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Learning Theories and Instruction
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Learning Theories and Instruction

For aesthetics and ease of use, I've linked the matrix contents to corresponding bookmarks within the document. To access specific content, scroll down through the document, or hold Control (ctrl) on your keyboard when you click a link inside the matrix.

Learning Theory Matrix						
Definitive Questions for Learning Theories	**Behaviorist Theory**	**Cognitive Theory**	**Constructivist Theory**	**Social Learning Theory**	**Connectivism**	**Adult Learning**
How does learning occur?	Behaviorist Learning	Cognitive Learning	Constructivist Learning	Social Learning	Connectivism Learning	Adult Learning
What factors influence learning?	Behaviorist Influences	Cognitive Influences	Constructivist Influences	Social Learning Influences	Connectivism Influences	Adult Learning Influences
What is the role of memory?	Behaviorism and Memory	Cognitive Theory and Memory	Constructivism and Memory	Social Learning and Memory	Connectivism and Memory	Adult Learning and Memory
How does transfer occur?	Behaviorist Learning Transfer	Cognitive Learning Transfer	Constructivist Learning Transfer	Social Learning Transfer	Connectivism Learning Transfer	Adult Learning Transfer
What types of learning are best explained by this theory?	Learning Types explained by Behaviorism	Learning Types explained by Cognitive Theory	Learning Types explained by Constructivist Theory	Learning Types explained by Social Learning Theory	Learning Types explained by Connectivism	Learning Types explained by Adult Learning
How is technology used for learning in your industry?	Behaviorism and Instructional Design	Cognitive Theory and Instructional Design	Constructivist Theory and Instructional Design	Social Learning and Instructional Design	Connectivism and Instructional Design	Adult Learning and Instructional Design

"Instructional designers have been charged with 'translating principles of learning and instruction into specifications for instructional materials and activities'. To achieve this goal, two sets of skills and knowledge are needed. First, a designer must understand the position of the practitioner… In addition to understanding and analyzing the problem, a second core of knowledge and skills is needed to 'bridge' or 'link' application with research – that of understanding the potential sources of solutions. Through this understanding, a proper prescriptive solution can be matched with a given diagnosed problem. The critical link, therefore, is not between the design of instruction and an autonomous body of knowledge about *instructional* phenomena, but between instructional design issues and the theories of human *learning*."(Ertmer & Newby, pg 50 - 51)

Behaviorist Learning

Behavioral learning is focused around understanding and changing a learner's behavior. In order for behavior learning to be effective, it must be observable and measurable

"Behaviorism equates learning with changes in either form or frequency of observable performance. Learning is accomplished when a proper response is demonstrated following the presentation of a specific environmental stimulus." (Ertmer & Newby, 1993) This theory centers on the importance of consequences and reinforcement. Reaction to conditions shape learning.

"In assuming that human behavior is learned, behaviorists also hold that all behaviors can also be unlearned, and replaced by new behaviors; that is, when a behavior becomes unacceptable, it can be replaced by an acceptable one. A key element to this theory of learning is the rewarded response. The desired response must be rewarded in order for learning to take place." (Standridge, 2001)

Return to Matrix

Behaviorist Influences

Behavioral learning influenced both by the learner's abilities and prior knowledge, and the learner's environment. These conditions should be considered by the instructional designer when designing, developing and delivering curriculum in order to achieve the desired behavior change.

"Although both learner and environmental factors are considered important by behaviorists, environmental conditions receive the greatest emphasis." (Ertmer & Newby, 1993) Arranging the stimuli and consequences in an environment are arguably the most critical factors.

"John B. Watson (1878-1958) and B. F. Skinner (1904-1990) are the two principal originators of behaviorist approaches to learning. Watson believed that human behavior resulted from specific stimuli that elicited certain responses. Watson's basic premise was that conclusions about human development should be based on observation of overt behavior rather than speculation about subconscious motives or latent cognitive processes. Watson's view of learning was based in part on the studies of Ivan Pavlov (1849-1936)." (Standridge, 2001)

Return to Matrix

Behaviorism and Memory

Memory is not commonly discussed in Behaviorism. "Although the acquisition of 'habits' is discussed, little attention is given as to how these habits are stored or recalled for future use. Forgetting is attributed to the 'nonuse' of a response over time." (Ertmer & Newby, 1993)

"Behaviorist techniques have long been employed in education to promote behavior that is desirable and discourage that which is not. Among the methods derived from behaviorist theory for practical classroom application are contracts, consequences, reinforcement, extinction, and behavior modification." (Standridge, 2001)

Return to Matrix

Behaviorist Learning Transfer

Learning Transfer refers to the ability of a learner to apply previously learned knowledge to new and/or different situations compared to a previous context. "In behavioral learning theories, transfer is a result of generalization. Situations involving identical or similar features allow behaviors to transfer across common elements." (Ertmer & Newby, 1993)

Return to Matrix

Learning Types explained by Behaviorism

Behaviorism is supportive of the basic acquisition of general knowledge, "however it is generally agreed that behavioral principles cannot adequately explain the acquisition of higher level skills or those that require a greater depth of processing." (Ertmer & Newby, 1993)

"Modeling is also known as observational learning. Albert Bandura has suggested that modeling is the basis for a variety of child behavior. Children acquire many favorable and unfavorable responses by observing those around them... Shaping is the process of gradually changing the quality of a response. The desired behavior is broken down into discrete, concrete units, or positive movements, each of which is reinforced as it progresses towards the overall behavioral goal. Cueing may be as simple as providing a child with a verbal or non-verbal cue as to the appropriateness of a behavior." (Standridge, 2001)

Return to Matrix

Behaviorism and Instructional Design

Behaviorists place "an emphasis on producing observable and measurable outcomes in students." (Ertmer & Newby, pg 56) This applies to an Instructional Designer in how the performance objectives are written and assessed. Depending on the content being delivered, the designer can match the type of assessment to meet the objective practically showing mastery. "Behaviorism equates learning with changes in either the form or frequency of observable performance." (Ertmer & Newby, 1993)

Walter Dick and Lou Carey encourage a systems approach model for designing instruction. They believe there is a predictable link between stimuli and the learner response, based on the behaviorist theory. The basic steps in the Dick and Carey instructional design model are:

1. Determine instructional goal
2. Analyze the instructional goal
3. Analyze learners and contexts
4. Write performance objectives
5. Develop assessment instruments
6. Develop instructional strategy
7. Develop and select instructional materials
8. Design and conduct formative evaluation
9. Revise instruction
10. Summative evaluation

(Dick & Carey, 1996)

"Specific assumptions or principles that have direct relevance to instructional design include the following:

- Behavioral objectives, task analysis, criterion-referenced assessment
- Learner analysis
- Sequencing of instructional presentation, mastery learning
- Tangible rewards, informative feedback
- Simple to complex sequencing of practice use of prompts"
  (Ertmer & Newby, 1993)

Return to Matrix

Cognitive Learning

Cognitive learning has its place in curriculum design and instruction. The idea of cognitive design is that a desired outcome can be achieved based on certain stimulus.

"Learning is equated with discrete changes between states of knowledge rather than with changes in the probability of response. Cognitive theories focus on the conceptualization of students' learning processes and address the issues of how information is received, organized, stored and retrieved by the mind." (Ertmer & Newby, 1993) The learner is considered an active participant in knowledge acquisition.

"An issue with cognitive information processing theories is that they primarily describe learning rather than explaining it." (Ormrod, Schunk, & Gredler, p. 99)

Return to Matrix

Cognitive Influences

Cognitive learning is influenced by psychological and brain studies. Understanding how the brain works and effects a learners capabilities at learning and retaining knowledge is important to the way curriculum is designed, developed and delivered.

"Cognitive theories contend that environmental "cues" and instructional components alone cannot account for all the learning that results from an instructional situation…The real focus of the cognitive approach is on changing the learner by encouraging him/her to use appropriate learning strategies." (Ertmer & Newby, 1993)

"Early studies by Bruner, Goodnow, and Austin (1956) explored the nature of concepts…The behavioral theory position on concept learning is that people learn associations gradually and that learnding builds up slowly." (Ormrod, Schunk, & Gredler, p. 105)

Return to Matrix

Cognitive Theory and Memory

The cognitive learning theory perhaps contains perhaps the most information about how the brain and memory work in learning. It is not only the physiology of the brain, but its processes and the relation between stimulus and outcome that are most valuable to this theory.

"Learning results when information is stored in memory in an organized, meaningful manner. Teachers/designers are responsible for assisting learners in organizing that information in some optimal way. Designers use techniques such as advanced organizers, analogies, hierarchical relationships and matrices to help learners relate new information to prior knowledge." (Ertmer & Newby, 1993)

Learner Variables:
"Older children were also more aware that their memory abilities differ from one context to another. Children of the same age showed variations in memory abilities." (Ormrod, Schunk, & Gredler, p. 103) "Learners' abilities to monitor how well they have done on a memory task also vary. Older children are more accurate in judging whether they have recalled all items they were to recall and whether they can recall information." (Ormrod, Schunk, & Gredler, p. 103)"

Task Variables:
"Knowing the relative difficulty of different forms of learning and retrieving from memory various types of information are parts of metacognitive awareness…Older children are more likely to believe that organized stories are easier to remember than disorganized pieces of information." (Ormrod, Schunk, & Gredler, p. 103)

Strategy Variables:
"Metacognition depends on the strategies learners employ…Older children are able to state more things they can do to help them remember. Regardless of age, children are more likely to think of external things (e.g. write a note) than internal ones (e.g. think about doing something)." (Ormrod, Schunk, & Gredler, p. 103)
"Simply generating a strategy does not guarantee its use…Older learners understand that the stem intention to use a strategy leads to strategy use, which produces an outcome." (Ormrod, Schunk, & Gredler, p. 103)

Return to Matrix

Cognitive Learning Transfer

The cognitive learner transfers information based on the way it is delivered, prior knowledge of the subject, and the learning environment. All of these things should be considered when designing, developing and delivering training.

"Prior knowledge is used to establish boundary constraints for identifying the similarities and differences of novel information. Not only must the knowledge itself be stored in memory but the uses of that knowledge as well. Specific instructional or real world events will trigger particular responses, but the learner must believe that the knowledge is useful in a given situation before he will activate it." (Ertmer & Newby, 1993)

"Conditional knowledge is understanding when and why to employ forms of declarative and procedural knowledge." (Ormrod, Schunk, & Gredler, p. 100) "Metacognition refers to the deliberate conscious control of cognitive activity (Brown, 1980)." (Ormrod, Schunk, & Gredler, p. 101)

"Metacognition comprises two related skills. First, one must understand what skills, strategies, and resources a task requires…Second, one must know how and when to use these skills and strategies to ensure the task is completed successfully." (Ormrod, Schunk, & Gredler, p. 101)

Return to Matrix

Learning Types explained by Cognitive Theory

Because the cognitive theory is based on the brain, its processes and behaviors, pieces of the cognitive theory can be found in many of the other learning theories, philosophies and strategies.

"Because of the emphasis on mental structures, cognitive theories are usually considered more appropriate for explaining complex forms of learning (reasoning, problem-solving, information-processing) than are those of a more behavioral perspective…Two techniques used by both camps in achieving this effectiveness and efficiency of knowledge transfer are simplification and standardization…Behaviorists would focus on the design of the environment to optimize that transfer, while cognitivists would stress efficient processing strategies." (Ertmer & Newby, 1993)

"…computer-based learning environments can serve as metacongitive tools to foster students' self-regulated learning (Azevendo, 2005a, 2005b)." (Ormrod, Schunk, & Gredler, p. 100)

Return to Matrix

Cognitive Theory and Instructional Design

Understanding the cognitive theory and its implications on learning is important for an instructional designer. It should be the intent of the instructional designer to design, develop and deliver curriculum with a concrete understanding of the learners, content and learning environment. Because pieces of the cognitive theory can be found in other learning theories, this is an especially important area of learning and theory instruction.

"Cognitive psychology has influenced the types of goals and objectives that are developed as a result of task analysis. (Smith & Ragen, 1999) Observable performance objectives are written to show understanding of the prescribed performance. Bloom's Taxonomy speaks more to cognitive domain and the level of understanding desired in a learner." (Ertmer & Newby, 1993)

"Cognitivists conduct learner analyses to determine a learner's predisposition to learning and decide how to design instruction so that it can be assimilated according to the learner's existing mental structure. (Ertmer & Newby, 1993) Learner characteristics are considered when a designer plans which instructional techniques, or learning strategies, to use in the instruction. (Smith & Ragen, 1999) Strategies based in cognitivism center around structuring, organizing and sequencing information. Examples of these strategies could include outlining, summarizing, synthesizing and advanced organizers." (Ertmer & Newby, 1993)

"During task analysis, goal statements are transformed into a format that can be used to guide the rest of the instructional design process. (Smith & Ragen, 1999) After the task analysis is completed, the designer has made a list of goals explaining what the learners should know, or be able to do, when the instruction is finished, including prerequisite skills and knowledge necessary for reaching the goals. A prerequisite is something a person must know or be able to do before they are able to learn something else. (Smith & Ragen, 1999) Understanding the difference between where the learner begins and where the learner needs to end is important for writing objectives and developing the materials." (Ertmer & Newby, 1993)

"Specific assumptions or principles that have direct relevance to instructional design include:

- Learner control, metacognitive training (e.g. self-planning, monitoring, and revising techniques).
- Cognitive task analysis procedures.
- Use of cognitive strategies such as outlining, summaries, synthesizers, advanced organizers, etc.
- Recall of prerequisite skills; use of relevant examples, analogies."

(Ertmer & Newby, 1993)

Return to Matrix

Constructivist Learning

I identify most with constructivist learning. The bases of this philosophy is that the learner constructs his/her own knowledge based on personal experience. It is important for the instructional designer to plan for a variety of activities/experiences that will allow the learner to meet the curriculum objectives.

"Constructivism is a theory that equates learning with creating meaning from experience. Even though constructivism is considered to be a branch of cognitivism, it distinguishes itself from traditional cognitive theories in a number of ways...Learners do not transfer knowledge from the external world into their memories; rather they build personal interpretations of the world based on individual experiences and interactions. Thus, the internal representation of knowledge is constantly open to change; there is not an objective reality that learners strive to know." (Ertmer & Newby, 1993)

"Constructivism is not a theory but rather an epistemology, or philosophical explanation about the nature of learning (Simpson, 2002)." (Ormrod, Schunk, & Gredler, p. 184)

Return to Matrix

Constructivist Influences

Because constructivism isn't a learning theory, per say, it is influenced by a number of cognitive and behaviorist ideas and strategies. It is the intent of the learning and the content that should influence how these ideas are built into a constructivist-based curriculum.

"Both learner and environmental factors are critical to the constructivist, as it is the specific interaction between these two variables that creates knowledge. Constructivists argue that behavior is situationally determined...it is critical that learning occur in realistic settings and that the selected learning task be relevant to the students' lived experience." (Ertmer & Newby, 1993)

"People produce knowledge based on their beliefs and experiences in situations (Cobb & Bowers, 1999) which differ from person to person." (Ormrod, Schunk, & Gredler, p. 184)

"Constructivism contrasts with conditioning theories that stress the influence of the environment on the person; constructivist theory also contrasts with cognitive information processing theory that places the locus of learning within the mind with little attention to the context in which it occurs. It shares with social cognitive theory the assumption that person, behaviors, and environments interact in reciprocal fashion (Bandura, 1986, 1997). (Ormrod, Schunk, & Gredler, p. 185) "Constructivism also has influenced educational thinking about curriculum and instruction...Constructivist ideas are also found in many professional standards and affect the design of curriculum and instruction, such as the learner-centered principles developed by the APA. (Ormrod, Schunk, & Gredler, p. 185)

Return to Matrix

Constructivism and Memory

The impact of memory as it impacts constructivism is dependent on the learner. Knowledge is constructed and connected to prior knowledge based on personal experience. Recall is dependent on the learners ability to apply the knowledge to a variety of situations and contexts.

The constructivist theory supports situated cognition. "Situated cognition (or learning) involves relations between a person and a situation; cognitive processes do not reside solely in one's mind (Greeno, 1989)." (Ormrod, Schunk, & Gredler, p. 186)

"A concept will continue to evolve with each new use as new situations, negotiations, and activities recast it in a different, more densely textured form. Therefore, 'memory' is always under construction as a cumulative history of interactions…The emphasis is not on retrieving intact knowledge structures, but on providing learners with the means to create novel and situation-specific understandings by 'assembling' prior knowledge from diverse sources appropriate to the problem at hand." (Ertmer & Newby, 1993)

Return to Matrix

Constructivist Learning Transfer

Transferring knowledge through constructive learning is based on the learners ability to process information on a higher level, being able to relate experiences, contexts, and situations that are not traditionally related outside of a classroom or real life experience.

"The constructivist position assumes that transfer can be facilitated by involvement in authentic tasks anchored in meaningful contexts…An essential concept in the constructivist view is that learning always takes place in a context and that the context forms an inexorable link with the knowledge imbedded in it. Therefore, the goal of instruction is to accurately portray tasks, not to define the structure of learning required to achieve a task." (Ertmer & Newby, 1993)

"Students exposed to a certain procedure for learning a subject experience situated cognition for that method; in other words, that is how this content is learned." (Ormrod, Schunk, & Gredler, p. 187)

"The instructional implication is that teaching methods should reflect the outcomes we desire in our learners…the method and the content must be properly situated." (Ormrod, Schunk, & Gredler, p. 187)

Return to Matrix

Learning Types explained by Constructivist Theory

Because constructivist learning can be applied to a variety of learning styles it is easy to implement in a variety of situations. It is the instructional designers job to design and develop curriculum with experiential learning in mind. It is the facilitators job to execute the designers intent in constructing knowledge based on experience.

"Constructivists believe that it is impossible to isolate units of information or divide up knowledge domains according to a hierarchical analysis of relationships...Constructivist learning environments are most effective for the stage of advanced knowledge acquisition, where initial misconceptions and biases acquired during the introductory stage can be discovered, negotiated, and if necessary, modified and/or removed." (Ertmer & Newby, 1993)

"Nature may constrain our thinking more than we wish to admit...Constructivism – with its emphasis on minimal instruction guidance – may downplay the importance of human cognitive structures. Instructional methods that are mapped better onto this cognitive structure may actually produce better learning (Kirschner, Sweller, & Clark, 2006)." (Ormrod, Schunk, & Gredler, p. 188)

Return to Matrix

Constructivist Theory and Instructional Design

It is the job of the instructional designer to determine the best possible practices for designing, developing, and delivering curriculum for constructivist learners if it is the desired strategy.

"Constructivist perspectives have important implications for instruction and curriculum design (Phillips, 1995). The most straightforward recommendations are to involve students actively in their learning and to provide experiences that challenge their thinking and force them to rearrange their beliefs." (Ormrod, Schunk, & Gredler, p. 188)

"Some of the specific strategies utilized by constructivists include situating tasks in real world contexts, use of cognitive apprenticeships (modeling and coaching a student toward expert performance), presentation of multiple perspectives (collaborative learning to develop and share alternative views), social negotiation (debate, discussion, evidence-giving), use of examples as real 'slices of life' reflective awareness, and providing considerable guidance on the use of constructive processes. The following are several specific assumptions or principles from the constructivist position that have direct relevance for the instructional designer:

- Anchoring learning in meaningful contexts
- Actively using what is learned
- Revisiting context at different times, in rearranged contexts, for different purposes, and from different conceptual perspectives
- Developing pattern-recognition skills, presenting alternative ways of representing problems
- Presenting new problems and situations that differ from the conditions of the initial instruction"

(Ertmer & Newby, 1993)

Return to Matrix

Social Learning

Social learning is the synthesis of a learners societal expectations, the reality they build from those expectations, and the knowledge transferred through social interactions in that reality based on motivation.

"Social constructivism emphasizes the importance of culture and context in understanding what occurs in society and constructing knowledge based on this understanding...Social constructivism is based on specific assumptions about reality, knowledge, and learning. To understand and apply models of instruction that are rooted in the perspectives of social constructivists, it is important to know the premises that underlie them.

> **Reality**: Social constructivists believe that reality is constructed through human activity. Members of a society together invent the properties of the world. For the social constructivist, reality cannot be discovered: it does not exist prior to its social invention.
> **Knowledge**: To social constructivists, knowledge is also a human product, and is socially and culturally constructed. Individuals create meaning through their interactions with each other and with the environment they live in.
> **Learning**: Social constructivists view learning as a social process. It does not take place only within an individual, nor is it a passive development of behaviors that are shaped by external forces. Meaningful learning occurs when individuals are engaged in social activities."
> (Kim, 2001)

Return to Matrix

Social Learning Influences

People are naturally social animals, who have learned and evolved through thousands of years of social interactions. It is only natural that social learning be considered as a method for delivering/receiving information. Certainly culture, geography, age, and cognitive abilities influence the effectiveness of social learning.

"Historical developments inherited by the learner as a member of a particular culture. Symbol systems, such as language, logic, and mathematical systems, are learned throughout the learner's life. These symbol systems dictate how and what is learned.

The nature of the learner's social interaction with knowledgeable members of the society is important. Without the social interaction with more knowledgeable others, it is impossible to acquire social meaning of important symbol systems and learn how to use them. Young children develop their thinking abilities by interacting with adults." (Kim, 2001)

Return to Matrix

Social Learning and Memory

Social learning is closely related to cognitivism and constructivism when it comes to memory. It is always appropriate for the learner to understand his/her learning abilities (and memory) when considering a learning method/environment.

"Social constructivists see as crucial both the context in which learning occurs and the social contexts that learners bring to their learning environment. There are four general perspectives that inform how we could facilitate the learning within a framework of social constructivism (Gredler, 1997): Cognitive tools perspective, Idea-based social constructivism, pragmatic or emergent approach and the transactional or situated cognitive perspectives." (Kim, 2001)

Return to Matrix

Social Learning Transfer

Social learning transfer is most effective when the learner is in a supportive environment, and he/she is comfortable with the concept. Internal motivation also influences the transfer of information in a social learning environment.

"Intersubjectivity not only provides the grounds for communication but also supports people to extend their understanding of new information and activities among the group members (Rogoff, 1990; Vygotsky, 1987). Knowledge is derived from interactions between people and their environments and resides within cultures (Shunk, 2000; McMahon, 1997). The construction of knowledge is also influenced by the intersubjectivity formed by cultural and historical factors of the community (Gredler, 1997; Prawat & Floden, 1994). When the members of the community are aware of their intersubjective meanings, it is easier for them to understand new information and activities that arise in the community." (Kim, 2001)

Return to Matrix

Learning Types explained by Social Learning Theory

The constructivist learning theory is very close to the social learning theory in that the learner must construct their own understanding and apply it to appropriate situations.

"Instructional models based on the social constructivist perspective stress the need for collaboration among learners and with practitioners in the society (Lave & Wenger, 1991; McMahon, 1997). Lave and Wenger (1991) assert that a society's practical knowledge is situated in relations among practitioners, their practice, and the social organization and political economy of communities of practice. For this reason, learning should involve such knowledge and practice (Lave & Wenger, 1991; Gredler, 1997). Social constructivist approaches can include reciprocal teaching, peer collaboration, cognitive apprenticeships, problem-based instruction, webquests, anchored instruction and other methods that involve learning with others (Shunk, 2000)." (Kim, 2001)

Return to Matrix

Social Learning and Instructional Design

Social learning is probably most effective in a traditional classroom environment where all communication (verbal and non verbal) can be interpreted and responded to. An on-line classroom (or social networking site) is a valuable place to construct ideas and collaborate with peers; however it is the facilitators job to guide the learners to the stated objectives of the curriculum.

Furthermore, the instructional designer should have a clear idea of the learning environment and understand the perspective audience when designing and developing for social learning application.

Return to Matrix

Connectivism Learning

Technology greatly influences and encourages connectivist learning. The more time a learner spends in his/her network, the more potential for effective learning and growth of the network.

Learning occurs "distributed within a network, social, technologically enhanced, recognizing and interpreting patterns." (Davis, Edmunds, & Kelly-Bateman, 2008)

"Principles of Connectivism:

- Learning and knowledge rest in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known.
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities."
  (Davis, Edmunds, & Kelly-Bateman, 2008)

Return to Matrix

Connectivism Influences

Connectivism is influenced by the network of the learner. If a network is diverse, reliable and allows room for growth, the learner will continue to be influenced by their network.

The factors that influence learning are the "diversity of network". (Davis, Edmunds, & Kelly-Bateman, 2008)

"At its core, George Siemens' theory of connectivism is the combined effect of three different components: chaos theory, importance of networks, and the interplay of complexity and self-organization.

Chaos Theory
The idea behind Chaos Theory is that, regardless of how unrelated events may seem, when studied together, they create a pattern that can show relevance beyond the individual events themselves (Salmon, 1999, para. 5). This creates what Gleick refers to as a "sensitive dependence on initial conditions" (1987, p.8). Basically, if the underlying conditions used to make decisions change, the decision itself is no longer as correct as it was at the time it was made. "The ability to recognize and adjust to pattern shifts, therefore, becomes a key learning task" (Siemens, 2005, para. 18).

Connectivism Influences, continued

Importance of Networks

According to Siemens, "considering technology and meaning-making as learning activities begins to move learning into the digital age" (2005, para. 15). Inherent to this new viewpoint on learning is the idea that we can no longer personally experience everything there is to experience as we try to learn something new. We must create networks which, simply defined, are connections between entities. By using these networks - of people, of technology, of social structures, of systems, of power grids, etc. - learning communities can share their ideas with others, thereby "cross-pollinating" the learning environment (Siemens, 2005, para. 21).

Complexity and Self-Organization

Heylighen (2008) describes the delicate interplay between complexity and self-organization as follows: "Complexity cannot be strictly defined, only situated in between order and disorder. A complex system is typically modeled as a collection of interacting agents, representing components as diverse as people, cells or molecules. Because of the non-linearity of the interactions, the overall system evolution is to an important degree unpredictable and uncontrollable. However, the system tends to self-organize, in the sense that local interactions eventually produce global coordination and synergy. The resulting structure can in many cases be modeled as a network, with stabilized interactions functioning as links connecting the agents" (p. 1). In addition, Luis Mateus Rocha (1998) defines self-organization as the "spontaneous formation of well organized structures, patterns, or behaviors, from random initial conditions" (p.3)."
(Davis, Edmunds, & Kelly-Bateman, 2008)

Return to Matrix

Connectivism and Memory

The importance of memory in connectivism is attached to the motivation behind the learner. A learner is more apt to remember information if it is meaningful and can be applied in a way that supports additional learning.

In connectivism, memory builds "adaptive patterns, representative of current state, existing in networks." (Davis, Edmunds, & Kelly-Bateman, 2008)

"New technology forces the 21st century learner to process and apply information in a very different way and at a very different pace from any other time in history. As a result, the span of time between learning something new, being able to apply it, and finding that it is outdated and no longer useful continues to decrease. This phenomenon is what Gonzalez refers to as the "half-life" of knowledge - the time span from when knowledge is gained until it becomes obsolete (2004). Since the advent of technology, from the radio to the internet, the half-life of knowledge has decreased significantly." (Davis, Edmunds, & Kelly-Bateman, 2008)

Return to Matrix

Connectivism Learning Transfer

Connectivist learning typically comes from a network of information they have created, or been given access to. A network can be comprised of websites, blogs, books, communities or groups, classes, family and/or friends, to name a few. The transfer occurs when the learner has made connections between what they want to learn, where to learn how to do it, and if it's a reliable source. Self-directed learners often have successful networks for learning.

Knowledge transfer occurs in connectivism when "connecting to (adding nodes)" existing networks. (Davis, Edmunds, & Kelly-Bateman, 2008)

Return to Matrix

Learning Types explained by Connectivism

There is limited information on the theory of connectivism because it is so new. The introduction of technology into learning has prompted a change in the way we design, develop and deliver information. Because this is the newest of the theories, I believe all previous theories have contributed to its inception. While this theory cannot support all of the strategies and ideas behind constructivism, cognitivism, behaviorism, I believe it's important to an instructional designer to take them into account when designing, developing and delivering training.

Learning theories best explained by connectivism are "complex learning, rapid changing core, and diverse knowledge sources." (Davis, Edmunds, & Kelly-Bateman, 2008)

Return to Matrix

Connectivism and Instructional Design

The concept of connectivism itself is supported by instructional design. A designer can build in a myriad of technology and networks to support effective learning. This can be accomplished through on-line training that provides links and attachments to additional information. An on-line classroom would also support connectivism in discussion and response portals, blog subscriptions and on-line libraries.

Return to Matrix

Adult Learning

Adult learning is very similar to young adult learning. Primary differences are going to be in their motivation, training content and learning environment. Self-directed learners are more common in adult learning if they have good motivation for acquiring the knowledge.

"Andragogy is the art and science of helping adults learn. Malcolm Knowles is the father of andragogy as he proposed five factors involved in adult learning.

The five assumptions underlying andragogy describe the adult learner as someone who:

- Has an independent self-concept and who can direct his or her own learning
- Has accumulated a reservoir of life experiences that is a rich resource for learning
- Has learning needs closely related to changing social roles
- Is problem-centered and interested in immediate application of knowledge
- Is motivated to learn by internal rather than external factors (Merriam, 2001, p.5)"

(Conlan, Grabowski, & Smith, 2003)

"Knowles used these principles to propose a program for the design, implementation and evaluation of adult learning. Since the development of his theory, Knowles has acknowledged that the principles he outlined did not apply solely to adult education. The development of the theory simply illustrates that the designer "should involve learners in as many aspects of their education as possible and in the creation of a climate in which they can most fruitfully learn" (Merriam, 2001, p.7). Knowles' main focus with the development of andragogy was the notion of the material being very learner centered and the learner being very self-directed.

Principles:

- Adults need to be involved in the planning and evaluation of their instruction
- Experience (including mistakes) provides the basis for learning activities
- Adults are most interested in learning about subjects that have immediate relevance to their job or personal life
- Adult learning is problem-centered rather than content-oriented"

(Conlan, Grabowski, & Smith, 2003)

Return to Matrix

Adult Learning Influences

In my experience, adult learners are influenced by different motivations and rewards than children. It is the job of the instructional designer that they keep their audience in mind when designing and developing training for adult learners.

"Learning opportunities for adults exist in a variety of settings ranging from a formal institution to a place of employment. It is important to acknowledge prior knowledge and experiences of learners, including their ability to recognize their own skills as lifelong learners. (Merriam, 1999).

Considerations for adult development and learning include biological and psychological development (including deterioration and disease processes that may occur) and sociocultural and integrative perspectives on development (Merriam, 1999). While the most common reason for adults to place themselves in a learning environment is a life-changing event, once in that environment there are many factors that affect the learning experience. The most significant is referred to here as the briefcase brought with them.

Briefcase may include:

- Life experience (including life altering events that affect cognitive abilities)
- Work experience (including development of thinking patterns based on this experience)
- Positive/negative previous adult learning experiences
- Performance affectors, including cognitive abilities
- Time between learning interactions
- Aging factors"

(Conlan, Grabowski, & Smith, 2003)

Return to Matrix

Adult Learning and Memory

The memory of a learner can be affected for a number of reasons ranging from birth defects to drug use to genetic age-related diseases. It is in the best interest of the learner that the type of learning environment be conducive to their cognitive abilities, as well as other factors.

"...training which focuses on specific types of cognition—e.g. memory, reasoning, concentration—can improve efficiency even as we age, but does not make us significantly more effective. A reason for these mixed results may be that the specific types of training selected emphasized tasks primarily performed by the frontal lobes of the brain. The frontal lobes make up 40% of the adult brain. It was the last part of the human brain to evolve and is the last part to mature. It is where we plan, organize, correct, control, and generate options. It is also the first part of the brain to shut down and deteriorate with physical and/or emotional stress caused by the demands of modern life." (Markus, 2003)

Return to Matrix

Adult Learning Transfer

Every human has a strong and preferred way to learn. It is the job of the instructional designer to design and develop curriculum with many learning styles in mind.

"There are seven primary factors that influence people's mental readiness for training and improved performance. The sum total of these represents learning's big picture, of which training is only one piece. We could develop the world's greatest training program, only to discover that six of seven key factors have been left unaddressed, creating diminished motivation and therefore, diminished performance." (Bouloutian, pg 42) The THINK model has seven key factors to designing effective adult learning:

1. "Expectations
    a. Objectives
    b. Sub-objectives
    c. Job description
2. Processes
3. Resources
    a. Equipment/systems
    b. Tools
    c. People
    d. Space/environment
    e. Budget
4. Incentives
    a. Compensation
    b. Communications
    c. Recognition
    d. Objectives
    e. Control
5. Training
6. Feedback
7. Motivation"

(Bouloutian, pg 42)

Return to Matrix

Learning Types explained by Adult Learning

I believe all the previously learned theories could be applied to adult learning, simply by adapting to the audience and the learning environment.

According to Adult Learning by Conlan, Grabowski & Smith, there are four learning theories linked to adult learning:

- Action learning
- Experiential learning
- Project Based Learning
- Self-directed learning

"**'Action learning** is defined as an approach to working with, and developing people, which uses work on a real project or problem as the way to learn. Participants work in small groups or teams to take action to solve their project or problem, and learn how to learn from that action. A learning coach works with the group in order to help them learn how to balance their work, with the learning from that work (O'Neil, 2000, p.44).'

Components of Action Learning:

- The first part of action learning is creating action groups based on programmed learning, "the expert knowledge" and learning or real world experiences. These are small groups, generally consisting on 3 or 4 people.
- Emphasis is placed on diversifying these small groups so that each group is best equipped to contribute to the learning community.
- A learning coach is designated for each group. Together, the learning coaches also form a group.
- From there, a project group leader is chosen. Both the project group leader and the learning coaches act as organizers, facilitators and overall motivators for the action groups (O'Neil, 2000).
- Action learning involves learning from experience through reflection and action with the support group.
- It is important that the groups remain constant and have duration, meaning the opportunity to establish themselves over a solid time period (Wade, 1999)."

(Conlan, Grabowski, & Smith, 2003)

"**Experiential learning** is a learning theory that is learner-centered and operates on the premise that individuals learn best by experience. A good way to describe this theory is "learning by doing". Experiential learning thus has the learner directly involved with the material being studied instead of just thinking and talking about that material.

Learning Types explained by Adult Learning, continued

Experiential learning:

- Is a cyclic process involving setting goals, thinking, planning, experimenting and making decisions, and finally action, followed by observing, reflecting and reviewing
- Uses participants' own experience and their own reflection about that experience, rather than lecture as the primary approach to learning. Experiential learning theory allows for the generation of understanding and allows for the transfer of skills and knowledge.
- Involves doing something and discovering what it is like, how it made the learner feel, what it meant to the learner, i.e. experiential learning is their experience and no one else's.
- Is, therefore, particularly effective in adult education as it addresses the cognitive, emotional and the physical aspect of the learner"

(Conlan, Grabowski, & Smith, 2003)

"In **Project Based Learning**, students work in groups to solve challenging problems that are authentic and often interdisciplinary. Learners decide how to approach a problem and what activities to pursue. This is comparable to the project based learning strategies as discussed in the ebook chapter Constructionism, Learning by Design, and Project Based Learning.

- The learners gather information from a variety of sources and synthesize, analyze, and derive knowledge from it.
- The learning is inherently valuable because it is connected to something real and involves adult skills such as collaboration and reflection.
- At the end, the learners demonstrate their newly-acquired knowledge and are judged by how much they have learned and how well they communicate it.
- Throughout this process, the teacher's role is to guide and advise, rather than to direct and manage student work."

(Conlan, Grabowski, & Smith, 2003)

"There are three categories involved with **self-directed learning**: the goals, the process, and the learner. In an adult learning context, the goals are generally self-determined, as is the process. Self-directed learning can be enhanced with facilitation, particularly through providing resources. Motivation is key to a successful self-directed learning experience. This is very similar to the motivation that takes place in children during a self-regulated learning experience as mentioned in the Motivation Chapter of the ebook.

Adult Learners are motivated by the opportunity to:

- Gain new skills, knowledge, and attitudes to improve their work performance
- Improve family life and health, enjoy the arts and physical recreation, participate in a hobby, or simply increase their intellectual capital"

(Conlan, Grabowski, & Smith, 2003)

Return to Matrix

Adult Learning and Instructional Design

My current job in instructional design has me currently working with adults in a corporate environment. Previous experience teaching children in public schools prepared me for the basics of developing and delivering curriculum. Once I entered the adult training realm, I only need to adjust my strategy for adult learners. Mostly this has meant reevaluating the learner's motivation, and the age appropriateness of the material.

"Much of adult learning occurs in a corporate environment involving a variety of training processes. In addition to applying the various learning styles discussed in previous ebook chapters, trainers/facilitators in such environments need to have a working skill set to meet the demands of fast-paced, changing environments. New trends involve instructional designers and facilitators becoming long-term assets to training departments. Expectations are for trainers to arrive not only with delivery skills, but also with design experience and application of learning theories in a variety of settings (Meyer, 2003).

The most significant trend that continues to make an impact on facilitators is the demand for the incorporation of technology into the content and delivery of professional development (King, 2003).

The professional development toolkit for trainers should include:

- The basics of design and delivery - needs assessment, developing objectives, creating an agenda, selecting appropriate activities, providing for transfer, and designing and conducting evaluation activities
- An understanding of diverse clients and their different learning styles
- The ability to read the context, assess needs, and select or create appropriate mini-learning sessions that are often delivered as just in time learning
- The use of reflective practice skills to make sense of their situation, tailoring learning solutions to their own and other local learning needs, developing and nurturing collaborative communities of practice
- The ability to coordinate university-based, certificate, and in-service programs designed as learning laboratories
- The ability to develop activities that increasingly involve active experiential learning and debriefings
- The ability to use more than one delivery system, particularly online and eLearning
- The use of learner-centered instruction, especially self-directed learning, means trainers will need to create better ways to include opportunities for reflection, clarification, and guidance."

(Conlan, Grabowski, & Smith, 2003)

"Professional development of facilitators of adults should promote dialogue, reflection, and quality. The integrative approach to professional development involves key elements (Lawler, 2003).

Adult Learning and Instructional Design, continued

Professional development:

- Is adult education
- Is learner centered
- Is transformative learning
- Needs to address motivation
- Needs to address technology learning

Training is critical in five areas today (Riddle, 2000). These areas - stimulating creativity, assessing innovation options, focusing on the customer, designing new services, and implementing change - require a broad range of skills on the part of the trainer. Development of trainers should include demonstrating multiple approaches to delivering the same information." (Conlan, Grabowski, & Smith, 2003)

Return to Matrix

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