

What is constructivism?

Constructivism is basically a theory -- based on observation and scientific study -- about how people learn. It says that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. When we encounter something new, we have to reconcile it with our previous ideas and experience, maybe changing what we believe, or maybe discarding the new information as irrelevant. In any case, we are active creators of our own knowledge. To do this, we must ask questions, explore, and assess what we know.

In the classroom, the constructivist view of learning can point towards a number of different teaching practices. In the most general sense, it usually means encouraging students to use active techniques (experiments, real-world problem solving) to create more knowledge and then to reflect on and talk about what they are doing and how their understanding is changing. The teacher makes sure she understands the students' preexisting conceptions, and guides the activity to address them and then build on them.

Constructivist teachers encourage students to constantly assess how the activity is helping them gain understanding. By questioning themselves and their strategies, students in the constructivist classroom ideally become "expert learners." This gives them ever-broadening tools to keep learning. With a well-planned classroom environment, the students learn HOW TO LEARN.

You might look at it as a spiral. When they continuously reflect on their experiences, students find their ideas gaining in complexity and power, and they develop increasingly strong abilities to integrate new information. One of the teacher's main roles becomes to encourage this learning and reflection process.

For example: Groups of students in a science class are discussing a problem in physics. Though the teacher knows the "answer" to the problem, she focuses on helping students restate their questions in useful ways. She prompts each student to reflect on and examine his or her current knowledge. When one of the students comes up with the relevant concept, the teacher seizes upon it, and indicates to the group that this might be a fruitful avenue for them to explore. They design and perform relevant experiments. Afterward, the students and teacher talk about what they have learned, and how their observations and experiments helped (or did not help) them to better understand the concept.

Contrary to criticisms by some (conservative/traditional) educators, constructivism does not dismiss the active role of the teacher or the value of expert knowledge. Constructivism modifies that role, so that teachers help students to construct knowledge rather than to reproduce a series of facts. The constructivist teacher provides tools such as problem-solving and inquiry-based learning activities with which students formulate and test their ideas, draw conclusions and inferences, and pool and convey their knowledge in a collaborative learning environment. Constructivism transforms the student from a passive recipient of information to an active participant in the learning process. Always guided by the teacher, students construct their knowledge actively rather than just mechanically ingesting knowledge from the teacher or the textbook.

Constructivism is also often misconstrued as a learning theory that compels students to "reinvent the wheel." In fact, constructivism taps into and triggers the student's innate curiosity about the world and how things work. Students do not reinvent the wheel but, rather, attempt to understand how it turns, how it functions. They become engaged by applying their existing knowledge and real-world experience, learning to hypothesize, testing their theories, and ultimately drawing conclusions from their findings.

The best way for you to really understand what constructivism is and what it means in your classroom is by seeing examples of it at work, speaking with others about it, and trying it yourself. As you progress through each segment of this workshop, keep in mind questions or ideas to share with your colleagues.

How does this theory differ from traditional ideas about teaching and learning?

As with many of the methods addressed in this series of workshops, in the constructivist classroom, the focus tends to shift from the teacher to the students. The classroom is no longer a place where the teacher ("expert") pours knowledge into passive students, who wait like empty vessels to be filled. In the constructivist model, the students are urged to be actively involved in their own process of learning. The teacher functions more as a facilitator who coaches, mediates, prompts, and helps students develop and assess their understanding, and thereby their learning. One of the teacher's biggest jobs becomes ASKING GOOD QUESTIONS.

And, in the constructivist classroom, both teacher and students think of knowledge not as inert factoids to be memorized, but as a dynamic, ever-changing view of the world we live in and the ability to successfully stretch and explore that view.

The chart below compares the traditional classroom to the constructivist one. You can see significant differences in basic assumptions about knowledge, students, and learning. (It's important, however, to bear in mind that constructivists acknowledge that students are constructing knowledge in traditional classrooms, too. It's really a matter of the emphasis being on the student, not on the instructor.)

Traditional Classroom	Constructivist Classroom
Curriculum begins with the parts of the whole. Emphasizes basic skills.	Curriculum emphasizes big concepts, beginning with the whole and expanding to include the parts.
Strict adherence to fixed curriculum is highly valued.	Pursuit of student questions and interests is valued.
Materials are primarily textbooks and workbooks.	Materials include primary sources of material and manipulative materials.
Learning is based on repetition.	Learning is interactive, building on what the student already knows.
Teachers disseminate information to students; students are recipients of knowledge.	Teachers have a dialogue with students, helping students construct their own knowledge.
Teacher's role is directive, rooted in authority.	Teacher's role is interactive, rooted in negotiation.
Assessment is through testing, correct answers.	Assessment includes student works, observations, and points of view, as well as tests. Process is as important as product.
Knowledge is seen as inert.	Knowledge is seen as dynamic, ever changing with our experiences.
Students work primarily alone.	Students work primarily in groups.

What does constructivism have to do with my classroom?

As is the case with many of the current/popular paradigms, you're probably already using the constructivist approach to some degree. Constructivist teachers pose questions and problems,

then guide students to help them find their own answers. They use many techniques in the teaching process. For example, they may:

- prompt students to formulate their own questions (inquiry)
- allow multiple interpretations and expressions of learning (multiple intelligences)
- encourage group work and the use of peers as resources (collaborative learning)

More information on the above processes is covered in other workshops in this series. For now, it's important to realize that the constructivist approach borrows from many other practices in the pursuit of its primary goal: helping students learn HOW TO LEARN.

In a constructivist classroom, learning is . . .

Students are not blank slates upon which knowledge is etched. They come to learning situations with already formulated knowledge, ideas, and understandings. This previous knowledge is the raw material for the new knowledge they will create.

Example: An elementary school teacher presents a class problem to measure the length of the "Mayflower." Rather than starting the problem by introducing the ruler, the teacher allows students to reflect and to construct their own methods of measurement. One student offers the knowledge that a doctor said he is four feet tall. Another says she knows horses are measured in "hands." The students discuss these and other methods they have heard about, and decide on one to apply to the problem.

The student is the person who creates new understanding for him/herself. The teacher coaches, moderates, suggests, but allows the students room to experiment, ask questions, try things that don't work. Learning activities require the students' full participation (like hands-on experiments). An important part of the learning process is that students reflect on, and talk about, their activities. Students also help set their own goals and means of assessment.

Examples: A middle-school language arts teacher sets aside time each week for a writing lab. The emphasis is on content and getting ideas down rather than memorizing grammatical rules, though one of the teacher's concerns is the ability of his students to express themselves well through written language. The teacher provides opportunities for students to examine the finished and earlier drafts of various authors. He allows students to select and create projects within the general requirement of building a **portfolio**¹. Students serve as peer editors who value originality and uniqueness rather than the best way to fulfill an assignment.

1. In a history class, asking students to read and think about different versions of and perspectives on "history" can lead to interesting discussions. Is history as taught in textbooks accurate? Are there different versions of the same history? Whose version of history is most accurate? How do we know? From there, students can make their own judgments.

Students control their own learning process, and they lead the way by reflecting on their experiences. This process makes them experts of their own learning. The teacher helps create situations where the students feel safe questioning and reflecting on their own processes, either privately or in group discussions. The teacher should also create activities that lead the student to reflect on his or her prior knowledge and experiences. Talking about what was learned and how it was learned is really important.

Example: Students keep journals in a writing class where they record how they felt about the class projects, the visual and verbal reactions of others to the project, and how they felt their own writing had changed. Periodically the teacher reads these journals and holds a conference with the student where the two assess (1) what new knowledge the student has created, (2) how the student learns best, and (3) the learning environment and the teacher's role in it.

The constructivist classroom relies heavily on collaboration among students. There are many reasons why collaboration contributes to learning. The main reason it is used so much in constructivism is that students learn about learning not only from themselves, but also from their peers. When students review and reflect on their learning processes together, they can pick up

strategies and methods from one another.

Example: In the course of studying ancient civilizations, students undertake an archaeological dig. This may be something constructed in a large sandbox, or, as in the Dalton School's "Archaeotype" software simulation, on a computer. As the students find different objects, the teacher introduces classifying techniques. The students are encouraged to (1) set up a group museum by developing criteria and choosing which objects should belong, and (2) collaborate with other students who worked in different quadrants of the dig. Each group is then asked to develop theories about the civilizations that inhabited the area.

The main activity in a constructivist classroom is solving problems. Students use inquiry methods to ask questions, investigate a topic, and use a variety of resources to find solutions and answers. As students explore the topic, they draw conclusions, and, as exploration continues, they revisit those conclusions. Exploration of questions leads to more questions. (See the CONCEPT TO CLASSROOM workshop [Inquiry-based Learning](#))

Example: Sixth graders figuring out how to purify water investigate solutions ranging from coffee-filter paper, to a stove-top distillation apparatus, to piles of charcoal, to an abstract mathematical solution based on the size of a water molecule. Depending upon students' responses, the teacher encourages abstract as well as concrete, poetic as well as practical, creations of new knowledge.

Students have ideas that they may later see were invalid, incorrect, or insufficient to explain new experiences. These ideas are temporary steps in the integration of knowledge. For instance, a child may believe that all trees lose their leaves in the fall, until she visits an evergreen forest. Constructivist teaching takes into account students' current conceptions and builds from there.

What happens when a student gets a new piece of information? The constructivist model says that the student compares the information to the knowledge and understanding he/she already has, and one of three things can occur:

- The new information matches up with his previous knowledge pretty well (it's **consonant** with the previous knowledge), so the student adds it to his understanding. It may take some work, but it's just a matter of finding the right fit, as with a puzzle piece.
- The information doesn't match previous knowledge (it's **dissonant**). The student has to change her previous understanding to find a fit for the information. This can be harder work.
- The information doesn't match previous knowledge, and it is **ignored**. Rejected bits of information may just not be absorbed by the student. Or they may float around, waiting for the day when the student's understanding has developed and permits a fit.

Example: An elementary teacher believes her students are ready to study gravity. She creates an environment of discovery with objects of varying kinds. Students explore the differences in weight among similarly sized blocks of Styrofoam, wood, and lead. Some students hold the notion that heavier objects fall faster than light ones. The teacher provides materials (stories, posters, and videos) about Galileo, Newton, etc. She leads a discussion on theories about falling. The students then replicate Galileo's experiment by dropping objects of different weights and measuring how fast they fall. They see that objects of different weights actually usually fall at the same speed, although surface area and aerodynamic properties can affect the rate of fall.

What is the history of constructivism, and how has it changed over time?

“ As long as there were people asking each other questions, we have had constructivist classrooms. Constructivism, the study of learning, is about how we all make sense of our world, and that really hasn't changed. ”

— Jacqueline Grennon Brooks (1999)
CONCEPT TO CLASSROOM INTERVIEW

The concept of constructivism has roots in classical antiquity, going back to Socrates's dialogues with his followers, in which he asked directed questions that led his students to realize for themselves the weaknesses in their thinking. The Socratic dialogue is still an important tool in the way constructivist educators assess their students' learning and plan new learning experiences.

In this century, **Jean Piaget**¹ and **John Dewey**² developed theories of childhood development and education, what we now call Progressive Education, that led to the evolution of constructivism

Piaget believed that humans learn through the construction of one logical structure after another. He also concluded that the logic of children and their modes of thinking are initially entirely different from those of adults. The implications of this theory and how he applied them have shaped the foundation for constructivist education.

Dewey called for education to be grounded in real experience. He wrote, "If you have doubts about how learning happens, engage in sustained inquiry: study, ponder, consider alternative possibilities and arrive at your belief grounded in evidence." Inquiry is a key part of constructivist learning.

Among the educators, philosophers, psychologists, and sociologists who have added new perspectives to constructivist learning theory and practice are **Lev Vygotsky**³, **Jerome Bruner**⁴, and **David Ausubel**⁵.

Vygotsky introduced the social aspect of learning into constructivism. He defined the "zone of proximal learning," according to which students solve problems beyond their actual developmental level (but within their level of potential development) under adult guidance or in collaboration with more capable peers.

Bruner initiated curriculum change based on the notion that learning is an active, social process in which students construct new ideas or concepts based on their current knowledge.

Seymour Papert's⁶ groundbreaking work in using computers to teach children has led to the widespread use of computer and information technology in constructivist environments.

Modern educators who have studied, written about, and practiced constructivist approaches to education include **John D. Bransford**⁷, **Ernst von Glasersfeld**⁸, **Eleanor Duckworth**⁹, **George Forman**¹⁰, **Roger Schank**¹¹, **Jacqueline Grennon Brooks**¹², and **Martin G. Brooks**

What are some critical perspectives?

Constructivism has been criticized on various grounds. Some of the charges that critics level against it are:

1. It's elitist. Critics say that constructivism and other "progressive" educational theories have been most successful with children from privileged backgrounds who are fortunate in having

outstanding teachers, committed parents, and rich home environments. They argue that disadvantaged children, lacking such resources, benefit more from more explicit instruction.

“ In truth, progressivism didn't work with all 'privileged' kids, just those who had advantages at home or were smart enough to do discovery learning. ”

— E.D. Hirsch

2. Social constructivism leads to "group think." Critics say the collaborative aspects of constructivist classrooms tend to produce a "tyranny of the majority," in which a few students' voices or interpretations dominate the group's conclusions, and dissenting students are forced to conform to the emerging consensus.

3. There is little hard evidence that constructivist methods work. Critics say that constructivists, by rejecting evaluation through testing and other external criteria, have made themselves unaccountable for their students' progress. Critics also say that studies of various kinds of instruction -- in particular **Project Follow Through**¹, a long-term government initiative -- have found that students in constructivist classrooms lag behind those in more traditional classrooms in basic skills.

Constructivists counter that in studies where children were compared on higher-order thinking skills, constructivist students seemed to outperform their peers.

What are the benefits of constructivism?

1. Benefit

Children learn more, and enjoy learning more when they are actively involved, rather than passive listeners.

2. Benefit

Education works best when it concentrates on thinking and understanding, rather than on rote memorization. Constructivism concentrates on learning how to think and understand.

3. Benefit

Constructivist learning is transferable. In constructivist classrooms, students create organizing principles that they can take with them to other learning settings.

4. Benefit

Constructivism gives students ownership of what they learn, since learning is based on students' questions and explorations, and often the students have a hand in designing the assessments as well. Constructivist assessment engages the students' initiatives and personal investments in their journals, research reports, physical models, and artistic representations. Engaging the creative instincts develops students' abilities to express knowledge through a variety of ways. The students are also more likely to retain and transfer the new knowledge to real life.

5. Benefit

By grounding learning activities in an authentic, real-world context, constructivism stimulates and engages students. Students in constructivist classrooms learn to question things and to apply their natural curiosity to the world.

6. Benefit

Constructivism promotes social and communication skills by creating a classroom environment that emphasizes collaboration and exchange of ideas. Students must learn how to articulate their ideas clearly as well as to collaborate on tasks effectively by sharing in group projects. Students must therefore exchange ideas and so must learn to "negotiate" with others and to evaluate their contributions in a socially acceptable manner. This is essential to success in the real world, since they will always be exposed to a variety of experiences in which they will have to cooperate and navigate among the ideas of others.