

UNIVERSITY OF THE WEST INDIES
OPEN CAMPUS

Cognitive Learning Theories

Presented by:
Malissa Bovell, Terrecere George & Ayana Francis



Presentation Menu

- 01** Overview of Cognitivism
- 02** Meaningful Learning & Schema Theory
- 03** Situated Cognition Theory
- 04** Cognitive Information Processing Theory
- 05** Cognitive Learning Theories : Comparative Analysis

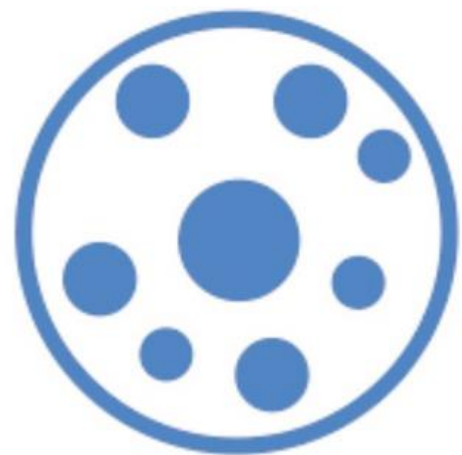
OVERVIEW OF COGNIVITISM

Cognitivists view :

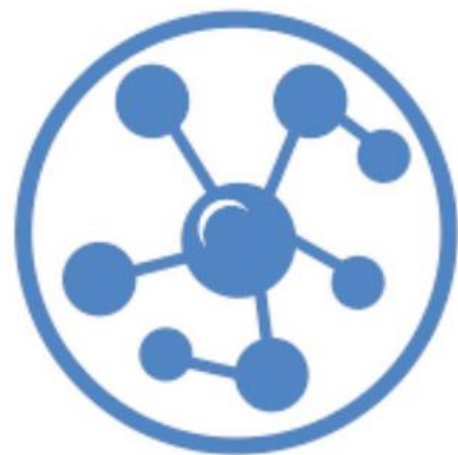
- Learning as an active process involving the acquisition or reorganisation of cognitive structures through which humans process and store information.
- The learner is an active participant in the process of knowledge acquisition and integration (Good and Brophy1990, Merriam and Cafferella 1999, Simon 2001)

This presentation shall provide a comparative review of Cognitive Learning Theories and linkages to aid Learning and Instructional Design.

MEANINGFUL LEARNING & SCHEMA THEORY



Information



Schema

Meaningful Learning

According to Ausubel (1978), " the most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly". Knowledge is constructed by the learner through their interpretation and linking new information to knowledge previously acquired. Knowledge begins with observation and recognition of events and objects through constructed concepts. Meaningful Learning is a process that related new information relevant to the concepts contained in a person's cognitive structure. Concepts are mapped out through teacher directed instruction of materials for learners to understand the correlation between ideas, images or words and create new linkages to prior knowledge.

Schema

The schema theory is an information-processing model to describe this aspect of perception and cognition. The model assumes that a person receives information which is less than perfect in terms of its completeness, its accuracy, and its reliability (Bartlett,1932). The Schema theory therefore reinforces the importance of prior knowledge to learning and the use of tools such as advance organizers and memory aids to bridge new knowledge to older knowledge stored in schema (Merriam, Caffarella & Baumgartner, 2007).

4 PROCESSES BY WHICH MEANINGFUL LEARNING OCCURS

• **Derivative Subsumption**

This describes the situation in which the new information pupils learn is an instance or example of a concept that pupils have already learned.

2. Correlative Subsumption

More valuable learning than that of derivative subsumption, since it enriches the higher-level concept.

3. Superordinate Learning

In this case, you already knew a lot of examples of the concept, but you did not know the concept until it was taught

4. Combinatorial Learning

This describes a process by which the new idea is derived from another idea that comes from his previous knowledge (in a different, but related, "branch"). Students could think of this as learning by analogy. If the new idea causes the students thinking to change completely this is referred to as restructuring of schema.

HOW SCHEMAS AFFECT LEARNING

Schemas also play a role in the learning process.

- Schemas influence what we pay attention to. People are more likely to pay attention to things that fit in with their current schemas. Schemas also impact how quickly people learn. People also learn information more readily when it fits in with the existing schemas.
- Schemas help simplify the world. Schemas can often make it easier for people to learn about the world around them. New information could be classified and categorized by comparing new experiences to existing schemas.
- Schemas allow us to think quickly. Even under conditions when things are rapidly changing our new information is coming in quickly, people do not usually have to spend a great deal of time interpreting it. Because of the existing schemas, people are able to assimilate this new information quickly and automatically.
- Schemas can also change how we interpret incoming information. When learning new information that does not fit with existing schemas, people sometimes distort or alter the new information to make it fit with what they already know.
- Schemas can also be remarkably difficult to change. People often cling to their existing schemas even in the face of contradictory information

KEY TO ACHIEVE MEANINGFUL LEARNING

Meaningful Learning must be active, constructive and rational and depends on new information and previous knowledge

Provide learners with activities through a harmonious environment that allows them to give their opinion, exchange ideas and debate.

Teachers/Instructors must guide the cognitive process of learning. Activate what students already know and introduce them to new information

SITUATED COGNITION THEORY

Situated cognition is a theory of instruction that suggests learning is naturally tied to authentic activity, context, and culture (Brown, Collins, & Duguid 1989). It is more difficult to learn from un-natural activities. For example, learning your first language or a foreign language by immersion is widely held to be easier than learning languages from textbooks and vocabulary lists.

BENEFITS OF SITUATED COGNITION

Learning is contextualized within something familiar and safe".

There isn't just one right solution or approach to learning.

Conceptual "tools" are discovered and applied individually and in authentic contexts.

SITUATED COGNITION PRINCIPLES

- 01** Knowledge needs to be presented in an authentic context.
- 02** Provides authentic content that reflects the new way knowledge will be used in real life.
- 03** Provides authentic activities that have real world relevance.
- 04** Provides access to expert performance and modelling of process.
- 05** Provides multiple roles and perspectives.
- 06** Learning requires social interaction and collaboration.
- 07** Supports collaborative construction of knowledge.
- 08** Promotes reflection and articulation
- 09** Provides for authentic assessments.

COGNITIVE APPRENTICESHIP MODEL

The most effective way to implement a Situated Cognition strategy is to pair it with the Cognitive Apprenticeship Model. (Brown, Collins, & Duguid, 1989)

It provides numerous practical applications that teachers can use to integrate contextual learning into their curriculum.

The learner acquires and absorbs knowledge and skills by doing. They are involved in a community of practice, where they are encouraged to gradually learn responsibilities and tasks by accessing the eLearning resources and working with peers and instructors. Learners must also reflect upon the teachings and determine how to apply their new found knowledge in real world settings.



SITUATED COGNITION & INSTRUCTION

Situated learning is an instructional approach where students are more inclined to learn by actively participating in the learning experience. Learning in formal education should focus on acquiring knowledge and skills in contexts that reflect how the knowledge and skills will be useful in real life (Collins, 1988).

Teaching by abstracting concepts is not effective because learning only occurs in authentic situations. It allows the classroom to become a learning community, where the learning structure transforms into one in which a teacher and learners work collaboratively to achieve important goals, goals that may well have been established jointly. (Driscoll 2014).

Teachers can help students learn and retain information by encouraging students to work together, look at problems from multiple angles, and generate their own solutions to problems based on their existing knowledge. Students participate through cognitive apprenticeships (Driscoll 2014).

Examples: Music classes, Sports teams, Cooking/Chef's training classes, Trade Apprenticeships

COGNITIVE INFORMATION PROCESSING THEORY

Information processing theories focus on how people: attend to environmental events, encode information to be learned and relate it to knowledge in memory, store new knowledge in memory, and retrieve it as needed. As summarized by Schunk (1996), information processing theories focus on how people:

- 1. attend to environmental events,**
- 2. encode information to be learned and relate it to knowledge in memory,**
- 3. store new knowledge in memory, and**
- 4. retrieve it as needed.**

Thus, learners are viewed as active seekers and processors of information.

Atkinson and Shiffrin (1968) in their stage theory model outline that ;-the sequence of three stages information goes through to become encoded into long term memory :sensory memory , short term working memory and long term memory. While this model was later modified it is still a benchmark of information processing theories.

Cognitive Information Processing (CIP), outlines that the learner is a human processor of information much like a computer's processing system, with inputs, processes and outputs.

CIP acknowledges perceptual development, the development of symbolic representations, concepts and categorization and memory development. There is special focus on the complex nature of information and the association with the concept of relevance, and the development of cognitive and related information retrieval theory.

Memory plays a very vital role in CIP, since it is viewed as our cognitive system for storing and retrieving information. CIP theorists explain how the environment affects behavior. It is however noteworthy that, with the CIP model, the variable introduced is the information processing system of the learner i.e. the sensory register, short-term or working memory and long-term memory.

COGNITIVE INFORMATION PROCESSING USE IN INSTRUCTION

Human beings "process information with different levels of "elaboration" that will make the information more or less likely to be retrieved later. Craik and Lockhart (1973) specified a continuum of elaboration that starts with perception, continues through attention and labeling, and ends at meaning.

This information is useful in instruction as learners respond differently to a variety of stimuli. With this in mind instruction can be tailored to achieve the learning objectives of students who present a variety of learning styles in a classroom especially in cases where one classroom may have students who may be performing below their expected levels or participants who display traits suggestive of learning or intellectual disability.

It is very beneficial for teachers in planning and implementation of the instructional activities with the broadest perspective. According to Gagne, the most important cornerstone of the teaching process is the learning situations. Therefore learning situations should be analyzed in the most detailed way. Learning situations are structured on the basis of three fundamental elements: "sense organs of students" and "situations and behaviors stimulating senses of students"

COGNITIVE THEORIES

COMPARATIVE ANALYSIS



1.

The world is complex, and yet people are able to make some sense out of it everyday (inclusive of persons with varying disabilities). Human beings are constantly exposed to a variety of stimuli and often filter the importance of one form of sensory information over another. The schema theory is an information-processing model which describes perception and cognition. The model assumes that a person receives information which is less than perfect in terms of its completeness, its accuracy, and its reliability. The model provides a dynamic description of how a person evaluates this kind of information about a case, how he selects one of his pre-existing patterns . information processing theory compares the human brain to a computer processor “with limitations”; this illustrates the impact on the differences of how humans filter information based on the stimuli that they are exposed to. Under schema theory, learning occurs by “combining background knowledge with information on text”. Learning under CIP is embedded when learners encode information to store in long-term memory storage .

2.

According to Fox(1997) situation cognition dictates that learning should be "socially relational rather than a mentalist process". Situation cognition further dictates that there be an overlap or degree of integration with the environment , learners and teachers in a way that lends itself to many "teachable moments" inclusive of authentic learning activities; Fox (1997) believes that this lends to life long learning. However the cognitive information processing theory differs in that it appreciates the learners' ability to encode information into long term memory for retrieval and appropriate application of knowledge (or information learned).

3.

It is notable that the Schema Theory and the Meaningful Learning Theory both outline that prior /previous knowledge plays a pivotal role in the learning process. Driscoll (2014) notes the impact of Ausubel's meaningful reception learning. Prior /previous knowledge or information should be meaningful in order to be encoded into memory.

References:

Ausubel, D., Novak, J., & Hanesian, H. (1978). Educational Psychology: A Cognitive View (2nd Ed.). New York: Holt, Rinehart & Winston.

Bartlett, F. C. (1932). Remembering: A study in experimental and social psychology. Cambridge, UK: Cambridge University Press.

Brown, J.S., Collins, A., & Duguid, P. (1989). Situated Cognition and the Culture of Learning. Educational Researcher, 18(1), 32-42.

Driscoll, M.P. (2005) Psychology of Learning for Instruction (pp. 153 - 182; Ch. 5 - Situated Cognition). Toronto, ON: Pearson

Driscoll, M. P. (2014). Psychology of learning for instruction (3rd ed.). Pearson College Division.

Fox, S. Situated learning theory versus traditional cognitive learning theory: Why management education should not ignore management learning. Systems Practice 10, 727-747 (1997). Retrieved from <https://doi.org/10.1007/BF02557922>

Good, T. L and Brophy J E (1990) Educational Psychology: A realistic approach 4th edition White Plains NY Longman .

Merriam, S. B., Caffarella, R. S. & Baumgartner, L. M. (2007) Learning in Adulthood. San Francisco, CA. Jossey-Bass

**Mayer, R. A. (2003). Elements of a science of e-learning. Journal of Educational Computing Research, 29(3), 297-313. Library Portal Access.
<https://www.vista.ubc.ca/webct/urw/lc5116011.tp0/cobaltMainFrame.dowebct>**

**MSU, (2005) Virtual University Design and Technology,
http://teachvu.vu.msu.edu/public/designers/social_interactions/index.php?page_num=4**

Tenenbaum, B (1996-2008) K-12 Instructional Media Center, <http://www.k12imc.org/student/resources/online/computer.php>

**Wilson, B. G., & Myers, K. M. (2000). Situated cognition in theoretical and practical context. In D. H. Jonassen, & S. M. Land (Eds.),
Theoretical foundations of learning environments (pp. 57-88). Mahwah: Lawrence Erlbaum Associates. Google Scholar**