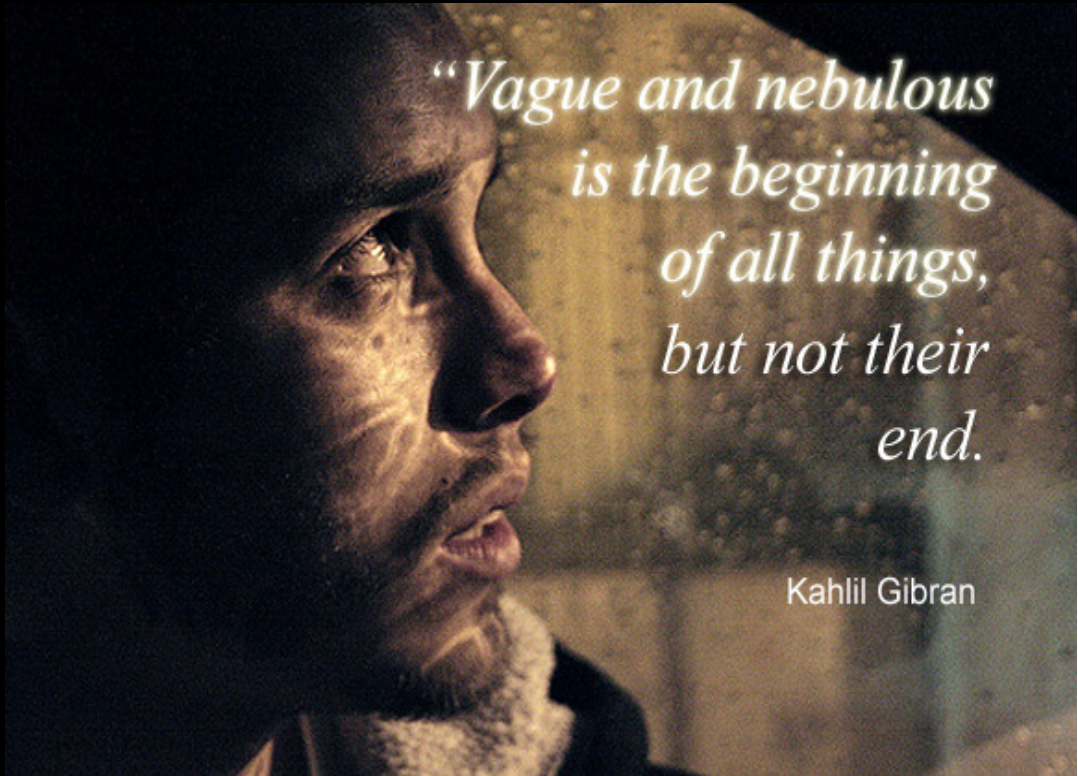


# Constructivism and the 5E Model Science Lesson

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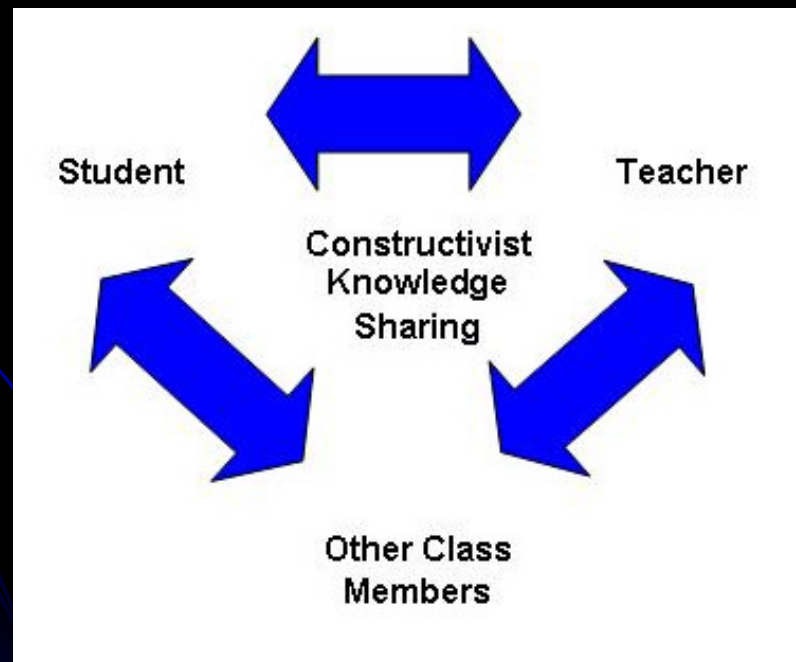


*“Vague and nebulous  
is the beginning  
of all things,  
but not their  
end.”*

Kahlil Gibran

# What is Constructivism?

**Constructivism** can be defined as a psychological theory of knowledge which argues that humans construct knowledge and meaning from their learning experiences. Learners build upon their prior knowledge, are active participants in their learning, and through processes of *accommodation* and *assimilation*, individuals construct new knowledge from their experiences.

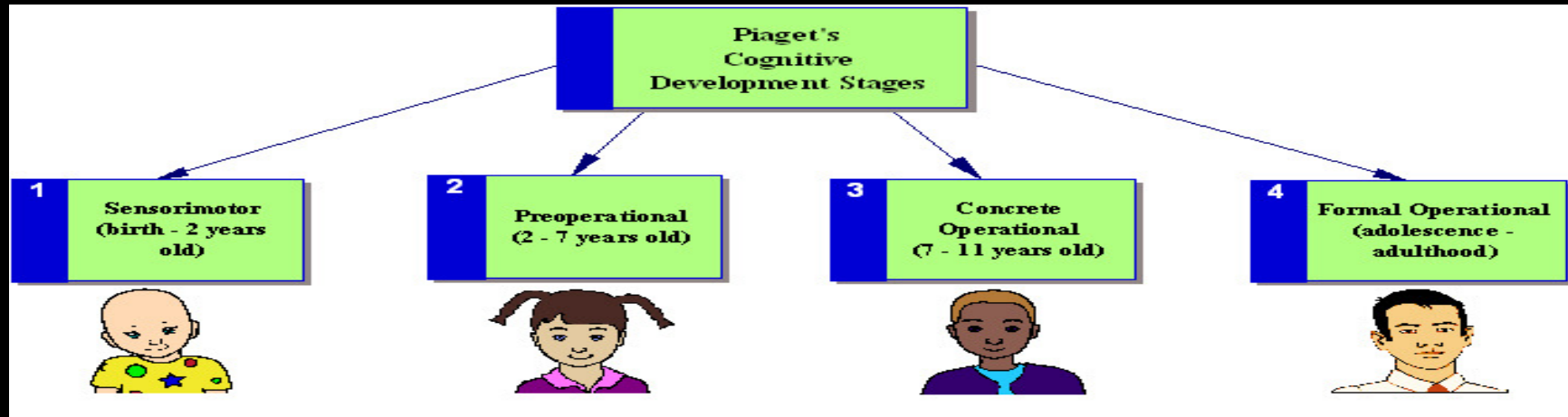


# Who created this theory?

Formalization of the theory of constructivism is generally attributed to Jean Piaget. Piaget asserted that knowledge is internalized by learners. He suggested that through processes of *accommodation* and *assimilation*, individuals construct new knowledge from their own learning experiences.



# Origins of Constructivism



Piaget theorized that children were able to learn through their own experiences in addition to knowledge received directly from adults. He asserts that learning experiences are more meaningful when the learner is actively engaged. His stages of cognitive development illustrate the way in which learning progresses as children develop into adolescence and adulthood.

# Stages of Cognitive Development

- The first stage, **sensorimotor**, begins at birth and lasts until 18 months-2 years of age. This stage involves the use of motor activity without the use of symbols. Knowledge is limited in this stage, because it is based on physical interactions and experiences. Infants cannot predict reaction, and therefore must constantly experiment and learn through trial and error.
- The **preoperational** stage usually occurs during the period between toddlerhood (18-24 months) and early childhood (7 years). During this stage children begin to use language; memory and imagination also develop. In the preoperational stage, children engage in make believe and can understand and express relationships between the past and the future. More complex concepts, such as cause and effect relationships, have not been learned. Intelligence is egocentric and intuitive, not logical.
- The **concrete operational** stage typically develops between the ages of 7-11 years. Intellectual development in this stage is demonstrated through the use of logical and systematic manipulation of symbols, which are related to concrete objects. Thinking becomes less egocentric with increased awareness of external events, and involves concrete references.
- The period from adolescence through adulthood is the **formal operational** stage. Adolescents and adults use symbols related to abstract concepts. Adolescents can think about multiple variables in systematic ways, can formulate hypotheses, and think about abstract relationships and concepts.

# Piaget's Office:

See how the stages of development are put into action!



# Advantages of Constructivism

- Students are active participants in the learning process and understand how they learn and thereby increase metacognitive skills.
- The teacher is a facilitator and the learners remain active throughout the learning process.
- Learning is meaningful to students because they are building on what they know.



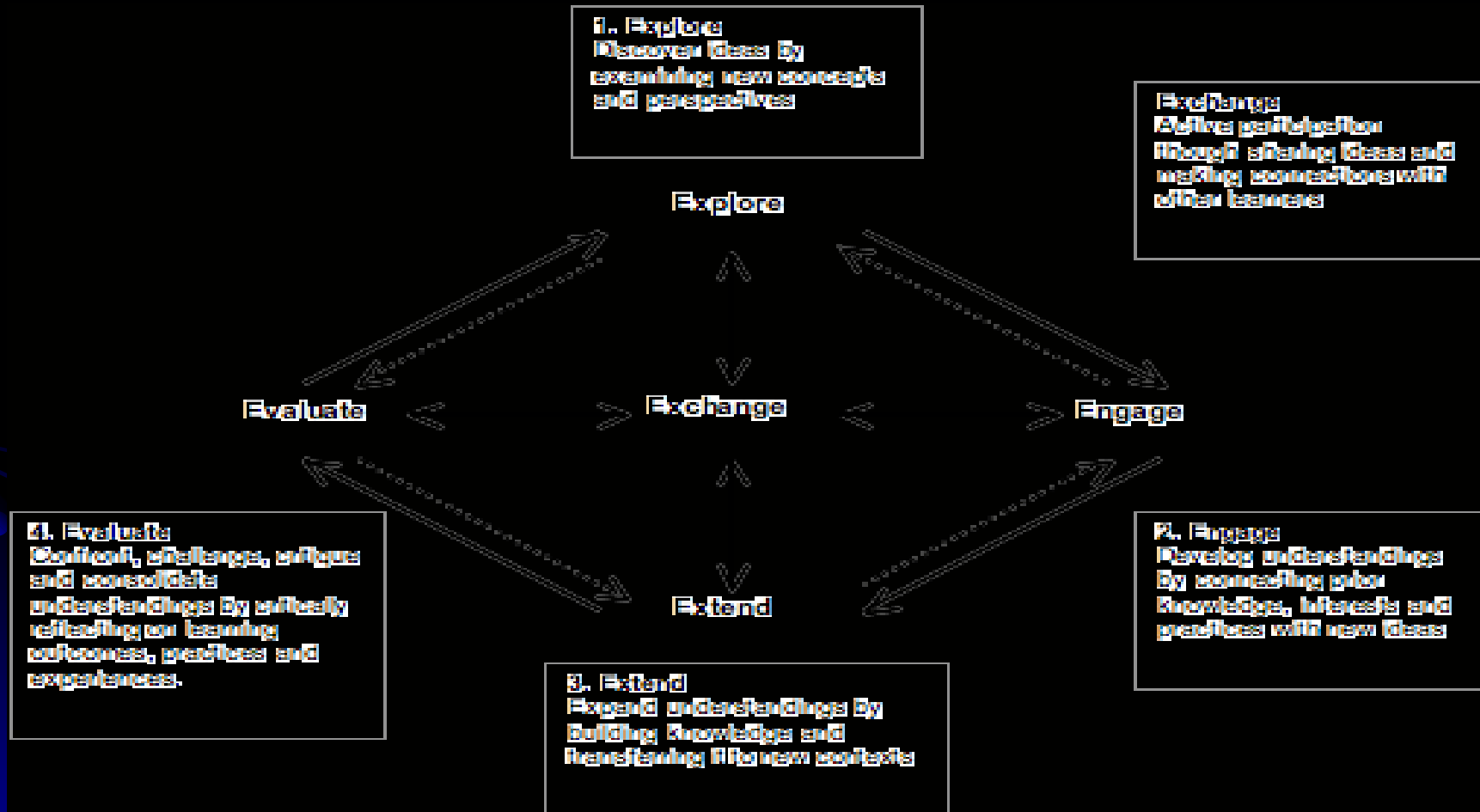
# Disadvantages of Constructivism

- Learners build new knowledge based on the foundation of previously learned knowledge. This factor will make learning difficult for students who have poor short or long term memory skills.
- Instruction would be difficult for whole class activities due to the fact that many children have had different levels of exposure to various life experiences. Thus, children may have different schemas.
- Since children may interpret information differently, the teacher ,who serves as a facilitator, must constantly check for understanding to ensure all are interpreting the information correctly.
- Requires a lot of pre-planning for teachers





# The 5E Constructivist Model



# Science Lesson Plan

**Content Area:** Science

**Grade Level:** 2nd Grade

**Objective:**

1. TSWBAT understand the process of evaporation.
2. TSWBAT observe how a liquid changes to a gas.

**MST Standards 4:** Physical Setting – Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

**Key Idea:** Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.

**Performance Indicators:** Students will observe the relationships among air, water, and land on Earth.

**Materials:** *Down Comes the Rain* by Franklyn Mansfield Branley, art supplies, burner, beaker, cup of water, graphic organizer, handout

**Proficiency Level:** low to mid intermediate English Language Learners (ELLs)

**Vocabulary:** water vapor, vapor, evaporation, liquid, gas, cloud

**Anticipatory Set:** The teacher will do a read aloud on the book *Down Comes the Rain*. At the end of the reading the teacher will use a cloud and raindrops as a graphic organizer

to collect some of the weather words mentioned in the story. The teacher will focus on “Evaporation” and address where in the book it shows that.

# Science Lesson contd...

**The TEACHER Will:** Show a whole class demonstration of how evaporation takes place. The teacher will put a cup of warm water in a beaker and wait for it to boil. The teacher will explain how the liquid is being changed to a gas (process of evaporation).

**The STUDENTS Will:** Observe the teacher demonstration and record what they see by making an illustration.

**Guided Practice:** Students will be given a handout showing a replica of the demonstration and then label the appropriate items (water, liquid, water vapor, gas and evaporation).

**Independent Practice:** Students will write in their science notebooks how evaporation took place in the science experiment.

**Extension:** The students will make a list of five examples they see “Evaporation” take place in the real world, for example, when cooking.

**Assessment:** The teacher will informally ask students question before, during and after the lesson to check for comprehension. The focus will be on students’ science notebook responses.

## **The Five E’s**

**Engage** – Students are engaged in the lesson by asking questions and making predictions.

**Explore** – Students make an illustration of demonstration and discuss with peers how evaporation took place.

**Explain** – Students will explain the process of evaporation in their science notebooks.

**Elaborate** – Students will make a list of 5 other places they see evaporation take place in the real world.

**Evaluate** – The teacher will informally assess students by asking questions and checking for a clear explanation of the evaporation process in their science notebooks