refer to Jean Piaget, **Six Psychological Studies.** (New York: Random House, 1967), Preface.

2. Dewey ties theory and practice together in such works as **Experience and Education,** (New York: Macmillan Publishers, 1979), Chapter Two.

3. I discuss this issue in Robert P. Craig, "On Jean Piaget," **Educational Studies,** Vol. 8, No. 3 (Fall 1977), p. 46.

4. An analysis of these three elements is in Jean Piaget, **Science of Education and the Psychology of the Child,** (New York: Viking Press, 1969), Chapter One.

5. These two kinds of experience are examined in Jean Piaget, **Genetic Epistemology,** (New York: Columbia University Press, 1970).

6. Margaret Mead's discussion of "primitive mentality" is found in a number of her works, such as, **Coming of Age in Samoa,** (New York: Macmillan Publishers, 1965), Chapter One.

7. Piaget brings this out in **The Langage and Thought of the Child,** (London: Routledge and Kegan Paul, 1952), Chapter Two.

8. "Self-regulation" is discussed in Jean Piaget, **Science of Education and the Psychology of the Child,** Chapter Two.

9. David Elkind makes this point in **Children and Adolescents,** (New York: Oxford University Press, 1974).

10. Barry Wadsworth, **Piaget's Theory of Cognitive Development,** (New York: David McKay Company, Inc., 1971), p. 16.

11. Postman and Weingarten's thoughts are found in **Teaching as a Subversive Activity,** (New York: Viking Press, 1972), Chapter One.

12. Jean Piaget, **The Moral Judgment of the Child,** (Glencoe, Illinois: The Free Press, 1965), pp. 52-89.

13. Quoted from Milton Schwebel, "The Role of Experience in Cognitive Development," **Piagetian Theory and the Helping Professions,** edited by Marie K. Poulsen, et. al., (Los Angeles: University of Southern California Press, 1976), p. 15. I am much in debt to his thought.

14. Ibid., p. 14. Holowinski's research is reported here.

15. There are many exponents of mastery learning. Perhaps one of the most articulate is Ben Bloom, **Stability and Change in Human Characteristics,** (New York: John Wiley & Sons, 1964).

16. For a consideration of various issues in mathematics education, refer to Paul A. Wagner, "A Philosophical Approach to Mathematical Education," **Proceedings of the Philosophy of Education Society,** edited by C. B. J. Macmillan, (Normal, Illinois: Illinois State University, 1981), pp. 376-383.

17. Jean Piaget, **The Language and Thought of the Child,** Chapter Two.