

Module 3.1 Learning Philosophies

By
Bill Bennett



3 MAJOR LEARNING PHILOSOPHIES

- Behavioral
- Cognitive
- Constructivism

Behavioral Philosophy

- Study of observable behavior
- Instructional Systems Design (ISD) is based largely on behavioral psychology
- Emphasis on:
 - Behavioral objectives (by end of lesson student will be able to...)
 - Analyzing learning tasks and activities
 - Teaching to specific levels of learner performance

Proponents:

- Edward Thorndike (1913)
 - Operant conditioning
 - Use of rewards and punishment to modify behavior
- Ivan Pavlov (1927)
 - Classical conditioning
 - Conditioned stimulus = conditional response
- B.F. Skinner (1938, 1969, 1974)
 - Operant conditioning

B.F. Skinner (1938, 1969, 1974)

- Operant conditioning:
 - ***Positive reinforcement***
 - behavior that is followed by positive environmental effects increases in frequency
 - ***Negative reinforcement***
 - behavior that is followed by the withdrawal of negative environmental effects increases in frequency
 - ***Punishment***
 - behavior that is followed by negative environmental effects decreases in frequency
 - ***Extinction***
 - when behavior that was previously increased in frequency through reinforcement is no longer reinforced it decreases
 - ***Principle of intermittent reinforcement***
 - behavior that is always rewarded increases rapidly in frequency, but after the reward ceases the behavior also extinguishes rapidly. Behavior that is rewarded intermittently increases in frequency more slowly, but is more long lasting or resistant to extinction

Cognitive Philosophy

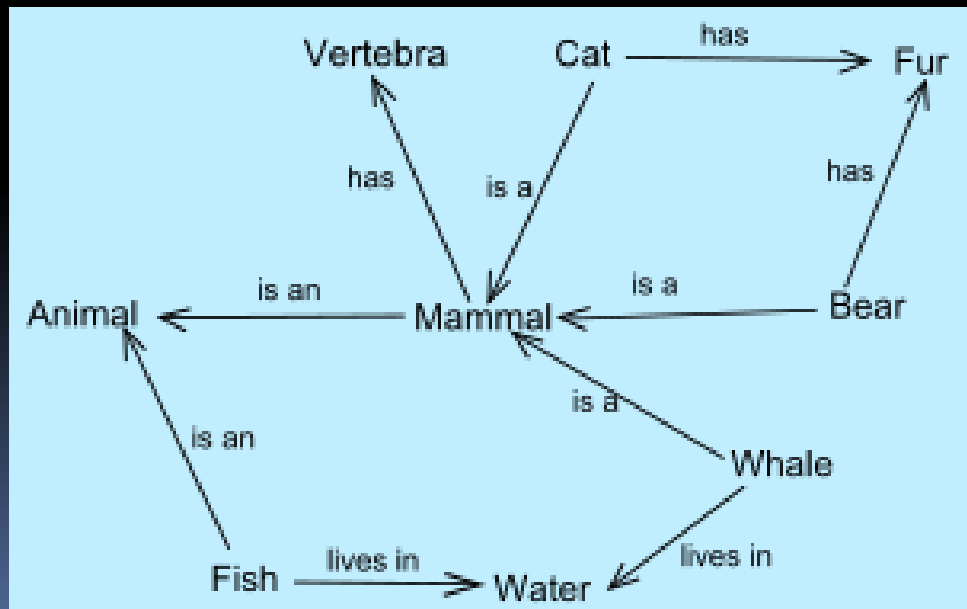
- Began in 1970s
- 3 models:
 - Information Processing
 - Semantic networks
 - Schema Theory

Information Processing

- Most dominant approach
- Studies how information In the world:
 - Enters through our senses (modality)
 - Becomes stored in memory (short-term & long-term)
 - Is retained or forgotten (transfer)
 - Is used (applied)

Semantic Networks

- Tries to parallel how biologists view the connections of the human brain
- Nodes of information connected by links characterized by similarity



Schema Theory

- Sir Frederick Bartlett (1932)
- Similar to Semantic Network theory

Areas of Cognitive Theory Most Related to Multimedia Design

- Perception and Attention
- Encoding of Information
- Memory
- Comprehension
- Active Learning
- Motivation
- Locus of Control
- Mental Models
- Metacognition
- Transfer of Learning
- Individual Differences

Perception and Attention

- Learning begins with attention to and perception of information
- Three main principles:
 - Information (visual or aural) must be easy to receive
 - The position (spatial or temporal) of information affects our attention to and perception of it
 - Differences and changes attract and maintain attention
- For perception of lesson elements to occur:
 - Attention must be initially attracted and maintained throughout lesson
 - Attention is affected and maintained by many characteristics of the learners themselves including:
 - Level of involvement in lesson
 - Personal interest in topic
 - Prior knowledge about content
 - Difficulty of the lesson for them
 - Novelty or familiarity of the information

Encoding of Information

- Lesson must be transformed into a format that can be stored in the brain
- Encoding depends on a number of factors including:
 - The format of the information in the environment
 - The medium of the information
 - Interrelationships of different information elements
- Principals of particular relevance to interactive multimedia
 - **Dual coding** (Clark & Paivio, 1995)
 - Learning is enhanced when complementary information is received simultaneously
 - Visuals with complimentary narration (good)
 - Narration while viewing conflicting text (bad)
 - **Multimedia effect** (Mayer, 1997; Mayer, Steinhoff, Bower, and Mars, 1995)
 - **Multiple symbol systems** (Dickson, 1985)

Memory

- Ensuring the important information can be recalled
- **Principle of organization**
 - Information is better retained if it is organized
 - More powerful than principle of repetition
 - Not always appropriate or convenient
 - When information has no inherent organization
 - When remembering large amounts of information
 - When automaticity is required
 - When motor or psychomotor skills are being learned
- **Principle of repetition**
 - Information is better retained the more it is practiced or used
- Affected by motivation and relevance of information to the learner

Comprehension

- Classify it, apply it, evaluate it, discuss it, manipulate it, and teach it to others
- Verbal information: being able to restate in own words or explain it to someone else
- Concepts: being able to distinguish examples from non-examples, including difficult discriminations and gray areas
- Rules and Principals: knowing when they apply and demonstrating correct application

Active Learning

- Emphasis of cognitive approach
- People learn not only from observation but also by doing
- Demonstrates importance in interactive multimedia programs
- Difficult to design interactions that are:
 - Frequent
 - Relevant
 - Interesting
 - Appropriate level of difficulty

Motivation

- Essential to learning
- 2 models used in multimedia design
 - Malone's Motivation Theory
 - Keller's ARCS Motivation Theory

Malone's Motivation Theory

- Intrinsic better than extrinsic in learning
- Four elements enhance intrinsic motivation
 - Challenge
 - Curiosity
 - Control
 - Fantasy

Challenge

- Should be individualized and adjusted for the learner
- Lesson should not be too easy or too difficult
- Uncertain outcomes increase challenge
- Vary challenge as performance improves

Curiosity

- Sensory curiosity
 - Aroused by surprising or attention getting visual and auditory effects
- Cognitive curiosity
 - Aroused by information that conflicts with learners existing knowledge or expectation, is contradictory or is in some way incomplete
- Learners are encouraged to seek new information that remedies conflict

Control

- 3 rules:
 - Contingency
 - Lessons that give feedback to learner's responses
 - Choice
 - Let learner determine sequence
 - Power
 - If learner's actions have powerful effects, lesson will be motivating

Fantasy

- Encourages learners to imagine themselves in imaginary contexts or events using vivid realistic images

Keller's ARC Motivation Theory

- ID must be proficient at:
 - Motivation design
 - Instructional design
 - Content design
- Four design considerations (ARCS):
 - Attention
 - Relevance
 - Confidence
 - Satisfaction

Attention

- Must be captured early and maintained
 - Curiosity one way to capture attention
 - Perceptual and content variety maintain attention

Relevance

- Showing learners what they will be learning is useful
- Fantasy examples from Malone are helpful
- Content and examples need to be interesting or important to learner

Confidence

- Make expectations for learning clear
- Provide reasonable opportunities to be successful
- Give the learner personal control

Satisfaction

- Enable users to apply what they have learned
- Provide positive consequences following progress
- Fairness is accomplished through:
 - lesson consistency
 - activities in keeping with stated objectives
 - intelligent and consistent evaluation of learners actions

Locus of Control

- Means whether control of sequence, content, methodology is controlled by learner, program, or a combination of both
- Higher achieving learners do better with more control than lower achievers
- Give perception of control while only providing partial control

Mental Models

- A representation in working memory that can be “run” by the learner to understand a system, solve problems, or predict events
- Use conceptual models to aid learner’s in acquiring or adjusting mental models
 - Computer diagrams
 - Animations
 - Video presentations

Metacognition

- The awareness of one's own cognition
- Metamemory
 - Awareness of how well one remembers or has remembered something
- Metacomprehension
 - Awareness of how well one is understanding something
- Researchers believe high achievers have good metacognition
- Four Learner Categories:
 - High cognition/High metacognition
 - High cognition/Low metacognition
 - Low cognition/High metacognition
 - Low cognition/Low metacognition
- Self-Awareness, reflection, self-assessment help with metacognition

Transfer of learning

- Applying or using knowledge in the real world
- Near transfer
 - Applying learned information or skill in a new environment similar to learning environment
- Far transfer
 - Applying learned information or skill in a very different environment
- Simulation, case-based learning, and collaborative learning play an important role

Individual Differences

- Not all people learn alike or at the same rate
- Capitalize on learner's talents
- Give appropriate help when needed
- Provide motivators learners can respond to
- Give listening alternative to reading

Constructivist Philosophy

- Began in 1980s
- Counters Objectivist and Positivist philosophy
 - Views learners as active creators of knowledge, who learn by observing, manipulating, and interpreting the world around them
- Social constructivism
 - Learning is inherently social
 - Norms, interpretations and knowledge are constructed by social groups
- Moderate constructivism
 - Our understanding of the real world is very individual and changing
- Radical constructivists
 - Believe that we can never really know the exact nature of the real world, so it is only our interpretations that matter

Constructivist Philosophy

- Radical constructivists argue that educational institutions are in grave danger if they continue to function based on behavioral or cognitive principals and that our educational systems must be redesigned along constructivist principals

Constructivist Philosophy

- Seymour Papert (1980)
 - Logo
 - Constructivist view of computer learning
 - A programming language to help learners better learn mathematic concepts and problem solving
 - Recently expanded approach to more general notion that most people learn most things better through construction of computer programs, computer games, or multimedia compositions than through traditional methods of directly teaching content

Constructivist Philosophy

- Principals

- Emphasize learning rather than teaching
- Emphasize the actions and thinking of learners rather than teachers
- Emphasize active learning
- Encourage learner construction of information and projects
- Use discovery or guided discovery approaches
- Have a foundation in situated cognition and its associated notion of anchored instruction
- Use cooperative or collaborative learning activities
- Use purposeful or authentic learning activities
- Emphasize learner choice and negotiation of goals, strategies, and evaluation methods
- Encourage personal autonomy on part of the learners
- Support learner reflection
- Support learner ownership of learning and activities
- Encourage learner to accept and reflect on the complexity of the real world
- Use authentic tasks and activities that are personally relevant to learners

Learning versus Teaching

- Emphasizes active process of learning
- De-emphasizes teaching activities and instructional methods
- Presentation of information downplayed
- Learner activity stressed
- Teacher questions discouraged
- Learner questions encouraged

Discovery Learning

- Emphasizes learner:
 - Exploring
 - Experimenting
 - Doing research
 - Asking questions
 - Seeking answers
- Emphasizes guided or even structured discovery environments
 - Learners & teachers are partners in the research experience
 - In contrast to pure discovery environments of the 1950s and 1960s

Construction

- Construction of projects
- Learners:
 - Set or negotiate a goal
 - Make plans
 - Do research
 - Create materials
 - Evaluate and revise
- “Constructionism”
 - Papert (1991)

Situated Learning & Anchored Instruction

- Substantial aspect of Constructivism
- Learning always occurs in some context and context significantly affects learning
- *Inert knowledge*: inaccessible outside of the context of learning
- Properly designed learning enhances transfer to other settings
- Anchored instruction states learning environment should closely replicate real world situations, goals, problems activities

Cooperative & Collaborative Learning

- Substantial aspect of Constructivism
- *Cooperative*: means learners are helping each other rather than hindering, competing, or ignoring one another although they may be working on individual projects
- *Collaborative*: learners work on a shared project or goal
- Advantages
 - Motivations enhanced, social skills fostered, metacognitive skills may be improved
- Disadvantages
 - May benefit some learners more than other
 - Problems with classroom behavior management, fair grading practices, ownership of materials created, optimal grouping of learners

Autonomy, Choice & Negotiation

- Learners should be given choices and the opportunity to be more autonomous in their actions
- Learners and teachers should jointly decide goals and activities
- Benefits:
 - Making goals and activities more meaningful to learners
 - Gives learners a sense of ownership
 - Increases motivation, planning and metacognitive skills

Reflection & Strategic Thinking

- Stresses people should be lifelong learners
- Learning environments should foster learning how to learn in addition to learning content
- Learners should have frequent opportunities:
 - To reflect and discuss what they have been doing, successes and failures, what they will do next
 - For strategic thinking, i.e. planning how they can achieve learning goals and what they can do when problems are encountered
- Exercises cognitive and metacognitive skills

Reflecting the Complexity of the World

- Traditional & current educational environments teach knowledge and skills that are too simplified
 - This causes learners to not be highly motivated
- Learning environments should reflect the complexities of real world jobs
 - There is a question as to how much complexity should be integrated

Constructivist Influence on IMD

- Constructivists feel that tutorial and drill instruction are poor for lifelong learners
- They maintain that much of what is currently taught teaches inert knowledge not easily applied in new situations
- They suggest hypermedia, simulation, virtual reality, open-ended learning environments are of more benefit
 - Allows learners to:
 - Explore information freely
 - Apply their own learning styles
 - Use software as a resource rather than as a teacher
- They support computer-based tools (in contrast to lessons) with which learners can design and construct their own knowledge

Criticisms of Behaviorism

- Strict behavioral approach not appropriate for multimedia design
- Behavioral Instructional Systems Design (ISD) was dry, unmotivating & didn't transfer to new situations
- Treated the learner as a bucket into which knowledge about the world was poured
- Ignores unobservable aspects of learning (such as thinking, reflection, memory, and motivation)
- Overlooks or even ignores unintended outcomes
- Too much emphasis on instructor and instructional materials and too little on the learner

Criticisms of Cognitivism

- Has strayed from active learning
- Proposed interaction in multimedia has not always been transformed into practice
- Multimedia is too dominated by reading, watching, and listening
- Collaboration, communication, and transfer weren't implemented into their learning environments

Criticisms of Objectivism/Instructivism

- Also accused of pouring knowledge into learners
- Approach is antithetical to collaboration, self-autonomy, active learning, and transfer of learning to real world

Criticisms of Constructivism

- Constructivist often mischaracterize other learning philosophies and overstate their differences
- They discount educational tools that can be useful, i.e. tutorials, drills, time constraints
- Radical constructivist approach contains inherent contradictions
- Constructivist approach works well only for learners with well developed metacognitive skills
- Good for some, not for all

Implications

- For use of computers and multimedia
 - Educators should use a variety of multimedia materials and approaches, and thus provide flexible learning environments meeting the needs of the greatest number of their learners
- For the design of educational software
 - Beginners should start with simpler more directed methodologies, such as tutorial and drill
 - Successful teachers and designers of instructional materials must adapt to the needs of different learners, subject areas, and situations
 - Adopt an eclectic approach, eschew labels and use a combination of all available methodologies