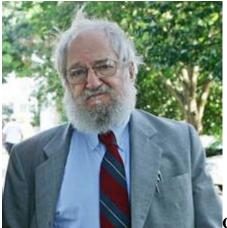EDUCATIONAL PSYCHOLOGY

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EDUCTIONAL PSYCHOLOGY

Session 7

Constructionist learning

Constructionist learning is inspired by the constructivist theory that individual learners construct mental models to understand the world around them. However, constructionism holds that learning can happen most effectively when people are also active in making tangible objects in the real world. In this sense, constructionism is connected with experiential learning, and builds on Jean Piaget's epistemological theory of constructivism.[1]

Seymour Papert defined constructionism in a proposal to the National Science Foundation entitled Constructionism: A New Opportunity for Elementary Science Education as follows: "The word constructionism is a mnemonic for two aspects of the theory of science education underlying this project. From constructivist theories of psychology we take a view of learning as a reconstruction rather than as a transmission of knowledge. Then we extend the idea of manipulative materials to the idea that learning is most effective when part of an activity the learner experiences as constructing is a meaningful product**Constructionist learning** is inspired by the constructivist theory that individual learners construct mental models to understand the world around them. However, constructionism holds that learning can happen most effectively when people are also active in making tangible objects in the real world. In this sense, constructionism is connected with experiential learning, and builds on Jean Piaget's epistemological theory of constructivism.[1]

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As Papert and Idit Harel say at the start of *Situating Constructionism*, "It is easy enough to formulate simple catchy versions of the idea of constructionism; for example, thinking of it as 'learning-by-making'. One purpose of this introductory chapter is to orient the reader toward using the diversity in the volume to elaborate—to construct—a sense of constructionism much

richer and more multifaceted, and very much deeper in its implications, than could be conveyed by any such formula.".[3]

Papert's ideas became well-known through the publication of his seminal book *Mindstorms: Children, Computers, and Powerful Ideas* (Basic Books, 1980). Papert described children creating programs in the Logo language. He likened their learning to a living in a "mathland," where learning mathematical ideas is as natural as learning French while living in France.

Instructional principles (problem-based learning)

Here is one type of theory that constructivist learning theory can be applied in a classroom setting. This is known as problem-based learning. Problem-based learning is a method which allows students to learn about a subject by exposing them to multiple problems so they will be able to construct their understanding of the subject through these problems. This kind of learning can be very effective for mathematics where students try to solve the problems in many different ways which allow the students' brains to be stimulated.[5] There are different types of instructional strategies to make problem based learning more effective.

1. Try to create all the learning activities for the learner to be related to a larger task. This is important because it allows student to see the connection to the activities that can be applied to many aspects of life. As a result, the learner will find the materials and activities they are doing useful.[6]

2. The learner needs to be supported to feel that they are beginning to have ownership of the overall problem.[7]

3. An authentic task should be designed for the learner. This means that the task and the learner's cognitive ability have to match with the problems to make learning valuable.[8]

4. Allow reflection on the content being learned so the learner can think through the process of what they have learned.[9]

5. Allow and encourage the learners to test ideas against different views in different context.[10]

These are some examples of problem based learning and is an example of a constructivist approach to learning.[11]

Bringing IT to a classroom

Papert has been a huge proponent of bringing IT to classrooms, as in his early uses of the Logo language to teach mathematics to children. Constructionist learning involves students drawing their own conclusions through creative experimentation and the making of social objects. The constructionist teacher takes on a mediational role rather than adopting an instructionist position. Teaching "at" students is replaced by assisting them to understand—and help one another to understand—problems in a hands-on way.[12]

While constructionism has, due to its impetus, been primarily used in science and mathematics teaching (in the form of inquiry-based science), it is arguable that it developed in a different form in the field of media studies in which students often engage with media theory and practice simultaneously, in a complementary praxis. More recently it has gained a foot hold in applied linguistics, in the field of second language acquisition (or SLA). One such application has been the use of the popular game *SimCity* as a means of teaching English using constructionist techniques (Gromik:2004).

Beginning in the 1980s, The LEGO Group funded research in Papert's research group at the MIT Media Laboratory, which at the time was known as the "Epistemology and Learning Group." When LEGO launched its LEGO Mindstorms Robotics Invention System in 1998, which was based on work in his group, they received permission to use the moniker "Mindstorms" from Seymour's 1980 book title. In The LEGO Group's LEGO Serious Play project, business people learn to express corporate issues and identity through the medium of plastic bricks—another form of constructionist learning.[13]

In 2005, Papert, together with Nicholas Negroponte and Alan Kay launched the One Laptop Per Child initiative to put constructionist learning into practice in the developing world. The aim is to provide $100 laptops to every child in the developing world.[14]

Constructionist learning have also been put into practice by the World Wide Workshop Foundation. With Papert as an advisor, the foundation established the Globaloria program in 2006 to teach youth to become game and simulation makers using constructionist learning principles.

Constructionist learning theory has influenced the computer science education, as well. Some educational programming languages have been created, wholly or in part, for educational use, to support the constructionist theory of Seymour Papert. These languages have been dynamically typed, and reflective. Logo was the best known of them, which is superseded by Scratch (programming language) and BYOB (programming language). At MIT, Papert went on to create the *Epistemology and Learning Research Group* at the MIT *Architecture Machine Group* which later became the MIT Media Lab. Here, he was the developer of an original and highly influential theory on learning called constructionism, built upon the work of Jean Piaget in constructionist learning theories. Papert worked with Jean Piaget at the University of Geneva, considered the most brilliant and successful of Piaget's proteges; Piaget once said that "no one understands my ideas as well as Papert." Papert has rethought how schools should work based on these theories of learning

2011)

Jean Piaget: founder of Constructivism

Constructivism is a theory of knowledge ([epistemology](#))[1] that argues that humans generate knowledge and meaning from an interaction between their experiences and their ideas. During infancy, it was an interaction between human experiences and their reflexes or behavior-patterns. [Jean Piaget](#) called these systems of knowledge *schemata*. Constructivism is not a specific pedagogy, although it is often confused with [constructionism](#), an educational theory developed by [Seymour Papert](#), inspired by constructivist and [experiential learning](#) ideas of Piaget. Piaget's theory of constructivist learning has had wide ranging impact on [learning theories](#) and [teaching methods](#) in [education](#) and is an underlying theme of many [education reform](#) movements. Research support for constructivist teaching techniques has been mixed, with some research supporting these techniques and other research contradicting those results.

Constructivist theory[

Formalization of the theory of constructivism is generally attributed to [Jean Piaget](#), who articulated mechanisms by which knowledge is internalized by learners. He suggested that through processes of **accommodation** and **assimilation**, individuals construct new knowledge from their experiences.

When individuals *assimilate*, they incorporate the new experience into an already existing framework without changing that framework. This may occur when individuals' experiences are aligned with their internal representations of the world, but may also occur as a failure to change a faulty understanding; for example, they may not notice events, may misunderstand input from others, or may decide that an event is a fluke and is therefore unimportant as information about the world. In contrast, when individuals' experiences contradict their internal representations, they may change their perceptions of the experiences to fit their internal representations.

According to the theory, *accommodation* is the process of reframing one's mental representation of the external world to fit new experiences. Accommodation can be understood as the mechanism by which failure leads to learning: when we act on the expectation that the world operates in one way and it violates our expectations, we often fail, but by accommodating this new experience and reframing our model of the way the world works, we learn from the experience of failure, or others' failure.

It is important to note that constructivism is not a particular [pedagogy](#). In fact, constructivism is a theory describing how learning happens, regardless of whether learners are using their

experiences to understand a lecture or following the instructions for building a model airplane. In both cases, the theory of constructivism suggests that learners construct knowledge out of their experiences.

However, constructivism is often associated with pedagogic approaches that promote active learning, or learning by doing. There are many critics of "learning by doing" (a.k.a. "discovery learning") as an instructional strategy (e.g. see the criticisms below).[2][3] While there is much enthusiasm for constructivism as a design strategy, according to Tobias and Duffy "... to us it would appear that constructivism remains more of a philosophical framework than a theory that either allows us to precisely describe instruction or prescribe design strategies.(p.4)".[2] This is unfortunate because there is quite a bit of promise to the educational philosophy behind constructivism, but constructivists seem to be having difficulties defining testable learning theories.[citation needed]

Constructivist learning intervention[

The nature of the learner[

Social constructivism not only acknowledges the uniqueness and complexity of the learner, but actually encourages, utilizes and rewards it as an integral part of the learning process (Wertsch 1997).

The importance of the background and culture of the learner

Social constructivism or socioculturalism encourages the learner to arrive at his or her version of the truth, influenced by his or her background, culture or embedded worldview. Historical developments and symbol systems, such as language, logic, and mathematical systems, are inherited by the learner as a member of a particular culture and these are learned throughout the learner's life. This also stresses the importance of the nature of the learner's social interaction with knowledgeable members of the society. Without the social interaction with other more knowledgeable people, it is impossible to acquire social meaning of important symbol systems and learn how to utilize them. Young children develop their thinking abilities by interacting with other children, adults and the physical world. From the social constructivist viewpoint, it is thus important to take into account the background and culture of the learner throughout the learning process, as this background also helps to shape the knowledge and truth that the learner creates, discovers and attains in the learning process (Wertsch 1997

The responsibility for learning[

Furthermore, it is argued that the responsibility of learning should reside increasingly with the learner (Glasersfeld, 1989). Social constructivism thus emphasizes the importance of the learner being actively involved in the learning process, unlike previous educational viewpoints where the responsibility rested with the instructor to teach and where the learner played a passive, receptive role. Von Glasersfeld (1989) emphasized that learners construct their own understanding and that they do not simply mirror and reflect what they read. Learners look for

meaning and will try to find regularity and order in the events of the world even in the absence of full or complete information.

The Harkness Discussion Method[

It is called the "Harkness" discussion method because it was developed at [Phillips Exeter Academy](#) with funds donated in the 1930s by [Edward Harkness](#). This is also named after the Harkness table and involves students seated in a circle, motivating and controlling their own discussion. The teacher acts as little as possible. Perhaps the teacher's only function is to observe, although he/she might begin or shift or even direct a discussion. The students get it rolling, direct it, and focus it. They act as a team, cooperatively, to make it work. They all participate, but not in a competitive way. Rather, they all share in the responsibility and the goals, much as any members share in any team sport. Although the goals of any discussion will change depending upon what's under discussion, some goals will always be the same: to illuminate the subject, to unravel its mysteries, to interpret and share and learn from other points of view, to piece together the puzzle using everyone's contribution. Discussion skills are important. Everyone must be aware of how to get this discussion rolling and keep it rolling and interesting. Just as in any sport, a number of skills are necessary to work on and use at appropriate times. Everyone is expected to contribute by using these skills