Constructivism

In traditional philosophy, the commodity that goes by the name of knowledge, whether based on information conveyed by the senses or on insights of intuitive reason, is always expected to represent an external reality in some way analogous to the way pictures represent what they are supposed to depict. The constructivist theory of knowing breaks with this tradition and posits a different relationship between knowledge and the real world. The activity of knowing is seen rather like that of a river that finds its way through the constraints presented by a landscape. The river does not discover what the landscape is like, but by trial and error it finds a way to flow. The path the river takes is determined on the one hand by the constraints of the landscape and on the other by the constraints implicit in the "logic" of water, which prevents the river from flowing uphill. In the constructivist view, then, knowledge does not regard what may or may not exist, but focuses (like the pragmatists' view) on what has proven successful.

Instead of speaking of truth, indicating that a piece of knowledge matches reality, constructivists speak of *functional fit*, by which they mean that their knowledge is expected to fit into the world of their experience. A concept, a way of thinking, or a theory is therefore said to be *viable* if experience shows that it does what is expected of it.

This change of perspective entails two basic principles: (1) knowledge is not passively received but actively built up by the cognizing subject; (2) the function of cognition is adaptive and serves the organization of the experiential world, not the discovery of ontological reality.

The Swiss psychologist Jean Piaget, the father of the constructivist school in the 20th century, characterized the situation by saying: "The mind organizes the world by organizing itself." This is often erroneously interpreted as an expression of philosophical idealism. It is a misinterpretation because it disregards the fact that Piaget considered knowledge a form of adaptation, and the world the mind organizes is not what idealist philosophers call reality, but the world of the individual's practical experience. Such a pragmatic position is perfectly compatible with views expressed by the great physicists of the 20th century, who held that physical theories are *models* of the experiential world, not descriptions of an observer-independent reality.

The constructivist theory of cognition, though formulated a decade earlier, has two obvious parallels to conceptions in the discipline of cybernetics. On the one hand, the process of cognition is a prime example of *self-organization* and can be seen as a

continuous chain of *feedback loops* in search of viable ways of acting and thinking. On the other, the constructivist theory of language and its meanings is in agreement with Shannon's theory of communication according to which signals (or words) do not carry meaning in themselves but are given it by the sender and the receiver on the basis of their individual experience in social and linguistic interaction.

Relinquishing the view of communication as a form of transportation (meanings being conveyed from sender to receiver) makes it necessary to consider that students' interpretation of texts and teachers' discourse is inevitably subjective and driven by the natural desire to organize their own experiential world in a reasonable, manageable fashion. This has several important consequences for the practice of education: (1) A radical distinction has to be made between educational procedures that aim at generating understanding ('teaching') and those that disregard conceptual development and aim at generating the repetition of specific phrases and behaviors ('training'). (2) The researcher's as well as the educator's interest will be focused on what can be inferred to be going on inside the student's head, rather than on overt responses. (3) The teacher will realize that knowledge cannot be transferred ready-made to students because conceptual structures can be built up only by them. Language, therefore, cannot serve as a means of transmission but only as a tool in the process of orienting the student's construction. (4) Students' "errors" and instances where their answers deviate from the teacher's expectations will be of particular interest, because these deviations tend to throw light on how the students, at the particular point in their conceptual development, are organizing their experiential world.

During the last twenty years, constructivism has had an acknowledged influence on the teaching of mathematics and science. Instances where it was put it in practice have been generally successful and the relevant literature is full of such evidence. But there has also been the inevitable backlash and attempts to mitigate the school's adamant agnosticism with regard to ontological reality. One of these attempts is called *constructionism* and holds that the conceptions of language and society reflect things that have an independent existence beyond the constructions of individual minds. But the assumption of any such correspondence remains a metaphysical fiction as long as no indication is given as to how its viability could be experientially achieved or confirmed. Constructivism, the school of thought discussed in this entry, is a theory of cognition and concerns, not what might "exist", but only what can rationally be known.