



Research Brief

Constructivist Teaching and Learning

Question: What are the characteristics of Constructivist teaching and learning? How can Constructivist approaches be introduced in the classroom?

Summary of Findings:

NCREL describes constructivism as an approach to teaching and learning based on the premise that cognition (learning) is the result of "mental construction." In other words, students learn by fitting new information together with what they already know. Constructivists believe that learning is affected by the context in which an idea is taught as well as by students' beliefs and attitudes.

Constructivist teaching is based on research about the human brain and what is known about how learning occurs. NCREL summarizes Caine and Caine (1991) who suggest that brain-compatible teaching is based on 12 principles:

1. "The brain is a parallel processor" (p. 80). It simultaneously processes many different types of information, including thoughts, emotions, and cultural knowledge. Effective teaching employs a variety of learning strategies.
2. "Learning engages the entire physiology" (p. 80). Teachers can't address just the intellect.
3. "The search for meaning is innate" (p. 81). Effective teaching recognizes that meaning is personal and unique, and that students' understandings are based on their own unique experiences.
4. "The search for meaning occurs through 'patterning' " (p. 81). Effective teaching connects isolated ideas and information with global concepts and themes.
5. "Emotions are critical to patterning" (p. 82). Learning is influenced by emotions, feelings, and attitudes.
6. "The brain processes parts and wholes simultaneously" (p. 83). People have difficulty learning when either parts or wholes are overlooked.
7. "Learning involves both focused attention and peripheral perception" (p. 83). Learning is influenced by the environment, culture, and climate.
8. "Learning always involves conscious and unconscious processes" (p. 84). Students need time to process 'how' as well as 'what' they've learned.
9. "We have at least two different types of memory: a spatial memory system, and a set of systems for rote learning" (p. 85). Teaching that heavily emphasizes rote learning does not promote spatial, experienced learning and can inhibit understanding.
10. "We understand and remember best when facts and skills are embedded in natural, spatial memory" (p. 86). Experiential learning is most effective.
11. "Learning is enhanced by challenge and inhibited by threat" (p. 86). The classroom climate should be challenging but not threatening to students.
12. "Each brain is unique" (p. 87). Teaching must be multifaceted to allow students to express preferences.

Jonassen (1991) notes that many educators and cognitive psychologists have applied constructivism to the development of learning environments. From these applications, he has isolated a number of design principles:



Research Brief

1. Create real-world environments that employ the context in which learning is relevant;
2. Focus on realistic approaches to solving real-world problems;
3. The instructor is a coach and analyzer of the strategies used to solve these problems;
4. Stress conceptual interrelatedness, providing multiple representations or perspectives on the content;
5. Instructional goals and objectives should be negotiated and not imposed;
6. Evaluation should serve as a self-analysis tool;
7. Provide tools and environments that help learners interpret the multiple perspectives of the world;
8. Learning should be internally controlled and mediated by the learner (pp.11-12).

Jonassen (1994) summarizes what he refers to as "the implications of constructivism for instructional design". The following principles illustrate how knowledge construction can be facilitated:

1. Provide multiple representations of reality;
2. Represent the natural complexity of the real world;
3. Focus on knowledge construction, not reproduction;
4. Present authentic tasks (contextualizing rather than abstracting instruction);
5. Provide real-world, case-based learning environments, rather than pre-determined instructional sequences;
6. Foster reflective practice;
7. Enable context-and content dependent knowledge construction;
8. Support collaborative construction of knowledge through social negotiation (p.35).

Elizabeth Murphy (1997) claims that multiple perspectives, authentic activities, and use of real-world environments are just some of the themes that are frequently associated with constructivist learning and teaching. There were many similarities between the perspectives of different researchers in her brief review of the literature, and the following section presents a synthesis and summary of the characteristics of constructivist learning and teaching :

1. Multiple perspectives and representations of concepts and content are presented and encouraged.
2. Goals and objectives are derived by the student or in negotiation with the teacher or system.
3. Teachers serve in the role of guides, monitors, coaches, tutors and facilitators.
4. Activities, opportunities, tools and environments are provided to encourage metacognition, self-analysis -regulation, -reflection & -awareness.
5. The student plays a central role in mediating and controlling learning.
6. Learning situations, environments, skills, content and tasks are relevant, realistic, authentic and represent the natural complexities of the 'real world'.
7. Primary sources of data are used in order to ensure authenticity and real-world complexity.



Research Brief

8. Knowledge construction and not reproduction is emphasized.
9. This construction takes place in individual contexts and through social negotiation, collaboration and experience.
10. The learner's previous knowledge constructions, beliefs and attitudes are considered in the knowledge construction process.
11. Problem-solving, higher-order thinking skills and deep understanding are emphasized.
12. Errors provide the opportunity for insight into students' previous knowledge constructions.
13. Exploration is a favoured approach in order to encourage students to seek knowledge independently and to manage the pursuit of their goals.
14. Learners are provided with the opportunity for apprenticeship learning in which there is an increasing complexity of tasks, skills and knowledge acquisition.
15. Knowledge complexity is reflected in an emphasis on conceptual interrelatedness and interdisciplinary learning.
16. Collaborative and cooperative learning are favoured in order to expose the learner to alternative viewpoints.
17. Scaffolding is facilitated to help students perform just beyond the limits of their ability.
18. Assessment is authentic and interwoven with teaching.

Does it Work?

Although Constructivism is based on sound theory and research, the jury is still out on its overall effectiveness as a single instructional approach. While there is evidence that the use of constructivist approaches does promote critical thinking, collaborative learning, and increased student engagement, it is less clear if it results in improved test scores. Indeed, by rejecting test scores in favor of authentic assessments, critics say that constructivists have not accepted accountability for student learning in the contemporary environment. Others have charged that the approach works best with students from privileged backgrounds who already possess essential skills and school-oriented attitudes and behaviors. Still others say that the overuse of collaborative and constructivist strategies can lead to “group think” and discourage independent thinking and creative problem solving by highly talented individuals. (Constructivism as a Paradigm for Teaching and Learning). Like most debates about instructional approaches, advocates and critics alike would probably agree that no single approach works for all students all the time. The key is to find the right mix of methods for the students being served and the content being taught.

References:

- Caine, R.N., & Caine, G. (1991). *Making connections: Teaching and the human brain*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Jonassen, D. (1991, September). Evaluating Constructivist Learning. *Educational Technology*, 36(9), 28-33.
- Jonassen, D. (1994, April). Thinking technology. *Educational Technology*, 34(4), 34-37.
- Jonassen, D. (1991). Objectivism vs. Constructivism. *Educational Technology Research and Development*, 39(3), 5-14.
- Murphy, E. (1997). Characteristics of Constructivist Teaching and Learning. Constructivism: from Philosophy to Practice. <http://www.cdli.ca/~elmurphy/emurphy/cle.html>



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North Central Regional Education Laboratory (NCREL). (n.d.) Constructivist Teaching and Learning Models, Pathways to School Improvement. Naperville, IL: Author <http://www.ncrel.org/sdrs/areas/issues/envrnmnt/drugfree/sa3const.htm>

Online Resources

Theory and Research

Constructivism vs. Instructivism

Karen Barton, University of South Carolina
<http://www.ed.sc.edu/caw/webbarton.htm>

This page was designed for researching two pedagogical styles of instruction. Its purpose is to introduce teachers, briefly, to example philosophies and opinions regarding the different models. With this information, a teacher can build their knowledge base for instruction, and, in turn, choose the model or combination of models that best fit his/her style of teaching and, more importantly, the style of learners he/she is teaching.

Constructivist Learning Theory

Professor Georeg Hein
Lesley College, Massachusetts.

<http://www.exploratorium.edu/IFI/resources/constructivistlearning.html>

A very complete examination of the theory behind constructivist teaching and learning. Provides an extensive review of the theoretical literature and an excellent bibliography.

T.F. Fenimore and M.B. Tinzmann (1990). What is a thinking curriculum? Naperville, IL: NCREL.

http://www.ncrel.org/sdrs/areas/rpl_esys/thinking.htm

“Thinking curricula, based on “new” ways of thinking about learning, treat both content and processes differently. Content includes concepts, principles, generalizations, problems, facts, definitions, etc. Process includes learning strategies and skills, creative and critical thinking, thinking about thinking (meta-cognition), social skills, and so on.” In this very readable paper, the authors describe some key characteristics of a thinking curriculum.

What is the Collaborative Classroom?

http://www.ncrel.org/sdrs/areas/rpl_esys/collab.htm

M.B. Tinzmann, B.F. Jones, T.F. Fenimore, J. Bakker, C. Fine, and J. Pierce
NCREL, Oak Brook, 1990.

The purpose of this GuideBook is to elaborate what classroom collaboration means so that the constructivist instruction movement can continue to grow and flourish. In this excellent summary paper, the authors describe characteristics of these classrooms and student and teacher roles, summarize relevant research, address some issues related to changing instruction, and give examples of a variety of teaching methods and practices that embody these characteristics.

Constructivist Teaching and Learning

Audrey Gray (1997). SSTA Research Centre Report #97-07, Regina, SA: Saskatchewan School Boards Association Research Centre,

<http://www.ssta.sk.ca/research/instruction/97-07.htm>

A summary of a Master's thesis by Audrey Gray, University of Saskatchewan, entitled “The Road to Knowledge is Always Under Construction: A Life History Journey to Constructivist Teaching”. Employing a qualitative research approach and a narrative reporting style, Ms. Gray explores the journey of Pat Gray, a Saskatoon English language arts teacher, towards the development of a constructivist approach to teaching and examines the ways he incorporates ideas and strategies into his teaching practices. The research provides insight into the process of teacher change and development and raises questions about teacher professional development that have implications for the way constructivist and transactional curricula are implemented.

Constructivist Teaching and Learning Models, Pathways to School Improvement

North Central Regional Education Laboratory (NCREL). <http://www.ncrel.org/sdrs/areas/issues/envrnmnt/drugfree/sa3const.htm>



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Research Brief

From NCREL's acclaimed "Pathways to School Improvement" Series, this complete resource explores the theory, research and practical applications of constructivism in the classroom.

Practical Applications

Teacher Workshop: Constructivism as a Paradigm for Teaching and Learning

<http://www.thirteen.org/edonline/concept2class/constructivism/>

This online, interactive workshop from New York's educational TV station, in conjunction with Disney, provides actual examples of constructivist teaching, a planning template for constructivist lessons, and outstanding information about this instructional approach and its effect on learners. If you visit only one site, make it this one!

Constructing Knowledge in the Classroom.

<http://www.sedl.org/scimath/compass/v01n03/construct.html>

This excellent resource from the Southwest Educational Development Laboratory "Compass" project provides non-technical explanations of constructivism and shows how to "ease into" a constructivist style in the classroom.

Education Topics: Constructivism

<http://www.ascd.org/portal/site/ascd/menuitem.d36b986168f3f8cddeb3ffdb62108a0c/>

From the Association for Supervision and Curriculum Development (ASCD), this site provides links to the association's professional resources on constructivist teaching and learning.

Teaching for Understanding

By David Perkins.

<http://www.exploratorium.edu/IFI/resources/workshops/teachingforunderstanding.html>

This article from the American Educator (AFT) outlines the qualities of the constructivist classroom and explains how to re-create them in classrooms at different levels.

Constructivism: How to...

2Learn.ca (Canada).

<http://www.2learn.ca/Profgrowth/constructhow.html>

2Learn.ca Education Society of Canada provides a superb collection of information and practical ideas for using innovative teaching methods that promote thinking, problem solving and student engagement. Constructivism is only one of their many topics.

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<http://www.principalspartnership.com>

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