

A Quick Tour of Educational Theories and Models

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Behaviourism

Behaviourism is a worldview that assumes a learner is essentially passive, responding to environmental stimuli. The learner starts off as a clean slate (i.e. *tabula rasa*) and behaviour is shaped through positive reinforcement or negative reinforcement. Both positive reinforcement and negative reinforcement increase the probability that the antecedent behaviour will happen again. In contrast, *punishment* (both positive and negative) decreases the likelihood that the antecedent behaviour will happen again. Positive indicates the application of a stimulus; Negative indicates the withholding of a stimulus. Learning is therefore defined as a change in behaviour in the learner. Lots of (early) behaviourist work was done with animals (e.g. Pavlov's dogs) and generalized to humans.

Classical Conditioning (Pavlov)

Summary: Classical conditioning is a reflexive or automatic type of learning in which a stimulus acquires the capacity to evoke a response that was originally evoked by another stimulus.

Originators and Key Contributors: First described by Ivan Pavlov (1849-1936), Russian physiologist, in 1903, and studied in infants by John B. Watson (1878-1958).

Operant Conditioning (Skinner)

Summary: A behaviourist theory based on the fundamental idea that behaviours that are reinforced will tend to continue, while behaviours that are punished will eventually end.

Originators and Key Contributors: B. F. Skinner, built upon Ivan Pavlov's theories of classical conditioning.

Social Learning Theory (Bandura)

Summary: Bandura's Social Learning Theory posits that people learn from one another, via observation, imitation, and modelling. The theory has often been called a bridge between behaviourist and cognitive learning theories because it encompasses attention, memory, and motivation.

Originator: Albert Bandura

Cognitivism

The cognitivist revolution replaced behaviourism in 1960s as the dominant paradigm. Cognitivism focuses on the inner mental activities – opening the “black box” of the human mind is valuable and necessary for understanding how people learn. Mental processes such as thinking, memory, knowing, and problem-solving need to be explored. Knowledge can be seen as schema or symbolic mental constructions. Learning is defined as change in a learner’s schemata.

A response to behaviourism, people are not “programmed animals” that merely respond to environmental stimuli; people are rational beings that require active participation in order to learn, and whose actions are a consequence of thinking. Changes in behaviour are observed, but only as an indication of what is occurring in the learner’s head. Cognitivism uses the metaphor of the mind as computer: information comes in, is being processed, and leads to certain outcomes.

Cognitive Apprenticeship (Collins et al.)

Summary: Cognitive Apprenticeship is a theory that attempts to bring tacit processes out in the open. It assumes that people learn from one another, through observation, imitation and modelling.

Originator: Collins, Brown and Newman

Around 1987, Collins, Brown, and Newman developed six teaching methods — modelling, coaching, scaffolding, articulation, reflection and exploration. These methods enable students to cognitive and metacognitive strategies for “using, managing, and discovering knowledge”

Modelling

Experts (usually teachers or mentors) demonstrate a task explicitly. New students or novices build a conceptual model of the task at hand. For example, a math teacher might write out explicit steps and work through a problem aloud, demonstrating her heuristics and procedural knowledge.

Coaching

During Coaching, the expert gives feedback and hints to the novice.

Scaffolding

Scaffolding is the process of supporting students in their learning. Support structures are put into place. In some instances, the expert may have to help with aspects of the task that the student cannot do yet.

Articulation

McLellan describes articulation as (1) separating component knowledge and skills to learn them more effectively and, (2) more common verbalizing or demonstrating knowledge and thinking processes in order to expose and clarify them.

This process gets students to articulate their knowledge, reasoning, or problem-solving process in a domain” (p. 482). This may include inquiry teaching (Collins & Stevens, 1982), in which teachers ask students a series of questions that allows them to refine and restate their learned knowledge and to form explicit conceptual models. Thinking aloud requires students to articulate their thoughts while solving problems. Students assuming a critical role monitor others in cooperative activities and draw conclusions based on the problem-solving activities.

Reflection

Reflection allows students to “compare their own problem-solving processes with those of an expert, another student, and ultimately, an internal cognitive model of expertise” (p. 483). A technique for reflection could be to examine the past performances of both expert and novice and to highlight similarities and differences. The goal of reflection is for students to look back and analyze their performances with a desire for understanding and improvement towards the behavior of an expert.

Exploration

Exploration involves giving students room to problem solve on their own and teaching students exploration strategies. The former requires the teacher to slowly withdraw the use of supports and scaffolds not only in problem solving methods, but problem setting methods as well. The latter requires the teacher to show students how to explore, research, and develop hypotheses. Exploration allows the student to frame interesting problems within the domain for themselves and then take the initiative to solve these problems.

For more information, see:

- Collins, A., Brown, J. S., & Newman, S. E. (1987). Cognitive apprenticeship: Teaching the craft of reading, writing and mathematics (Technical Report No. 403). BBN Laboratories, Cambridge, MA. Centre for the Study of Reading, University of Illinois. January, 1987.

Cognitive Load Theory of Multimedia Learning (Sweller)

John Sweller’s paper, “Implications of Cognitive Load Theory for Multimedia Learning” describes the human cognitive architecture, and the need to apply sound instructional design principles based on our knowledge of the brain and memory. Sweller first describes the different types of memory, and how both are interrelated, because schemas held in long-term memory, acting as a “central executive”, directly affect the manner in which information is synthesized in working memory. Sweller then explains that in the absence of schemas, instructional guidance must provide a substitute for learners to develop either own schemas.

[Cognitive Theory of Multimedia Learning \(Mayer\)](#)

Summary: A cognitive theory of multimedia learning based on three main assumptions: there are two separate channels (auditory and visual) for processing information; there is limited channel capacity; and that learning is an active process of filtering, selecting, organizing, and integrating information.

Originator: Richard Mayer

Distributed Cognition (DCog)

Summary: Distributed cognition is a branch of cognitive science that proposes cognition and knowledge are not confined to an individual; rather, it is distributed across objects, individuals, artefacts, and tools in the environment.

Originators: Edwin Hutchins in the 1990s.

Distributed Cognition, which often makes use of ethnographically collected data, is not so much a method; more accurately, it is a useful descriptive framework that describes human work systems in informational and computational terms. It is useful for analyzing situations that involve problem-solving. As it helps provide an understanding of the role and function of representational media, it has implications for the design of technology in the mediation of the activity, because the system designers will have a stronger, clearer model of the work. Thus, it is an important theory for such fields as CSCL, CSCW, HCI, instructional design, and distance learning.

Elaboration Theory (Reigeluth)

Summary: Elaboration theory is an instructional design theory that argues that content to be learned should be organized from simple to complex order, while providing a meaningful context in which subsequent ideas can be integrated.

Originators: Charles Reigeluth (Indiana University) and his colleagues in the late 1970s. The paradigm shift from teacher-centric instruction to learner-centered instruction has caused “new needs for ways to sequence instruction” (Reigeluth, 1999). Charles Reigeluth of Indiana University posited Elaboration Theory, an instructional design model that aims to help select and sequence content in a way that will optimize attainment of learning goals. Proponents feel the use of motivators, analogies, summaries and syntheses leads to effective learning. While the theory does not address primarily affective content, it is intended for medium to complex kinds of cognitive and psychomotor learning.

According to Reigeluth (1999), Elaboration Theory has the following values:

- It values a sequence of instruction that is as holistic as possible, to foster meaning-making and motivation
- It allows learners to make many scope and sequence decisions on their own during the learning process
- It is an approach that facilitates rapid prototyping in the instructional development process

- It integrates viable approaches to scope and sequence into a coherent design theory

The simplest version of the concept, principle or task should be taught first. Teach broader, more inclusive concepts, principles, or tasks before the narrower, more detailed ones that elaborate upon them. One should use either a topical or a spiral approach to this elaboration. Teach “supporting” content such as principles, procedures, information, higher-order thinking skills, or attitudes together with the concepts to which they are most closely related. Group concepts, principles, or steps and their supporting content into “learning episodes” of a useful size (not too small or large). Finally, allow students to choose which concepts, principles, or versions of the task to elaborate upon or learn first (or next).

ADDIE Model

Summary: The ADDIE model is a systematic instructional design model consisting of five phases: (1) Analysis, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation. Various flavors and versions of the ADDIE model exist.

Originator: Unknown. Refined by Dick and Carey and others.

The generic term for the five-phase instructional design model consisting of Analysis, Design, Development, Implementation, and Evaluation. Each step has an outcome that feeds into the next step in the sequence. There are probably over 100+ different variations of the generic ADDIE model.

The five phases of ADDIE are as follows:

Analysis

- During analysis, the designer identifies the learning problem, the goals and objectives, the audience’s needs, existing knowledge, and any other relevant characteristics. Analysis also considers the learning environment, any constraints, the delivery options, and the timeline for the project.

Design

- A systematic process of specifying learning objectives. Detailed storyboards and prototypes are often made, and the look and feel, graphic design, user-interface and content is determined here.

Development

- The actual creation (production) of the content and learning materials based on the Design phase.

Implementation

- During implementation, the plan is put into action and a procedure for training the learner and teacher is developed. Materials are delivered or distributed to the student group. After delivery, the effectiveness of the training materials is evaluated.

Evaluation

- This phase consists of (1) formative and (2) summative evaluation. Formative evaluation is present in each stage of the ADDIE process. Summative evaluation consists of tests designed for criterion-related referenced items and providing opportunities for feedback from the users. Revisions are made as necessary.

Constructivist Theories

A reaction to didactic approaches such as behaviourism and programmed instruction, constructivism states that learning is an active, contextualized process of constructing knowledge rather than acquiring it. Knowledge is constructed based on personal experiences and hypotheses of the environment. Learners continuously test these hypotheses through social negotiation. Each person has a different interpretation and construction of knowledge process. The learner is not a blank slate (*tabula rasa*) but brings past experiences and cultural factors to a situation.

NOTE: A common misunderstanding regarding constructivism is that instructors should never tell students anything directly but, instead, should always allow them to construct knowledge for themselves. This is actually confusing a theory of pedagogy (teaching) with a theory of knowing. Constructivism assumes that all knowledge is constructed from the learner's previous knowledge, regardless of how one is taught. Thus, even listening to a lecture involves active attempts to construct new knowledge.

Social Development Theory (Vygotsky)

Summary: Social Development Theory argues that social interaction precedes development; consciousness and cognition are the end product of socialization and social behavior.

Originator: Lev Vygotsky (1896-1934).

Communities of Practice (Lave and Wenger)

Summary: Etienne Wenger summarizes Communities of Practice (CoP) as “groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly.” This learning that takes place is not necessarily intentional. Three components are required in order to be a CoP: (1) the domain, (2) the community, and (3) the practice.

Originators: Jean Lave and Etienne Wenger in 1991 and further elaborated in 1998.

The Assumptions of Constructivism - Merrill

- knowledge is constructed from experience
- learning is a personal interpretation of the world
- learning is an active process in which meaning is developed on the basis of experience
- conceptual growth comes from the negotiation of meaning, the sharing of multiple perspectives and the changing of our internal representations through collaborative learning
- learning should be situated in realistic settings; testing should be integrated with the task and not a separate activity”
(Merrill, 1991, in Smorgansbord, 1997)

<http://www.usask.ca/education/coursework/802papers/mergel/brenda.htm#The Basics of Constructivism>

Jonassen (1999) lists the following implications of constructivism for instructional design:

"...purposeful knowledge construction may be facilitated by learning environments which:

- Provide multiple representations of reality - avoid oversimplification of instruction by representing the natural complexity of the world
- Present authentic tasks - contextualize
- Provide real-world, case-based learning environments, rather than pre-determined instructional sequences
- Foster reflective practice
- Enable context- and content-dependent knowledge construction
- Support collaborative construction of knowledge through social negotiation, not competition among learners for recognition

"Although we believe that constructivism is not a prescriptive theory of instruction, it should be possible to provide more explicit guidelines on how to design learning environments that foster constructivist learning"

<http://www.usask.ca/education/coursework/802papers/mergel/brenda.htm#The Basics of Constructivism>

Thanks to Fiona Coffey - <http://moodle.op.ac.nz/mod/wiki/view.php?id=128412>

Humanism

Summary: Humanism is a paradigm/philosophy/pedagogical approach that believes learning is viewed as a personal act to fulfil one's potential.

Humanism, a paradigm that emerged in the 1960s, focuses on the human freedom, dignity, and potential. A central assumption of humanism, according to Huitt (2001), is that people act with intentionality and values. This is in contrast to the behaviourist notion of operant conditioning (which argues that all behaviour is the result of the

application of consequences) and the cognitive psychologist belief that the discovering knowledge or constructing meaning is central to learning. Humanists also believe that it is necessary to study the person as a whole, especially as an individual grows and develops over the lifespan. It follows that the study of the self, motivation, and goals are areas of particular interest.

Key proponents: Abraham Maslow, Carl Rogers, Malcolm Knowles

Maslow's Hierarchy of Needs

Summary: Maslow's Hierarchy of Needs (often represented as a pyramid with five levels of needs) is a motivational theory in psychology that argues that while people aim to meet basic needs, they seek to meet successively higher needs in the form of a hierarchy.

Experiential Learning (Kolb)

Summary: A four-stage cyclical theory of learning, Kolb's experiential learning theory is a holistic perspective that combines experience, perception, cognition, and behavior.

Originators: David A. Kolb (1939-)

Malcolm Knowles and Andragogy

While the concept of [andragogy](#) had been in spasmodic usage since the 1830s it was Malcolm Knowles who popularized its usage for English language readers. For Knowles, andragogy was premised on at least four crucial assumptions about the characteristics of adult learners that are different from the assumptions about child learners on which traditional pedagogy is premised. A fifth was added later.

1. Self-concept: *As a person matures his self concept moves from one of being a dependent personality toward one of being a self-directed human being*
2. Experience: *As a person matures he accumulates a growing reservoir of experience that becomes an increasing resource for learning.*
3. Readiness to learn. *As a person matures his readiness to learn becomes oriented increasingly to the developmental tasks of his social roles.*
4. Orientation to learning. *As a person matures his time perspective changes from one of postponed application of knowledge to immediacy of application, and accordingly his orientation toward learning shifts from one of subject-centeredness to one of problem centredness.*
5. Motivation to learn: *As a person matures the motivation to learn is internal* (Knowles 1984:12).

Problem-Based Learning (PBL)

Problem-Based Learning (PBL) is a pedagogical approach and curriculum design methodology often used in higher education and K-12 settings.

The following are some of the defining characteristics of PBL:

- Learning is driven by challenging, open-ended problems with no one “right” answer
- Problems/cases are context specific
- Students work as self-directed, active investigators and problem-solvers in small collaborative groups (typically of about five students)
- A key problem is identified and a solution is agreed upon and implemented
- Teachers adopt the role as facilitators of learning, guiding the learning process and promoting an environment of inquiry

Rather than having a teacher provide facts and then testing students ability to recall these facts via memorization, PBL attempts to get students to apply knowledge to new situations. Students are faced with contextualized, ill-structured problems and are asked to investigate and discover meaningful solutions.