A stylized, colorful illustration of a landscape. The foreground features rolling green hills with a brown path. On the left, there is a green tree, a purple flower, and an orange flower. A red bird is flying in the sky. The background consists of layered blue and white waves, suggesting a sky or water. The overall style is simple and artistic.

# Psychology of learning?

Manuel Torres

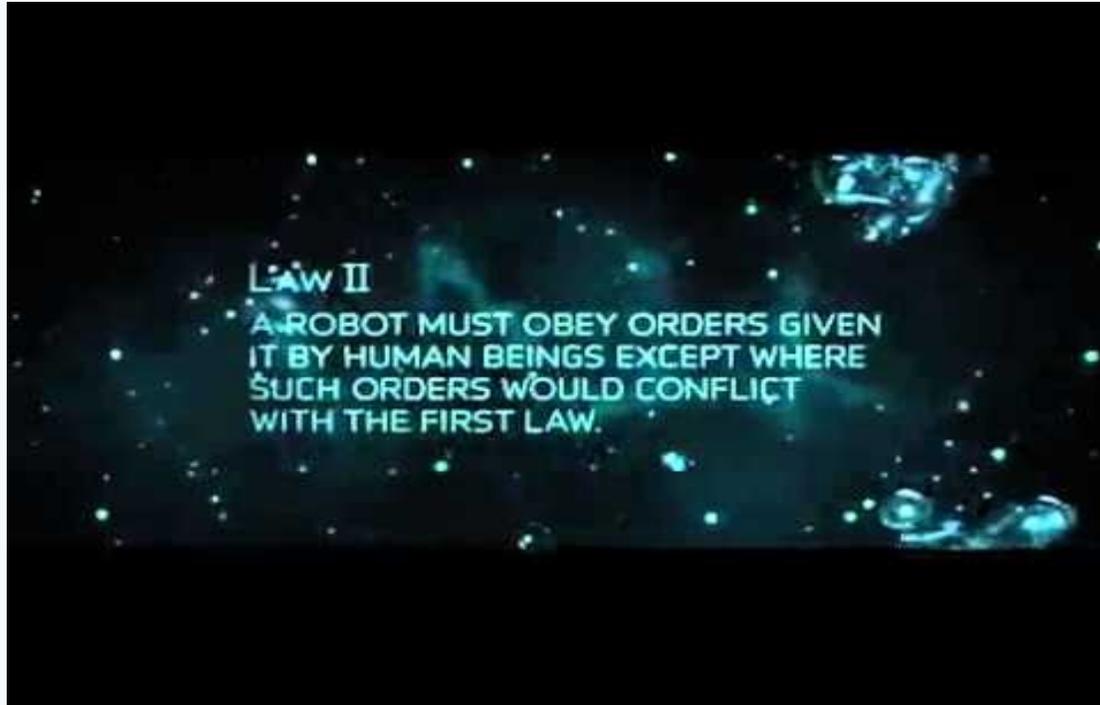
Psychology 2 Bach IES Campo San Alberto

# Basic definition:

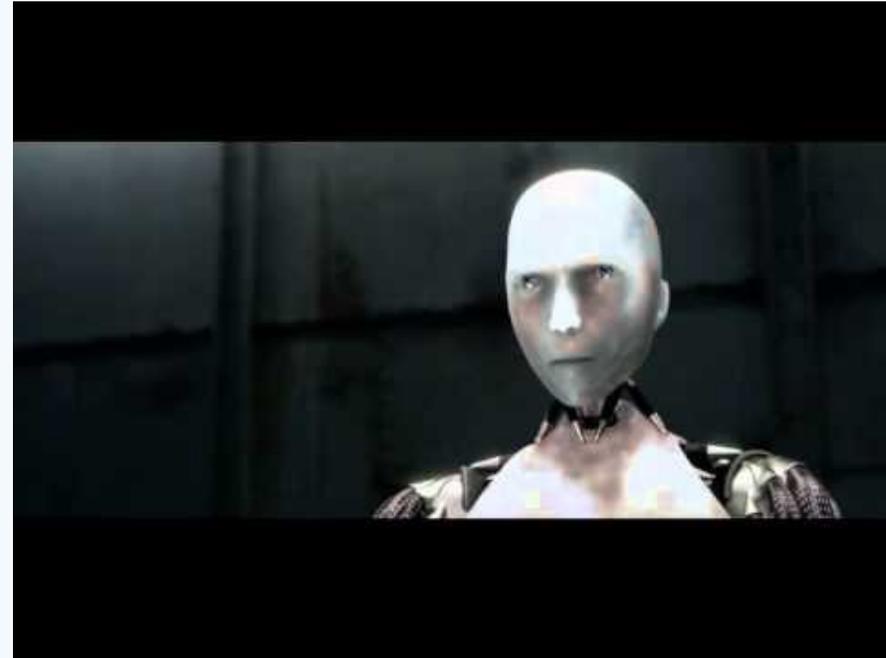
- **Learning** is often defined as a relatively lasting change in behavior that is the result of experience.
- When you think of learning, it might be easy to fall into the trap of only considering formal education that takes place during childhood and early adulthood, but learning is actually an ongoing process that takes place throughout all of life.



# Robots: learning, code or intelligence?



<https://www.youtube.com/watch?v=2z7a8MTYrDE>



<https://www.youtube.com/watch?v=05bGPiyM4jg>

# Learning related to education

- Learning: education
- Learning: change
- Learning: manipulation
- Learning: influence
- Learning: what processes are following to get to change someone's behavior?



# Learning theories in Psychology

- Behaviourism: classical and instrumental
- Piaget: learning as a genetic and cognitive process
- Vygotsky and Luria: potential development theory
- Bandura: social learning
- Gardner: cognitivism
- Novak and Ausubel: Constructivism.



# Behaviourism: classical and instrumental

## Learning Through Classical Conditioning

- Learning through association is one of the most fundamental ways that people learn new things.
- Russian physiologist Ivan Pavlov discovered one method of learning during his experiments on the digestive systems of dogs.
- He noted that the dogs would naturally salivate at the sight of food, but that eventually the dogs also began to salivate whenever they spotted the experimenter's white lab coat.
- Later experiments involve pairing the sight of food with the sound of a bell tone. After multiple pairings, the dogs eventually began to salivate to the sound of the bell alone.
- This type of learning is known as classical conditioning. It takes place through the formation of associations. A neutral stimulus that naturally and automatically triggers a response is paired with a neutral stimulus. Eventually, an association forms and the previously neutral stimulus becomes known as a conditioned stimulus that then triggers a conditioned response.



<https://www.youtube.com/watch?v=128Ts5r9NRE>

# Learning Through Operant Conditioning

- The consequences of your actions can also play a role in determining how and what you learn. Behaviorist B.F. Skinner noted that while classical conditioning could be used to explain some types of learning, it could not account for everything. Instead, he suggested that reinforcements and punishments were responsible for some types of learning. When something immediately follows a behavior, it can either increase or decrease the likelihood that the behavior will occur again in the future.
- This process is referred to as operant conditioning.
- For example, imagine that you just got a new puppy, and you would like to begin training it to behave in specific ways. Whenever the puppy does what you want it to do, you reward it with a small treat or a gentle pat. When the puppy misbehaves, you scold him and do not offer affection. Eventually, the reinforcement leads to an increase in the desired behaviors and a decrease in the unwanted behaviors.

# Learning Through Observation

- While classical conditioning and operant conditioning can help explain many instances of learning, you can probably immediately think of situations where you have learned something without being conditioned, reinforced or punished. Psychologist Albert Bandura noted that many types of learning do not involve any conditioning and in fact, evidence that learning has occurred might not even be immediately apparent. Observational learning occurs by observing the actions and consequences of other people's behavior.
- In a series of famous experiments, Bandura was able to demonstrate the power of this observational learning. Children watched video clips of adults interacting with a large, inflatable Bobo doll. In some instances, the adults simply ignored the doll, while in other clips the adults would hit, kick and yell at the doll.
- When kids were later given the chance to play with in a room with a Bobo doll present, those who had observed the adults abusing the doll were more likely to engage in similar actions.
- As you can see, learning is a complex process that involves multiple factors. Psychologists today not only study how learning occurs but also how social, emotional, cultural, and biological variables might influence the learning process.

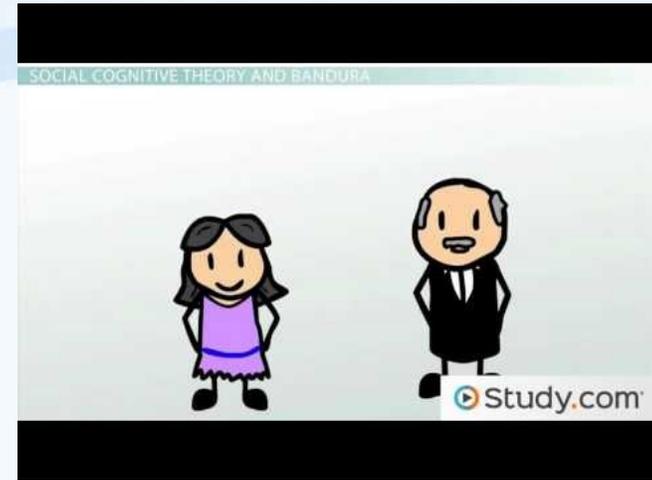
# Bandura: social learning

In social learning theory Albert Bandura (1977) agrees with the behaviorist learning theories of classical conditioning and operant conditioning.

However, he adds two important ideas:

1. Mediating processes occur between stimuli & responses.

1. Behavior is learned from the environment through the process of observational learning.



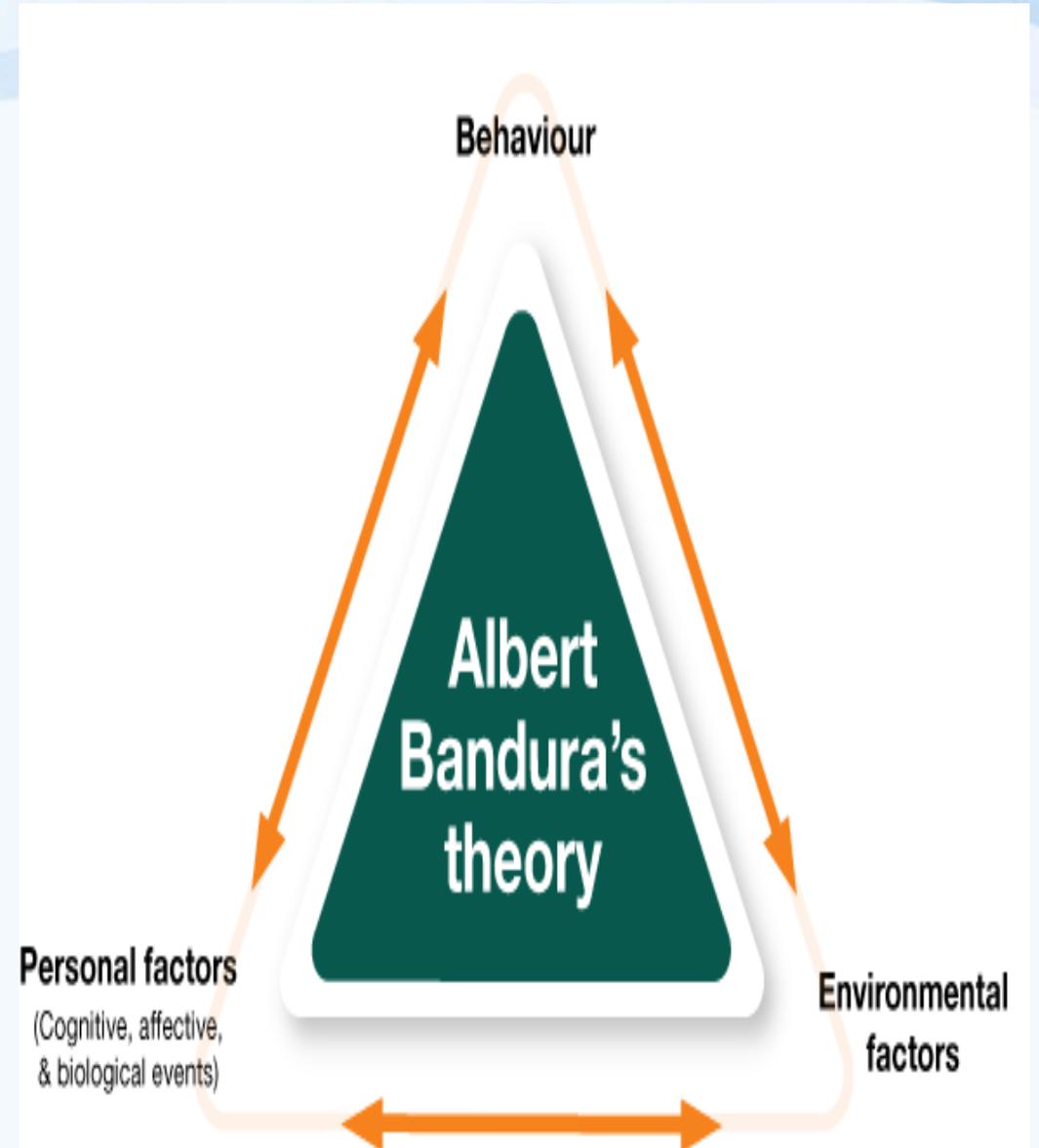
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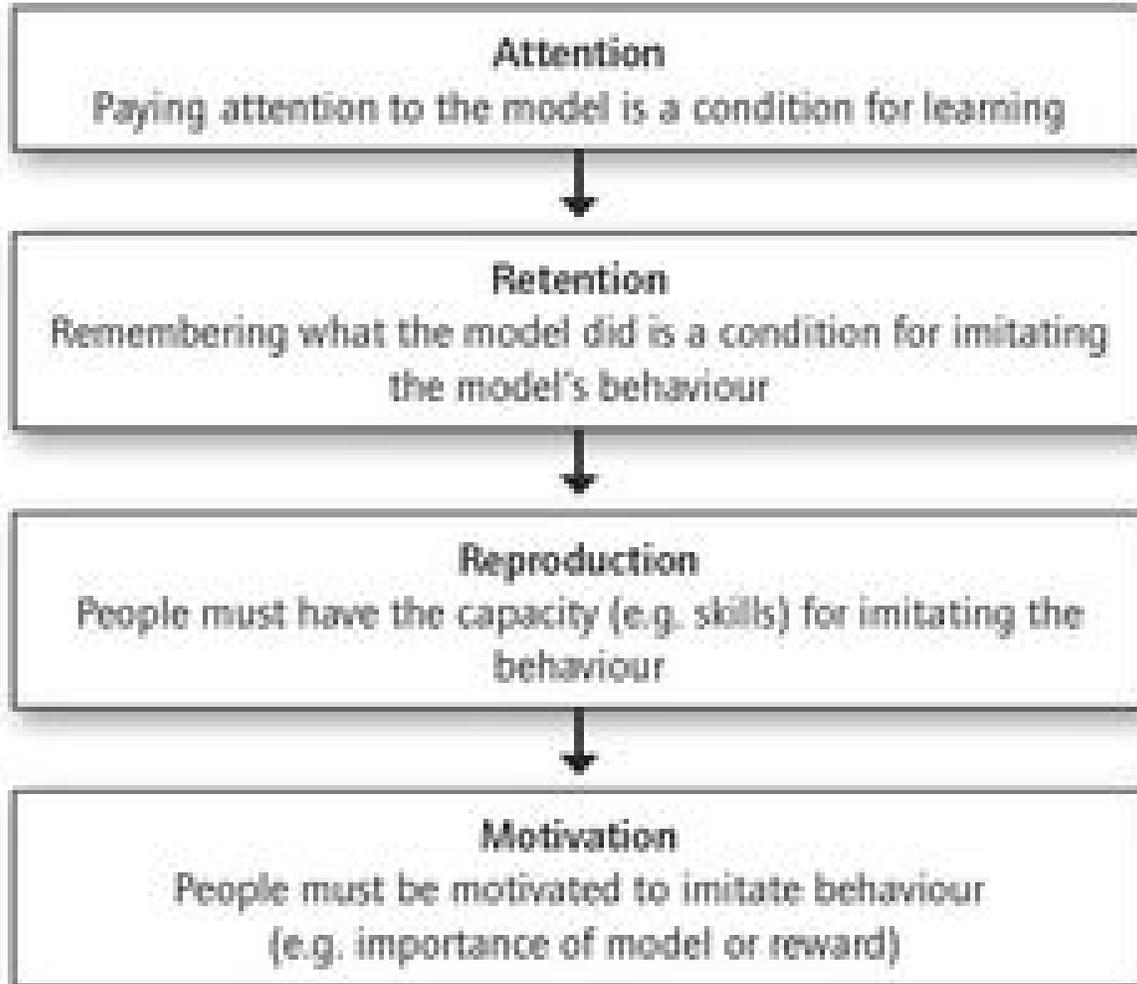
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# Observational learning

- Children observe the people around them behaving in various ways. This is illustrated during the famous [Bobo doll experiment](#) (Bandura, 1961).
- Individuals that are observed are called models. In society, children are surrounded by many influential models, such as parents within the family, characters on children's TV, friends within their peer group and teachers at school. These models provide examples of behavior to observe and imitate, e.g. masculine and feminine, pro and anti-social etc.
- Children pay attention to some of these people (models) and [encode](#) their behavior. At a later time they may imitate (i.e. copy) the behavior they have observed. They may do this regardless of whether the behavior is 'gender appropriate' or not, but there are a number of processes that make it more likely that a child will reproduce the behavior that its society deems appropriate for its sex.



## Four important factors in social learning (observational learning)



## 5 stages of Observational learning

- **1: Attention** – the observer must actively watch the model when completing the task
  - **Attention is Influenced by**
    1. Motivation & interest of observer
    2. Personality characteristics of model
    3. Avoidance of distracters
    4. Distinctiveness, importance, Etc
- Bandurra felt we are more likely to attend to model if model has/ is**
1. High status
  2. Similar in nature to observer
  3. Is well liked, is known, behavior is visible/ distinctive
  4. Etc



# Theories of child development

## Jean Piaget - 1896-1980

### Main points

Development takes place in distinct stages of cognitive development. Adults influence but the child is building their own thinking systems.

### Key words

Cognitive learning theory; assimilate; symbolism; accommodate; egocentric; decentre; conservatism; active learners; schemata; sensory-motor; stages; pre-operational; animism; moral realism; concrete operations; formal operations



[More detail](#)

[Home](#)

Nature



Nurture

Gesell

Freud

Erikson

Skinner

Bandura

Vygotsky

Piaget

# Piaget: Schemas

- Imagine what it would be like if you did not have a mental model of your world. It would mean that you would not be able to make so much use of information from your past experience, or to plan future actions.
- Schemas are the basic building blocks of such cognitive models, and enable us to form a mental representation of the world. Piaget (1952) defined a schema as:
- 'a cohesive, repeatable action sequence possessing component actions that are tightly interconnected and governed by a core meaning'.
- In more simple terms Piaget called the schema the basic building block of intelligent behavior – a way of organizing knowledge. Indeed, it is useful to think of schemas as “units” of knowledge, each relating to one aspect of the world, including objects, actions and abstract (i.e. theoretical) concepts.

## Conclusion

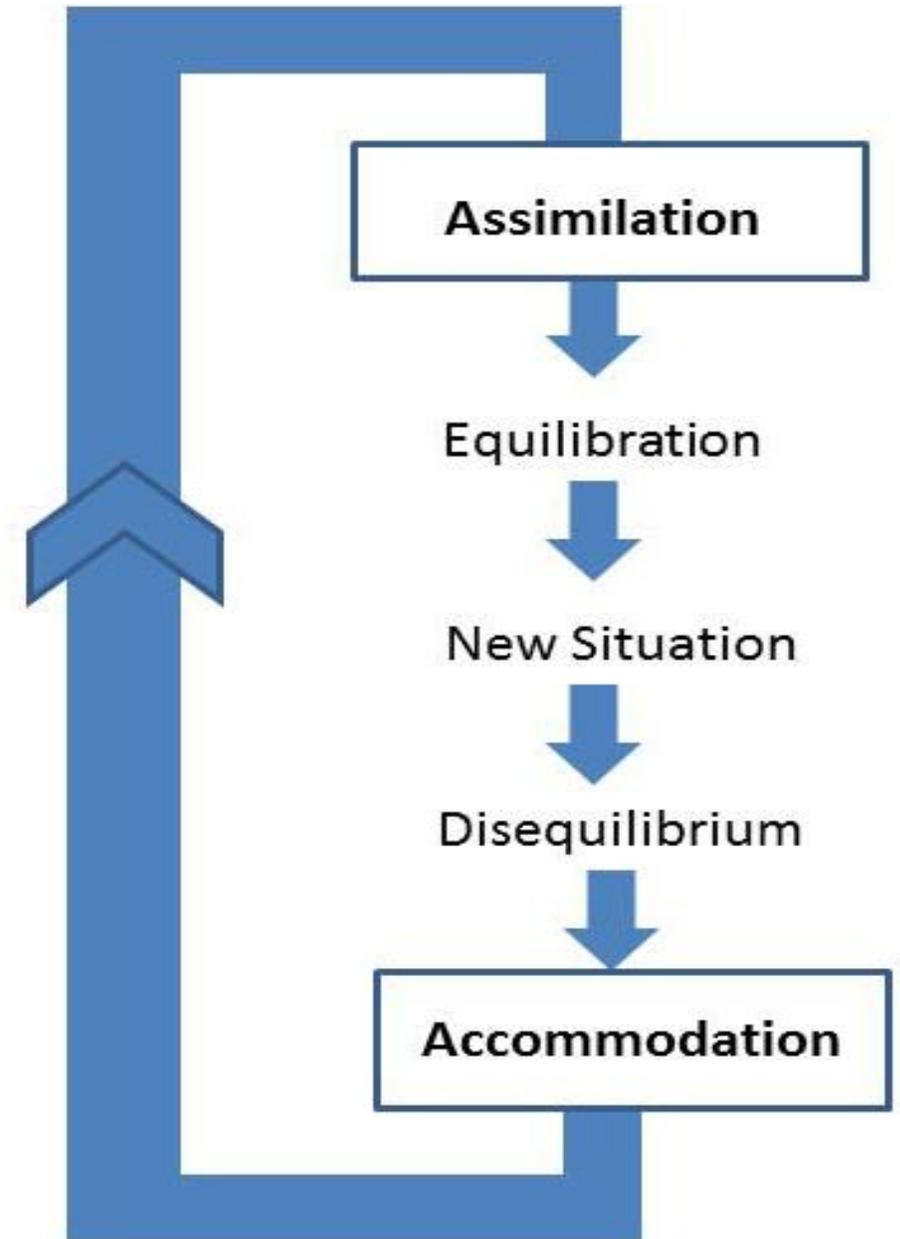
### How Piaget’s Theory impacts on learning?

**Curriculum:** Educators must plan a developmentally appropriate curriculum that enhances their students logical and conceptual growth.

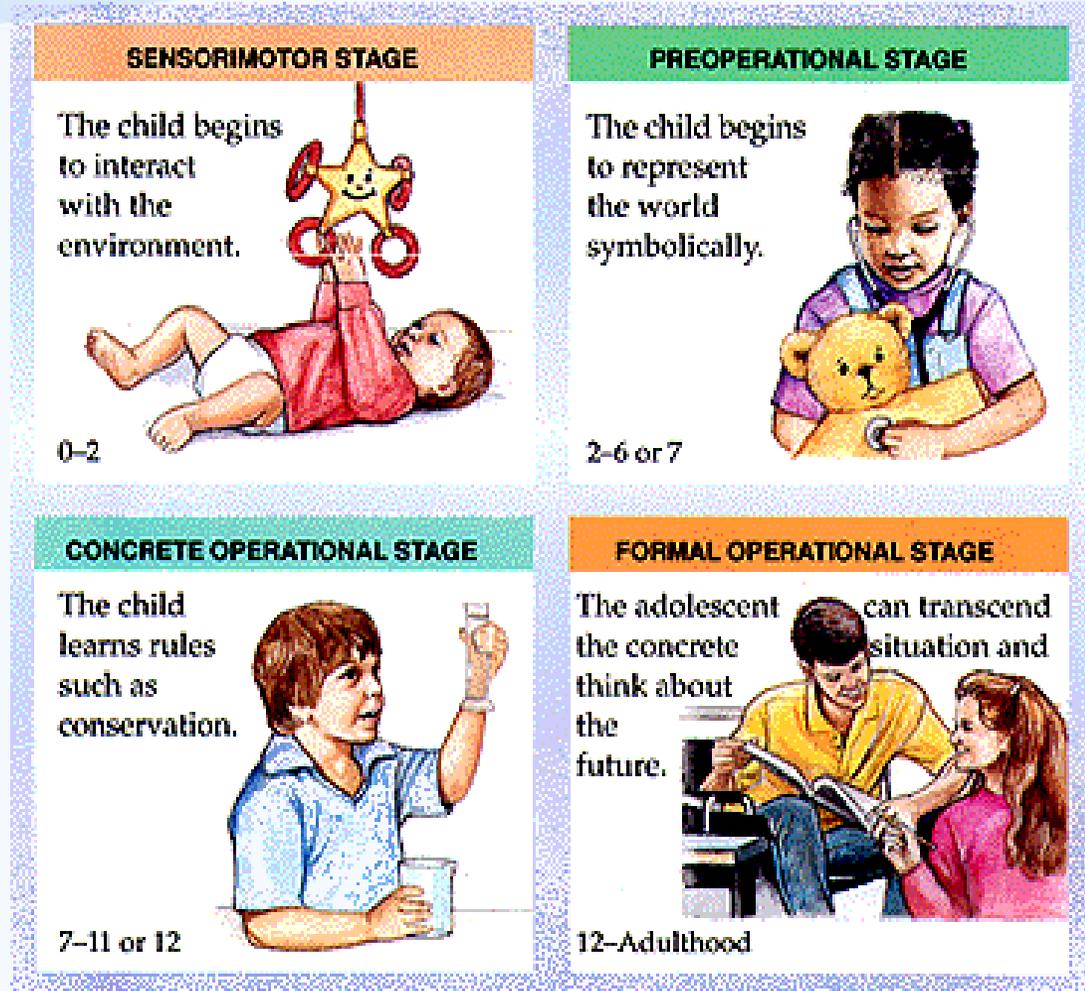
**Instruction:** Teachers must emphasize the critical role that experiences -or interactions with the surrounding environment- play in student learning.

# Piaget theory of learning

- Schemas (building blocks of knowledge).
- Adaptation processes that enable the transition from one stage to another (equilibrium, assimilation and accommodation).
- Stages of Cognitive Development:
  - sensorimotor,
  - preoperational,
  - concrete operational,
  - formal operational.



- Jean Piaget (1952; see also Wadsworth, 2004) viewed intellectual growth as a process of **adaptation** (adjustment) to the world. This happens through:
- **Assimilation**
- – Which is using an existing schema to deal with a new object or situation.
- **Accommodation**
- – This happens when the existing schema (knowledge) does not work, and needs to be changed to deal with a new object or situation.
- **Equilibration**
- – This is the force which moves development along. Piaget believed that cognitive development did not progress at a steady rate, but rather in leaps and bounds.



# Stages of Cognitive Development

Stage	Characterised by
<b>Sensori-motor</b> (Birth-2 yrs)	<p>Differentiates self from objects</p> <p>Recognises self as agent of action and begins to act intentionally: e.g. pulls a string to set mobile in motion or shakes a rattle to make a noise</p> <p>Achieves object permanence: realises that things continue to exist even when no longer present to the sense (pace Bishop Berkeley)</p>
<b>Pre-operational</b> (2-7 years)	<p>Learns to use language and to represent objects by images and words</p> <p>Thinking is still egocentric: has difficulty taking the viewpoint of others</p> <p>Classifies objects by a single feature: e.g. groups together all the red blocks regardless of shape or all the square blocks regardless of colour</p>
<b>Concrete operational</b> (7-11 years)	<p>Can think logically about objects and events</p> <p>Achieves conservation of number (age 6), mass (age 7), and weight (age 9)</p> <p>Classifies objects according to several features and can order them in series along a single dimension such as size.</p>
<b>Formal operational</b> (11 years and up)	<p>Can think logically about abstract propositions and test hypotheses systematically</p> <p>Becomes concerned with the hypothetical, the future, and ideological problems</p>

Piaget did not claim that a particular stage was reached at a certain age - although descriptions of the stages often include an indication of the age at which the average child would reach each stage.

#### Sensorimotor Stage (Birth-2 yrs)

The main achievement during this stage is **object permanence** - knowing that an object still exists, even if it is hidden.

It requires the ability to form a mental representation (i.e. a schema) of the object.

#### Preoperational Stage (2-7 years)

During this stage, young children are able to think about things symbolically. This is the ability to make one thing - a word or an object - stand for something other than itself.

Thinking is still **egocentric**, and the infant has difficulty taking the viewpoint of others.

#### Concrete Operational Stage (7-11 years)

Piaget considered the concrete stage a major turning point in the child's cognitive development, because it marks the beginning of logical or operational thought.

This means the child can work things out internally in their head (rather than physically try things out in the real world).

Children can conserve number (age 6), mass (age 7), and weight (age 9). Conservation is the understanding that something stays the same in quantity even though its appearance changes

#### Formal Operational Stage (11 years and over)

The formal operational stage begins at approximately age eleven and lasts into adulthood. During this time, people develop the ability to think about abstract concepts, and logically test hypotheses.

# Kohler: psychology of Gestalt

- **Insight learning** occurs when a new behavior is learned through cognitive processes rather than through interactions with the outside world.
- Insight learning is the abrupt realization of a problem's solution. Insight learning is not the result of trial and error, responding to an environmental stimulus, or the result of observing someone else attempting the problem. It is a completely cognitive experience that requires the ability to visualize the problem and the solution internally - in the mind's eye, so to speak - before initiating a behavioral response.
- Insight learning is considered a type of learning because it results in a long-lasting change. Following the occurrence of insight, the realization of how to solve the problem can be repeated in future similar situations.

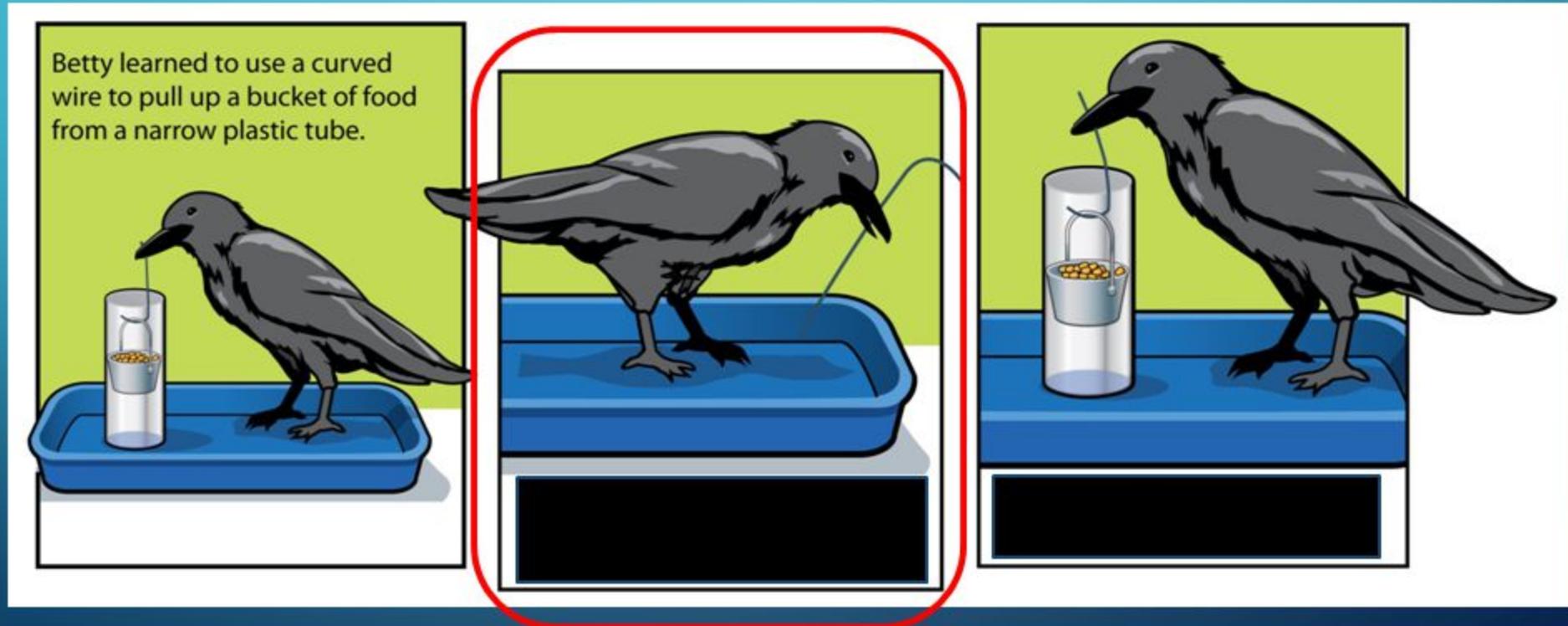
## Insight learning - Kohler

- Insight learning refers to the sudden realisation of a solution of a problem
- After a period of mentally manipulation of aspects of a problem for a while
- Kohler experimented with Sultan the chimp who was caged with food strategically placed outside the cage.
- Some boxes and sticks were placed in the cage.
- Through some manipulation of these objects which got Sultan nowhere, he seemed to suddenly figure out that the sticks could be joined to get the food.
- He used Insight to solve similar problems



# INSIGHT LEARNING

Learning how to solve a problem or do something by applying what you already know, without a period of trial and error



# Example

## 1: Preparation

- Can't work out how to load the songs initially
- Data gathering

## 2: Incubation

- Song loading problem put on hold while she goes on a walk
- Problem worked on unconsciously

## 3: Insight

- During her walk, she suddenly there is a mental representation of how to load the songs

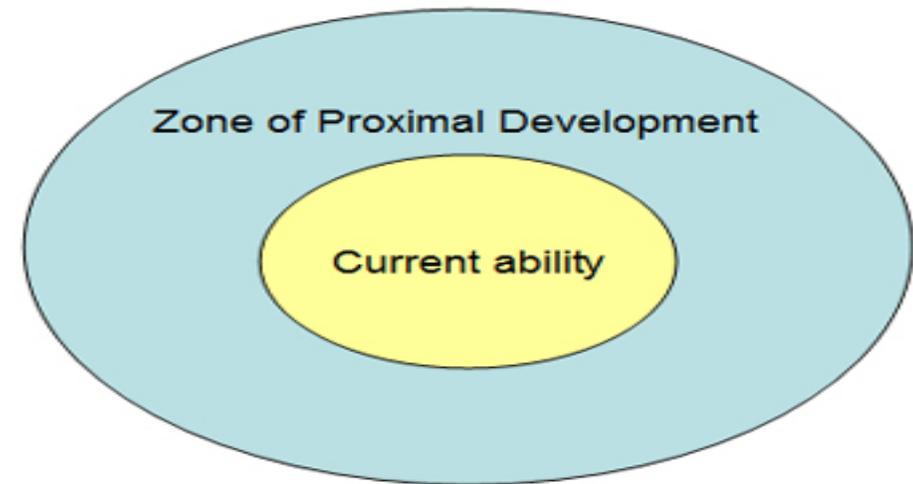
## 4: Verification

**Solution checked,  
her songs do load**

- E.g. Amelia can't figure out how to load free songs from youtube on to her iphone
- After spending an hour trying a variety of unsuccessful strategies.
- She 'cracks it' and decides to go for a walk.
- ½ way through the walk, she suddenly realises, that she needs to put the songs in iTunes 1<sup>st</sup>.
- She bolts home and tests her theory out and sure enough it works

# Vygotsky and Luria: potential development theory

- Vygotsky's theories stress the fundamental role of **social interaction** in the development of cognition (Vygotsky, 1978), as he believed strongly that community plays a central role in the process of "making meaning."
- Unlike Piaget's notion that childrens' development must necessarily precede their learning, Vygotsky argued, "**learning is a necessary and universal aspect of the process of developing culturally organized, specifically human psychological function**" (1978, p. 90). In other words, social learning tends to precede (i.e. come before) development.
- Vygotsky's theory is one of the foundations of **constructivism**. It asserts three major themes regarding social interaction, the more knowledgeable other, and the zone of proximal development.



# Vygotsky's Zone Proximal Development (ZPD)

Maximum level of cognitive development that can be achieved at this time

where

Higher level of cognitive development not attainable even with coaching

Zone of Proximal Development where additional meaningful is possible with effort and/or coaching

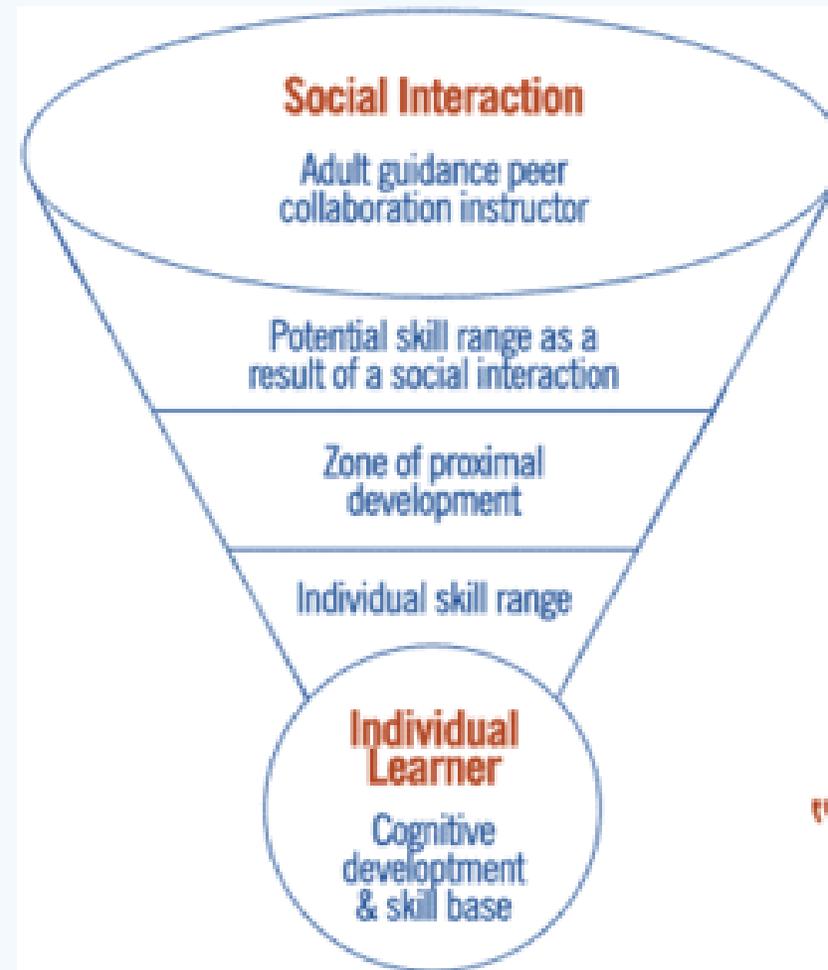
Base level of cognitive development already attained on this topic

is

Level of understanding of a topic achieved from prior meaningful learning

# Vygotsky: SOCIAL INTERACTION

- Social interaction plays a fundamental role in the process of cognitive development. In contrast to Jean Piaget's understanding of child development (in which development necessarily precedes learning), Vygotsky felt social learning precedes development. He states:
- “Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological)”.



“ Learning is cognitive development through social interaction ”

Lev Vygotsky

# THE MORE KNOWLEDGEABLE OTHER (MKO) VIGOSKY

- *The MKO refers to anyone who has a better understanding or a higher ability level than the learner, with respect to a particular task, process, or concept. The MKO is normally thought of as being a teacher, coach, or older adult, but the MKO could also be peers, a younger person, or even computers.*

## The More Knowledgeable Other (MKO)

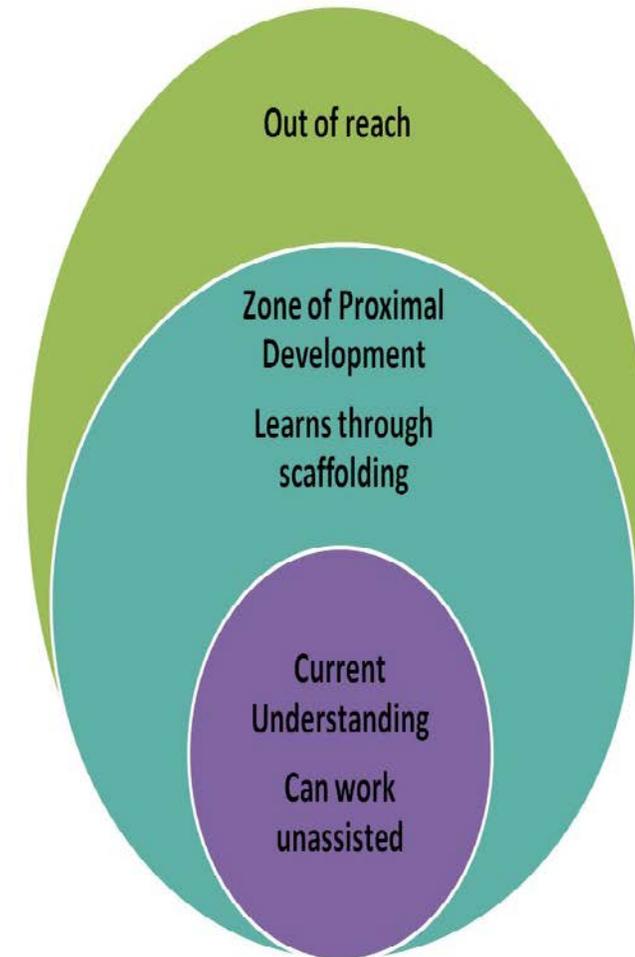
- Anyone who has a better understanding or a higher ability level than the learner
  - Parent
  - Coach
  - Teacher
  - Siblings
- Usually has to do with a respect to a particular task, process, or concept
- Scaffolding



# THE ZONE OF PROXIMAL DEVELOPMENT (ZPD) VIGOSKY

- *The ZPD is the distance between a student's ability to perform a task under adult guidance and/or with peer collaboration and the student's ability solving the problem independently. According to Vygotsky, learning occurred in this zone.*
- *Vygotsky focused on the connections between people and the sociocultural context in which they act and interact in shared experiences<sup>[3]</sup>. According to Vygotsky, humans use tools that develop from a culture, such as speech and writing, to mediate their social environments. Initially children develop these tools to serve solely as social functions, ways to communicate needs. Vygotsky believed that the internalization of these tools led to higher thinking skills.*

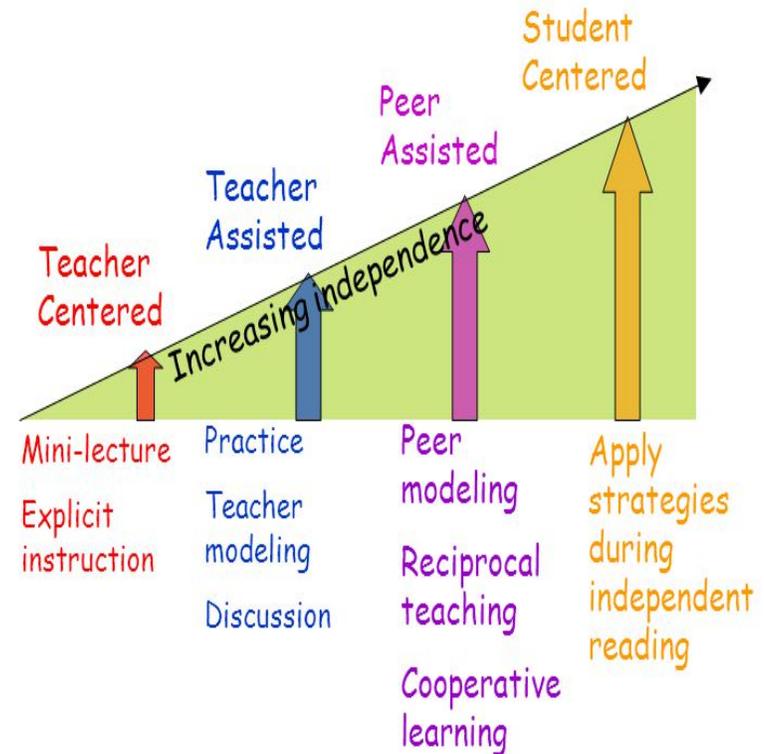
## Zone of Proximal Development



# Vygotsky in education

- Many schools have traditionally held a transmissionist or instructionist model in which a teacher or lecturer 'transmits' information to students. In contrast, Vygotsky's theory promotes learning contexts in which students play an active role in learning. Roles of the teacher and student are therefore shifted, as a teacher should collaborate with his or her students in order to help facilitate meaning construction in students. Learning therefore becomes a reciprocal experience for the students and teacher.

## One model of scaffolding



# Gardner: cognitivism

## Howard Gardner (1943- Present)

- Howard Gardner developed the theory of multiple intelligences.
- He conducted extensive research of exceptional students, as well as those who had suffered brain trauma. He used his original findings to conclude that “people use a variety of eight intelligences” (263) to construct their view and understanding of the world.
- Howard Gardner agreed that instructional methods should vary in style so that the intelligences of all students are being met



- Developed by Harvard psychologist Howard Gardner in 1983 and subsequently refined, this theory states there are at least seven ways (“intelligences”) that people understand and perceive the world. These intelligences may not be exhaustive. Gardner lists the following:

# Novak and Ausubel: Constructivism.

- **Meaningful Learning:**
- Non-arbitrary, non-verbatim, substantive incorporation of new knowledge into cognitive structure.
- Deliberate effort to link new knowledge with higher order concepts in cognitive structure
- Learning related to experiences with events or objects.
- Affective commitment to relate new knowledge to prior learning.

## **Meaningful learning is**

1. Well organised relevant knowledge structures
2. Emotional commitment to integrate new with existing knowledge.

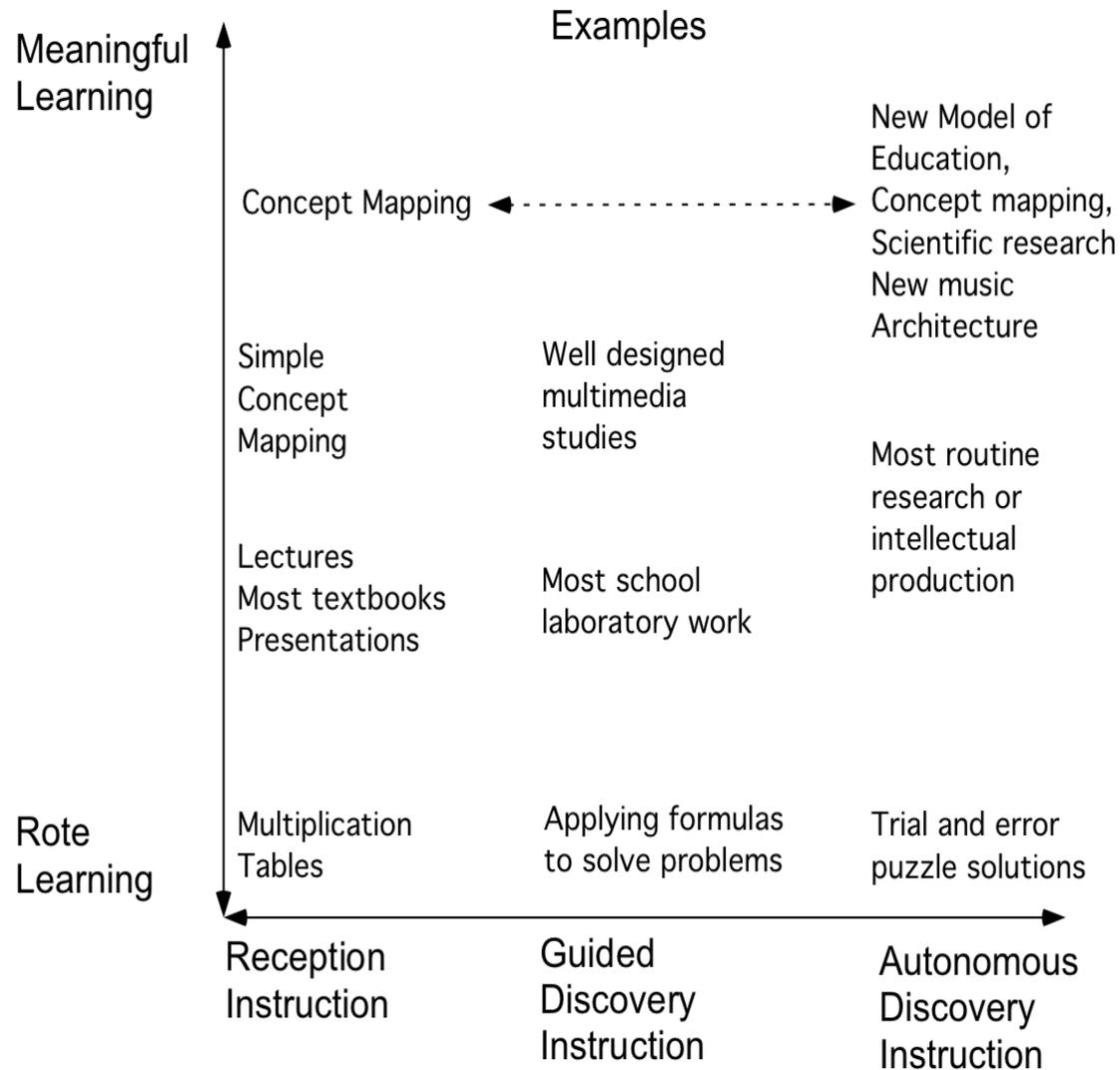
## **Rote learning is**

1. Little or no relevant knowledge
2. No emotional commitment to relate new with existing relevant knowledge.

Rote learning

Meaningful learning

**Creativity results from high levels of meaningful learning**



- Ausubel believed that learning proceeds in a top-down, or deductive manner.
- Ausubel's theory consists of three phases, presentation of an advance organizer, presentation of learning task or material, and strengthening the cognitive organization.  
 Ausubel's Model of Learning:  
 The main elements of Ausubel's model are
  - Phase One: Advance Organizer
  - Phase Two: Presentation of Learning Task or Material
  - Phase Three: Strengthening Cognitive Organization

# Concept mapping

- *Concept mapping for meaningful learning* Novak and Gowan (1984) have developed a theory of instruction that is based on Ausubel's meaningful learning principles that incorporates
  - **"concept maps"** to represent meaningful relationships between concepts and propositions.
  - A cognitive map is a "kind of visual road map showing some of the pathways we may take to connect meanings of concepts."
  - According to Novak and Gowan concept maps should be
    - **hierarchical**;
    - the more **general**, more inclusive concepts should be at the top of the map, and the more specific,
    - less inclusive concepts at the bottom of the map.
- *The concept map of the food chain is done in Inspiration I suspect, and I don't have time to go hunt for that program, so can't copy it. We'll construct a concept map in statistics in the Fall.*
- *The concept map is a tool that science teachers can use to determine the nature of students' existing ideas. The map can be used to make evident the key concepts to be learned and suggest linkages between the new information to be learned and what the student already knows. Concept maps can precede instruction, and be used by the teacher to generate a meaningful discussion of student ideas.*
- *Following the initial construction and discussion of concept maps, instructional activities can be designed to explore alternative frameworks, resulting in cognitive accommodation.*

# KEY:

Student Individual Work

Student Group Work

Class Work

Out of class work

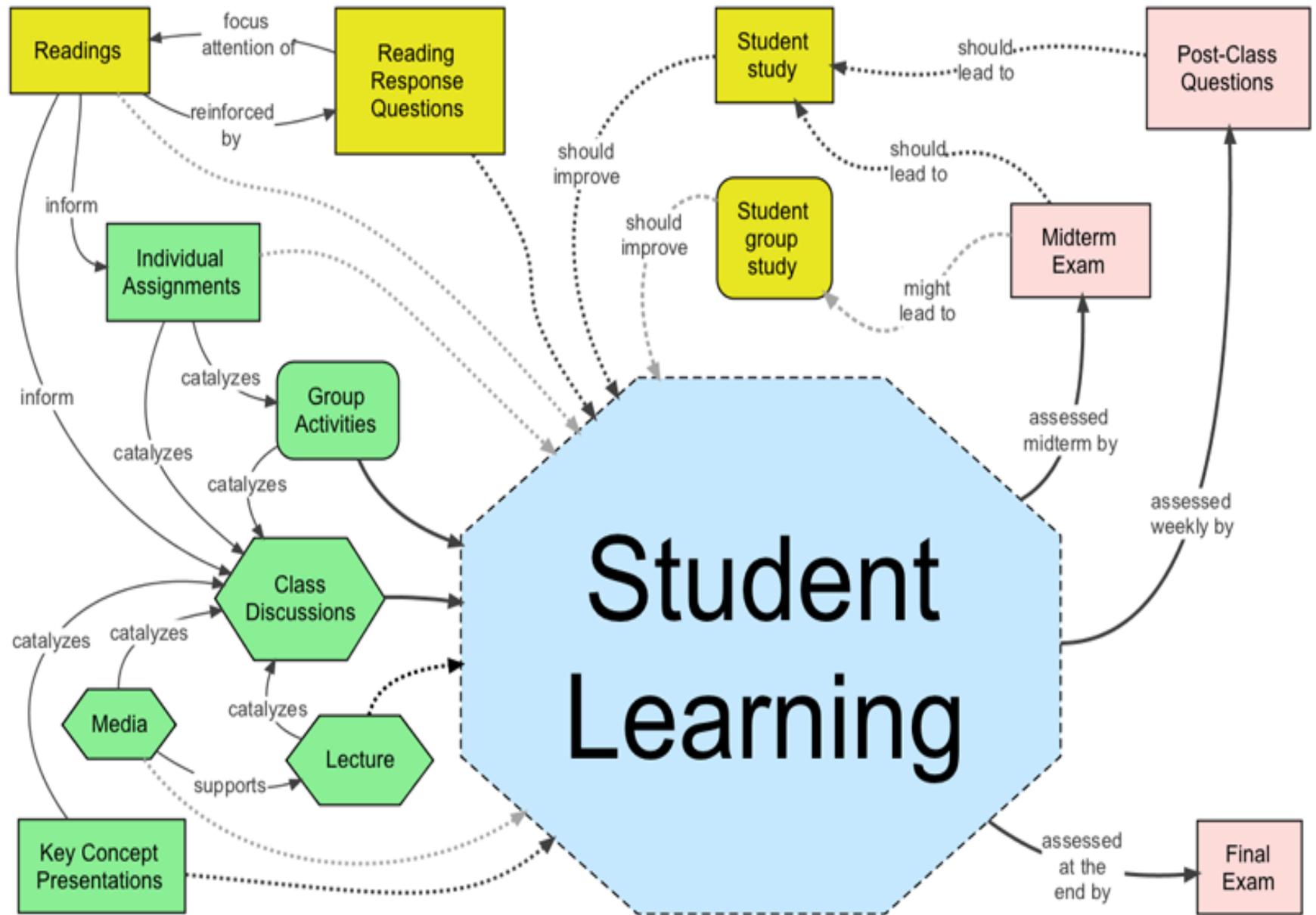
In-class work

Assessments

—strongest link—>

·····moderate link·····>

·····weakest link·····>



# Multiple intelligences

- **LINGUISTIC**

- *The ability to use spoken or written words.*

- **LOGICAL-MATHEMATICAL**

- *Inductive and deductive thinking and reasoning abilities, logic, as well as the use of numbers and abstract pattern recognition.*

- **VISUAL-SPATIAL**

- *The ability to mentally visualize objects and spatial dimensions.*

- **BODY-KINESTHETIC**

- *The wisdom of the body and the ability to control physical motion.*

- **MUSICAL-RHYTHMIC**

- *The ability to master music as well as rhythms, tones and beats.*

- **INTERPERSONAL**

- *The ability to communicate effectively with other people and to be able to develop relationships.*

- **INTRAPERSONAL**

- *The ability to understand one's own emotions, motivations, inner states of being, and self-reflection.*

# Multiple Intelligences

```
graph TD; A((Multiple Intelligences)) --- B((Verbal-Linguistic)); A --- C((Mathematical-Logical)); A --- D((Musical)); A --- E((Visual-Spatial)); A --- F((Bodily/Kinesthetic)); A --- G((Intrapersonal)); A --- H((Interpersonal)); A --- I((Naturalist)); A --- J((Existential));
```

## **Verbal-Linguistic**

Learning through spoken and written words: reading, listening, speaking and writing

## **Mathematical-Logical**

Learning through reasoning and problem-solving: numbers

## **Musical**

Learning through songs, patterns, rhythms, instruments, and musical expression

## **Existential**

Learning by seeing the "big picture". Connects real world understandings and application to new learning

## **Naturalist**

Learning through classification, categories, and hierarchies: ability to pick up on subtle differences

## **Interpersonal**

Learning through interactions with others: working collaboratively and cooperatively

## **Intrapersonal**

Learning through feelings, values, and attitudes: understand other people

## **Bodily/Kinesthetic**

Learning through interaction with one's environment: concrete experiences

## **Visual-Spatial**

Learning visually and organizing ideas spatially: think in images and pictures and "see" things in one's mind

# Gardner and education

- “Where individuals differ is in the **strength** of these intelligences – the so-called profile of intelligences –and in the ways in which such intelligences are invoked and **combined** to carry out different tasks, solve diverse problems, and progress in various domains.”
- Gardner says that these differences “challenge an educational system that assumes that everyone can learn the same materials in the same way and that a uniform, universal measure suffices to test student learning. Indeed, as currently constituted, our educational system is heavily biased toward linguistic modes of instruction and assessment and, to a somewhat lesser degree, toward logical-quantitative modes as well.”

## The Multiple Intelligences (MI) Chart

### Verbal/linguistic intelligence

- using language to present your ideas, to express your feelings or to persuade others

### Musical/rhythmic intelligence

- creating and feeling a rhythm to express a mood; detecting and analysing musical themes

### Logical/mathematical intelligence

- reasoning, logical thinking; handling mathematical problems

### Intrapersonal intelligence

(within the self)

- understanding your own interior thoughts and feelings in a very clear way

### Visual/spatial intelligence

- creating and interpreting visual images; thinking in three dimensions

### Interpersonal intelligence

(between people)

- understanding the feelings, needs and purposes of others

### Bodily/kinesthetic intelligence

- feeling and expressing things physically; doing hands-on work

### Naturalist intelligence

- understanding nature, seeing patterns in the way nature works; classifying things



# The Major Theories

- **Behaviorist-** Learning described as changes in the observable behavior of a learner made as a function of events in the environment.
- **Cognitive-** In addition to observable behavior, learning also involves nonobservable behavior such as memory and motivation.
- **Constructivism-** Accepts behaviorist and cognitive precepts but adds that Learners construct their own knowledge through experience-based activities rather than being directed by teachers.
  - How the learner interprets an experience is what matters.