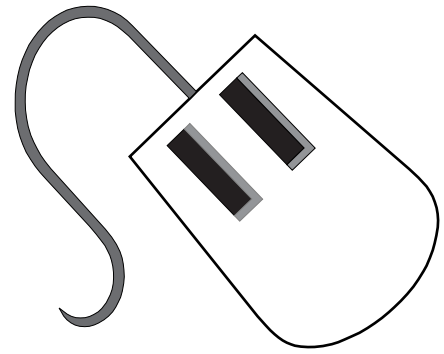


APPENDIX C

Instructional Theory: How Kids Learn



BEHAVIORISM

Behaviorism is a theory that looks at learning in terms of behaviors. Behaviorists use rewards and punishments to get the learner to complete tasks correctly. This is called conditioning. The rewards and punishments fall into three categories. Positive Reinforcement is the receiving of something pleasurable for doing something right or not doing something wrong. Negative reinforcement is the taking away of something un-pleasurable for the same reasons. Punishment is the introduction of something un-pleasurable for doing something wrong.

- Ivan Pavlov (1849–1936) was one of the early researchers in the study of Behaviorism. He detailed what he termed as “Classic Conditioning” by linking a stimuli, a bell, to a natural behavior, drooling.
- B.F. Skinner (1904–1990) continued work on conditioning and labeled a new type; “Operant Conditioning.” In operant conditioning a response or behavior is reinforced by a reward. Eventually this behavior is linked to the reward, and it is considered a learned behavior.
- Robert Gagne (1916–2002) believed that in order to teach students a complex behavior a teacher must break this behavior into smaller tasks. Each of these tasks had to be taught in a sequence to best transfer the knowledge to the next task, and each task had to be mastered.

CONSTRUCTIONISTS

Constructionist theorists believe that we construct much of our own learning, taking what we know of the world, and fitting in the new knowledge. Constructionists feel that learning is the quest to make sense of things, to find a meaning for why things happen. It is important for the learners to understand the whole of a task, and all of the parts must be understood with the whole in mind. As teachers it is imperative that the learner’s prior knowledge be understood as new learning is taking place.

Jerome Bruner (1915–) felt that learning was an active process, and that students must be actively engaged in the learning process. Bruner’s theories led to the use of a spiral curriculum, revisiting and adding to knowledge year after year, in many school districts.

Piaget’s Stages of Cognition

Sensorimotor stage: Most learning takes place as the child physically interacts with the world.

Preoperational stage: most learning happens through concrete situations, the child has difficulty with abstractions.

Concrete operations: At this stage the child can start to conceptualize and deal with abstract thought.

Formal operations: This is the final stage where abstract thinking and deductive reasoning are present.

Jean Piaget (1896–1980) believed that children progress through different cognitive stages, and that how they perceive the world depends heavily on their current stage. Piaget believed that a person learned only when his or her mental concept of the world (schema) encountered a new piece of information. This new information created a state of disequilibrium where the data must be either be accepted into the existing schema (assimilation) or the schema must be changed to fit in the new knowledge (accommodation).

Lev Vygotsky (1896–1934) believed that all students had a “Zone of Proximal Development” where learning could best take place as long as a more experienced collaborator, like a teacher, helps support the students learning. He called this cognitive support scaffolding. John Dewey (1859–1952) began a learning laboratory later known as the Dewey School. Dewey saw learning as a student driven activity, with the teacher having the role of facilitator.

MULTIPLE INTELLIGENCES

Howard Gardner (1943–) is a psychologist who had a problem with the conventional idea that there is only one type of intelligence. His research has led to the Theory of Multiple Intelligences, which describe how individuals best learn.

Instructors who utilize the theories of Howard Gardner need to keep in mind these differing learning styles when preparing lessons, activities and assessment.

BLOOMS TAXONOMY

Benjamin Bloom (1914–1999) wished to classify student learning behaviors. He defined three separate domains that affect learning. The cognitive domain of learning has to do with what a student knows and how well they can use this knowledge. The affective domain of learning deals with attitudes and emotions of the students. Finally, the psychomotor domain includes motor skills, etc. All of these domains have to be addressed if effective learning is to take place. A deficiency in any of these areas could cause difficulty in the ability to learn.

Multiple Intelligences

Verbal-Linguistic learners excel in the use of words and language.

Logical-Mathematical learners excel in the use of numbers, abstract patterns, and deductive reasoning.

Visual-Spatial learners excel in the ability to visualize and manipulate objects mentally.

Body-Kinesthetic learners utilize their abilities to control their bodies. They are great hands on learners.

Musical-Rhythmic learners recognize patterns and sounds.

Interpersonal intelligence deals with a child's communications and relationships with others.

Intrapersonal intelligence deals with a child's inner awareness and self-reflection.

Naturalistic intelligence deals with a child's ability to recognize the natural world around them.

Bloom's Taxonomy

Knowledge requires the child only recall information.

Comprehension forces the child to explain in greater detail.

Application allows the student to use the information in new situations.

Analysis shows the student noticing patterns or hidden meanings.

Synthesis occurs when the student collects information from many different sources to create new ideas.

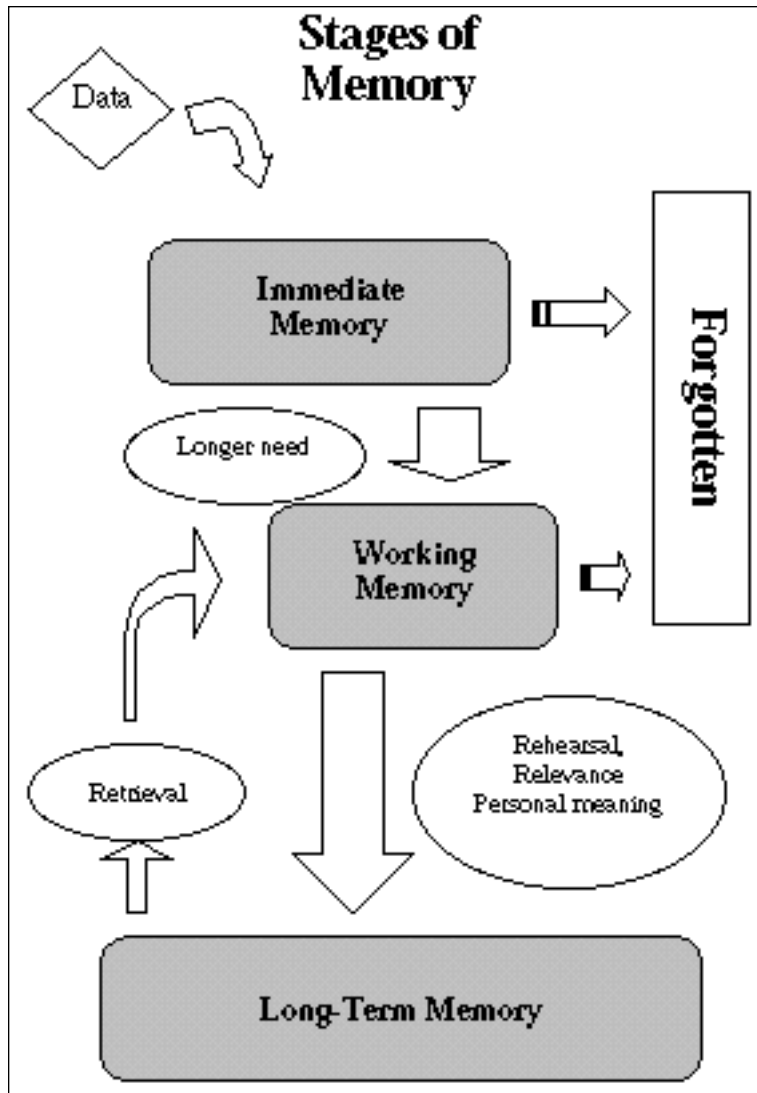
Evaluation is the highest level of learning and requires the student to be able to evaluate or judge the information in comparison to other pieces of information.

According to Bloom's theories, teacher interaction with the students played a key role in learning. He found that all learning fits into one of six categories. Bloom listed these categories in a hierarchical manner with questions demanding the least level of understanding at the beginning and learning requiring the greatest level of understanding at the end.

As teachers, this theory forces a reconsideration of questioning and culminating activities in the learning environment. It is important to strive for the highest possible level of thinking.

BRAIN THEORY

"For centuries, scientists have been attempting to understand exactly how the brain grows and develops. . . . Brain imaging technologies have given neuroscientists powerful new



tools to look at brain structure and function.” (2003, Sousa) Obviously, understanding how a brain develops, and how the brain stores and retrieves information is of great interest to educators. Brain theory is incredibly complicated and deserves more attention than can be given in this limited space, so this text will limit the explanation to the stages of memory and factors that seem to help information move into long term memory.

The first stage of memory is immediate memory. This is the memory a person uses to hold information just long enough to accomplish a small task. This type of memory only lasts a few seconds. If it turns out that this task must be done multiple times the information will move into the working memory. Working memory is the area of the brain that allows someone the ability to process the information. Working memory seems to be limited to about 7 items. This is of extreme importance when a teacher is planning activities. Keep instructions simple, since only about 7 items can be worked on at one time.

From the working memory information may go into long-term memory. Long-term memory is defined as the “ability to store information in a permanent form.” (2003, Sousa) Certain factors seem to increase the likelihood that information will be placed into long-term memory. Information that helps one survive and information that makes a strong emotional impact have the best chance of being stored in long-term memory. Unfortunately for teachers, most of the current curricula do not fit these categories. In the classroom, it seems that the two key factors in information processing is that the knowledge make sense to the student, based on past experiences, and that it somehow be relevant to the learner.



SUMMARY

Teachers are expected to help all students they come in contact with to better learn. In a classroom there are always differing levels of mastery, but there are also widely varying learning styles. As a teacher it is important to have a strong understanding of learning theory in order to best serve the students.

Behaviorists believe that learning takes place in response to a stimulus. Behaviors can be learned and unlearned through consistent reinforcement, and complex tasks can be taught through the teaching of sequenced smaller tasks.

Constructionists believe that all learning is a quest for making sense of the world. They believe that prior knowledge, and a student's world view are integral parts of the learning process. Constructionist classrooms involve student directed learning, individualized curriculum, and the teacher serving as a facilitator.

Howard Gardner developed the theory of multiple intelligences, which states that there are nine distinct areas of intelligence, and that learning is easiest in situations where a student's individual intelligences are utilized.

Benjamin Bloom stated that three distinct domains of learning were in play every time learning was taking place, and that limitations in any of these domains could be detrimental to the learning process. He also developed Bloom's Taxonomy of Learning. In this knowledge is the lowest level of learning, while the ability to evaluate information is the highest level of learning. It is a teacher's job to try to get a student to the highest possible level of understanding.

Finally, brain researchers are beginning to succeed in explaining how the brain works. As educators it is important to remember that there are limits to how much information can be manipulated and utilized within the working memory, and that students are more likely to remember information that has meaning and relevance to them.



WEBSITES

Funderstanding Learning Theory

<http://www.funderstanding.com>

Theorists of Behaviorism

<http://tiger.coe.missouri.edu/~t377/btheorists.html>

Constructivism and Constructionism

<http://userwww.sfsu.edu/~foreman/itec800/finalprojects/annmariethurmond/home.html>

Benjamin Bloom—Critical Thinking Skills

http://inventors.about.com/library/lessons/bl_benjamin_bloom.htm

Theory of Multiple Intelligences

<http://www.pz.harvard.edu/SUMIT/MISUMIT.HTM>

Brain Research

<http://www.novusresearch.com/research/memorybrain.html>

Neuroscience for Kids

<http://faculty.washington.edu/chudler/neurok.html>

LOGO Foundation

<http://el.media.mit.edu/logo-foundation>



REFERENCES

- Bellis, M. (2004). Benjamin Bloom—Critical Thinking Skills. Retrieved 3/6/04 from http://inventors.about.com/library/lessons/bl_benjamin_bloom.htm
- Eisenberg, M. & Berkowitz, R. (1999). Teaching Information and Technology Skills: The Big 6. Worthington, OH: Linwood Publishing, Inc.
- Funderstanding. (2001). Retrieved 3/6/04 from <http://www.funderstanding.com/behaviorism.cfm>
- Harvard Project Zero. (1999). Theory of Multiple Intelligences. Retrieved 3/6/04 from <http://www.pz.harvard.edu/SUMIT/MISUMIT.HTM>
- Jonassen, D. (1996). Computers in the Classroom: Mindtools for Critical Thinking. Englewood Cliffs, NJ: Prentice Hall.
- Morris, W. (1979). The American Heritage Dictionary of the English Language. Boston, MA: Houghton Mifflin Company.
- Morrison, G. & Others (1999). Integrating Computer Technology into the Classroom. Upper Saddle River, NJ: Prentice Hall
- Papert, S. (1993). The Children's Machine: Rethinking School in the Age of the Computer. New York, NY: HarperCollins Publishers.
- Shelly, G. & Others (2002). Integrating Technology in the Classroom. Boston, MA: Thomson Learning.
- Sousa, D. (2003). How the Gifted Brain Learns. Thousand Oaks, CA: Corwin Press, Inc.
- Starr, L. (2000). Creating Rubrics: Tools You Can Use. Education World.
- Thurmond, A. (1999) Constructivism and Constructionism. Retrieved 3/6/04 from <http://userwww.sfsu.edu/~foreman/itec800/finalprojects/annmariethurmond/home.html>
- Warlick, D. (1999). Raw Materials for the Mind: Teaching & Learning in Information & Technology Rich Schools. Raleigh, NC: The Landmark Project.
- White, A. (1995) Theorists of Behaviorism Retrieved 3/6/04 from <http://tiger.coe.missouri.edu/~t377/btheorists.html>