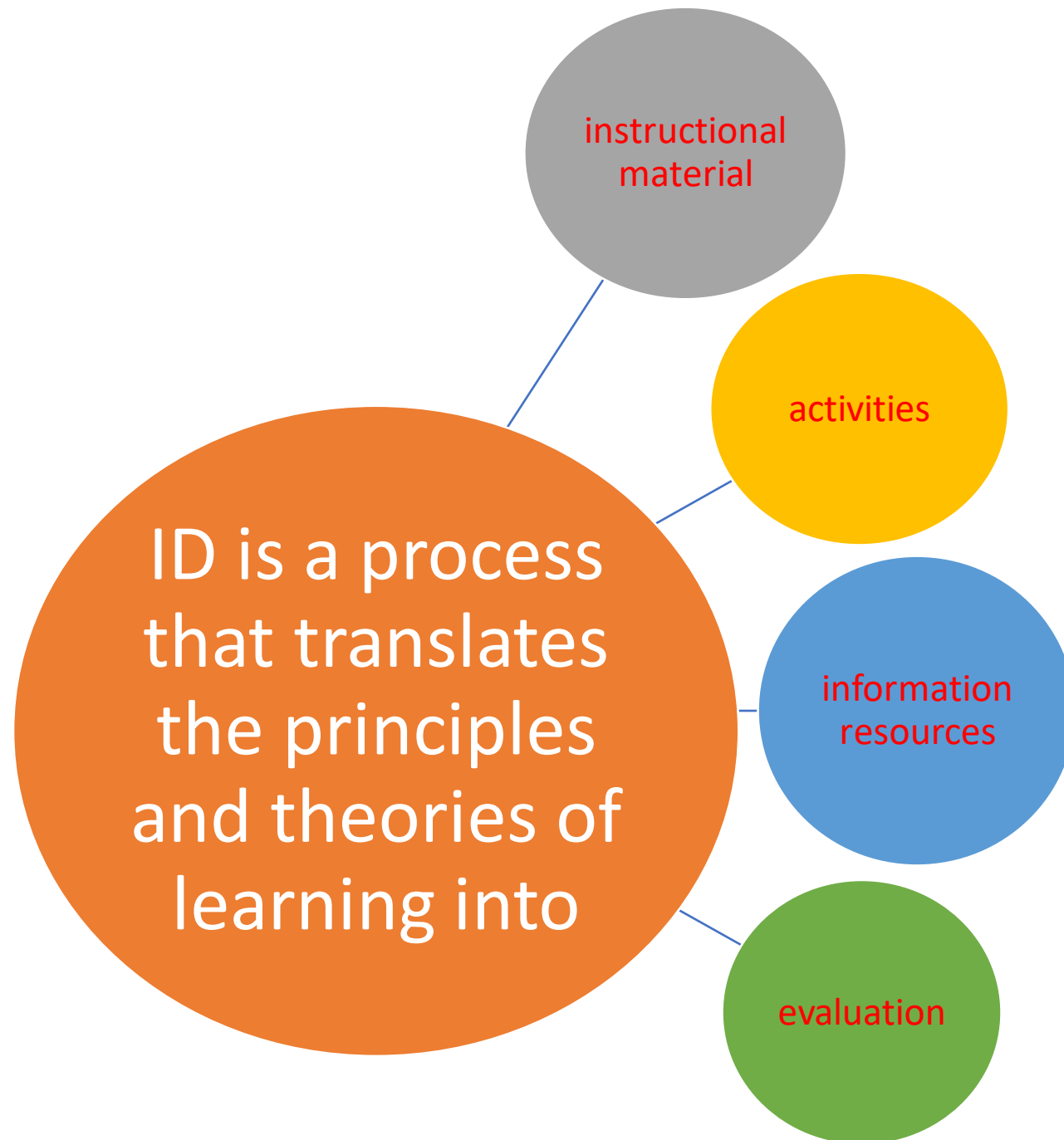
The background of the slide is a teal color with a repeating pattern of speech bubbles. Each bubble is a different color (red, yellow, purple, grey) and contains a blue question mark. The bubbles are scattered across the entire slide, creating a textured, question-themed background.

# Recap ~ Instructional Design, what is it?

Answer these questions: [Link to recap questions](#)





Instructional

# Foundations of multimedia-based instructional design

---

Design

clarity





# Learning objectives

At the end of this topic you should be able to:

- Know what are the theories that are the foundation or basis for an ID
- explain the importance of the foundational areas (learning theory, communication theory etc.) to the ID



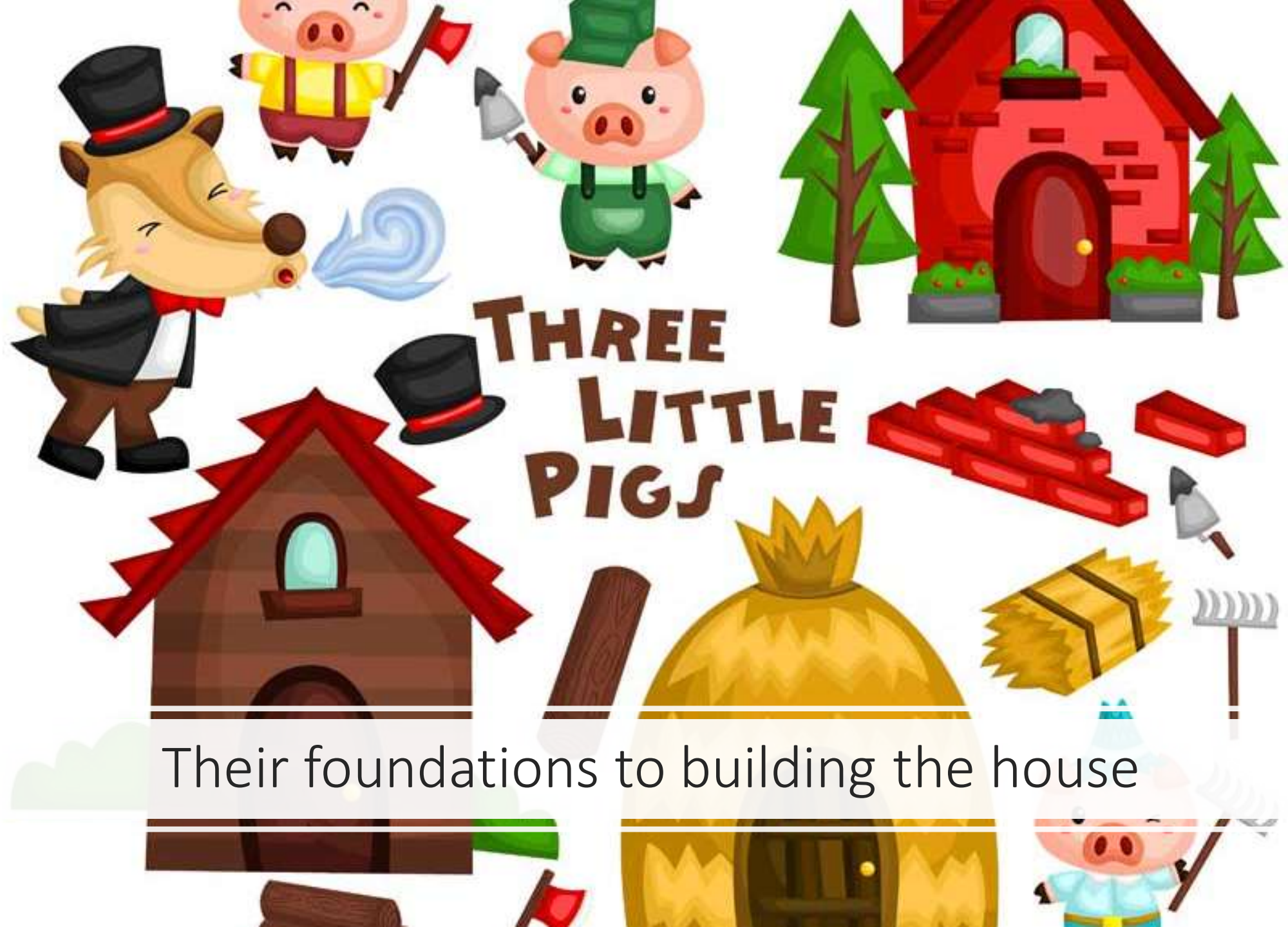
Why do we need foundations before developing an instructional application?

---

Let's use the story of the 'Little pigs and wolf' as an example







Their foundations to building the house

# Why foundations?

- Just as a house requires a strong foundation to support its structure, instructional design needs a solid foundation of theories and principles to uphold the learning process. Without this foundation, the educational structure may become unstable and ineffective.
- The foundations for learning are the **theories** and **principles**



# Theory & Principles

---



# Theory

- 1. Definition:** A theory is a systematic and organized set of concepts, ideas, that aim to explain, predict, or understand phenomena or events within a particular domain of study. Theories provide a framework for making sense of complex issues and generating hypotheses.
- 2. Purpose:** to provide a coherent and logical explanation for observed facts or phenomena.
- 3. Examples:** In the context of instructional design, theories could include learning theories like behaviorism, cognitivism, constructivism, and connectivism. These theories offer different perspectives on how people learn and suggest strategies for designing effective learning experiences.

# Principles

- 1. Definition:** Principles are fundamental guidelines that guide actions, decisions, or practices within a specific domain. They are often derived from theories and research findings and provide practical guidance for achieving specific goals or outcomes.
- 2. Purpose:** serve as practical rules or recommendations for practitioners in a particular field..
- 3. Examples:** In the context of instructional design, principles could include principles of multimedia learning, such as the redundancy principle (avoiding redundant information) or the contiguity principle (presenting related elements close in time and space). These principles guide the design of multimedia materials to enhance learning.

# The theories that are the foundations to ID



Communication theory



Systems theory



Learning theory



Development theory



Instructional theory

# 1. Communication theory





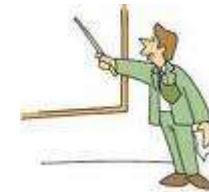
# Communication theory



The theory says, **"A message is generated at source and is transmitted by some medium to a receiver at the destination. Distracting messages are referred as noise."**

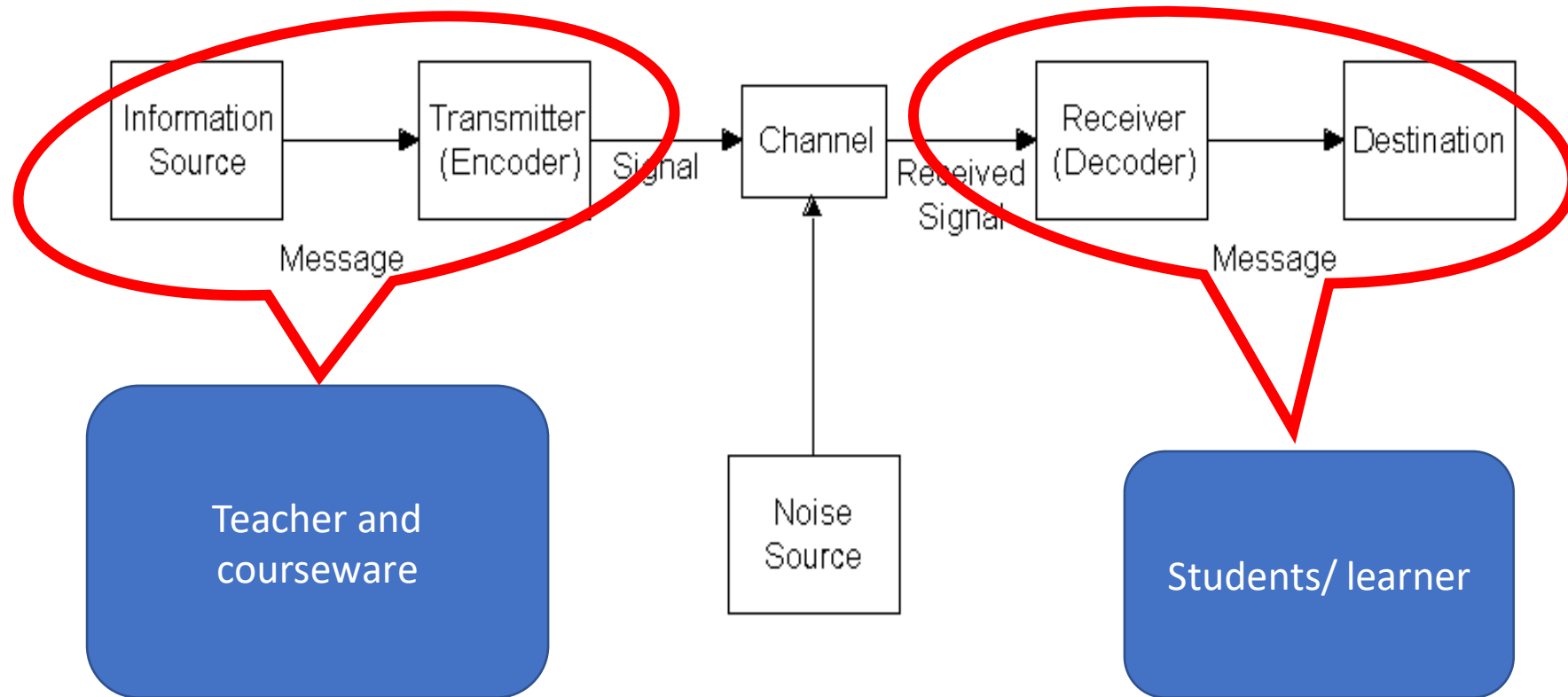


Communication theory is closely linked to the concept of learning.

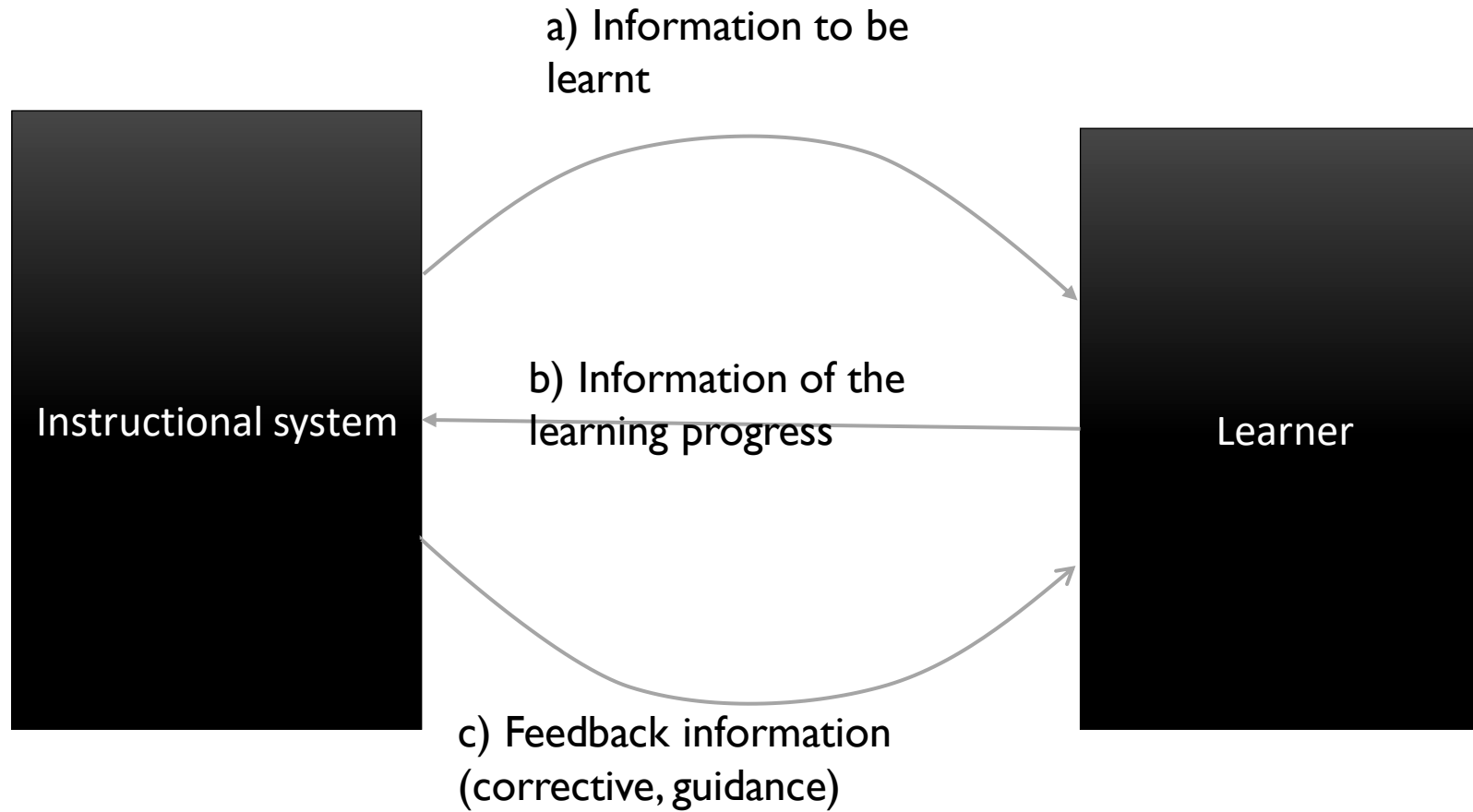


# Communication theory

## The Shannon-Weaver Mathematical Model, 1949



# Instructional process according to communication theory



# Instruction occurs when ...



a teacher transmit a variety of messages

the learner communicates to the teacher that learning is progressing

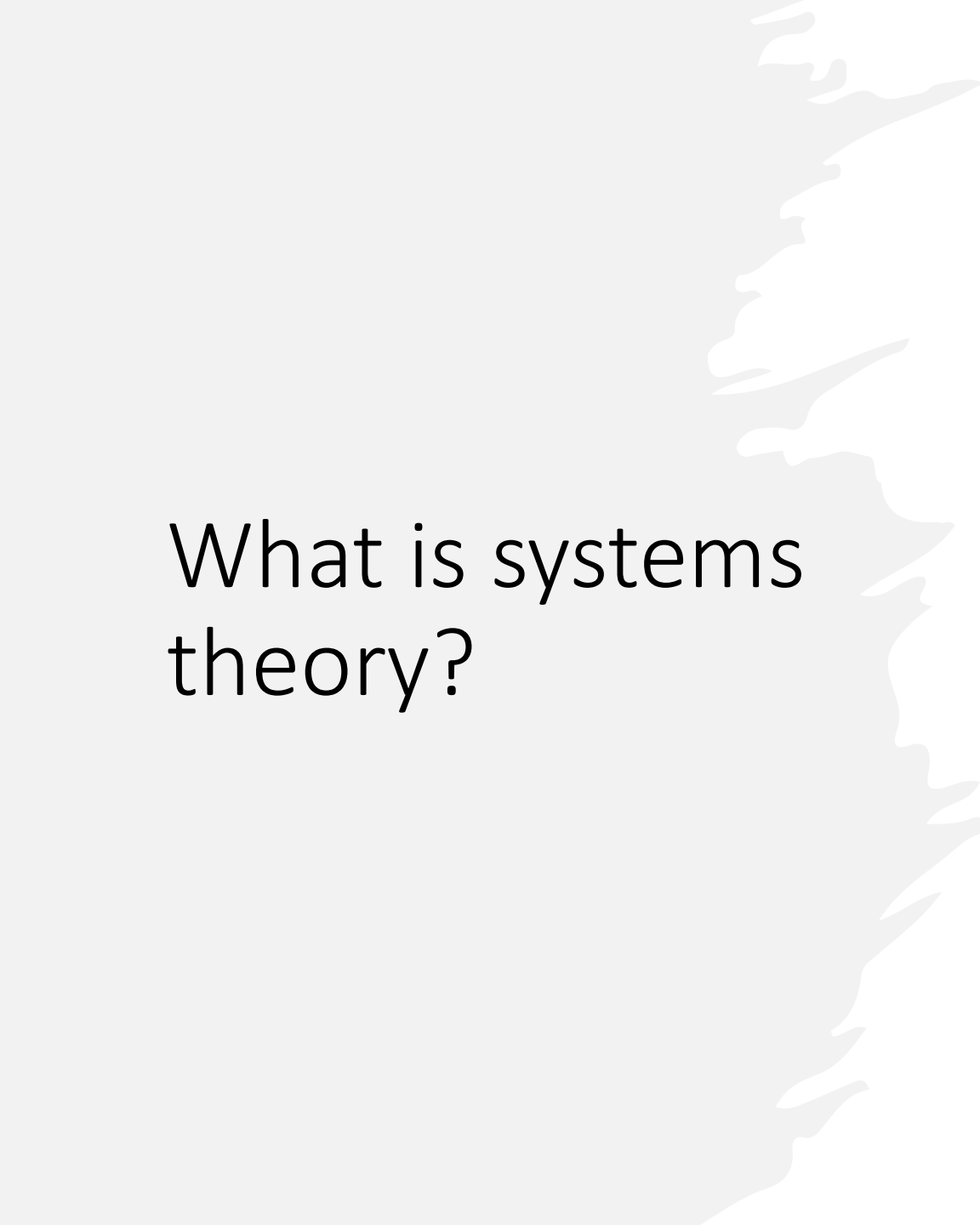
the teacher interpreted the feedback and decides on corrective action.  
Feedback the information to the learner







## 2. Systems Theory



What is systems theory?

- A system is a collection of interrelated and interdependent components or elements that work together to achieve a specific goal or purpose.

**Composer**

**Rehearsals**

**Feedback**

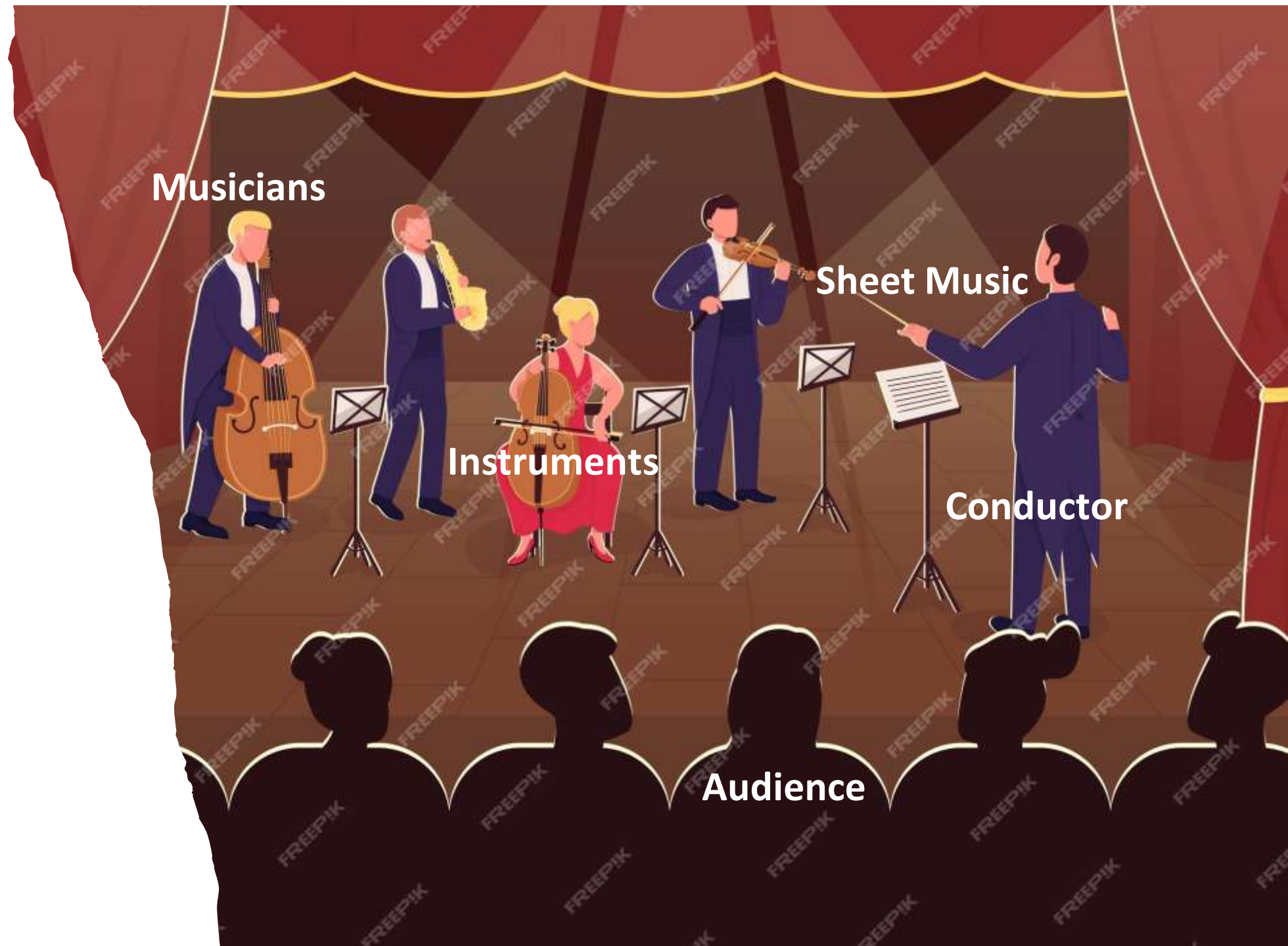
**Musicians**

**Instruments**

**Sheet Music**

**Conductor**

**Audience**



**Composer  
(Instructional  
Designer)**

**Rehearsals  
(Instructional  
Planning)**

**Feedback  
(Assessment  
and  
Evaluation)**

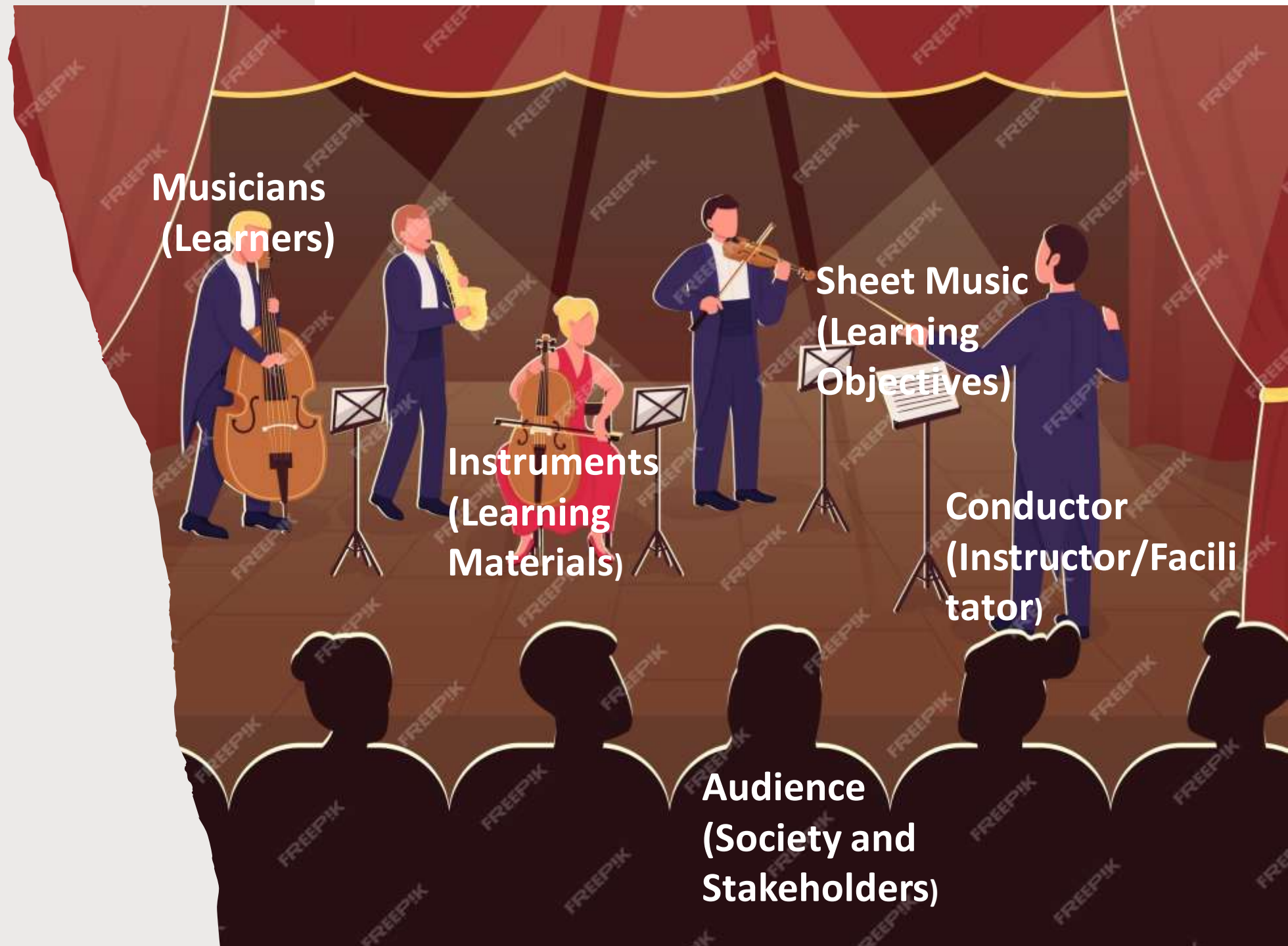
**Musicians  
(Learners)**

**Instruments  
(Learning  
Materials)**

**Sheet Music  
(Learning  
Objectives)**

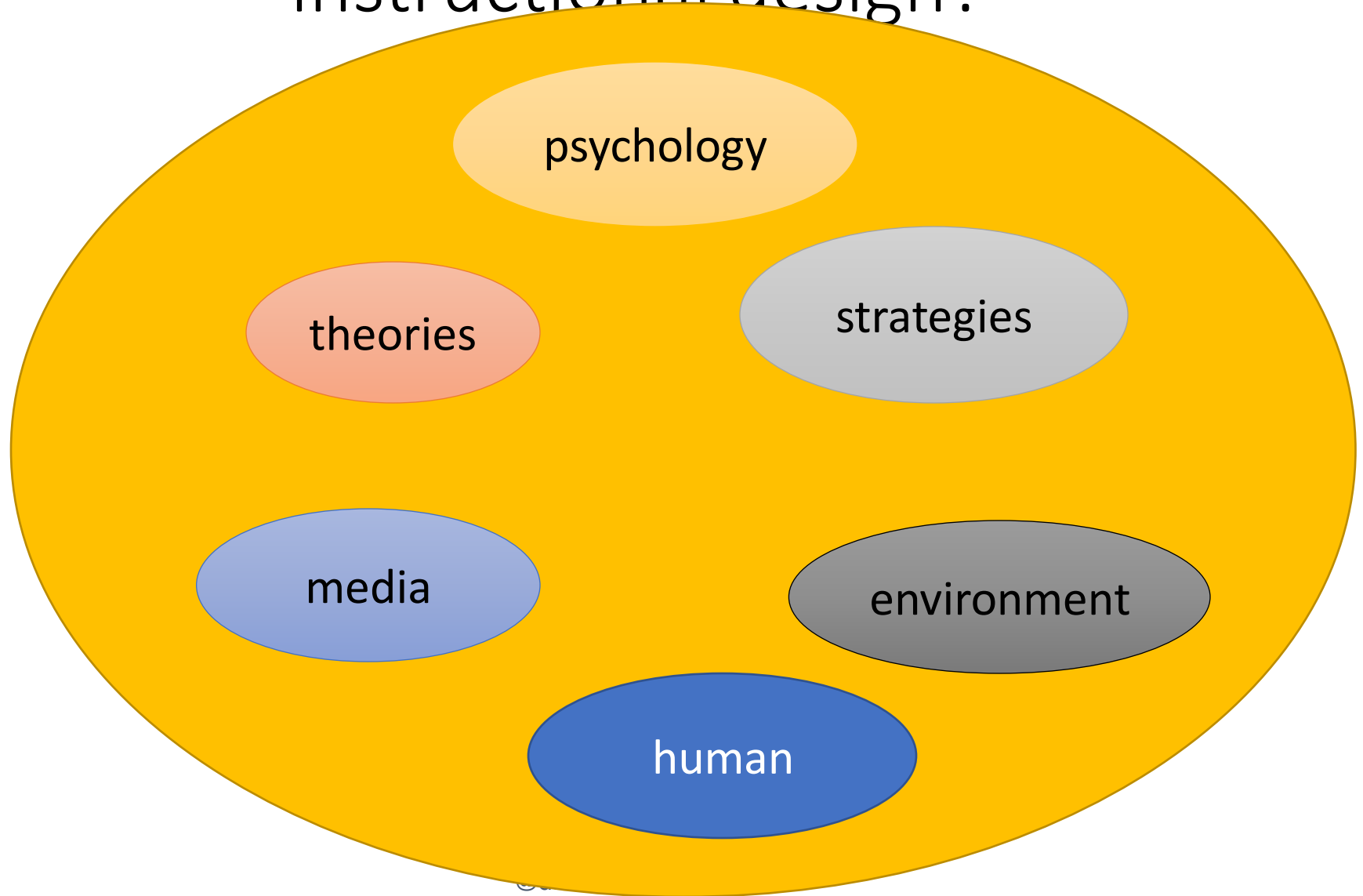
**Conductor  
(Instructor/Facili  
tator)**

**Audience  
(Society and  
Stakeholders)**





# What are the possible components in systems for instructional design?



### 3. Learning theories





# What is learning theory?

- Learning theory refers to a body of knowledge and concepts that seeks to explain **how learning occurs** and **how individuals acquire knowledge, skills, behaviors, and attitudes.**

# Learning theories

Behaviorism

Cognitivism

Constructivism

Connectivism

Humanism

Social Learning Theory

Experiential Learning

Andragogy



---

# Behaviorism

- Behaviorism is a theory that focuses on **observable behaviors** and external stimuli.
- Learning is the result of associations between **stimuli and responses**.
- Classical conditioning (Pavlov) and operant conditioning (Skinner) are key concepts in behaviorism.
- Behaviorism emphasizes reinforcement and punishment to shape behavior.



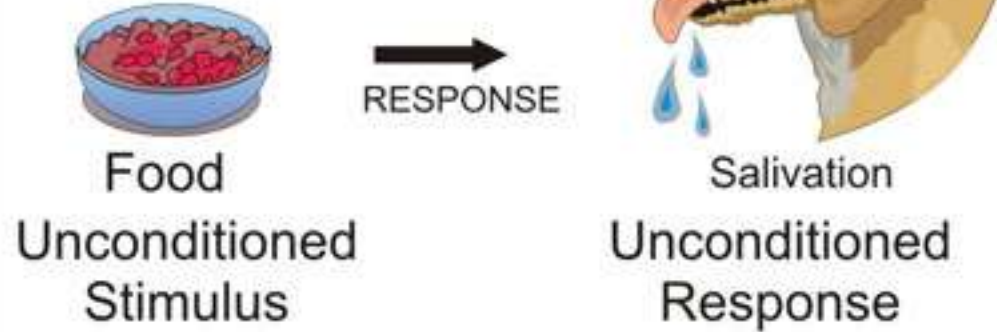
# Several key concepts to behaviorism

- 1. Stimulus-Response (S-R)**
- 2. Classical Conditioning**
- 3. Operant Conditioning**
- 4. Reinforcement**
- 5. Punishment**

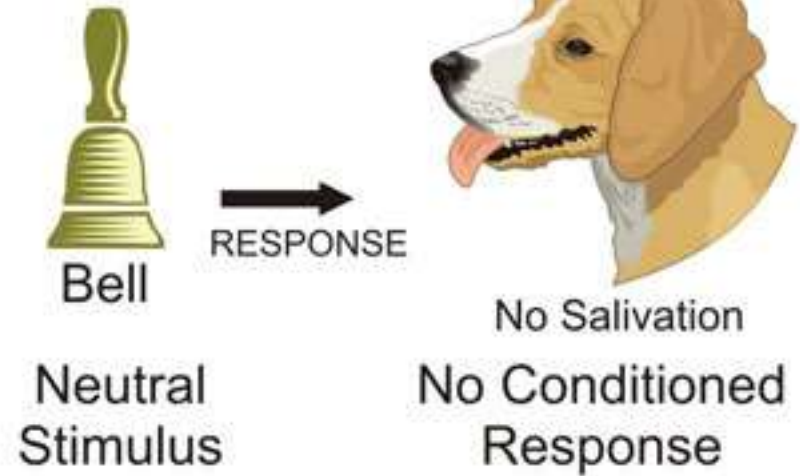
# Several key concepts to behaviorism

- 1. Stimulus-Response (S-R):** Behaviorism often describes the relationship between stimuli and responses.
  - A stimulus is an environmental event or situation that elicits a response from an individual.
  - The response is the observable behavior produced as a result of the stimulus.
  - Behaviorists study how specific stimuli trigger particular responses.
- 2. Classical Conditioning:** Classical conditioning, associated with the work of Ivan Pavlov, involves the learning of associations between neutral stimuli and naturally occurring stimuli.
  - Over time, neutral stimuli can elicit responses similar to those produced by the natural stimuli. The famous example is Pavlov's dogs, where a bell ringing became associated with food and triggered salivation.

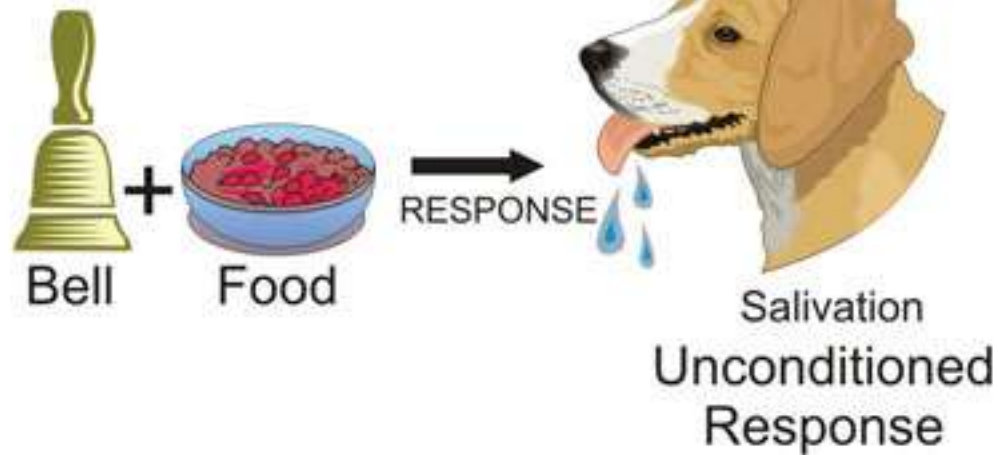
### 1. Before Conditioning



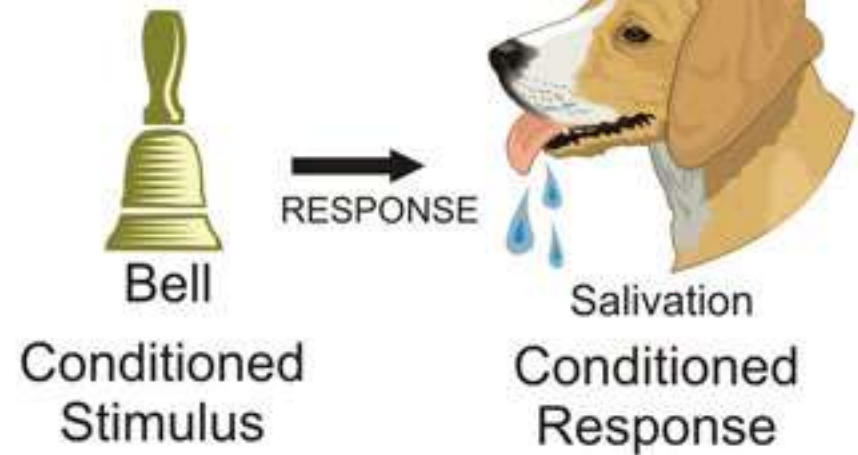
### 2. Before Conditioning



### 3. During Conditioning



### 4. After Conditioning



## Classical Conditioning

# Other key concepts to behaviorism

3. **Operant Conditioning:** Operant conditioning, developed by B.F. Skinner
  - It focuses on how behaviors are strengthened or weakened based on their consequences.
  - Two important approaches in this concept are : Reinforcement and punishment.
4. **Reinforcement:** Reinforcement is a key concept in operant conditioning.
  - It refers to the process of strengthening a behavior by providing a positive consequence (positive reinforcement) or removing an aversive stimulus (negative reinforcement) immediately following the behavior.
  - Reinforcement makes the behavior more likely to occur in the future.

# Key concepts to behaviorism

5. **Punishment:** Punishment is another concept in operant conditioning.
- It involves the application of an aversive consequence to reduce or weaken a behavior.
  - Positive punishment adds an undesirable stimulus (e.g., a scolding), while negative punishment removes a desired stimulus (e.g., taking away privileges).
  - Punishment aims to decrease the likelihood of the behavior occurring again.



Operant  
conditioning-  
reinforcement  
& punishment

Something is **added** to  
**increase** the likelihood of  
a behavior.

*E.g. Child gets praise from  
parent for good school  
grades*

**POSITIVE  
REINFORCEMENT**

Something is **removed** to  
**increase** the likelihood of  
a behavior.

*E.g. A child cleans their  
room to avoid nagging  
parents*

**NEGATIVE  
REINFORCEMENT**

Something is **added** to  
**decrease** the likelihood  
of a behavior.

*E.g. Parent scolding a child for  
fighting with their sibling*

**POSITIVE  
PUNISHMENT**

Something is **removed**  
to **decrease** the  
likelihood of a behavior.

*E.g. Child losing iPad privileges after  
refusing to eat vegetables*

**NEGATIVE  
PUNISHMENT**

# Types of Learning Reinforcement

## Positive Reinforcement Example

Positive behavior followed by positive consequences

1.)

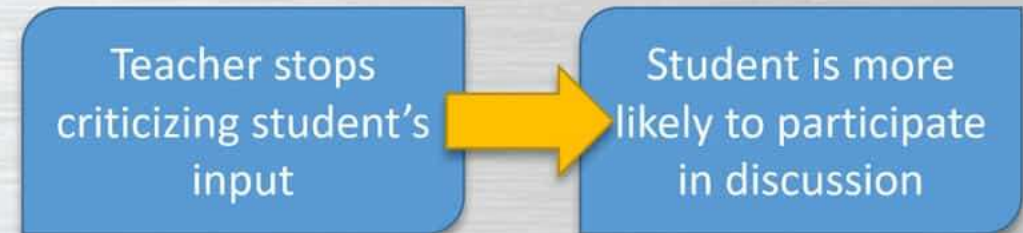


2.)



## Negative Reinforcement Example

Positive behavior followed by removal of negative consequences.



# Behaviorism principles that can be applied in ID



PRACTICE AND  
REPETITION



MODELLING



REINFORCEMENTS



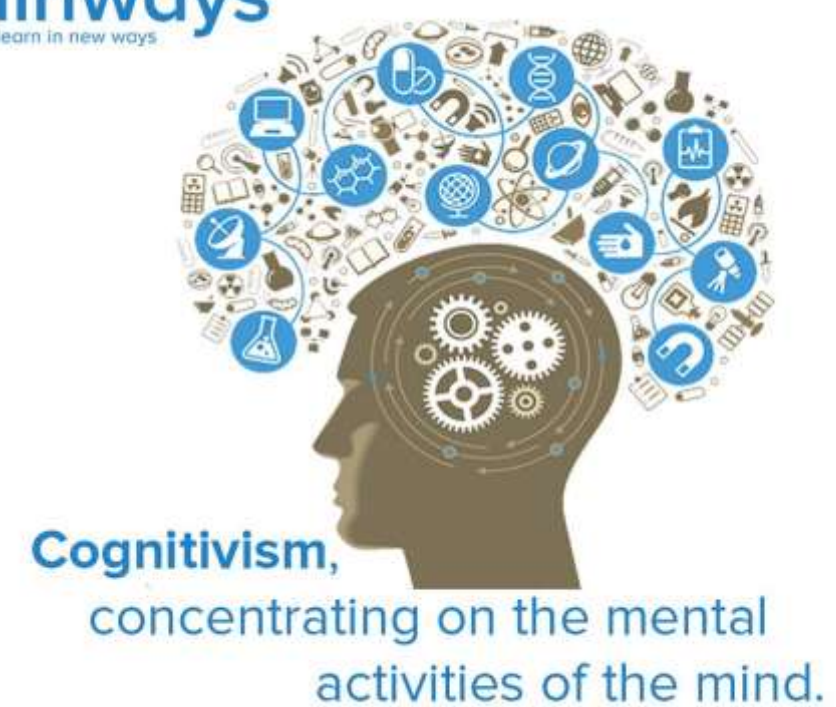
FEEDBACK AS  
STIMULUS



BEHAVIORAL  
ASSESSMENTS

# Cognitivism

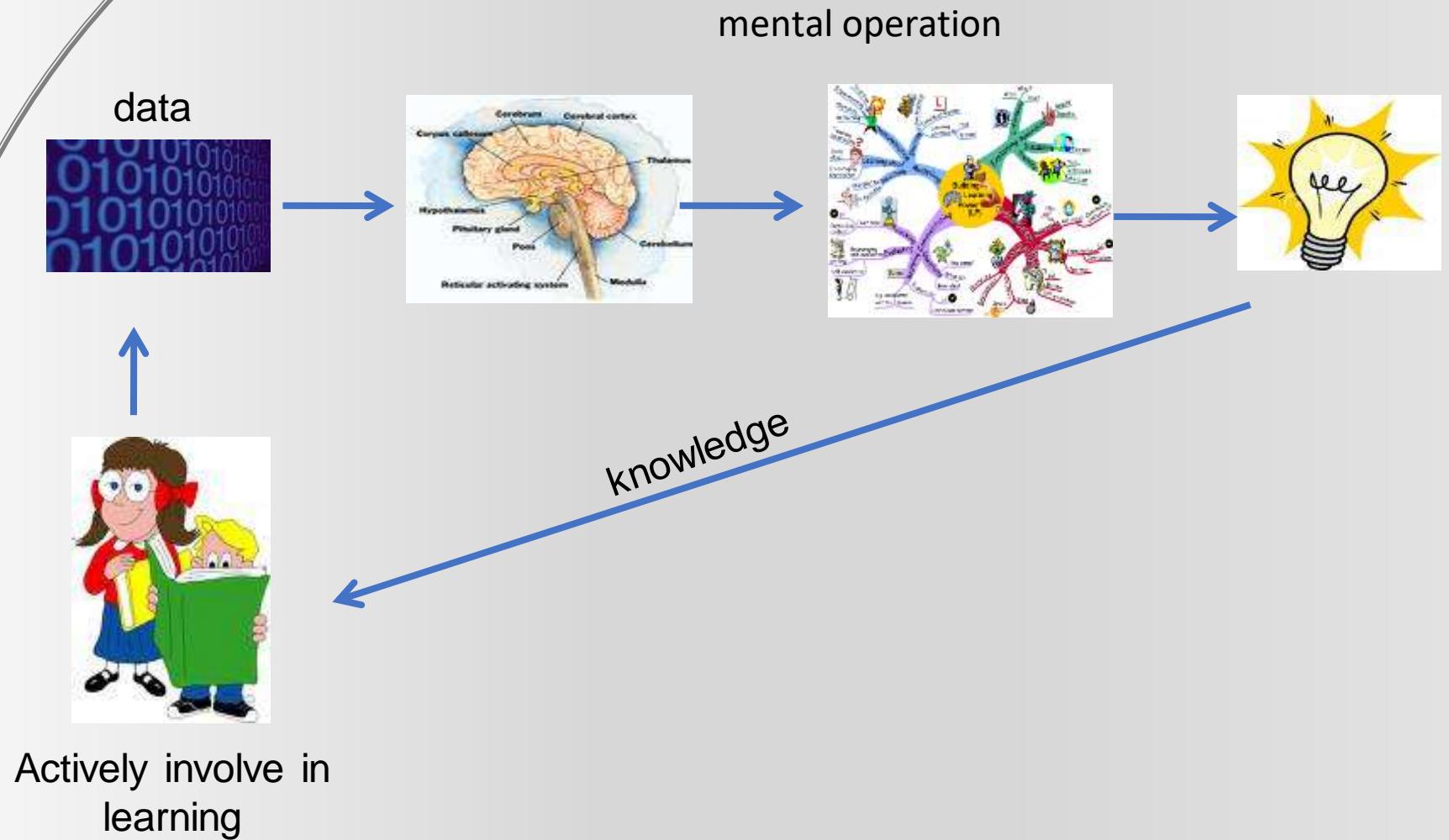
- Cognitivism emphasizes mental processes such as thinking, memory, problem-solving, and information processing.
- It suggests that learning involves the internal organization and processing of information.
- Cognitive theories propose that learners actively construct knowledge through cognitive processes.





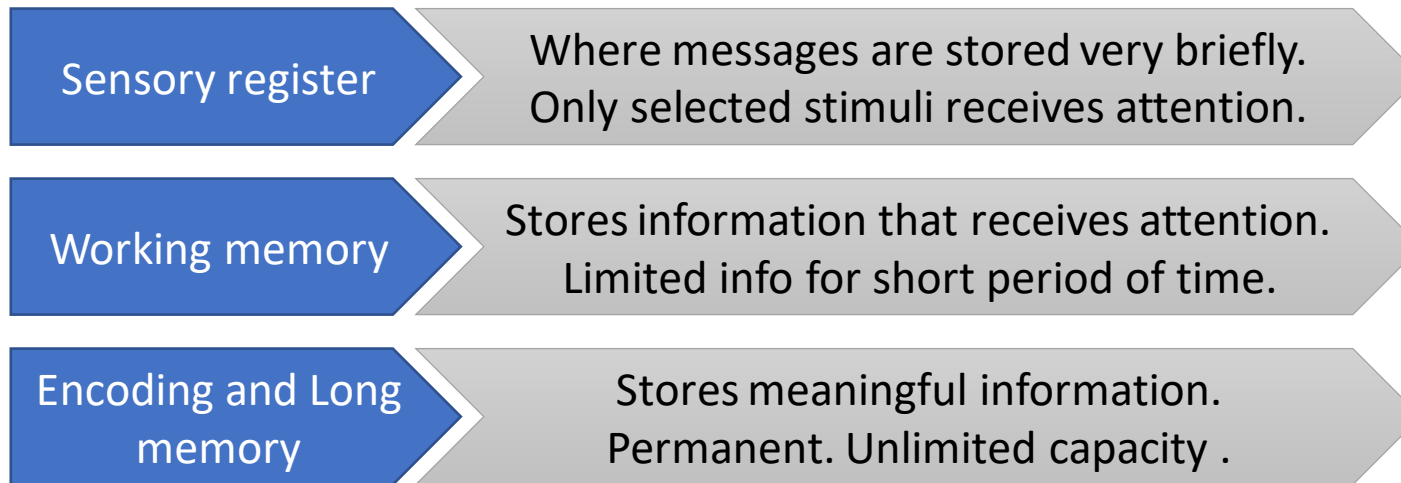
# Cognitivism

INFORMATION  
PROCESSING



# Information Processing theory

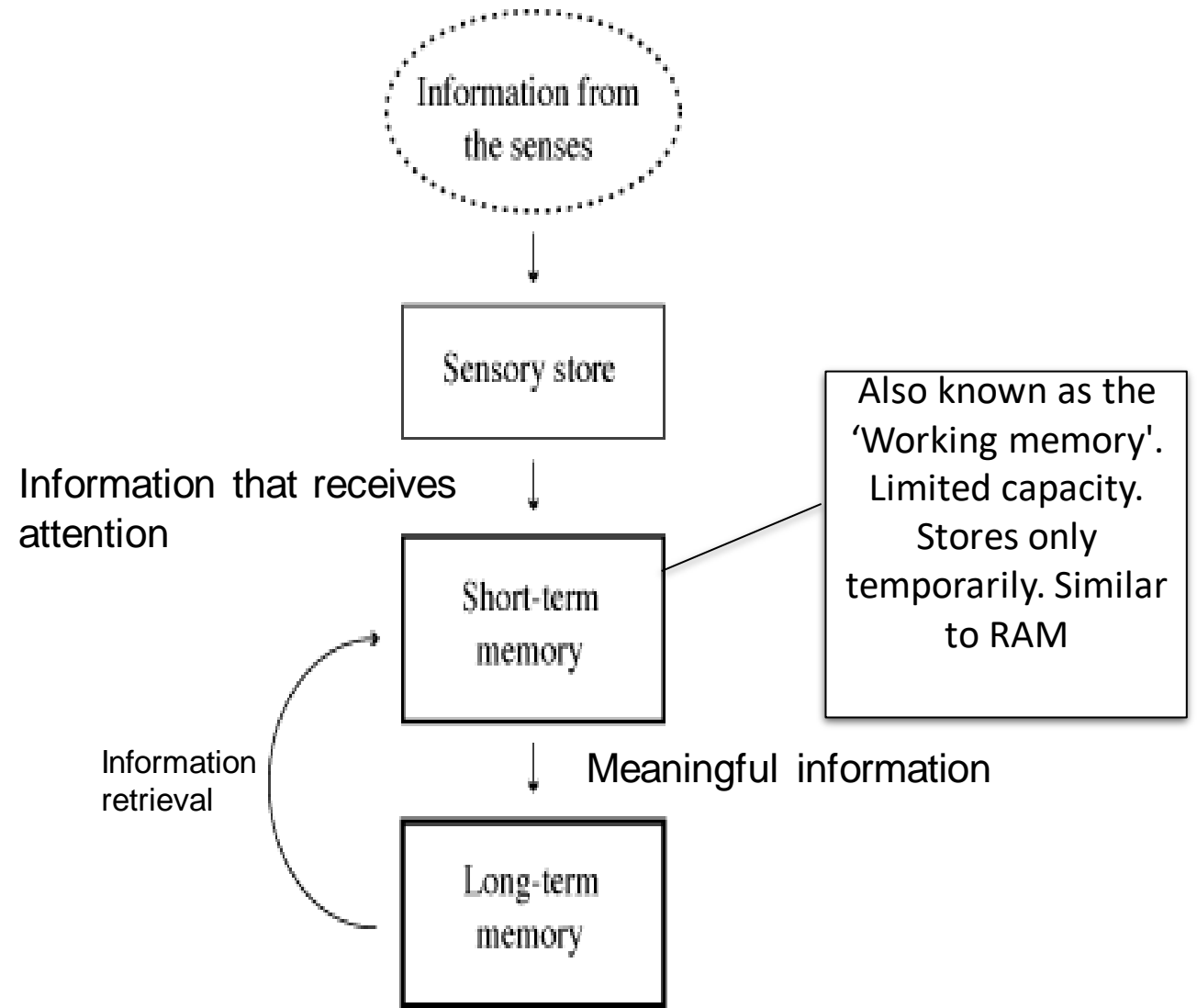
- Describes learning as a series of transformations of information through a series of brain structures.
- The brain structures are suggested as follows:





# Information processing

- Cognitivism often adopts an information processing model to describe **how humans perceive and make sense of the world**.
- This model maps the human mind to a computer, where sensory input receives information, process it, and stored, leading to output or behavioral responses.



# How does information processing theory can be applied in the instructional design

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**Attention and Selective Processing:** limited attention spans

- avoid overwhelming /excessive information. Use visual cues to guide their attention to key concepts.

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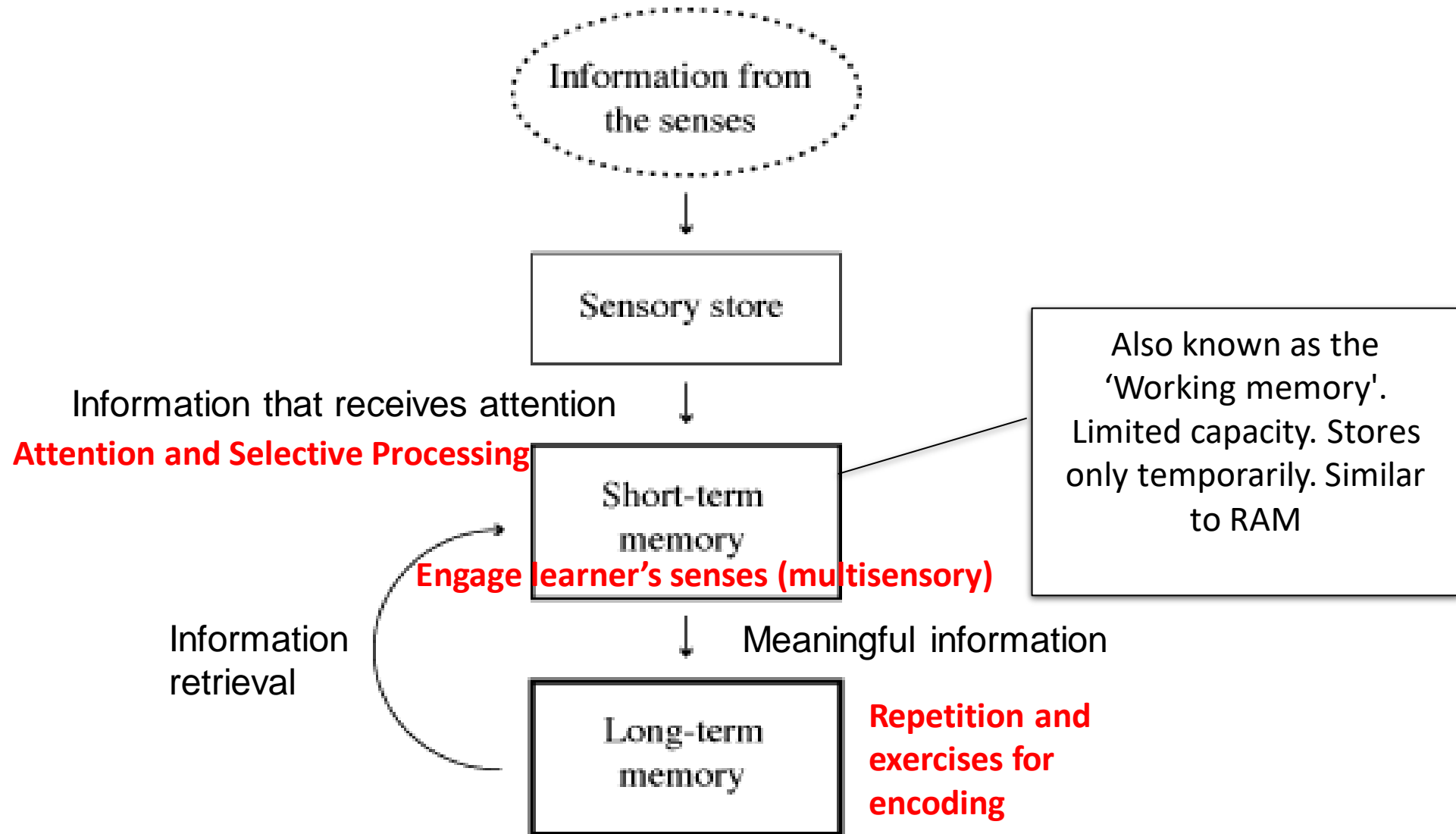
**Sensory Memory:** Sensory memory briefly holds incoming sensory information. Need to engage learners' senses by using multimedia elements to create a sensory-rich learning environment that are relevant to the learning objectives.

---

**Working Memory:** where the information is actively processed and manipulated. Avoid cognitive overload, apply small chunks. Encourage learners to practice and apply new knowledge immediately to transfer it to long-term memory.

# How does information processing theory can be applied in the instructional design

- **Long-term Memory:** To encourage the transfer of information from working memory to long-term memory
- to reinforce learning and improve memory retention.
  - promote active engagement and rehearsal.
  - Spaced repetition, self-testing.
  - rehearsal techniques



# Applying cognitivism in ID

- 1.Setting Clear Learning Objectives:** to help learner prepares to perform mental model
- 2.Activate Prior Knowledge:** connecting new information to existing mental frameworks
- 3.Chunking and Sequencing:** Organize instruction content into meaningful chunks and sequences. Sequencing ensures that content is presented in a logical order, allowing learners to build on their existing knowledge progressively.



# Information processing theory

## Creating meaningful information

- are those that are integrated with related prior knowledge.

Eg.



A very tall animal, long neck – a giraffe

- can be designed.

Eg.

Sequencing numbers:

012 2333 444  
@drmarina ismail



# Instructional strategies to enhance cognitive processes

Explanations	Providing clear explanations and demonstrations.
Engagement	Encouraging active engagement and problem-solving.
Scaffolding	Scaffolding instruction to gradually increase complexity.
Metacognitive	Fostering metacognitive skills through reflection and self-assessment.
Visual Aids	Using visual aids and multimedia to enhance understanding.
Prior knowledge	Promoting meaningful learning through connections to prior knowledge.

# Constructivism

- Constructivism is a learning theory that suggests learners **actively construct** their own understanding of knowledge and meaning through a process of mental organization, integration, and interpretation.
- In other words, it emphasizes that individuals don't simply absorb information passively; instead, they actively build their knowledge based on their prior experiences, mental frameworks, and interactions with their environment.

# CONSTRUCTIVISM

## Main Principles

1. Knowledge is actively constructed by learners.

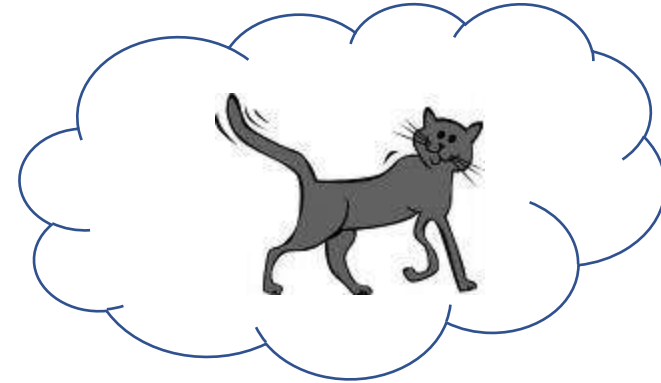
2. Learners rely on prior knowledge to construct knowledge.

3. Individuals create meaning through interaction.



# CONSTRUCTIVISME

How learners built new knowledge  
based on prior knowledge



It's a cat

Tail?

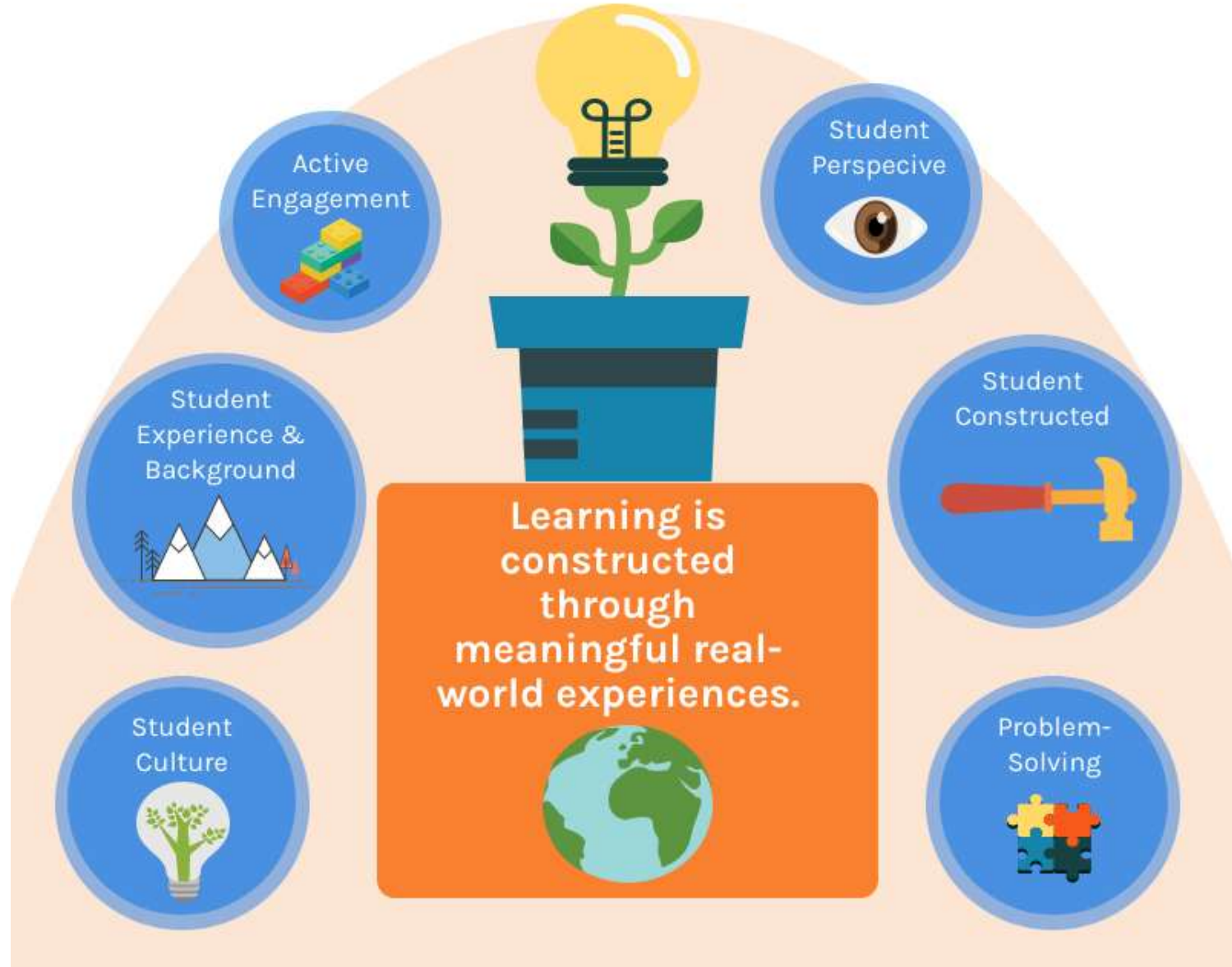
Whiskers?

Hairy?

Meow?



# CONSTRUCTIVISM



# Key principles of constructivism

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**Active Learning:** Learners are actively engaged in making sense of new information by connecting it to what they already know. They construct knowledge through mental activities such as problem-solving, critical thinking, and reflection.

---

**Prior Knowledge:** Prior knowledge is important in the learning process. New information is integrated with and adjusted based on what learners already understand.

---

**Social Interaction:** Constructivism acknowledges the importance of social interaction in learning. Collaborative learning, discussions, and interactions with peers and experts can enhance understanding and provide alternative viewpoints.



# Key principles of constructivism

---

**Zones of Proximal Development (ZPD):** A concept where learners can tackle more complex tasks with the guidance of a more knowledgeable person (teacher, peer, or mentor). Provide support to help learners move beyond their current level of understanding.

---

**Scaffolding:** Scaffolding is the support provided to learners as they work on tasks within their ZPD. It involves offering guidance, cues, and feedback to help learners gradually develop their skills and understanding.

---

**Active Construction of Meaning:** Learners actively construct their own meaning by assimilating new information and accommodating it into their existing mental structures. This process leads to the creation of personal and meaningful knowledge.

---

**Contextual Learning:** Learning is seen as a situated activity that occurs within specific contexts. Knowledge is closely tied to the context in which it is learned and applied.

---

# Applying constructivism in instructional design

---

## **1. Assess Prior Knowledge:**

- Begin by assessing learners' prior knowledge and existing mental frameworks related to the topic. This helps you understand their starting point.

## **2. Set Clear Learning Objectives:**

- Clearly define learning objectives that specify what learners should know or be able to do by the end of the instruction. Objectives should be meaningful and achievable.

## **3. Design Authentic Tasks and Situations:**

- Create authentic and real-world tasks or scenarios that mirror the types of situations in which learners will apply their knowledge or skills.

---

#### **4. Promote Active Engagement:**

- Encourage active learning through problem-solving, exploration, experimentation, and hands-on activities.
- Provide opportunities for learners to explore and construct their understanding rather than passively receive information.

#### **5. Facilitate Social Interaction:**

- Foster collaborative learning environments where learners can engage in discussions, peer interactions, and knowledge sharing.
- Encourage learners to share their perspectives and experiences with peers.

#### **6. Scaffold Learning:**

- Offer scaffolding support to learners as needed. Provide guidance, prompts, and feedback to help learners progress through complex tasks or concepts.
- Gradually decrease scaffolding as learners become more competent.

---

## **7. Encourage Reflection:**

- Promote reflective thinking by asking learners to think about their learning experiences, analyze their thought processes, and make connections to real-life situations.

## **8. Use Multiple Resources:**

- Provide a variety of learning resources, such as readings, videos, simulations, and expert interviews. This allows learners to explore content from different angles.

## **9. Emphasize Critical Thinking:**

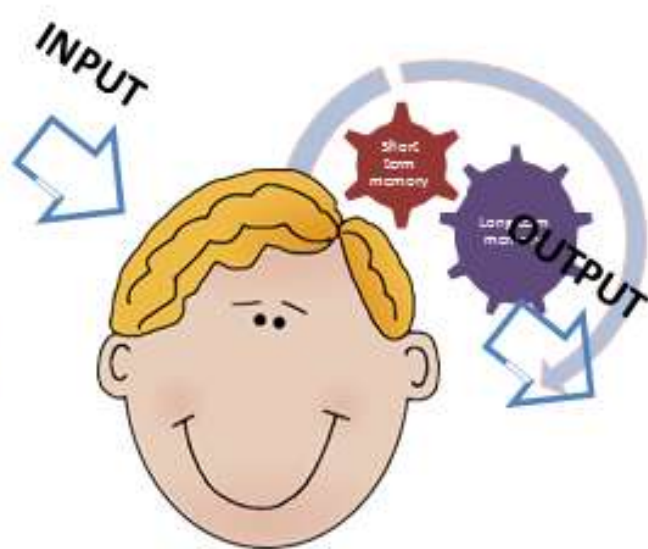
- Encourage critical thinking and problem-solving skills by posing open-ended questions, challenges, and complex scenarios.
- Encourage learners to evaluate information critically and make informed decisions.

Behaviorism	Cognitivism	Constructivism
<b>Focus:</b> what the learner does; proper response to a given stimulus (observable)	<b>Focus:</b> processing of information; how the learner organizes new information within preexisting schema (internal)	<b>Focus:</b> how the learner interprets the new information and applies to their own reality (meaning constantly evolves)
<b>Learner is:</b> reactive	<b>Learner is:</b> proactive	<b>Learner is:</b> proactive
<b>Type of learning:</b> basic definitions and explanation of concepts; generalization, recall	<b>Type of learning:</b> higher-level reasoning and information processing; emphasis on memory, organization	<b>Type of learning:</b> higher-level problem solving and critical analysis; emphasis on real-world scenarios
<b>Examples:</b> pre-tests, comprehension checks; facilitate learning through assessments that allow practice, repetition	<b>Examples:</b> corrective feedback, learning strategies like analogy, metaphor, concept mapping; remove irrelevant information	<b>Examples:</b> apprenticeships, clinics, collaborative learning; encourage application of new knowledge in a variety of contexts and perspectives





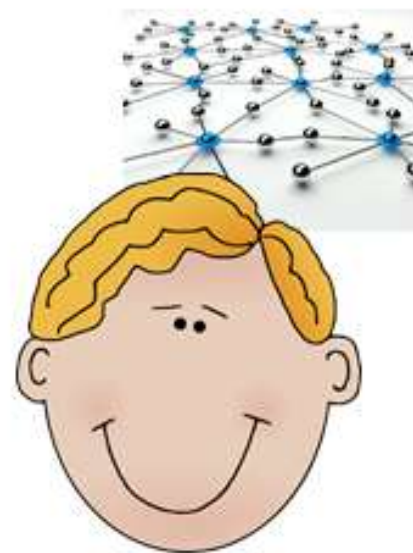
**Behaviorism**



**Cognitivism**



**Constructivism**



**Connectivism**



## 4. Developmental Theory

# What is developmental theory

- Developmental theory, in the context of psychology, refers to a set of frameworks and models that **seek to explain and describe how individuals grow, change, and develop across their lifespan.**
- These theories offer insights into the physical, cognitive, emotional, and social changes that occur as individuals progress from infancy through adulthood.
- It focuses on human development.
- There are several prominent developmental theories, and each provides a unique perspective on human development.



# Some of the developmental theories

1. Piaget's Theory of Cognitive Development
2. Erikson's Psychosocial Development Theory
3. Kohlberg's Theory of Moral Development
4. Vygotsky's Sociocultural Theory
5. Social Learning Theory (Albert Bandura)



# Piaget's Theory of Cognitive Development

- Piaget was a Swiss psychologist who conducted extensive research on the cognitive development of children.
- His theory suggests that individuals go through distinct stages of cognitive development as they grow and mature, and it outlines the changes in thinking and understanding that occur at each stage.



# Four main developmental stage

## 1. Sensorimotor Stage (0-2 years):

- During this stage, infants and toddlers learn about the world primarily through their senses and motor actions.

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

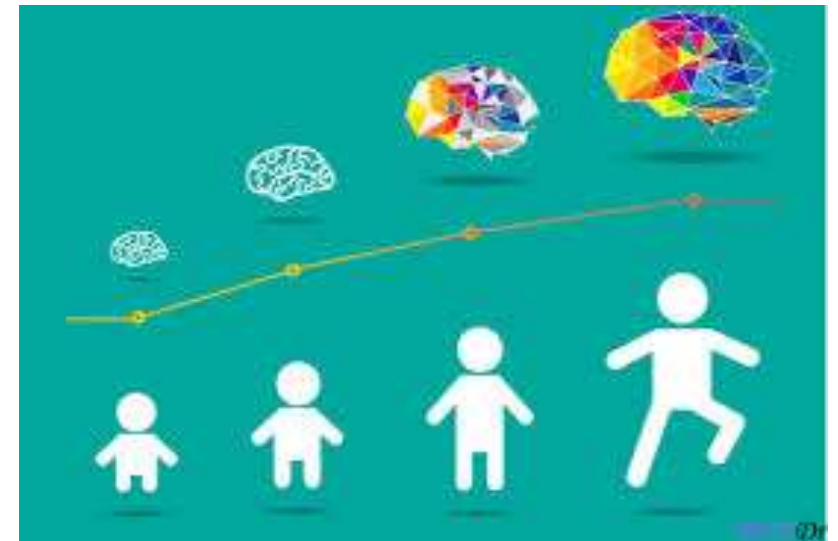
- In this stage, children develop symbolic thinking and language. They can use words and symbols to represent objects and concepts. However, their thinking is characterized by egocentrism, where they have difficulty seeing things from others' perspectives, are unable to perform mental operations or understand concepts.

## 3. Concrete Operational Stage (7-11 years):

- During this stage, children begin to think logically about concrete events and objects. They can perform mental operations and understand concepts like conservation. Capable of solving practical problems and understanding cause-and-effect relationships.

## 4. Formal Operational Stage (11 years and beyond):

- In the formal operational stage, individuals develop abstract thinking abilities. They can think hypothetically, reason deductively, and solve complex problems. They can also consider various perspectives and engage in systematic planning and problem-solving.





Piaget believed that  
development precedes  
learning

# Applying Piaget's theory in ID

- Assess learners' developmental stage
- Prepare learning material according to stages
- Active learning activities
- Use concrete materials esp for younger learners. Eg. marbles
- Real world application
- Support multiple learning styles





# Vygotsky's Sociocultural theory

- often referred to as social development theory, is a prominent and influential framework in the field of developmental psychology and education.
- This theory **emphasizes the social and cultural context of learning**
- suggests that cognitive development is significantly shaped by social interactions, cultural practices, and the support of more knowledgeable individuals, such as parents, teachers, and peers.

# Key principles and concepts of Vygotsky's sociocultural theory

## 1. Zone of Proximal Development (ZPD):

- The ZPD is a central concept in Vygotsky's theory. It represents the **difference between what a learner can do independently and what they can achieve with guidance and support.**
- Vygotsky believed that learning occurs within the ZPD, where learners receive help to move beyond their current level of understanding.

## 2. Scaffolding:

- Scaffolding refers to the **support** and guidance provided by more knowledgeable individuals (e.g., teachers, peers) to help learners accomplish tasks or solve problems within their ZPD.
- Scaffolding is gradually reduced as learners gain independence and competence.

### **3. Social Interaction:**

- Social interaction is considered very important for learning and development. Vygotsky emphasized the importance of dialogue, collaboration, and discussion in promoting cognitive growth.
- Interactions with peers and more knowledgeable others (MKO) provide opportunities for learning.

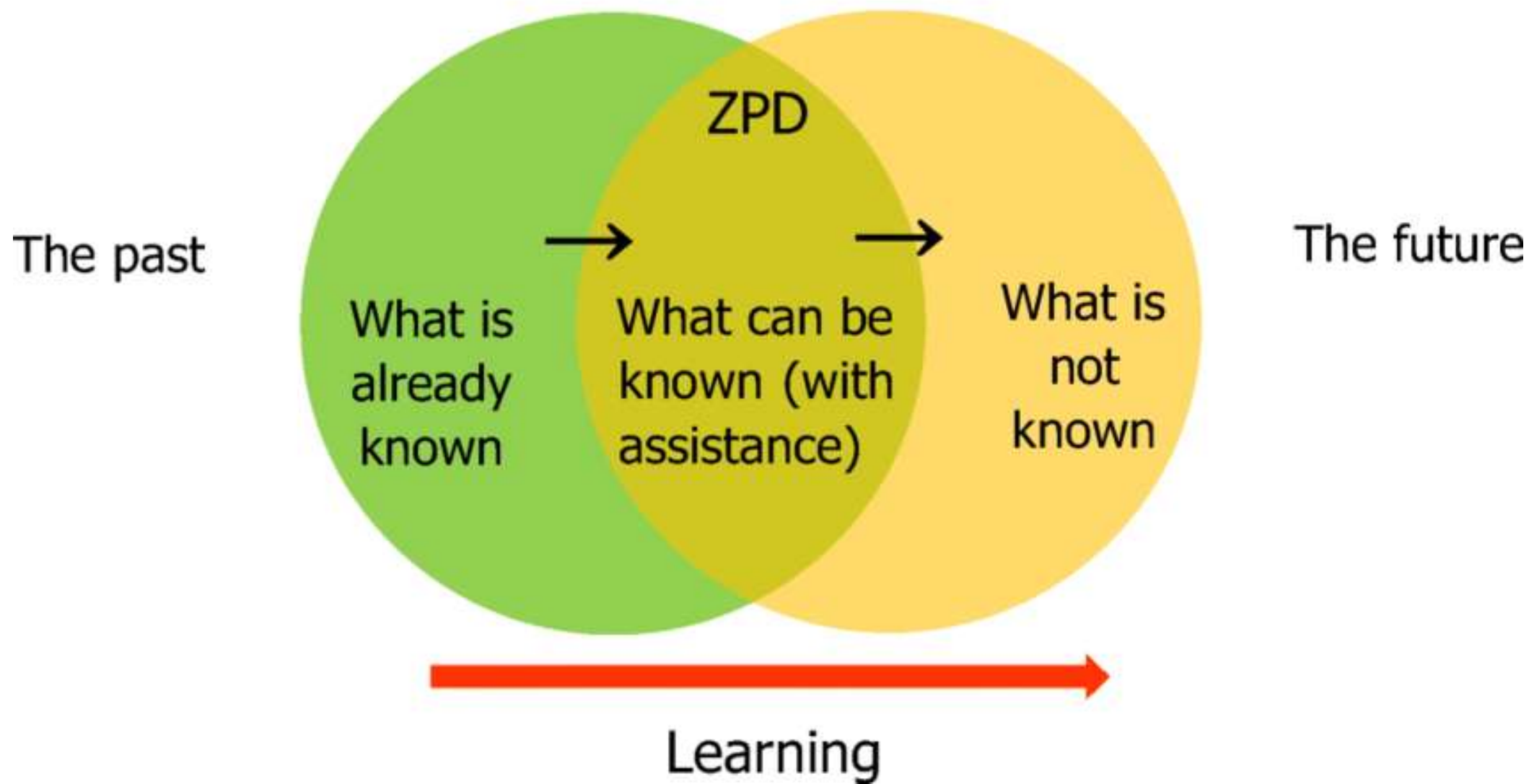
### **4. Private Speech:**

- Vygotsky observed that young children often engage in private speech (talking to themselves) while solving problems or completing tasks. He suggested that this self-talk serves as a way for children to internalize and regulate their thoughts and actions.

### **5. Cultural Context:**

- Vygotsky stressed the significance of the cultural context in which learning occurs. Culture shapes the values, beliefs, practices, and tools that influence cognitive development. Learning is embedded in cultural practices and norms.

# Vygotsky's zone of proximal development (ZPD)





Vygotsky believed that  
learning precedes  
development

# Applying Lev Vygotsky's sociocultural theory in instructional design

## 1. Identify the ZPD:

- Assess the learners' current level of competence and determine their ZPD.

## 2. Scaffolding:

- Provide structured support and guidance to learners within their ZPD. This support can come from the instructor, peers, or technology.
- As learners progress, gradually reduce the level of support to encourage independence.

## 3. Collaborative Learning:

- Design application that promotes collaborative learning (social interaction)

#### **4. Social Interaction:**

- Foster social interaction within the learning environment. Encourage discussions, debates, and dialogues to promote cognitive development through interaction with others.

#### **5. Zone of Proximal Development Activities:**

- Develop learning activities that are specifically designed to address the ZPD. These activities should challenge learners just beyond their current competence, with the expectation that they will receive support and grow.



What is the major difference between Piaget's cognitive development theory and Vygotsky's sociocultural theory?

# The answer:

## Cognitive Development vs. Learning:

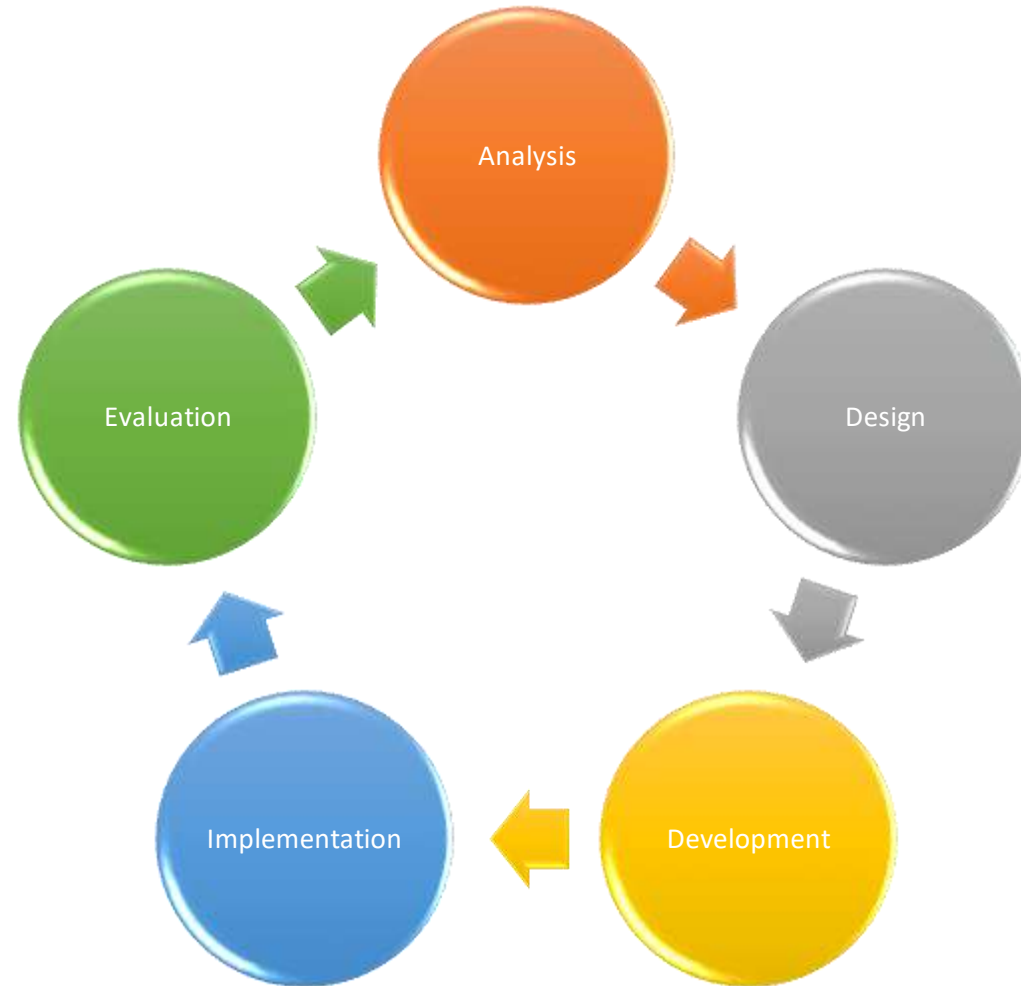
- Piaget's theory is primarily concerned with cognitive development, emphasizing how children construct knowledge and understanding. He believed that **development drives learning**.
- Vygotsky's theory is focused on the role of social interaction in learning. He argued that **learning precedes development**, and that cognitive development is influenced by the cultural and social context in which learning occurs.

## 5. Instructional design models

# ID models

- Is a systematic frameworks or structured approaches that guide the development of effective learning experiences and educational materials.
- These models provide a step-by-step process for designing, developing, implementing, and evaluating instructional programs and materials.
- are used by instructional designers, educators, and curriculum developers to ensure that instruction is well-organized, aligns with learning objectives, and is grounded in educational and psychological principles.

# Basic activities in instructional model



# Several ID Models

**ADDIE Model**

**Dick and Carey Model**

**Gagne's Nine Events of Instruction**

**Merrill's First Principles of Instruction**

**ASSURE Model**

**The ARCS Model**

# Selection of ID models

- selection of ID models depends on factors such as the type of content, technology available, and the nature of the learners.

## **1. Learning Objectives/ Learning content**

- What do you want learners to know or be able to do at the end of the instruction? Different instructional models may be better suited to different types of objectives. For example, some models are better for knowledge acquisition, while others are more suitable for skill development or problem-solving.



## **2. Types of Learners:**

- Analyze the characteristics and needs of the target audience. Consider their age, prior knowledge, learning preferences, and cultural background. Some models may be more effective for specific learner groups.

## **3. Consider Available Resources:**

- Evaluate the resources and tools that are available. Some models may require advanced technology, while others can be implemented with minimal resources. Choose a model that aligns with the available resources.

END of topic