LEARNING THEORIES

Ausubel's Learning Theory

David Paul Ausubel was an American psychologist whose most significant contribution to the fields of educational psychology, cognitive science, and science education. Ausubel believed that understanding concepts, principles, and ideas are achieved through deductive reasoning. Similarly, he believed in the idea of meaningful learning as opposed to rote memorization. The most important single factor influencing learning is what the learner already knows. This led Ausubel to develop an interesting theory of meaningful learning and advance organizers.

Learning Theory

Ausubel's believes that learning of new knowledge relies on what is already known. That is, construction of knowledge begins with our observation and recognition of events and objects through concepts we already have. We learn by constructing a network of concepts and adding to them.

Ausubel also stresses the importance of reception rather than discovery learning, and meaningful rather than rote learning. He declares that his theory applies only to reception learning in school settings. He didn't say, however, that discovery learning doesn't work; but rather that it was not efficient. In other words, Ausubel believed that understanding concepts, principles, and ideas are achieved through deductive reasoning

Ausubel was influenced by the teachings of **Jean Piaget.** Similar to Piaget's ideas of conceptual schemes, Ausubel related this to his explanation of how people acquire knowledge.

Meaningful learning

Ausebel's theory also focuses on meaningful learning. According to his theory, to learn meaningfully, individuals must relate new knowledge to relevant concepts they already know. New knowledge must interact with the learner's knowledge structure.

Meaningful learning can be contrasted with rote learning. he believed in the idea of meaningful learning as opposed to rote memorization. The latter can also incorporate new information into the pre-existing knowledge structure but without interaction. Rote memory is used to recall sequences of objects, such as phone numbers. However, it is of no use to the learner in understanding the relationships between the objects.

Because meaningful learning involves a recognition of the links between concepts, it has the privilege of being transferred to long-term memory. The most crucial element in meaningful learning is how the new information is integrated into the old knowledge structure. Accordingly, Ausubel believes that knowledge is hierarchically organized; that new information is meaningful to the extent that it can be related (attached, anchored) to what is already known.
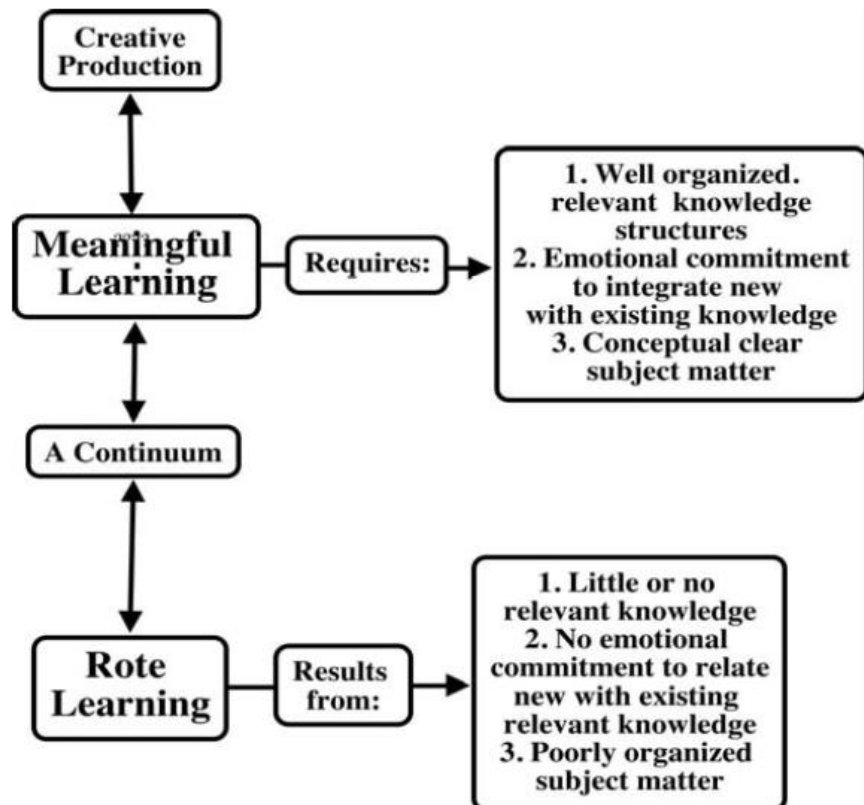
The rote-meaningful learning continium showing the requirements of meaningful learning

Advance Organizers

Ausubel advocates the use of advance organizers as a mechanism to help to link new learning material with existing related ideas. Advance organizers are helpful in the way that they help the process of learning when difficult and complex material are introduced. This is satisfied through two conditions:

1. The student must process and understand the information presented in the organizer-- this increases the effectiveness of the organizer itself.

2. The organizer must indicate the relations among the basic concepts and terms that will be used

Ausubel's theory of advance organizers fall into two categories: comparative and expository

Comparative Organizers

The main goal of comparative organizers is to activate existing schemas and is used as reminders to bring into the working memory of what you may not realize is relevant. A comparative Organizer is also used both to integrate as well as discriminate. It "integrates new ideas with basically similar concepts in cognitive structure, as well as increase discriminability between new and existing ideas which are essentially different but confusably similar"

Expository Organizers

"In contrast, expository organizers provide new knowledge that students will need to understand the upcoming information". Expository organizers are often used when the new learning material is unfamiliar to the learner. They often relate what the learner already knows with the new and unfamiliar material—this in turn is aimed to make the unfamiliar material more plausible to the learner.

Ausubel Learning Model

Ausubel believed that learning proceeds in a top-down or deductive manner. Ausubel's theory consists of of three phases. The main elements of ausubel teaching method are shown below in the table

Ausubel's Model of Meaningful Learning

Phase One *Advance Organizer*	*Phase Two* *Presentation of Learning task or Material*	*Phase Three* *Strengthening Cognitive Organization*
Clarify aim of the lesson	Make the organization of the new material explicit	Relate new information to advance organizer
Present the lesson	Make logical order of learning material explicit	Promote active reception learning.
Relate organizer to students' prior knowledge	Present material in terms of basic similarities and differences by using examples, and engage students in meaningful learning activities	

Gagne Learning Theory

Robert Gagné is one of the behaviorist theorists. He is also known as a bridge theorist because he took the best of both worlds, behaviorism and cognitivism, to create his view of instruction and its design. Gagné believes that learning results in behavior changes that are observable. He called these changes in behavior *outcomes*. Outcomes, according to Gagné, are descriptions of educational goals in terms of what is to be accomplished through the prescribed learning activities.

Gagné also maintains a cognitive perspective in which learning was recognized as a result of an individual's cognitive efforts to construct his or her personal knowledge. In his work, he focuses on memory and how to plan curriculum in chunks so as not to overload memory. His instructional design models reflect this emphasis on thinking and remembering. Because of the importance he assigns to mental processes in his theory while recognizing the significance of targeted behaviors, he bridges the gap from behaviorism to cognitivism.

Gagne had clearly established an interest in a desire to apply theory to practice, use research and theory to solve practical problems. Interested in examining the larger issue of applying theory to training, teaching and learning with the eventual objective of enhancing both their effectiveness and efficiency. Unlike many other s Gagne's theory approaches learning from the view point of the instruction. The theory differs in that it covers the entire learning process from design to assessment and application while other theories tend to be useful for certain aspects of learning , for example behaviorist for class room management and cognitive for information processing.

The theory divided into three elements

- taxonomy of learning out comes
- conditions necessary to achieve the learning outcomes
- and nine events of instruction designed to guide the teacher through the process of designing for learning

The conditions of learning reflecting the behaviorist thought process was created by Gagne, who identified five categories of learning . He was a leader in developing instructional guide lines for directed instruction that combine the behavioral and information processing learning theories. His instructional theory tends to side with behaviorists principles (teacher centered approach).

He believes that the results of learning are measurable through testing and that drill, practice, immediate feedback or effective

His theory defines five major categories of learning that each require a different type of instruction in order for learning to occur verbal information, intellectual skills, cognitive strategies , motor skills and attitudes (Taxonomy of Human learning capabilities)

Types of Human Capabilities	Conditions	Principles for Instructional Events
Verbal Information	Retrieving stored information: the internal conditions to support this learning include • Preexisting of organized knowledge • Strategies for processing the new information	• Provide meaningful context of information for encoding • Provide elaborations, imagery, or other encoding cues • Organize information so that it can be learned in chunks
Intellectual Skills	Metal operations that permits individuals to respond to conceptualizations of the environment: • Discrimination • Concrete and defined concepts • Rule using • Problem solving: combining subordinate rules in order to solve a problem The internal conditions to facilitate this type of learning include: • Recalling prerequisite skills • Interacting in a variety of ways with the new learning • Applying the new skills to range and variety of different situations and contexts	• Provide varied concrete examples and rules • Provide opportunities for interacting with examples in different ways • Assess learners in new situations
Cognitive Strategies	An internal process by which the learners plans, controls, and monitors his/her won ways of thinking and learning, including • Task specific • General • Executive	• If task-specific, describe the strategy; if task general, demonstrate the strategy. • Provide opportunities for strategy specific practice with support and feedback
Attitude	An internal state, i.e. predisposition that affects an individual choice of action	• Provide respected models who enact positive behavior and reinforce the model • When learner enacts the behavior, provide reinforcement
Motor Skills	Capability to perform a sequence of physical movements. It involves three stages: • Learning the sequence of the movement • Practicing the movement • Refining the movement from the feedback from the environment	• Establish executive subroutine and provide for mental rehearsal. • Arrange several repetitions of skills with correct feedback

The objectives are then categorized into one of the five domains of learning outcomes (each learning outcome must have- pre-requisite knowledge or skills must be identified). The instructor then uses the conditions of learning for the particular learning outcomes to determine the conditions necessary for learning . He is best known for his learning out comes , learning conditions and nine events of instruction . He focuses on out comes /behaviors that result from instruction .Different internal and external conditions are necessary for each type of learning.

According to Gagne the teacher must accomplish at least three tasks

- ✓ assure pre requisite skills
- ✓ supply instructional conditions
- ✓ determine the type of learning

According to Gagne the eight different classes of levels in which human beings learn are as follow:

- Signal Learning, the individual learns to make a general response to a signal (involuntary).
- Stimulus Response learning, the individual learns to make a precise response to a stimulus (voluntary).
- Chaining, the individual connects two or more stimulus.
- Verbal Association, the individual learns the chains that are verbal.
- Multiple Discrimination, the individual learns to make different responses to different stimuli.
- Concept Learning, the individual learns to make a common response to a class of stimuli.
- Rule Learning (Principle Learning), the individual learns to make a chain of two or more concepts (rule).
- Problem Solving, the individual learns to think

    Each new stages or level in learning is dependent upon the possession of prerequisite knowledge, skills and strategies at lower levels.

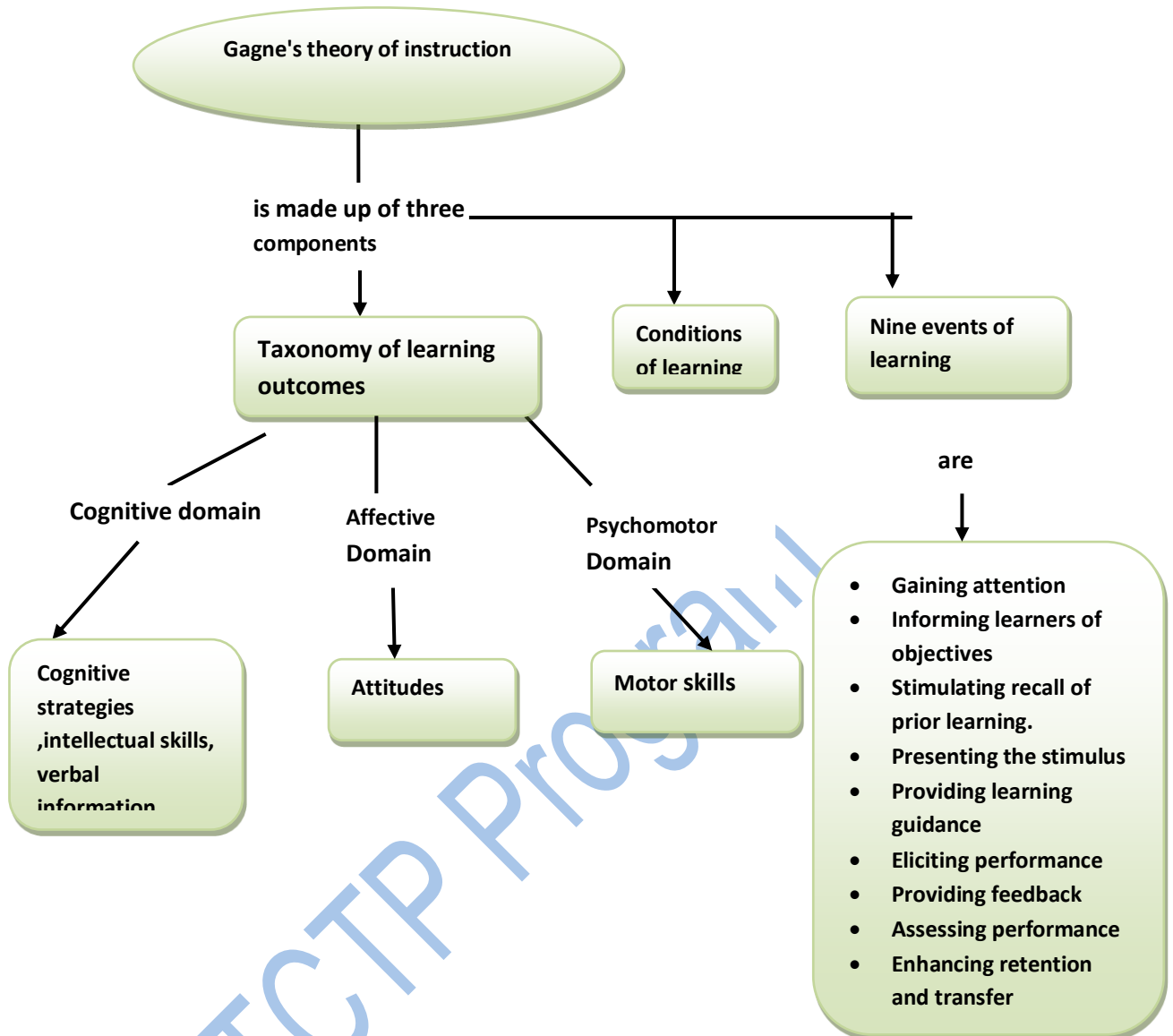   Gagne's learning Theory is summarized in the figure below

Figure: Summary of Gagne's Learning Theory

GAGNE's LEARNING MODEL

His model is objective that can be easily evaluated as the required learning is observable and can be measured, task -focused models. He proposed that the information processing model of learning could be combined with behaviorist concepts . Gagne translated the informational processing model into an instructional model called phases of learning that is the nine events are broken down into three phases

> ➢ the pre-instructional phase,
> ➢ the instructional phase and
> ➢ the post instructional phase

- ❖ in pre-instructional phase
  - ✓ gain attention
  - ✓ inform learners of the objectives
  - ✓ stimulate recall prior learning
- ❖ instructional phase
  - ✓ present the stimulus
  - ✓ provide learning guidance
  - ✓ elicit student performance
  - ✓ provide feedback(reinforcement)
- ❖ post instructional phase
  - ✓ asses performance
  - ✓ enhance retention
  - ✓ transfer (generalization)
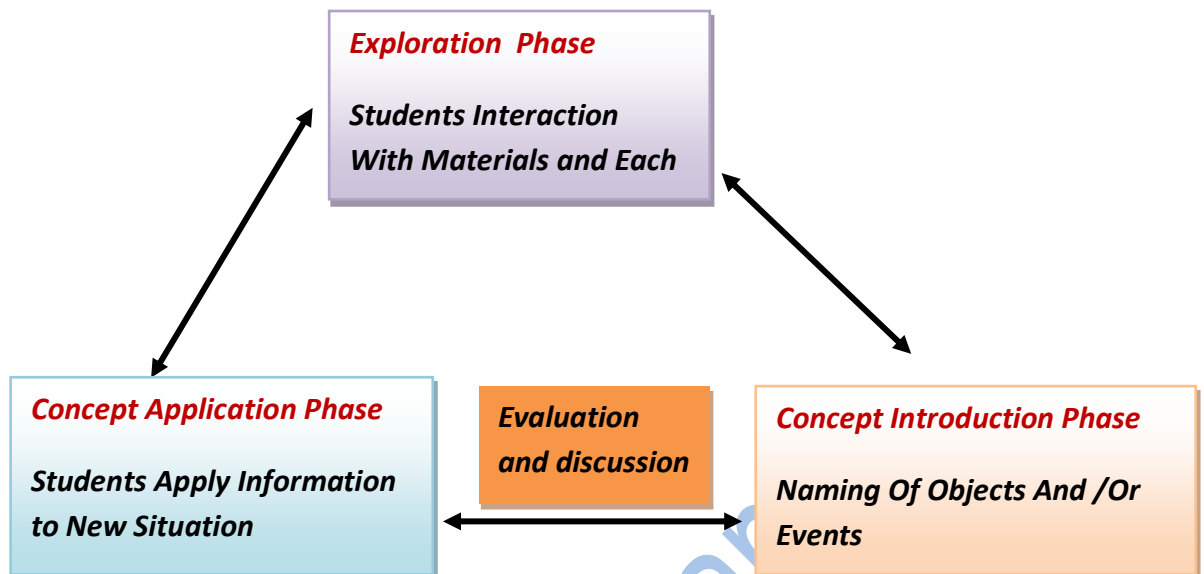
Piaget learning theory

Piaget's work led to the cognitive constructivist theory. Piaget believed that cognitive development occurs through a sequence of successive qualitative changes in cognitive structures. His theory has two main parts: "an ages and stages component that predicts what children can and cannot understand at different ages, and a theory of development that describes how children develop cognitive abilities"

Piaget theory of cognitive development suggested that human's unable automatically understand and use information that they have been given because they need to construct their prior knowledge through prior personal experiences to enable them to create mental images. He says that humans learn by constructing their own knowledge. The primary role of teacher should be to motivate the children to create their own knowledge through their personal experiences. Teachers are merely facilitators who support learners in the learning process. Learners should take control in making decisions in line with their needs and cognitive state. Piaget advocated non intervention saying that everything one teaches a child prevents him from inventing or discovering.

He believed that children develop knowledge through active participation in their learning Learners will build their own knowledge through experience. This experience will help them build mental models which they will further develop through assimilation and accommodation. He believed that cognitive development was a product of the mind achieved through observation

and experimentation. For Piaget learning is *cyclical*. Piaget's learning cycle includes an exploration, concept introduction and concept application phase

Exploration Phase

Students Interaction With Materials and Each

Concept Application Phase

Students Apply Information to New Situation

Evaluation and discussion

Concept Introduction Phase

Naming Of Objects And /Or Events

He identified several discrete phases children under go as they grow. Very young children are only able to process concrete operational information they are unable to think abstractly, reflect on the past or project into the future. Older children develop these abilities over time.

Learning is not so much a process of acquiring new knowledge, but of reconstructing our existing schemas. Children are active and motivated learners. Through their action, they construct schemas (mental concept). Every Schema is coordinated with other schemata. New information is integrated and interrelated with the knowledge structure that already exists in the mind of child.

Learning occurs not by passive reception of transmitted information, but by active interaction with objects and ideas. The nature of this interaction is an *adaptation* involving three mental processes described by Piaget.

1. Assimilation - integrating new information with existing knowledge is a cognitive process(making information to fit)
2. accommodation- the change that occurs in the mental structure of the child (changing information to fit). The process of cognitive development is the result of a series of related assimilations and accommodations.
3. Equilibrium - mental balance of information

    He felt that a child passes through a series of stages of cognitive development:
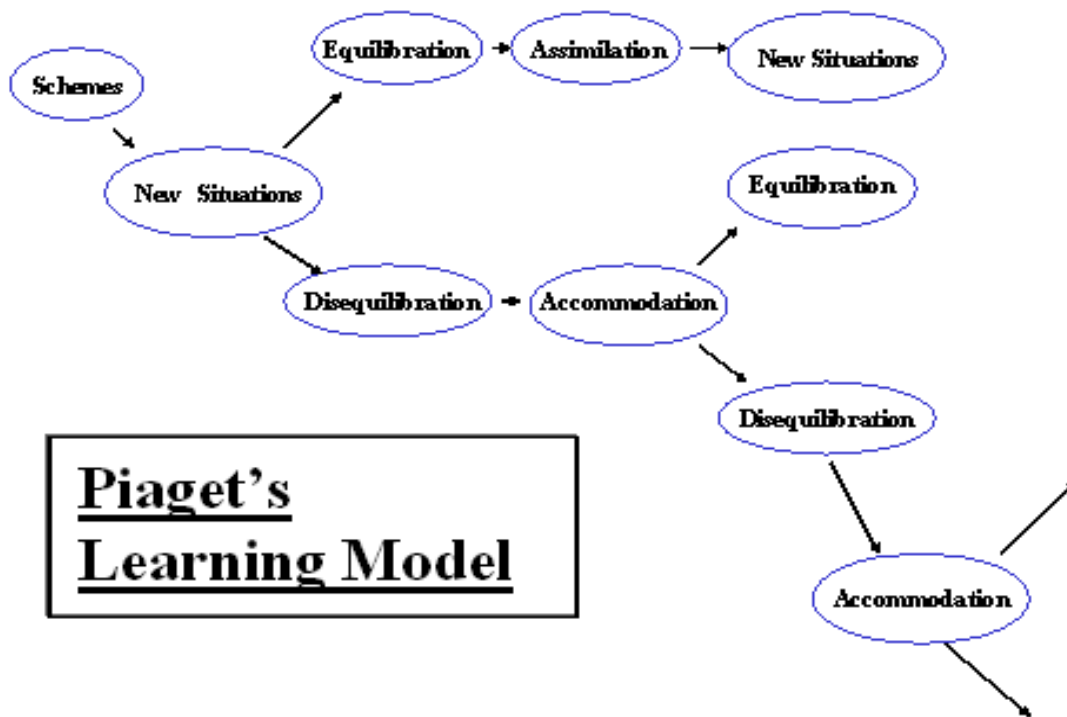
    ✓ **Sensorimotor** stage (birth to 2 years): children explore world around them through their senses;

- ✓ **Preoperational** stage (2 to about 7): abilities to communicate through speech, develop numerical abilities, increase level of self control but unable to do "conservation tasks" (e.g. realize that shape is not related to quantity);

- ✓ **Concrete operational stage(7 to about)** : increase in abstract reasoning, can do conservation tasks;

- ✓ **Formal operations stage** (about 12 to 15): can form and test hypotheses, organize information and reason scientifically, can show result of abstract thinking (writing, drama).

Piaget's Learning Model

Piaget's Learning Model is one of the more profound models for learning that has yet been proposed.

His model of child development and learning suggests that children, depending of their level of development, create mental maps or cognitive structures that enable them to understand their environment. If new information is presented that fits into existing structures, the child incorporates (assimilates) the information. If it does not fit into a structure, the child accommodates it, that is, constructs new mental structures into which it fits. In doing so, the child continually constructs his or her understanding of the world around him or her. In terms of learning, application of Piaget's theories requires, first, that educators teach content for which the child is developmentally ready and second, that educators use childrens previous knowledge to help them assimilate or accommodate new information. Piaget's work laid the foundation for subsequent constructivist theory.
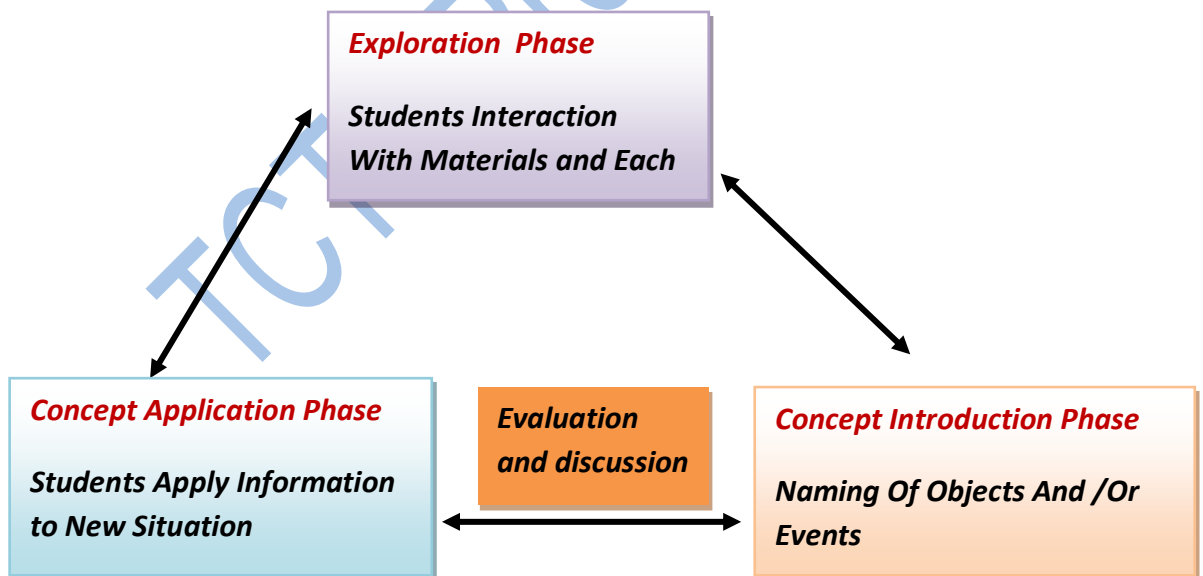
Criticisms of Piaget's Theory

- Children's thinking is not as consistent as the stages suggest.
- Infants and young children are more competent than Piaget recognized.
- Piaget understates the social components of cognitive development. over looks influences of cultural and social groups
- Piaget was better at describing processes than explaining how they operate.
- Piaget's theory has been criticized because of his suggestion of fixed sequential developmental stages.
- underestimate children's abilities

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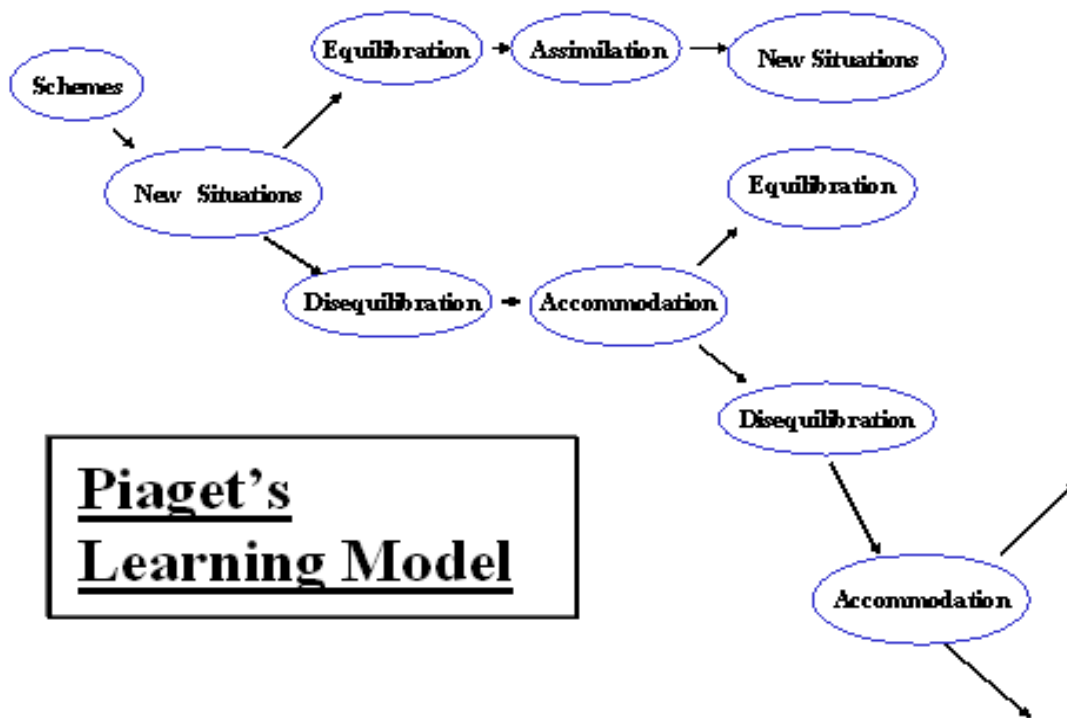
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Differences and Similarities of Piaget's, Gagne's and Ausubel's Learning Theories

For David Ausubel direct didactic instruction is the best way to teach concepts. Old cognitive structures are modified to accept new concepts (the new concepts are assimilated with the old). Reception learning- concept labels and the regularities they represent are explicitly taught by the teacher in contrast to discovery learning (regularities are discovered by the students themselves). New knowledge is associated with ideas or concepts in the learner's cognitive structure.

Ausubel's theory is different from Piaget's in that an older child has a more elaborate cognitive structure than a younger one and this is not a "unique cognitive ability" determines why the older child is capable of higher level thought.

Ausubel advocates direct teaching of concepts. Ausubel believes that eventually the use of physical, concrete objects in teaching should be eliminated in favour of verbal instruction. Ausubel accepts the ideas of assimilation and accommodation without accepting the full implications of Piaget stage theory. In terms of readiness Ausubel's view is closed to that of Gagne than that of Piaget. Ausubel distinctly contrasting explanations of cognitive development. He is more explicit in the recommendation for teaching than Piaget. For Piaget children and adults use mental schemes to guide behaviour or cognition and interpret new material to be assimilated. For meaningful learning information is stored in networks of connected facts or concepts referred to as schemata. For Paiget learning content out to be organized according to the children level of cognitive development.

- from concrete to abstract
- from nearby to distant
- from existing experience to new experience
- from elementary to complex according to the individuals physical and mental development
- learning is change in behaviour

For Piaget cognitive development is a function of four processes

1) physiological development
2) personal interaction with the environment
3) social transmission or direct instruction
4) "self-regulation"

Ausubel uses inductive approach to guide pupils so as to derive generalization concept, principles or laws.

Gagne concerns about how people obtain information during learning process and looked at the steps or events in learning. Ausubel emphasized reception of information and the need to link that prior learning. So that Ausubel is in fundamental agreement with Gagne in that the key to readiness is prerequisite knowledge. For Gagne the acquisition of specifically learned rule is a cumulative process and systems of individualized instruction based on mastery of a sequence of performance objectives. He believes that knowledge has separate real existence of its own outside the human mind and learning happens when this knowledge is transmitted to the learner. For Piaget children construct knowledge in their minds so that learning happens when a learner constructs both mechanisms for learning and his or her own unique version of knowledge. In general   differences and similarities of Piaget's, Gagne's and Ausubel's learning theories are summarized in the table   below

Relationships among the learning theories of Piaget, Gagne and Ausubel

Terms	*Gagne*	*Piaget*	*Ausubel*
Epistemology	Finite nature of Knowledge (knowledge transfer)	Knowledge structure appropriate for stage of development and nature of knowledge constructed and based on experience	Knowledge structure appropriate for stage of development
Origin of Learning Goals	Goals prescribed	• Subject matter and stage of development determine goals • Determined by task	Subject matter and stage of development determine goals
Motivation	Extrinsic motivation	Intrinsic and extrinsic motivation	Intrinsic motivation
Importance of external stimulus	Stimulus required	No stimulus required (Stimulus required task/ problem	No stimulus required
Theory	More of Behaviorist /cognitivist	Constructivist (coginitivist and activist)	Cognitivist
Learning teaching approach	Seriallist	Holist ,collaborative	Holist
Importance of Environment	Environment is more significant than heredity	Interaction with environment is more important	Environment and heredity equally significant

Terms	Gagne	Piaget	Ausubel
Methods of learning	Stimulus response is required for learning to occur • Learner takes passive role • Teacher takes an active role	Subject provides its own structures and procedures for learning , need to learn is driven by activity and interaction with world -action learning	Subject provides its own structures and procedures for learning
Dependency	Student depend on teacher	Team dependent, Student subject guided discover	Student subject guided discover
Pedagogical Approach	Teacher centred	Student centred , practice centred	Student centred
Learning approach	• Presentation (passive) • Systematic instruction	Provide organized opportunities for insight to occur, Unstructured learning	Provide organized opportunities for insight to occur
Thinking process	Deductive	Deductive and inductive (complexity)	deductive
Type of learning	Individual	Individual and group, distributed and situated team and group learning	Individual and group
Type of model	Objective model (behaviourist model) or transmission model	Process model(capability model), information process model, activity model , generative learning model	Process model(capability model), information process model, activity model
Metaphor for learning	Learning as • Acquisition • Reproduction • Imitation • Modelling	Learning as • Understanding • Inquiry • Co-creation • Communal constructivism • Co-generative	Learning as • Understanding • Inquiry