

Constructivist teaching methods

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Constructivist teaching is based on [constructivist learning theory](#). This theoretical framework holds that learning always builds upon knowledge that a student already knows; this prior knowledge is called a [schema](#). Because all learning is filtered through pre-existing schemata, constructivists suggest that learning is more effective when a student is actively engaged in the learning process rather than attempting to receive knowledge passively. A wide variety of methods claim to be based on constructivist learning theory. Most of these methods rely on some form of guided discovery where the teacher avoids most direct instruction and attempts to lead the student through questions and activities to discover, discuss, appreciate and verbalize the new knowledge.

History

Constructivist teaching methods are based on [constructivist learning theory](#). Along with [John Dewey](#), [Jean Piaget](#) researched [childhood development](#) and education. Their theories are now encompassed in the broader movement of [progressive education](#).

Constructivist learning theory says that all knowledge is constructed from a base of prior knowledge. Children are not a blank slate and knowledge cannot be imparted without the child making sense of it according to his or her current conceptions. Therefore children learn best when they are allowed to construct a personal understanding based on experiencing things and reflecting on those experiences.^[1]

Constructivist teaching strategies

Characteristics of Constructivist Teaching

One of the primary goals of using constructivist teaching is that students learn how to learn by giving them the training to take initiative for their own learning experiences.

According to Audrey Gray, the characteristics of a constructivist classroom are as follows:

- the learners are actively involved
- the environment is democratic
- the activities are interactive and student-centered
- the teacher facilitates a process of learning in which students are encouraged to be responsible and autonomous

Examples of constructivist activities

Furthermore, in the constructivist classroom, students work primarily in groups and learning and knowledge are interactive and dynamic. There is a great focus and emphasis on social and communication skills, as well as collaboration and exchange of ideas.^[1] This is contrary to the traditional classroom in which students work primarily alone, learning is achieved through repetition, and the subjects are strictly adhered to and are guided by a textbook. Some activities encouraged in constructivist classrooms are:

- Experimentation: students individually perform an experiment and then come together as a class to discuss the results.
- Research projects: students research a topic and can present their findings to the class.
- Field trips. This allows students to put the concepts and ideas discussed in class in a real-world context. Field trips would often be followed by class discussions.
- Films. These provide visual context and thus bring another sense into the learning experience.
- Class discussions. This technique is used in all of the methods described above. It is one of the most important distinctions of constructivist teaching methods.^[2]

Constructivist approaches can also be used in online learning. For example, tools such as discussion forums, wikis and blogs can enable learners to actively construct knowledge.

Because existing knowledge schemata are explicitly acknowledged as a starting point for new learning, constructivist approaches tend to validate individual and cultural differences and diversity

Role of teachers

In the constructivist classroom, the teacher's role is to prompt and facilitate discussion. Thus, the teacher's main focus should be on guiding students by asking questions that will lead them to develop their own conclusions on the subject.

David Jonassen identified three major roles for facilitators to support students in constructivist learning environments:

- Modeling
- Coaching
- Scaffolding^[3]

Constructivist Learning Environments (CLEs)

Jonassen has proposed a model for developing constructivist learning environments (CLEs) around a specific learning goal. This goal may take one of several forms, from least to most complex:

- Question or issue
- Case study
- Long-term Project

- Problem (multiple cases and projects integrated at the curriculum level)

Jonassen recommends making the learning goals engaging and relevant but not overly structured.

In CLEs, learning is driven by the problem to be solved; students learn content and theory in order to solve the problem. This is different from traditional objectivist teaching where the theory would be presented first and problems would be used afterwards to practice theory.

Depending on students' prior experiences, related cases and scaffolding may be necessary for support. Instructors also need to provide an authentic context for tasks, plus information resources, cognitive tools, and collaborative tools.^[3]

Constructivist assessment

Traditionally, assessment in the classrooms is based on testing. In this style, it is important for the student to produce the correct answers. However, in constructivist teaching, the process of gaining knowledge is viewed as being just as important as the product. Thus, assessment is based not only on tests, but also on observation of the student, the student's work, and the student's points of view.^[1] Some assessment strategies include:

- Oral discussions. The teacher presents students with a “focus” question and allows an open discussion on the topic.
- KWL(H) Chart (What we **know**, What we **want** to know, What we have **learned**, **How** we know it). This technique can be used throughout the course of study for a particular topic, but is also a good assessment technique as it shows the teacher the progress of the student throughout the course of study.
- Mind Mapping. In this activity, students list and categorize the concepts and ideas relating to a topic.
- Hands-on activities. These encourage students to manipulate their environments or a particular learning tool. Teachers can use a checklist and observation to assess student success with the particular material.
- Pre-testing. This allows a teacher to determine what knowledge students bring to a new topic and thus will be helpful in directing the course of study.^[2]

An example of a lesson taught with a Constructivist background

A good example of a lesson being taught in a constructivist way, with the teacher mediating learning rather than directly teaching the class is shown by the example of [Faraday's](#) candle. There are various forms of this lesson, but all are developed from the Christmas lectures Faraday gave on the functioning of candles. In open constructivist lessons using these lectures as a basis, students are encouraged to discover for themselves how candles work. They do this first by making simple observations, from which they later build ideas and hypotheses which they then go on to test. The teachers acts to encourage this learning. If successful, students can use this lesson to understand the components of combustion, an important chemistry topic.^[4]

Constructivism for Adults

Constructivist philosophy has a long history of application in education programs for young children, but is used less frequently in adult learning environments. As humans develop, there are qualitative changes in their ability to think logically about experiences, but the processes by which learning occur, [cognitive adaptation](#) and [social mediation](#), are believed to be continuous or remain the same throughout the life.^[5] At the heart of constructivist philosophy is the belief that knowledge is not given but gained through real experiences that have purpose and meaning to the learner, and the exchange of perspectives about the experience with others^[6] ([Piaget](#) & [Inhelder](#), 1969; [Vygotsky](#), 1978).

Learning environments for adults based on constructivist philosophy include opportunities for students to make meaningful connections between new material and previous experience, through discovery. One of the simplest ways to do this is asking [open-ended questions](#). Open-ended questions such as “Tell me about a time when...” or “How might this information be useful to you?” causes learners to think about how new information may relate to their own experience. Student responses to such questions are opportunities for experiencing the perspectives of others. For these questions to be effective it is critical that instructors focus on teaching content that is useful for participants. The importance of using these types of strategies with adults contributes to what^[7] [Bain](#) (2004 p. 4) noted as critical learning environments where instructors “embed” the skills they are teaching in “authentic tasks that will arouse curiosity, challenge students to rethink assumptions and examine their mental modes of reality”.

Such approaches emphasize that learning is not an "all or nothing" process but that students learn the new information that is presented to them by building upon knowledge that they already possess. It is therefore important that teachers constantly assess the knowledge their students have gained to make sure that the students' perceptions of the new knowledge are what the teacher had intended. Teachers will find that since the students build upon already existing knowledge, when they are called upon to retrieve the new information, they may make errors. It is known as reconstruction error when we fill in the gaps of our understanding with logical, though incorrect, thoughts. Teachers need to catch and try to correct these errors, though it is inevitable that some reconstruction error will continue to occur because of our innate retrieval limitations.

In most pedagogies based on constructivism, the teacher's role is not only to observe and assess but to also engage with the students while they are completing activities, wondering aloud and posing questions to the students for promotion of [reasoning](#) ([DeVries et al.](#), 2002). (ex: I wonder why the water does not spill over the edge of the full cup?) Teachers also intervene when there are conflicts that arise; however, they simply facilitate the students' resolutions and [self-regulation](#)^[disambiguation needed], with an emphasis on the conflict being the students' and that they must figure things out for themselves. For example, promotion of literacy is accomplished by integrating the need to read and write throughout individual activities within print-rich classrooms. The teacher, after reading a story, encourages the students to write or draw stories of their own, or by having the students reenact a story that they may know well, both activities encourage the students to *conceive themselves* as reader and writers.

Arguments against constructivist teaching techniques

Main article: [Constructivism \(learning theory\)](#)

Critics have voiced the following arguments against constructivist based teaching instruction:

- A group of cognitive scientists has also questioned the central claims of constructivism, saying that they are either misleading or contradict known findings.^[8]
- One possible deterrent for this teaching method is that, due to the emphasis on group work, the ideas of the more active students may dominate the group's conclusions.^[1]

While proponents of constructivism argue that constructivist students perform better than their peers when tested on higher-order reasoning, the critics of constructivism argue that this teaching technique forces students to "[reinvent the wheel](#)." Supporters counter that "Students do not reinvent the wheel but, rather, attempt to understand how it turns, how it functions."^[1]

Proponents argue that students — especially [elementary school](#)-aged children — are naturally curious about the world, and giving them the tools to explore it in a guided manner will serve to give them a stronger understanding of it.^[1]

Mayer (2004)^[9] developed a literature review spanning fifty years and concluded "The research in this brief review shows that the formula constructivism = hands-on activity is a formula for educational disaster." His argument is that [active learning](#) is often suggested by those subscribing to this philosophy. In developing this instruction these educators produce materials that require learning to be behaviorally active and not be "cognitively active."^[9] That is, although they are engaged in activity, they may not be learning (Sweller, 1988). Mayer recommends using guided discovery, a mix of direct instruction and hands-on activity, rather than pure discovery: "In many ways, guided discovery appears to offer the best method for promoting constructivist learning."^[9]

Kirchner et al. (2006) agree with the basic premise of constructivism, that learners construct knowledge, but are concerned with the instructional design recommendations of this theoretical framework. "The constructivist description of learning is accurate, but the instructional consequences suggested by constructivists do not necessarily follow." (Kirschner, Sweller, and Clark, 2006, p. 78). Specifically, they say instructors often design unguided instruction that relies on the learner to "discover or construct essential information for themselves" (Kirchner et al., 2006, p75).

For this reason they state that it "is easy to agree with Mayer's (2004)^[9] recommendation that we "move educational reform efforts from the fuzzy and nonproductive world of ideology—which sometimes hides under the various banners of constructivism—to the sharp and productive world of theory-based research on how people learn" (p. 18). Finally Kirschner, Sweller, and Clark (2006) cite Mayer^[9] to conclude fifty years of empirical results do not support unguided instruction.

Another important consideration in evaluating the potential benefits/limitations of constructivist teaching approach is to consider the large number of varied personal characteristics as well as

prevalence of learning problems in children today. For example, in a solely constructivist approach was employed in a classroom of you children then a significant number of children, for example say with Attention Deficit/Hyperactivity Disorder, might not be able to focus on their perceptions of learning experiences long enough to build a knowledge base from the event. In other words, constructivist theory is biased to students who desire to learn more and are capable of focusing attention to the learning process independently. A mixed approach that incorporates components of constructivist learning along with other approaches, including more guided teaching strategies, would better meet the learning needs of the majority of students in a classroom by accounting for differences between learning styles and capacities. ^[citation needed]

Specific approaches

Specific approaches to education that are based on constructivism include:

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- [Constructionism](#)
 - An approach to learning developed by [Seymour Papert](#) and his colleagues at MIT in Cambridge, Massachusetts. Papert had worked with Piaget at the latter's Institute in Geneva. Papert eventually called his approach "constructionism." It included everything associated with Piaget's constructivism, but went beyond it to assert that constructivist learning happens especially well when people are engaged in constructing a product, something external to themselves such as a sand castle, a machine, a computer program or a book. This approach is greatly facilitated by the ready availability of powerful 'constructing' applications on personal computers. Promoters of the use of computers in education see an increasing need for students to develop skills in [Multimedia literacy](#) in order to use these tools in constructivist learning.
- Reciprocal Learning
 - Two teach each other.
- Procedural Facilitations for Writing
- Critical Exploration (Duckworth, 2006) The two components of critical exploration are curriculum development and pedagogy. In this method teachers find ways to encourage their students to explore the subject matter and express their thoughts on the material(Duckworth).
- Cognitively Guided Instruction
 - A research and teacher professional development program in elementary mathematics created by Thomas P. Carpenter, Elizabeth Fennema, and their colleagues at the University of Wisconsin-Madison. Its major premise is that teachers can use students' informal strategies (i.e., strategies students construct based on their understanding of everyday situations, such as losing marbles or picking flowers) as a primary basis for teaching mathematics in the elementary grades.
- Inquiry-based learning

- [Problem-based learning](#)
- Cognitive apprenticeships
- Various methods involving collaboration or group work
- Cooperative learning (reciprocal questioning, Jigsaw Classroom, structured controversies)
- Anchored Instruction (Bransford et al.)
 - Problems and approaches to solutions are embedded in a narrative environment.
- Cognitive Apprenticeship (Collins et al.)
 - Learning is achieved by integration into a specific implicit and explicit culture of knowledge.
 - Six features of cognitive apprenticeships: modeling of the performance, support through coaching/tutoring, scaffolding, students articulate knowledge, reflection on progress, exploration of new applications. (Woolfolk, 2010)
- Cognitive Flexibility (Sprio et al.)
 - A constructivist approach to curriculum design, in which the learning activities spelled out in the intended learning outcomes are built into the teaching methods and assessment tasks.
- [The Silent Way](#)
 - A constructivist approach to foreign language teaching and learning developed by [Caleb Gattegno](#) who worked with Piaget before WWII and in the late 1940s.

See also

- [learning theory](#)
- [childhood development](#)
- [progressive education](#)
- [Constructivist epistemology](#)
- [Constructivism \(learning theory\)](#)
- [Montessori method](#)

External links

- [Constructivist Teaching and Learning Models](#)
- [SSTA Research Centre Report on Constructivist Teaching and Learning](#)
- [Constructivist Teaching](#)
- [Association for Constructivist Teaching](#)
- [Constructivist Teaching Practices: Perceptions of Teachers and Students](#)
- [Constructivist Learning and Teaching](#)
- [Constructivism as a Paradigm for Teaching and Learning](#)

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