**Contributory works to Constructivism Theory**

The two major contributors to Constructivism theory are Piaget with his cognitive and developmental perspectives and Bruner and Vygotsky with their contextual nature of learning (Driscoll, 2005). Other contributors are listed:

- 1933 - Dewey, philosophies
- 1977 - Gibson, Ecological Psychology
- 1984 - Goodman, philosophies
- 2003 - Matthews, views of Derrida and Foucault
Constructivist Assumptions About Learning

Constructivist assumptions and learning while comparing other viewpoints including: objectivism, cognitive information processing theory and behaviour theory.

The constructivist theory assumes the learner constructs their knowledge into meaning and are not empty vessels (Driscoll, 2005). However, this construction of knowledge does not correspond to external reality (Driscoll, 2005). In response, constructivist have implemented systematic reasonable limits from human biology and reality with social negotiation to test learner understanding against others learners (Driscoll, 2005).

Objectivism is a viewpoint of an individual's experience through their knowledge of the world (Driscoll, 2005). Therefore as individual's have more experiences their knowledge becomes further enriched as it transfers from external sources internally to the learner (Driscoll, 2005). Cognitive information processing and behavioural theories materialize from the objectivist tradition (Driscoll, 2005). In behavioural theory a facilitator identifies learning goals for the learner and a reinforcer arranges presumed effective contingencies (Driscoll, 2005). In cognitive information processing theory, presumably knowledge is transferred to the learner by inputs and then stored (Driscoll, 2005).

Constructivist Models of Memory

There are several models of memory to draw constructivist assumptions such as: Eco's rhizome metaphor, network model of memory, propositional model, ACT mode of memory, and ACT-R.

In Eco's rhizome metaphor, the rhizome has no beginning or end and is constantly changing shape which parallels the unlimited potential of knowledge construction (Driscoll, 2005). The rhizome's limitless possibilities is similar to the transitory system of knowledge as there are no assumptions of context or stability (Driscoll, 2005). The network model of memory relies on stored terms of a concept node and makes connections by association (Driscoll, 2005). Propositional model link part and parcels of understanding stored as propositions defined as patterns of activation (Driscoll, 2005). Method of juxtaposition through meaningful relationships reveals any two things can be linked (Driscoll, 2005). ACT is the most compatible with constructivism because of its ability to operate all the time and make adaptations to behaviour. Moreover, ACT-R adds a mechanism of knowledge compilation which allows for new rules to be established when new problems are presented and addresses the constructivist information-processing perspective (Driscoll, 2005).

Constructivist Learning Goals

According to Driscoll (2005), the constructivist identify in learning relevant context and meaningful activity. The learning process continuous with critical thinking and collaboration skills (Driscoll, 2005). A common downside in Constructivist theory is a lack of attention on student behaviour in prerequisite and entry skills over higher-order goals consequently some students having a inability to focus on learning objectives rather than playing (Driscoll, 2005). To avoid this pitfall and best service students, the constructivist teacher needs to guide students to the zone of proximal development which provides just enough guidance to facilitate task expectations (Driscoll, 2005). Therefore, the constructivist teacher ability and scaffolding should aim to maximize the learner's abilities, capabilities, and needs to best service them (Driscoll, 2005). Although, the onus is on the learner to discover their gaps and problem solve to achieve desired improvements (Driscoll, 2005).
Conditions for Learning

1. Embed learning in complex, realistic, and relevant environments (Driscoll, 2005).
   - Students must be given rich learning environments, tools, content of learning, and opportunities to enable and deal with complex learning (Driscoll, 2005).

2. Provide for social negotiations as an integral part of learning (Driscoll, 2005).
   - Collaboration is an essential component in the learning environment because the transmission or culture of sharing allows for multiple points of view and transforms all parties (Driscoll, 2005).

   - Using juxtapositions and viewing information with multiple sensory modes such as visual, auditory and tactile enables more information to be received (Driscoll, 2005).

4. Encourage ownership in learning (Driscoll, 2005).
   - The learning environment should be centralized with an authentic context to the learner with the role of teacher as a resource or coach (Driscoll, 2005).

   - Learners use metacognition with reflexivity to prompt awareness and attitude towards creating meaning within their limited context to a worldly viewpoint (Driscoll, 2005). This is an essential component to goal acquisition such as reasoning, understanding multiple perspectives and position commitment (Driscoll, 2005).

Methods of Instruction (Driscoll, 2005)

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<th>Instructional Goals</th>
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<td>Complex, realistic and relevant environments that incorporate authentic activity</td>
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<td>Retention, understanding</td>
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Methods of Instruction include:

- Microworlds and Hypermedia
- Collaborative Learning and Problem Scaffolding
- Goal-Based Scenarios and Problem-Based Learning
- Software Shells and Course Management Tools
Microworlds and Hypermedia

Microworlds are complete small subsets of real environments such as LOGO (Driscoll, 2005). Microworlds have two distinct characteristics. First, the point of entry matches learners cognitive state (Driscoll, 2005). Second, Microworlds embody the most simplistic model of a domain or system (Driscoll, 2005). Hypermedia is interfaced on microcomputers with networking abilities which can be accessed by multiple users at the same time (Driscoll, 2005). Design strategies are varied with vast amounts of information such as research data, photographs, descriptions, and definitions, etc. (Driscoll, 2005). Microworlds can be expensive to design and produce conversely hypermedia is an alternative because it is more cost effective and accessible (Driscoll, 2005). Both methods are student-centered with rich and provide authentic activity in addition to social negotiation and reflexivity within certain instructional contexts (Driscoll, 2005).

Collaborative Learning and Problem Scaffolding

Groupware is software designed for groups to facilitate and manage group interactions (Driscoll, 2005). Computer-supported collaborative learning (CSCL) are designed for learners to connect inside and outside the classroom and access to experts with on-line support while problem scaffolding (Driscoll, 2005). CSCL provide learners with easily goal-setting and monitor tools to track theirs and possibly other learners progress (Driscoll, 2005).

Goal-Based Scenarios and Problem-Based Learning

Goal-based scenarios in a task environment present clear goals to be achieved (Driscoll, 2005). This environment gives the learner practice to develop their skills (Driscoll, 2005). Problem-based learning allows learners to work in collaborative groups to solve realistic problems using a variety of resources such as technology (Driscoll, 2005). Problem-based learning includes: systematically identifying the nature of a problem, assigns tasks, gather and consult to arrive at a solution, and then reevaluates solution with group strategies (Driscoll, 2005).

Software Shells and Course Management Tools

Software Shells are empty content available to be adapted to a user's application for example, Bubble Dialogue, STAR LEGACY and Construe. Bubble Dialogue allows students to fill in a comic strip to create conversations. STAR LEGACY allows students to fulfill a learning cycle by accepting a challenge, brainstorming ideas, test understanding, and publish results to gain external feedback. This tool clearly identifies to the teacher areas the learner needing attention in the learning process therefore further student learning development (Driscoll, 2005). Construe is a course management tool with features such as student conferencing system, opinions on articles, and publish reports (Driscoll, 2005). These methods of instruction using constructivist strategies are increasing in popularity as user-friendly computer technologies gain accessibility (Driscoll, 2005).

Summary of Constructivist Theory

Constructivism is a multitude of approaches with a less apparent identity in theory or a philosophy (Driscoll, 2005). However, according to Driscoll (2005) agreed upon Constructivist Theory is as follows:

- Only the active learner is a successful learner.
- Learning from examples and learning by doing enable earners to achieve deep levels of understanding.
- Learning with understanding is what is desired, not rote learning.
Resources