

## COGNITIVE AND SOCIAL CONSTRUCTIVISM: DEVELOPING TOOLS FOR AN EFFECTIVE CLASSROOM

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An effective classroom, where teachers and students are communicating optimally, is dependent on using constructivist strategies, tools and practices. There are two major types of constructivism in the classroom: (1) Cognitive or individual constructivism depending on Piaget's theory, and (2) Social constructivism depending on Vygotsky's theory. Similarities include inquiry teaching methods and students creating concepts built on existing knowledge that are relevant and meaningful. Differences include language development theory where thinking precedes language for cognitive constructivism and language precedes thinking for the theory of social constructivism. Understanding communicative tools and strategies helps teachers to develop individual learning methods such as, discovery learning, and social interactive activities to develop peer collaboration.

### **Introduction**

Constructivism is a vague concept, but is currently discussed in many schools as the best method for teaching and learning. For many educators or teachers, it has a variety of meanings. In order for teachers to use it effectively, they have to know where the student is at a given learning point or the current stage in their knowledge of a subject so that students can create personal meaning when new information is given to them. When in the classroom, teachers have the potential to teach constructively, if they understand constructivism. Constructivist teaching strategies and practices are the next important step in educational reform. Constructivist teaching strategies have a great effect in the classroom both cognitively and socially for the student. A teacher must understand and use methods of both

cognitive and social constructivism, if he or she is to run an effective constructivist classroom.

In cognitive constructivism, ideas are constructed in individuals through a personal process, as opposed to social constructivism where ideas are constructed through interaction with the teacher and other students. While they are fundamentally different both types will ultimately form overall constructivism or constructed learning elements for students to easily grasp; the main concept being that ideas are constructed from experience to have a personal meaning for the student. To be effective, both theories of constructivism need to be explicit in communicating concepts so that students can connect to them. Teachers need to understand these theories, as well as, know how to incorporate constructivist teaching methods, strategies,

tools and practices to develop an effective learning environment.

### **Cognitive Constructivism**

Many educators in schools throughout America are required to teach constructively in their classrooms. The term cognitive constructivism can connote ambiguous or puzzled reactions from teachers who are told that they should be using teaching strategies to promote this form of learning approach for their students. Substantial individual thought needs to be acquired in content or subject areas for students to actually understand the material instead of just being able to recite it. Providing classroom situations and activities that promote individual learning is required. Jean Piaget, a well-known French Swiss developmental psychologist, who wrote many books and articles on learning, construed this process. Piaget was originally a biologist and theorists state that he thought in terms of students becoming "little scientists," who learn voraciously as individuals who build conceptual structures in memory to store information. Initially, he built his theories observing his own children as they learned and played together.

Piaget's main focus of constructivism has to do with the individual and how the individual constructs knowledge. Cognitive constructivism came directly from Piaget's work. Piaget's theory of cognitive development proposes that humans cannot be given information, which they immediately understand and use; instead, humans must construct their own knowledge (Piaget, 1953). He stated that

children's schemas are constructed through the process of assimilation and accommodation, when going through four different stages of development (Wadsworth, 2004). Piaget's (1953) four stages of development are: Sensorimotor stage, which a child goes through from ages zero to two; preoperational stage (two to seven years old), concrete operational stage (seven to eleven years old), and the formal operational stage (eleven years old to adulthood).

In Piaget's sensorimotor stage children begin to discover their environment around them through their own senses and physical activity and then language, as they get older within this stage. Children in his next stage of preoperational develop their own language skills but still cannot grasp the thoughts of others. As Piaget described within this stage there is "symbolic function" where children begin to distinguish pictures or symbols for different objects in their immediate environment and another sub-stage of "intuitive thought" where children ask all sorts of questions about everything within their environment (Wadsworth, 2004). Within Piaget's concrete operational stage, a pivotal growth point in the brain in logical development, children begin to replace intuitive thought with their own logical reasoning. In Piaget's (1953) formal operational stage children, up to adulthood, will start using higher levels of thinking or abstract ideas to solve problems. Piaget's stages are well-known and are accepted as the basis for depicting the growth of logical thinking in children. Although there has been criticism of his specific stages, Piaget's theories still hold true and are revered by many the-

orists.

Piaget's theory includes assimilation and accommodation, which are processes children go through as a search for balance or "equilibration" (Wadsworth, 2004). When describing Piaget's theory, "equilibration occurs when children shift from one stage to another and is manifested with a cognitive conflict, a state of mental unbalance or disequilibrium in trying to make sense of the data or information they are receiving. Disequilibrium is a state of being uncomfortable when one has to adjust his or her thinking (schema) to resolve conflict and become more comfortable" (Powell, 2006, pp. 26, 27). According to Piaget (1953), assimilation is when children bring in new knowledge to their own schemas and accommodation is when children have to change their schemas to "accommodate" the new information or knowledge. This adjustment process occurs when learning, as one is processing new information to fit into what is already in one's memory. Teachers need to facilitate this process in the classroom.

Piaget's stages of development are all about the ability to learn at different ages in childhood based on logical development. His theory on equilibration, assimilation and accommodation all have to do with the children's ability to construct cognitively or individually their new knowledge within their stages and resolve conflicts (Piaget, 1953). Recognizing that this process occurs within each individual student at a different rate helps the teacher facilitate constructivist learning. Piaget's cognitive constructivism theory incorporates the importance of understanding what

each individual needs to get knowledge and learn at his or her own pace. Observing students and comprehending their level of difficulty is paramount to this process. For example, when teaching complex concepts, some students in the classroom may grasp them quickly while others can be struggling. Asking questions of students to know where they may have difficulty is part of the inquiry method to alleviate misinterpretation. Understanding these stages and teaching within the ability of students to grasp concepts logically and intellectually is a main goal of all teachers. Effective learning occurs when clarity begins.

#### **Social Constructivism**

Social constructivism is a highly effective method of teaching that all students can benefit from, since collaboration and social interaction are incorporated. This type of constructivism was formed after Piaget had already described his theories involving individual or cognitive constructivism. Lev Vygotsky, the founding father of social constructivism believed in social interaction and that it was an integral part of learning. Social constructivism is based on the social interactions a student in the classroom along with a personal critical thinking process. All of Vygotsky's research and theories are collectively involved in social constructivism and language development such as, cognitive dialogue, the zone of proximal development, social interaction, culture and inner speech (Vygotsky, 1962). Understanding his theories or building a classroom where interaction is prominent helps develop effective classrooms.

Von Glaserfeld, E. (1989). Cognition, construction of knowledge, and teaching. *Synthese*, 80(1), 121-140.

## **Knowledge as an Adaptive Function**

Constructivism differs from pragmatism in its predominant interest in how the knowledge that “enables us to cope” is arrived at. The work of Jean Piaget, the most prolific constructivist in our century, can be interpreted as one long struggle to design a model of the generation of viable knowledge. In spite of the fact that Piaget has reiterated innumerable times (cf. 1967a, pp.210ff) that, from his perspective, cognition must be considered an adaptive function, most of his critics argue against him as though he were concerned with the traditional notion of knowledge as correspondence.

This misinterpretation is to some extent due to a misconception about adaptation. The technical sense of the term that Piaget intended comes from the theory of evolution. In that context, adaptation refers to a state of organisms or species that is characterized by their ability to survive in a given environment. Because the word is often used as a verb (e.g. this or that species has adapted to such and such an environment), the impression has been given that adaptation is an evolutionary activity. This is quite misleading. In phylogeny no organism can actively modify its genome and generate characteristics to suit a changed environment. According to the theory of evolution, the modification of genes is always an accident. Indeed, it is these accidental modifications that generate the variations on which natural selection can operate. And nature does not – as even Darwin occasionally slipped into saying (Pittendrigh 1958, p.397) – select “the fittest”, it merely lets live those that have the characteristics necessary to cope with their environment and lets die all that have not.

This interpretation of the theory of evolution and its vocabulary is crucial for an adequate understanding of Piaget’s theory of cognition. As for Vico, knowledge for Piaget is never (and can never be) a “representation” of the real world. Instead it is the collection of conceptual structures that turn out to be adapted or, as I would say, viable within the knowing subject’s range of experience.

In both, theory of evolution and the constructivist theory of knowing, “viability” is tied to the concept of equilibrium. Equilibrium in evolution indicates the state of an organism or species in which the potential for survival in a given environment is genetically assured. In the sphere of cognition, though indirectly linked to survival, equilibrium refers to a state in which an epistemic agent’s cognitive structures have yielded and continue to yield expected results, without bringing to the surface conceptual conflicts or contradictions. In neither case is equilibrium necessarily a static affair, like the equilibrium of a balance beam, but it can be and often is dynamic, as the equilibrium maintained by a cyclist.

To make the Piagetian definition of knowledge plausible, one must immediately take into account (which so many interpreters of Piaget seem to omit) that a human subject’s experience always includes the social interaction with other cognizing subjects. This aspect of social interaction is, obviously, of fundamental importance if we want to consider education, that is, any situation in which the actions of a teacher are aimed at generating or modifying the cognitive constructions of a student. But introducing the notion of social interaction, raises a problem for constructivists. If what a cognizing subject knows cannot be anything but what that subject has constructed, it is clear that, from the constructivist perspective, the others with whom the subject may interact socially cannot be posited as an ontological given. I shall

return to this problem as well as to the constructivist approach to education; but first I want to explicate the basis of a Piagetian theory of learning.

## The Context of Scheme Theory

Two of the basic concepts of Piaget's theory of cognition are assimilation and accommodation. Piaget's use of these terms is not quite the same as their common use in ordinary language. Both terms must be understood in the context of his constructivist theory of knowing. Unfortunately, this is what contemporary textbooks in developmental psychology (most of which devote at least a few pages to Piaget) often fail to do. Thus one reads, for instance:

Assimilation is the process whereby changing elements in the environment become incorporated into the structure of the organism. At the same time, the organism must accommodate its functioning to the nature of what is being assimilated. (Nash 1970, p. 360)

This is not at all what Piaget meant. One reason why assimilation is so often misunderstood is that its use as an explanatory postulate ranges from the unconscious to the deliberate. Another stems from disregarding that Piaget uses that term, as well as "accommodation", within the framework of his theory of schemes. An example may help to clarify his position.

An infant quickly learns that a rattle it was given makes a rewarding noise when it is shaken, and this provides the infant with the ability to generate the noise at will. Piaget sees this as the "construction of a scheme" which, like all schemes, consists of three parts:

- (1) Recognition of a certain situation (e.g. the presence of a graspable item with a rounded shape at one end);
- (2) association of a specific activity with that kind of item (e.g. picking it up and shaking it);
- (3) expectation of a certain result (e.g. the rewarding noise).

It is very likely that this infant, when placed in its high-chair at the dining table, will pick up and shake a graspable item that has a rounded shape at one end. We call that item a spoon and may say that the infant is assimilating it to its rattling scheme; but from the infant's perspective at that point, the item is a rattle, because what the infant perceives of it is not what an adult would consider the characteristics of a spoon but just those aspects that fit the rattling scheme.<sup>2</sup>

Shaking the spoon, however, does not produce the result the infant expects: the spoon does not rattle. This generates a perturbation ("disappointment"), and perturbation is one of the conditions that set the stage for cognitive change. In our example it may simply focus the infant's attention on the item in its hand, and this may lead to the perception of some aspect that will enable the infant in the future to recognize spoons as non-rattles. That development would be an accommodation, but obviously a rather modest one. Alternatively, given the situation at the dining table, it is not unlikely that the spoon, being vigorously shaken, will hit the table and produce a different but also very rewarding noise. This, too, will generate a perturbation (we might call it "enchantment") which may lead to a different accommodation, a major

one this time, that initiates the “spoon banging scheme” which most parents know only too well.

This simple illustration of scheme theory also shows that the theory involves, on the part of the observer, certain presuppositions about cognizing organisms. The organism is supposed to possess at least the following capabilities:<sup>3</sup>

- The ability and, beyond that, the tendency to establish recurrences in the flow of experience; this, in turn, entails at least two capabilities,
- remembering and retrieving (re-presenting) experiences,
- and the ability to make comparisons and judgements of similarity and difference;
- apart from these, there is the presupposition that the organism likes certain experiences better than others, which is to say, it has some elementary values.

The first three of these are indispensable in any theory of learning. Even the parsimonious models of classical and operant conditioning could not do without them. As to the fourth, the assumption of elementary values, it was explicitly embodied in Thorndike’s Law of Effect: “Other things being equal, connections grow stronger if they issue in satisfying states of affairs” (Thorndike 1931/1966, p.101). It remained implicit in psychological learning theories since Thorndike, but the subjectivity of what is “satisfying” was more or less deliberately obscured by behaviorists through the use of the more objective sounding term “reinforcement”.

The learning theory that emerges from Piaget’s work can be summarized by saying that cognitive change and learning take place when a scheme, instead of producing the expected result, leads to perturbation, and perturbation, in turn, leads to accommodation that establishes a new equilibrium. Learning and the knowledge it creates, thus, are explicitly instrumental. But here, again, it is crucial not to be rash and too simplistic in interpreting Piaget. His theory of cognition involves a two-fold instrumentalism. On the sensory-motor level, action schemes are instrumental in helping organisms to achieve goals in their interaction with their experiential world. On the level of reflective abstraction, however, operative schemes are instrumental in helping organisms achieve a coherent conceptual network that reflects the paths of acting as well as thinking which, at the organisms’ present point of experience, have turned out to be viable. The first instrumentality might be called “utilitarian” (the kind philosophers have traditionally scorned). The second, however, is strictly “epistemic”. As such, may be of some philosophical interest – above all because it entails a radical shift in the conception of “knowledge”, a shift that eliminates the paradoxical conception of Truth that requires a forever unattainable ontological test. The shift that substitutes viability in the experiential world for correspondence with ontological reality applies to knowledge that results from inductive inferences and generalizations. It does not affect deductive inferences in logic and mathematics. In Piaget’s view, the certainty of conclusions in these areas pertains to mental operations and not to sensory-motor material (cf. Beth & Piaget 1961; Glaserfeld, 1985b).

## **The Social Component**

In connection with the concept of viability, be it “utilitarian” or “epistemic”, social interaction plays an important role. Except for animal psychologists, social interaction refers to what goes on among humans and involves language. As a rule it is also treated as essentially different from the interactions human organisms have with