Professional Development Programme (PDP)

Topic for study: Educationist Jean Piaget

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JEAN PIAGET

"**When you teach a child something you take away forever his chance of discovering it for himself**"

–Jean Piaget

Jean Piaget was a Swiss psychologist known for his work on child development. He was the first to make a systematic study of the acquisition of understanding in children. Piaget's 1936 theory of cognitive development and epistemological view are together called "genetic epistemology". He is thought by many to have been the major figure in 20th-century developmental psychology. Piaget placed great importance on the education of children.

कुंपणे तोडुनि सारी, विरघळून गेले काही ।
काळाने द्यावी दाद, हा हट्टही धरला नाही ।।
झपाटलेपण त्यांचे, कोंबातच मुरले होते ।
हर श्वासामध्ये त्यांच्या, हरण्यावर औषध होते ।।
उत्साह पहावे तेव्हा, भरलेला काठोकाठ ।
मळभात हरवली जरीही, इवलीशी पाऊलवाट ।।
कधी ध्यास नसे मानाचा, ना थाटही अभ्यासाचा ।
मातीला देऊन कान, ऐकती मुळांचे गान ।।
त्या धुंदीतही समाधी, अशी अजाणतेपणि गवसे ।
श्रमलेल्या शरीरांमधुनी, ती धुन आशेची बरसे ।।
बदल पेरला ज्यांनी, त्या सर्वांची ना गणती ।
प्रकाशण्या मन अपुले, चल लावू आज ही पणती ।।

This is Pune Vedh Geet (song) 2019 written by Dr. Anand Nadkarni, Sr. Psychiatrist, educationist, author (IPH Thane). While studying about Jean Piaget I remembered this song which tells how these passionate people worked for their fulfilment of dreams to bring enlightenment in our lives. I feel that this song conveys the appropriate feelings of all these educationists, who worked relentlessly for improvising the field of child education.

Contents

- **Name of Educationist: Jean Piaget**

- **Place of Origin**

Jean Piaget was born on 9th August 1896 in Neuchatel, in the Francophone region of Switzerland.

- **Place of Work**

Piaget was child who has developed certain abilities, inclinations at an earlier age. He was a budding scientist at an early age. He has interest in biology and the natural world. His early interest was in zoology in which he had published several articles on mollusks (soft skin creatures like snail etc.) by the age of fifteen. He developed interest in epistemology the field of Philosophy and logic. He also published two philosophical papers that showed his direction of thinking. Later he developed interest in psychoanalysis at that time it was flourishing strain of psychology. Piaget moved from Switzerland to Paris where he taught at the Grange-Aux-Beller Street School for Boys run by Alfred Binet the developer of the Binet- Simon test which become Stanford – Binet Intelligence Scales. Piaget assisted in the making of Binet intelligence tests.

Although Piaget an epistemologist (someone who studies the nature and beginning of knowledge). It is this piece of his work that has made Piaget a major contribution to the knowledge base of educational psychology. While others asked **what** children know or **when** they know it, Piaget asked **how** children arrive at what they know.

Piaget was working on Alferd Binet Laboratory School, his job was to standardise the French version of a British intelligence test. While doing this work, Piaget began to notice similarities in the wrong answer children gave to questions at certain ages, and he began to wonder what thought processes they were using.

This became the research question and need for him to work which led him to the theory that, **"young children's cognitive processes are inherently different from those of adults."** Ultimately, he was to propose a global theory of **Cognitive Development** stages in which individuals exhibit certain common patterns of cognition in each period of development.

- ## Time of Tenure (which year/century)

Jean Piaget born on 9th August 1896 and died on 16th September 1980 was a Swiss Psychologist known for his work on Child Development. Piaget's theory of Cognitive Development and epistemological view are together called "Genetic Epistemology".
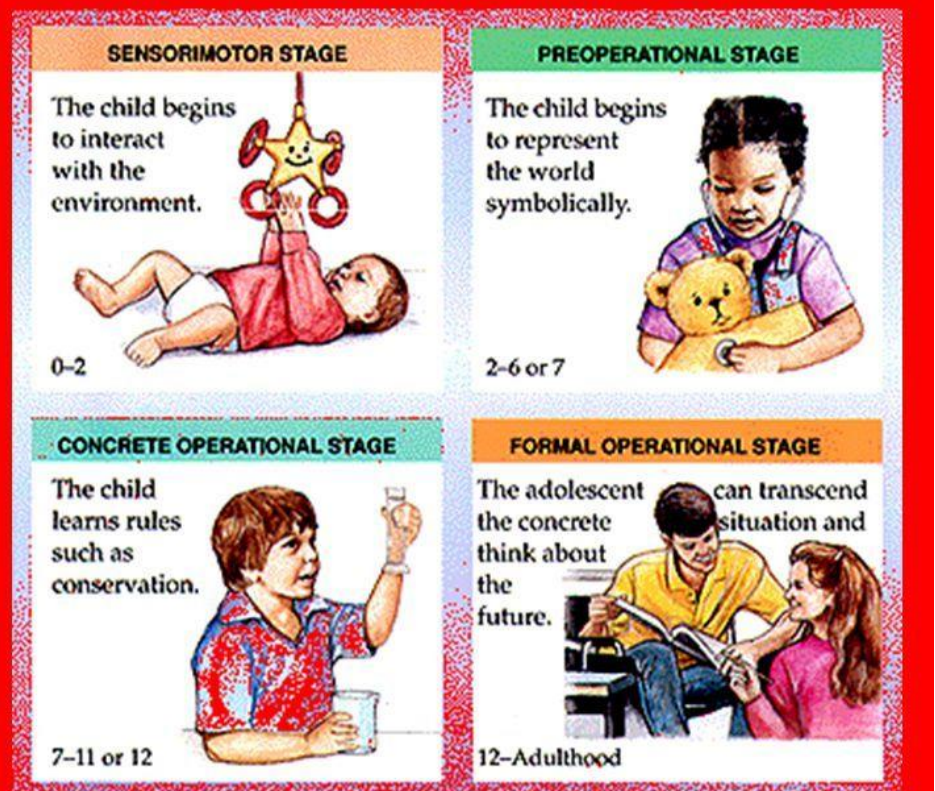
- ## The then status of the society and community

For several years after the advent of agriculture, the education of children was a matter squashing their willfulness in order to make them good labourer's. A good child was an obedient child, who suppressed his or her urge to play and explore and obey the orders of adult masters. Employers in industry saw schooling as a way to create better workers. As industry progressed and became somewhat more automated, the need for child labour declined in some parts of the world. Education was understood as inculcation. The idea began to spread that childhood should be a time of learning and schools for children were developed as places of learning. The idea and practice of universal compulsory public education developed had their own agendas concerning the lesson that children should learn. Children should learn moral lessons and disciplines. The same power assertive methods that had been used to make children work in fields and factories were quite naturally transferred to the classroom. Repetition and memorization of lessons is tedious work for children. Their basic instincts urge them constantly to play freely and explore the world on their own. In some school children were permitted certain periods of play to burst their steam but play was not considered to be a

channel of learning. In the classroom play was the enemy of learning. In John Wesley's rules for Wesleyan School there is a statement: "As we have no play days, so neither do we allow any time for play on any day, for he the plays as a child will play as a man".

Jean Piaget-Cognitive Development.

- Piaget provided support for the idea that children think differently than adults and his research identified several important milestones in the mental development of children

SENSORIMOTOR STAGE
The child begins to interact with the environment.
0–2

PREOPERATIONAL STAGE
The child begins to represent the world symbolically.
2–6 or 7

CONCRETE OPERATIONAL STAGE
The child learns rules such as conservation.
7–11 or 12

FORMAL OPERATIONAL STAGE
The adolescent can transcend the concrete situation and think about the future.
12–Adulthood

- **Philosophy of the Educationist**

Jean Piaget was one of the most influential researchers in the area of developmental psychology during 20th Century. Although Piaget is frequently referred to as a psychologist, he was really an "Epistemologist"- who studies the nature and beginning of knowledge. This work that has made Piaget a major

contributor to the knowledge base of educational. When others were asking what children know or when children know Piaget asked how children arrive at what they know. Piaget noticed similarities in the wrong answer children gave to questions at certain age and wonder what thought processes they were using. This thought turned into a research process and became a theory of "Stages of Cognitive Development". He concluded that the traditional idea that children were "empty vessels to be filled with knowledge" was incorrect, and instead believed them to be "active builders of knowledge – little scientists who construct their own theories of the world". The theory shows how children construct knowledge by giving meaning to the people, places and things in their world. His expression "Construction is superior to instruction" means children learn best when they are actually doing the work themselves and creating their own understandings of what's going on instead of being given explanations by adults. Piaget believed children needed every possible opportunity to do things for themselves.

 While studying more about Jean Piaget I could observed this example in my life. I am working in Saraswati Mandir Trust (SMT), English Medium School (Pre-Primary), Thane.

"In my Sr. Kg. class one day when I gave alphabet cards and some high frequency words cards on the back side of which have some pictures, I observed children make sentences by their own with the help of pictures. Some time it is not appropriate grammatically but the picture tells us the meaning and what the child wants to say. I think this is what Piaget says children learn by their own".

One more example- "when children draw their thoughts or any given event their lines, circles, shapes or any stroke of pencil/colour crayon has their own explanation and meaning which they want to express. This is what I think Piaget says children gives meaning to people, places and things".

Jean Piaget was the first psychologist to make a systematic study of cognitive development. His contributions include a theory of cognitive child development, detailed observational studies of cognition in children, and a series of simple but ingenious tests to reveal different cognitive abilities.

Piaget's theory about children learning requires changing the image of teacher into someone who nurtures inquiry and supports the children's own search for answers. Piaget believed that children learn only when their curiosity is not fully satisfied. Their curiosity actually drives their learning. For eg. If children are learning forms/states of water they need to know how water changes its forms. Teacher saying orally or showing picture will not serve or increase children curiosity but if the teacher/facilitator gives the experience how water changes its form, children will enjoy learning. As while doing it by themselves increases their curiosity to see what happens after each action. Their curiosity, their patience to wait for results develops which teaches them a lot.

Piaget stressed the importance of play as an avenue for learning. Repetitive action like throwing of toys and observing them done by a toddler is a play for him to learn, to know the world better than he/she has as prior experience. Also, children engage in symbolic play like making things with play dough, market-market, doll play etc. gives sense of the object and activities that surround them. They began to understand how things work and with time and repetition they use new information to increase their understanding of the world around them.

Piaget believed that all children pass through the same stages when developing their thinking skills. Their intellectual growth is based partly on physical development and changes by children's interactions with the environment. They build their own understanding of the world by the things they do.
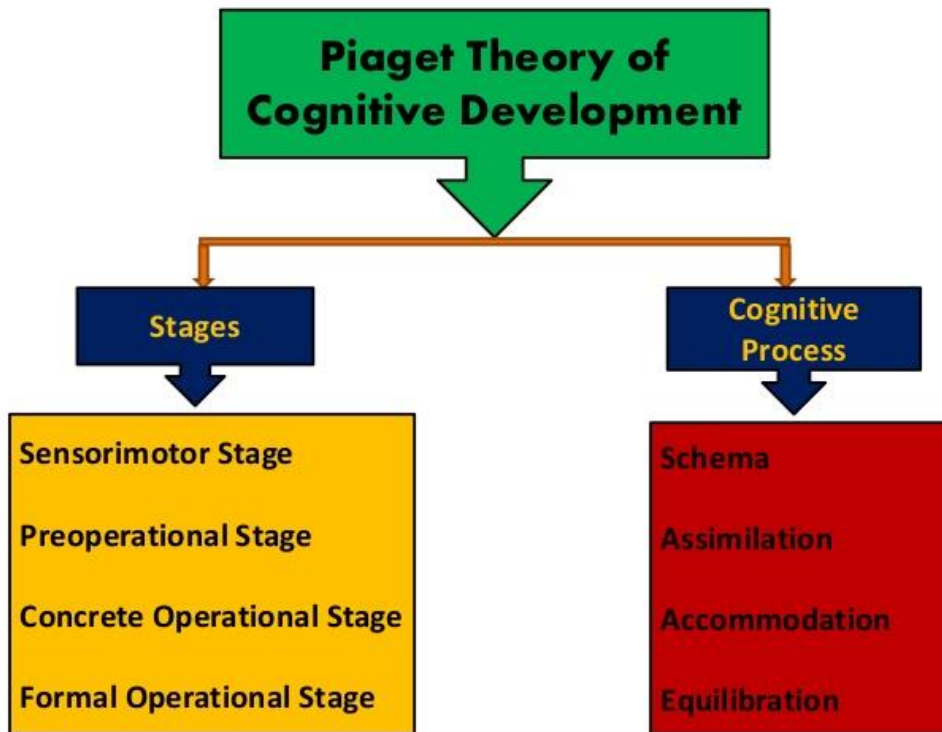
"Stages of Cognitive Development"

Piaget says there are four stages of children cognitive development.

1.Sensorimotor Stage (0-2 years), in which a child learns primarily through their senses.

2. Preoperational Stage (2-6 years), when a child learns to use words and symbols like numbers.

3. Concrete Operational Stage (6-11 years), when they understand how to perform mental tasks, like math.

4. Formal Operational Stage (11- adult), when children learn complex and abstract reasoning.

Now we will learn more about each stage.

1. **Sensorimotor Stage (0-2 Yrs.)**: Children experience the world through movement and their senses. During this stage they are extremely egocentric, meaning they cannot perceive the world from others viewpoints. The sensorimotor stage is divided into six sub-stages.

   i) <u>**Simple reflexes (0-1 month)**</u>: From birth to one month old. At this time infants uses reflexes such as rooting and sucking. If we put any object/finger in their lips the first response is sucking and getting knowing of the object.

   ii) <u>**First Habits and Primary circular reactions (1-4 month)**</u>: From one month to four months old. During this time infants learn to co-ordinate sensation and two types of **schema** (define on pg.no. 19). Eg. When a baby cries, he gets attention from others. Infant learns to coordinate their cry with the response they get.

   iii) <u>**Secondary circular reactions (4-8 months)**</u>: Four to eight months old. At this time, they become aware of things beyond their own body. They are more object oriented; schemas regarding repeated actions that bring about a desirable consequence. It involves actions relating to the world outside. Babies vocalization increases eg. As infants come to notice that if they make noises other people around them will respond with noises of their own. This leads helpful to the development of language and the formation of social relationships. Eg. Baby understands the voice of their near and dear ones and responds alike.

   iv) <u>**Co-ordination of secondary circular reactions (8-12 months)**</u>: From eight months to twelve months old. During this stage they can do thigs intentionally. They can now combine and recombine schemata and try to reach a goal. Their object permanence understanding increases. <u>For eg.</u> If toy falls down and any adult gives it back, they understand that things that goes from their sight comes back. Same way when we play 'Peek-a-boo' with a baby they respond happily when we come back in front of them. That is their learning when a thing is off sight it is
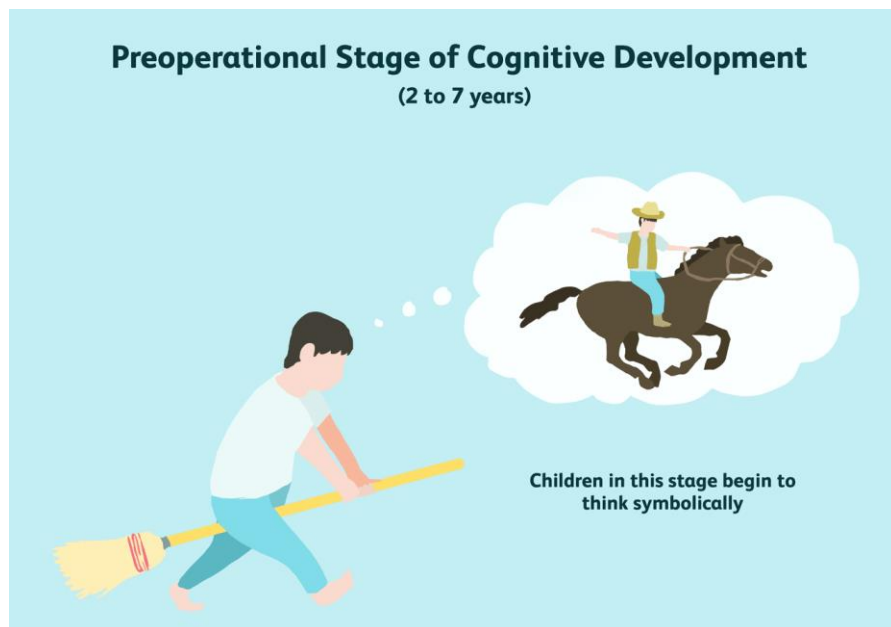
there, it comes back. That's why when a mother leaves the baby in a creche or a day care the baby knows mother is there somewhere even if she is not in front of him/her. The baby cries to get her back, as she comes back, he/she becomes happy.

v) **Tertiary Circular reactions, novelty and curiosity (12-18 months)**: Around the age of 12 months to 18 months infants develop tertiary circular reactions, which are schemas regarding the deliberate variation of actions that bring desirable consequences rather than just repeating enjoyable activities. They carry out miniature experiments to observe the consequences. <u>For eg.</u> Piaget observed his son Laurent dropping a toy swan repeatedly, varying the position from which he dropped it, carefully observing each time to see where it falls. Laurent made modifications in the situation to learn about the consequences. Also, when a baby learns to do things like crawling, standing with support of table or chair then even if he/she falls down the baby tries to do it again and again. He/she learns 'I can do it" and do intentionally. In the same way if they make any sound or try to speak a letter or word and if they get response from the elders or surrounding, they do it again and again for desirable results.

vi) **Beginnings of thought which lasts from 18 months to two years**: The major achievement in the capacity for mental representation or symbolic thought. A mental representation is an internal image of past event or object. With the attainment of the cognitive skill of deferred imitation. Children are able to imitate people and senses they have witnessed in the past. <u>For eg.</u> Children imitate elders speaking on telephone. They imitate and play role of their dear ones or anybody they have observed like animal walk, making sounds etc. Also, children learn sense of hot and cold and repeat as elders "'ha…!" For hot. Children tries to wear 'chapples' by themselves as their elders. Many times, they wear in wrong leg.

Preoperational Stage of Cognitive Development
(2 to 7 years)

Children in this stage begin to think symbolically

2. **The Preoperational Stage (2–6 yrs)**: According to Piaget after the sensorimotor stage children's cognitive development enters the pre-operational stage, which extends from the second year of life through age seven or eight. Here children's thinking differs most from adult thought patterns. Piaget said that during the pre-operational stage, children are egocentric that means they think of everything only as it relates to them. They can only focus on one characteristic of a thing or a person at a time. They take the exact meaning of the words gathers information from what they experience rather than from what they are told and relate from their experience.

While working at SMT same experience I observed in my Sr. Kg class.
In the classroom, when we were discussing on 'milk products' and children started telling, which milk products they like, one child said he likes Panner, another told a story how his mother brought that product. Those who did not like it said they don't know anything. One enthusiastically described how they went to their grandparent's house and conversation shifted from milk

products to their own experiences. These children are typical of this developmental stage. This is the egocentrism Piaget refers to. Children are not connecting with each other's stories, rather each child's word trigger other children's thoughts about their own experience.

Egocentric Conversations

My dad is a policeman...

I have a real big dog...

He caught a robber once...

He licks my face all the time...

This is also seen in the drawings they made. They can see a complete picture or object in their lines, dots or in any shape they have drawn. It has its own meaning.

Piaget believed that in the preoperational stage, children form ideas from their direct expressions in life. Telling children something is less effective than finding a way to help them think their own way through a problem. For eg. If a child sees an animal having four legs, one tail and it barks it is a dog but when he/she sees another animal with same physical traits cannot be a

dog unless it barks but if it 'mews' then a child will go through a mental process that challenges his/her worldview.

In operational stage children tend to believe what they see; they do not have a firm grasp of qualities belonging to the objects in their world. <u>For eg.</u> 'heavy' and 'large'. A big empty bottle and a small filled bottle. Children initially by seeing will say big bottle is heavy and small bottle is light but by experiencing after handling they realised the fact.

Piaget did a classic experiment involving a conservation task to demonstrate this kind of thinking in children. He put two sets of coins on a table in two lines. Both sets had the same small number of coins, but the coins in one line were spread farther apart. When asked which line had more coins in it, preoperational stage child always said the line in which the coins were spread farther apart had more.

I experienced the same (theory) in my class of Sr. KG.
"1 cupful of water was poured into a glass and with same cup, 1 cup water was filled into a flat bowl. When asked students which container has more water? children gave the answer – the glass had more water."

According to Piaget such type of conversation task, involving conversation of number show whether child has grasped the concept that contain physical characteristics of objects remain the same, even though their outward appearance changes.

We all know children cry during their haircut. We had not thought why children cry? Because we never thought from their point of view. It might be because we ask them to be careful of getting hurt while using sharp objects like scissor's, knives, hammer etc. So, they might be thinking that while cutting hair it would hurt them and they get confused from our behaviour of insisting them to have a haircut. Here the child overgeneralises from their limited experience. They base their general belief about something on a single experience, which might cause them reaching a false conclusion.

Preoperational children also tend to focus on one attribute of an object or person at a time. <u>For eg.</u> It is hard for them to think of their mother as their grandmother's daughter. Many times, we also see when a new baby comes to the family this elder child is not ready to accept to share parents with the baby. We have to make them convince that the baby is a part of our family and you are responsible person of the family so you should also take care of the baby. It is very tactful task by asking questions like, who will look after this small baby? How would you feel if no one gives attention to you? How baby will tell us that he/she is not comfortable? To make them think by themselves and take the responsibility of baby. Piaget's theory tells us that it will be more effective to ask questions that help children to think over the problem on their own rather than telling them by adults.

In the preoperational stage of age four and seven. Children tend to become very curious and ask many questions beginning the use of primitive reasoning. There is an emergence in the interest of reasoning and wanting

to know why things are the way they are. Piaget called it the 'intuitive substage' because children realize they have knowledge but they are unaware of how they acquired it.

Thus, we can say that Centration, Conservation, Irreversibility, Class inclusion and Transitive inference are all characteristics of preoperative thought.

3. **Concrete operational stage (6-11yrs)**: Children enter stage of concrete operations at about age seven, many changes in their thought patterns are visible. At this age children possess the characteristic of reversibility. Which allows them to reverse the direction of their thought. They are beginning to be able to think abstractly. The concrete operational child can hold several qualities in mind, knowing that a boat is large, red and is a sailboat. Can understand that their mother is also the daughter of his/her grandmother. With this, children can add, subtract, and multiply 'in their heads'. They have now acquired better classification skills.
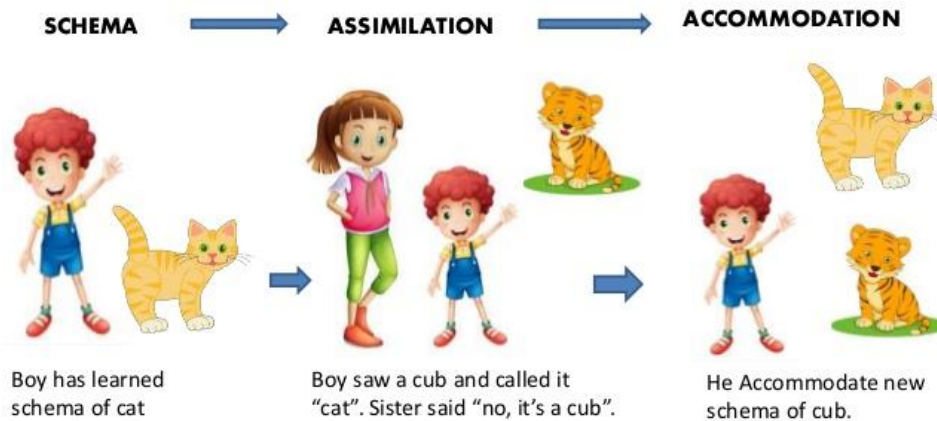
4. **The final stage is of Formal operations (11-Adult)**: This stage begins around age eleven or twelve and is marked by the ability to think logically and in hypothetical terms. Display more skills oriented towards problem solving, often in multiple steps.

All these stages represent various characteristics of that stage. Children pass through these stages in the same order, but not exactly at the same time. Each child is expected to exhibit the characteristics of every stage at some point and to ultimately reach the fourth stage.

Piaget theory is based on the idea that knowledge acquisition is a process of continuous self-construction. Knowledge is invented and re-invented as the child develops and interacts with their surrounding world. Children actively acquire knowledge through their own actions

Key Words

- COGNITION
- SCHEMA
- ASSIMILATION
- ACCOMMODATION

SCHEMA → ASSIMILATION → ACCOMMODATION

Boy has learned schema of cat

Boy saw a cub and called it "cat". Sister said "no, it's a cub".

He Accommodate new schema of cub.

Imagine what it would be like if you did not have a mental model of your world. **Schemas** are the basic building blocks of such cognitive models, and enable us to form a mental representation of the world.

Piaget defined a schema as -

"a cohesive, repeatable action sequence processing component actions that are tightly interconnected and governed by a core meaning"

In simple term the basic building blocks of intelligent behaviour – a way of organizing knowledge. It is a structured cluster of concepts, it can be used to represent objects, scenarios or sequences of events or relations. A schema is the mental framework that is created as children interact with their physical and social environments, for eg. many 3 years old children insist that the sun is alive because it comes up in the morning and goes down at night. According to Piaget,

these children are operating based on a simple cognitive schema that things that move are alive. At this age they rely on their current cognitive structures to understand the world around them. Moreover, younger and older children may often interpret and respond to the same objects and events in very different ways because cognitive structures take different forms at different ages.

Piaget descried three kinds of intellectual structures- behavioural or sensorimotor schemata, symbolic schemata and operational schemata.

Behavioural schemata are an organized pattern of behaviour that are used to represent and respond to objects and experiences.

Symbolic schemata are internal mental symbols like images or verbal codes that one uses to represent aspects of experience.

Operational schemata are internal mental activity that one performs on objects of thought.

According to Piaget, children use the process of assimilation and accommodation to create a schema or mental framework for how they perceive and/or interpret what they are experiencing.

Assimilation: Assimilation plays an important role in how we learn about the world around us. Through assimilation, we take in new information or experiences and incorporate them into our existing ideas. Assimilation refers to a part of the adaptation process. In early childhood, children are constantly assimilating new information and experiences into their existing knowledge about the world. For eg. A new born baby has a different experience about the surrounding when he/she is in the mother's womb, and when he/she takes birth has to assimilate with the present surrounding. Assimilation process starts from birth itself. With this process only he/she comes to know many principals of life.
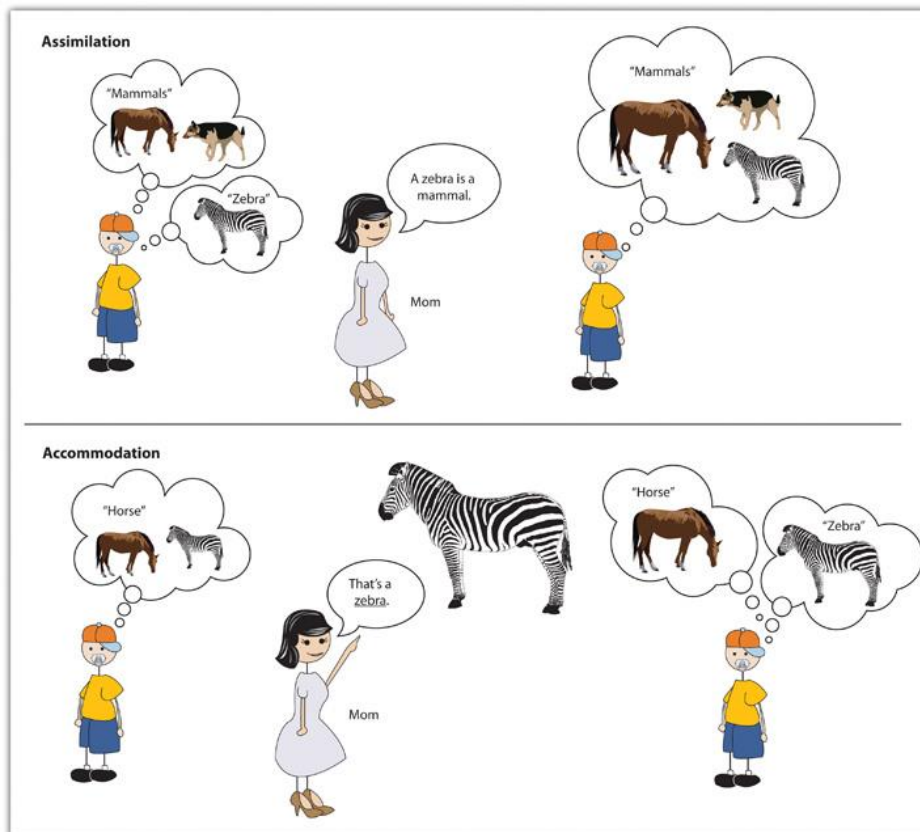
Accommodation: As children encounter new things and interpret these experiences, they make adjustments to their existing ideas about the world around them. This happens when the existing schema or knowledge does not work, and needs to be changed to deal with a new objects or situation is called as accommodation. For eg. When a child learns by experience that 'things exist even if they are not in sight'.

Equilibrium: Equilibrium occurs when a child's schemas can deal with most new information through assimilation. However, an unpleasant state of dis-equilibrium occurs when new information cannot be fitted into existing schemas. For eg. When a child knows how a dog is and when he/she experience the same physical traits but sounds different then disequilibrium occurs, again the process of assimilation of new information is done and accommodation of knowledge comes into existence that four legs one tail and 'mew' sound it is a 'Cat'.

Jean Piaget's theory of language development in children

Piaget's theory describes children's language as "symbolic," allowing them to venture beyond the "here and now" and to talk about such things as the past, the future, people, feelings and events. During this time, children's language often shows instances of what Piaget termed "animism" and "egocentrism."

His theory of language development suggests that children use both assimilation and accommodation to learn language. According to him, children first create mental structures within the mind (schemas) and from these schemas, language development happens.

Piaget's claim is that language depends on thought for its development, and is based on four sources of evidence: the period of infancy, in which fundamental principles of thought are exhibited well before language; the simultaneous emergence of language, deferred imitation, symbolic play, evocative memory, and mental imagery, suggesting language is but one outcome of more fundamental changes in cognitive abilities.

Why a child talk? Piaget asks what he admits is a strange question: "What are the needs which a child tends to satisfy when he talks?" Any sane person would say that the purpose of language is to communicate with others, but if this was the case, he wondered, why did children talk when there was no one around, and why did even adults talk to themselves, whether internally or muttering aloud? It was clear that language could not be reduced to the one function of simply communicating thought.

Piaget conducted his research at the Rousseau Institute in Geneva, opened in 1912 for the study of the child and teacher training. There he observed children of four and six, taking down everything they said while they worked and played, and the book includes transcripts of their 'conversations'.

What Piaget quickly discovered – and what every parent could confirm – is that when children speak, a lot of the time they are not talking to anyone in particular. They are thinking aloud. He identified two types of speech, egocentric and socialized. Within the egocentric type were three patterns:

- **Repetition** – speech not directed to people, the saying of words for the simple pleasure of it.
- **Monologue** – whole commentaries which follow the child's actions or play.
- **Collective monologue** – when children are talking apparently together, yet are not really taking account of what the others are saying. (A room of ten children seated at different tables may be noisy with talk, but in fact are all really talking to themselves.)

He noted that until a certain age (seven, he thought), a child has no 'verbal continence', but must say anything that comes into his head. A kindergarten or nursery, he wrote, "is a society in which, strictly speaking, individual and social life are not differentiated". Because the child believes themselves to be the centre of the universe, there is no need for the idea of privacy or withholding views in sensitivity to others. The adult, in contrast, because of his comparative lack of egocentricity, has adapted to a fully socialized speech pattern in which many things are left unsaid. Only madmen and children, as it were, say whatever they think, because only they really matter. It was for this reason that a child is able to talk all the time in the presence of his friends, but never be able to see things from their point of view.

Part of the reason for the egocentricity of the child is that a significant part of their language involves gesture, movements and sounds. As these are not words, they cannot express everything, so the child must remain partly a prisoner of their own minds. We can understand this when we appreciate that the greater an adult's mastery of language, the more likely he or she will be able to understand, or at least be aware of, the views of others. Language, in fact, takes a person

beyond themselves, which is why human culture puts such stress on teaching it to children - it enables them to eventually move out of egocentric thinking.

Despite some questions about the precise timings, Piaget's stages of child development have largely stood the test of time, and his impact on pre-school and school education has been great.

Yet Piaget never considered himself a child psychologist, and was more accurately a scientist focused on theories of knowledge. His observation of children led to broader theories on communication and cognition, because what he learned about the child's mind threw the adult's into clearer view. For instance, it was not only children who used schemas to make sense of the world, we adults also have to accommodate and assimilate new information by conforming it to what we know already.

Piaget invented the field of 'genetic epistemology', which means how theories of knowledge evolve or change in relation to new information. Given that the construction of knowledge is such a human, psychological endeavor, it made it all the more important to be rigorously objective about the admission of new facts. For Piaget, a person's mind is a relatively arbitrary creation, formed in such a way that reality could be explained according to that person's own model of the world. In education, he believed, you had to take account of these models rather than simply shoving facts down a person's throat, otherwise information would not be assimilated. Such a method of education resulted in dull conformists who were uncomfortable with change, and Piaget was ahead of his time in suggesting that we should educate people to be innovative and inventive thinkers who were both aware of the subjectivity of their own minds, yet mature enough to accommodate new facts. His initial experiments observing the language and thought of the child, therefore, led to great insights into how as adults we process knowledge and create new understanding.

Intervention with community and society

While Piaget's theory has caught a lot of attention and many educational institutions have used it, the concept has also attracted its fair share of criticism. What do researcher's find most bothersome about the theory is, the theory's focus on development as stages.

While Piaget didn't think these stages occur at a specific age, nonetheless he suggested you move from one stage to another. According to scientist who find this problematic are Lev Vygotsky and Burner, who believed development to be a fully continuous process. Instead of moving from single stage to another, they feel cognitive development is never ending process. Vygotsky thought the origin of human reasoning to be rooted in our ability to communicate rather than interacting with the material world.

- Piaget said that cognitive development is driven by a child's inbuilt tendency to adapt to new experiences whereas Vygotsky said that cognitive development is driven by social interaction

- Piaget stated children learn through active self-discovery; Vygotsky said children learn through instruction and guidance

- Piaget believed thoughts always proceed language. Vygotsky disagreed with Piaget's notion that language is secondary to action.

- Piaget believed cognitive development is the same universally whereas Vygotsky said that it differs across cultures and time

- Piaget believed children will only learn when they are ready, whereas Vygotsky believed that development could be accelerated to an extent, with correct scaffolding and within the ZPD.

- Piaget believed that language is a result of cognitive development, whereas Vygotsky said that language is key to cognitive development.

Piaget's theory is criticized for its emphasis of biological maturation. The theory sees development as genetic and biological process and therefore leaves out the impact of culture or social setting. Dasen shares in his essay in the book 'Psychology and Culture' his observations amongst aboriginal children in Australia. The children did similar spatial awareness and conservation takes that Piaget conducted, with the aboriginal children having the ability to conserve later then Piaget's Swiss children. According to Dasen cognitive development is therefore not just maturation process, but also dependent on cultural factors. In this instance, spatial awareness is crucial for nomadic groups to survive and live on a day-to-day basis.

Piaget's theory was based largely on observation and clinical interviews. He got interested in the topic as he observed children's answer's and play time. But observation is more open to bias than anything else. One person's observation of a child playing with a ball might be very different from other person's observation. This is especially true for his theory, as he constructed the whole theory of his observations alone. If he had discussed the findings with another researcher, the result might be found more reliable. For eg. His interviews weren't observed by another psychologist or observer. The answers might have been interpreted differently if someone else also looked at them. Many point to the fact that Piaget based his work on a very small sample size that included his own children and their peers. Not only is this a very small group from which little data could expect to be called, the children involved were also from privilege backgrounds. Further, since Piaget didn't clearly define his variables, it is nearly impossible to replicate his study. For any study to be considered valid, it must be subject to easy replication.

The theory also attacked because it already underestimates how children actually learn. Where Piaget pointed that children in the preoperational stage were egocentric and incapable of understanding the experiences of others, subsequent

research had contradicted this. In fact, research has found that children as young as three are capable of non-egocentric thoughts and behaviour.

Implications of the research:

Piaget's theory has had a major impact on the theory and practice of education. It has helped to create a view where the focus of attention is on the idea of developmentally appropriate education. This refers to an educational with environments, curriculum, materials and instruction that are consistency with student's physical and cognitive abilities as well as their social and emotional needs.

There are four main teaching implications drawn from Piaget's theory (Slavin, 2005):

1. A focus on the process of children's thinking, not just its products: Instead of simply checking for a correct answer, teachers should emphasize the student's understanding and process they used to get the answer.

2.Recognition of the crucial role of children's self-initiated, active involvement in learning activities: In a Piagetian classroom, children are encouraged to discover themselves through spontaneous interaction with the environment, rather than the presentation of ready-made knowledge.

3. A deemphasis on practices aimed at making children adult like in their thinking: This refers to what Piaget referred to as the "American question" which is "How can we speed up development?". His belief is that trying to speed up and accelerate children's process through the stages could be worse than no teaching at all.

4. Acceptance of individual differences in developmental progress: Piaget's theory asserts that children go through all the same developmental stages, however they do so at different rates. Because of this, teachers must make special effort to arrange classroom activities for individuals and groups of children rather than for the whole class group.

The educational implication of Piaget's theory is the adaptation of instruction to the learner's development level. It is important that the content of instruction needs to be consistent with the developmental level of the learner.

The teacher's main role is the facilitation of learning by providing various experiences for the students. "Discovery Learning" allows opportunities for students to explore and experiment, while encouraging new understandings. Opportunities that allow learners of different cognitive levels to work together often help encourage less mature students to advance to a higher understanding of the material. One future implication for the instruction of students is the use of hands-on experiences to help students learn (Wood, 2008).

Some general suggestions include:

- The use of concrete props and visual aids, such as models and/or time lines
- Facilitate learning by using familiar examples to explain complex ideas, such as a story problem in math
- Give students the opportunities to classify & group information, use outlines & hierarchies to facilitate assimilation of new information with previously learned knowledge.
- Present problems that require logical analytical thinking, "brain teasers" are a great way to incorporate this.

How can information on the Stages of Cognitive Development apply to teaching?

Some practical ways to teach children in each of Piaget's four stages of Cognitive Development. By using them in our teaching, we can hopefully teach students in a way that will help them be the most effective learners.

Sensorimotor Period: Activities for Infants and Toddlers

The term "sensorimotor" comes from the child understanding their world largely through their senses for their first 2 years. This stage is characterized by the lack of language and internal representation. It focuses on the reflexes that the child is born with such as sucking, reaching and grasping. In this stage of development, the child eventually develops *primary circular reactions*, which are activities centered on the child's body and repetitious in nature. Eventually, children develop the coordination of separate activities and the evolution of language. A final achievement in this stage is recognizing cause-and-effect relationships.

- Provide a rich stimulating environment.
- Allow the child to play with toys that squeak when squeezed. (ex: rubber duck) At first when the child squeezes the toy, they will be surprised by the sound and why it happened. However, after some time the child will realize that by squeezing the toy, they are the one causing the noise. This gives an example of cause-and-effect relationships: if I squeeze the duck, it will squeak.
- Another example of a toy is a rattle; when the baby shakes a rattle, it makes noise.
- Playing peek-a-boo is another good example of a fun activity for children around this age.

Preoperational Period: Activities for Toddlers and Early Childhood

This stage is in effect when children are about 2 to 7 years old. This stage is characterized by the inability to understand all the properties of classes. Transductive reasoning is also characteristic of this age groups thinking. Transductive reasoning involves making inferences from one specific to another based on faulty logic. Egocentrism and conservation are also characteristic of this age group. Egocentrism is the inability to take another person's point of view into account. One way to help children overcome egocentrism is to help them face another person's perspective by putting themselves in the others "shoes".

- One way to do this is by playing dress up and encouraging the child to take on a character.
- Sometimes children in this age group enjoy playing house. This is also a good activity because they are playing different roles that they have observed in their own lives.
- Hands on activities should also be facilitated at this time.
- Encourage children to play with toys that change shape (ex: playdoh, sand, clay, water) because this will help them move towards the concept of conservation.
- Children need physical, hands on practice with facts and skills needed for development.
- Use cut-out letters to build words.
- Avoid lessons that are very different from the child's world. And steer away from using workbooks or paper and pencil activities very often.

Concrete Operations: Activities for Middle Childhood

In this stage children evolve from prelogical, egocentric thinking to a more rule-regulated type of thinking. Some of the rules of logic include reversibility, identity, and compensation. One activity that a child at this age would enjoy is a cooking activity with their mom or dad.

We can incorporate several components of Piaget's theories into this activity. Baking involves measurements, which would be useful to the concept of conservation. Measuring cups come in all different shapes so it would be fun to measure the exact same measurement using different types of measuring utensils. Also, the ingredients could be classified into different categories such as the dry ingredients and the wet ingredients and so on. Numbers and seriation come into play with the distinct steps in the directions. Children around this age group usually really enjoy helping out in the kitchen, especially if it's baking something fun like cookies, so it turns into a great learning opportunity.

- Give children the chance to manipulate objects and test out ideas.
- Do simple experiments, with participation of the students.
- Avoid dealing with more than three of four variables at a time.
- Reading selections should have a limited number of characters.
- Experiments should have a limited number of steps.
- Students should have practice classifying objects and ideas on complex levels.
- Have students group sentences on a piece of paper.
- Use analogies to show the relationship of new material to already acquired knowledge.

Formal Operations: Activities for Adolescents

This period is characterized by applying their logic directly to real objects or situations.

At the beginning of this stage:

- Teachers should continue using strategies and materials used in the concrete operations stage.
- Use charts and illustrations, as well as incorporate new more sophisticated graphs and diagrams.
- Give step by step explanations and materials

Students need the opportunity to explore various hypothetical situations. Children in this stage should be encouraged to work in groups in school to explain and discuss hypothetical topics.

For example:

* Have then discuss social issues in groups and brainstorm.

* Have them write a short story on a hypothetical topic such as what life would be like in outer space. This allows the child to apply their new creative aspect.

* Students should also be encouraged to explain how they solved a problem.

* Students could work in pairs, one is the listener, while the other is the problems solver. The problem solver works the problem out loud, while the listener checks to see that all steps are followed and seem logical.

* Teachers could put a few essay questions on a test, which allows students the opportunity to give more than one final answer.

* Teachers should try to teach broad concepts, rather than just facts.

* Use materials and ideas relevant to the students like, if you were teaching material about the Civil War, the class could join in a discussion about other issues which have divided our country.

* Use lyrics from a popular song to teach poetry

It is important to note that adolescence may reach formal operations at different times or in some cases not at all.

"Constructivism" is a learning theory that says humans construct their knowledge using hands-on experience rather than being taught abstract concepts from books. The teacher who uses constructivism in teaching students does everything they can to give students hands-on experiences, using people and objects. The teacher also asks students to use any skills they have already learned.

Jean Piaget was also a constructivist and said, "Each time one prematurely teaches a child something he could have discovered himself, that child is kept from inventing it and consequently from understanding it completely."

Lev Vygotsky was another constructivist. He wrote, "A child's play is not simply a reproduction of what he has experienced, but a creative reworking of the impressions he has acquired. He combines them and uses them to construct a new reality."

Piaget and Vygotsky have very similar ideas with Piaget developing the foundation of Cognitive Development and Vygotsky expanded on Piaget's theories and developing his own theories.

The Constructivist Model that Piaget and Vygotsky's theories are based on is an education program that believes children are always learning.

The curriculum is based on children experiencing an activity and learning from it. Children might go on an outing to a farm and the teacher will use this outing in the classroom to teach the children about science, math and English. This type of school focuses on a child's physical, mental, emotional and cognitive abilities. The Constructivist model realizes that not all children learn at the same pace so the curriculum is set up so children can learn on an individual basis or in small groups depending on the cognitive level they are at. (Brewer, 2004)

Within all of Piaget's observations he noticed that children learn a lot from their peers. Children act differently when engaging, arguing or sharing ideas with their peers compared to how they would act if they were with adults. Piaget said that children would satisfy their own needs by interacting in these situations with a peer that was at the same cognitive level. This child would be learning social skills and how to share with their peers. Piaget thought that educators should focus on social and emotional issues as well as teaching mentally. (Gallagher & Easley, 1978)

Piaget was studying children in the early 1900's and at this time he proposed that we need to look at the relationships between children and other children and children and their parents, he noticed that one side always is telling the other side what to do and the lesser side can only agree, Piaget believed that everyone should be equal in order to have respect for each other (De Lisi, 2002), nearly 100 years later we are still trying to solve bullying among children and adults. Piaget had a lot of good ideas when describing how to teach children cognitively. Piaget's theory of Cognitive development is said to have been one of the most influential theories developed. Piaget has uncovered the unknown for researchers to build upon today. Piaget believed in constructivism and this is still being incorporated into newer theories of infant development. Piaget made everyone believe that to teach children we need to look at how we are teaching through a child's point of view, he said children are curious and they need to learn from the environments they are in, by asking questions instead of being told information. Piaget also stated that not all children are going to learn the same material at the same time and described how different children may learn at a slower or faster pace than others, he said curriculum should be taught to fit individuals or small groups based on learning ability. Above all Piaget asked questions that researchers are still trying to find the answer to today.

However, Piaget did believe that all children learn the same thing around the same time universally. Vygotsky disputed this fact and said that all cultures learn different materials according to what the culture feels is important at a specific age.

Vygotsky developed the "Sociocultural Theory" that is all children learn from a guide who is more educated than they are. Vygotsky also developed the "Zone of Proximal Development", he said this was the activity that children couldn't complete on their own, they could accomplish with help from another person more cognitively advanced then themselves. (Hung & Nichani, 2002)

Vygotsky also developed a lot of good theories, that are still being used and researchers are still building on these theories. We have to wonder if Vygotsky didn't die at such a young age what theories he might have developed. Vygotsky's theories were of great interest to read and study, the theories that he developed should be a part of what school systems are based on today.

In comparison Piaget and Vygotsky theories were based on the same ideas but were also very different like in these examples. Piaget and Vygotsky stressed active rather than passive learning. Students in Piaget's classroom would spend most of the day independently discovering their own activities. In Vygotsky classrooms teachers would give students hints to the answer and eventually give less hints so that peers were helping each other figure out the answer. Piaget and Vygotsky both noticed through observation that children would talk to themselves while playing. Piaget called this "egocentric speech". Vygotsky expanded on Piaget's theory and thought that children tend to talk to themselves while trying to solve a problem, Vygotsky called this "private speech" and he thought that children that did this were more organized and efficient. Vygotsky also that as children get older their "private speech" lesson from full sentences to one word and eventually all they do is move their lips. The difference that was noticed most was that Vygotsky thought it was important for children to have a

lot of interaction with adults while learning about culture and internalizing knowledge and Piaget thought that peer was important as they promote a social aspect in a child's life. (Shaffer, Wood and Willoughby)

In conclusion, Piaget and Vygotsky were important to understanding the cognitive development of children. Piaget and Vygotsky had similar views on how children should develop but their approach in teaching the children this varied considerably.

Jean Piaget's philosophy with present day world scenario of advance technology and science like neuro science, brain research, cognitive science, anthropology and epistemology.

The work of Jean Piaget has probably been most influential in our thinking about cognitive development, as it describes the periods of major change in cognitive processes that support abstract thinking. Before he started to describe his observations of developing children, cognitive developmental psychology was hardly if at all established as a discipline in its own right. His thinking about development was based on questions which have inspired philosophers for centuries, such as 'Where does knowledge come from?' and 'How does intelligence develop?' In addition, Piaget's early interest in cognitive development grew out of his interest in biology. Inspired by the likes of Darwin, Piaget was interested in questions such as 'How do people and knowledge evolve?' In this sense, the theory of Piaget had already a strong link with brain development, because it was based on assumptions of interaction between pre-programmed biological systems and changing environmental demands, which together produce rapid changes in development. Despite the controversial nature of his detailed theoretical claims, Piaget's theory can provide an example to illustrate the kinds of ideas and concepts that originated from psychology and that developmental neuroscience needs to tackle.

Perhaps the most influential of Piaget's ideas are his developmental stages, propelled by dynamic processes of assimilation and accommodation. These ideas could be said to be reminiscent of sensitive periods in brain development, as indicated by synaptogenesis and synaptic pruning. For example, Piaget suggested that a child cannot reach a new stage before mastering the old one, which has similarities with the idea of a hierarchical development of conscious control levels (Zelazo, 2004). Interestingly, synaptic density studies suggest that changes in grey matter develop at different rates for different brain regions and the change in grey matter in a higher-order brain region would not contribute to cognitive function if the grey-matter changes in a supporting brain region were not yet completed. Whether the changes occur suddenly or through slow accumulation of knowledge (which is suddenly observable) has remained unclear, but theories of brain maturation and of stage-wise mental development agree that changes in cognitive skills occur through an interplay between biological programs and accumulating environmental input. Information-processing theories, which often build upon the classic Piagetian framework, have emphasized how biologically based growth of internal control, self-regulation, working memory and automatization allows children to progressively increase processing limits. For example, the development of working memory capacity has been explained as an age-related increase in processing space, in which the absolute capacity of working memory does not change, but the capacity functions more efficiently with advancing age. Early in development, children are thought to rely more on working memory storage space, but the processes are less efficient. In contrast, across development, children increase in processing ability, and consequently, there is a decrease in the necessary storage space. These changes in capacity may be influenced by a general increase in processing speed which could underlie performance enhancements in a wide variety of domains, including working memory (Kail, 1991, Kail, 2007).

More recently, and influenced by findings from patients with prefrontal damage, it is assumed that internal control and working memory capacity are associated with the emergence of executive functions (Dempster, 1993, Diamond, 2002). Executive functions refer to the ability to control our thoughts and actions with

the purpose of achieving future goals. Changes in executive functions could account for developmental improvements in a variety of higher-order processing domains, although it is still debated whether these are co-occurring but separate developments (Huizinga et al., 2006) or whether a general reflective level of processing underlies these improvements (Zelazo, 2004). For example, an information-processing theory referred to as the levels-of-consciousness theory, postulates that the development of the levels of consciousness goes via hierarchical functional system changes, where young children may master one level of processing (e.g., keeping rules active in mind) but not another level of processing (e.g., flexibly switching between competing rules). Once the highest level of consciousness is reached, children can solve the most complex problems, which can explain the observed age-related improvements in executive functions.

Based on these behavioural models, it is generally predicted that two or more brain systems work closely together when performing complex tasks, but the way in which they work together is predicted to be different. For example, according to Case's conceptualization of working memory development, there should be one system which is important for storage of information, and a second system which is important for processing information and the relative contribution of these systems changes during development. In contrast, the levels of conscious processing account suggests that executive function and reflective consciousness is dependent on the maturation of additional brain regions in prefrontal cortex (see also Bunge and Zelazo, 2006). The challenge is now to use neuroimaging methods to directly test the developmental theories of working memory and executive function. For this purpose, we will summarize neuroimaging research which focused on different types of working memory and control functions.

In brain maturation and developmental theories the selection of paradigms and age groups can be more readily based on knowledge from decades of research in developmental psychology, and argued that to date conclusions of brain-imaging findings often rely on post hoc interpretation. The example of a major developmental theory, Piaget's concepts of stage-like development, can be

related to current data-based approaches in structural and functional brain imaging.

The use of psychophysiological measures, including brain-imaging analysis, which can provide a more solid basis for relating developmental changes in performance on tasks to actual brain maturation, and the results from prior <u>fMRI</u> studies provide the building blocks for starting this new direction. One example of a how these building blocks can be implemented is by using the neural basis of development accounts proposed by <u>Johnson, 2001</u>, <u>Johnson, 2010</u>. This theory provides a principled division of possible processes in brain development. Even though this theory was originally developed to account for changes observed in young children (ages 0–2 years), the concepts of maturation, interactive specialization and skill learning can readily be applied to functional neuroimaging studies in children and adolescents. The accounts provide direct starting points for understanding differences in brain recruitment and to relate these to developmental theory.

Paradigmatic progress in developmental <u>neuroscience</u> can rely more on knowledge from developmental experimental psychology, and that developmental models of cognitive development can be articulated further on the basis of anatomical and functional differentiation of target brain regions. Much progress is currently made in the technological possibilities of brain imaging techniques, which allows, for example, for the estimation of age based on brain connectivity indices (<u>Dosenbach et al., 2010</u>). This is a very important development for a better understanding of changes in brain function.

From the above information/details what I understood is – "human brain is a learning organ which learns by experience and to give maximum windows of opportunities, giving experience of learning to a child is our duty as a facilitator/teacher. At the same time this experience of learning should be stimulating and tension free learning. Every teacher/facilitator should know how brain works as a 'learning organ' which will help her/him to deal with learning of children".

Piaget's Contributions to Psychology

Piaget provided support for the idea that children think differently than adults, and his research identified several important milestones in the mental development of children. His work also generated interest in cognitive and developmental psychology. Piaget's theories are widely studied today by students of both psychology and education.

Piaget held many chair positions throughout his career and conducted research in psychology and epistemology. He created the International Center for Genetic Epistemology in 1955 and served as its director until his death on September 16, 1980.

Piaget's Influence on Psychology

Piaget's theories continue to be studied in the areas of psychology, sociology, education, and genetics. His work contributed to our understanding of the cognitive development of children. While earlier researchers had often viewed children simply as smaller versions of adults, Piaget helped demonstrate that childhood is a unique and important period of human development.

His work also influenced other notable psychologists including Howard Gardner and Robert Sternberg.

In their 2005 text *The Science of False Memory*, Brainerd and Reyna wrote of Piaget's influence:

"In the course of a long and hugely prolific career, he contributed important scholarly work to fields as diverse as the philosophy of science, linguistics, education, sociology, and evolutionary biology. Above all, however, he was *the* developmental psychologist of the 20th century.

For two decades, from the early 1960s to the early 1980s, Piagetian theory and Piaget's research findings dominated developmental psychology worldwide, much as Freud's ideas had dominated abnormal psychology a generation before.

Almost single-handedly, he shifted the focus of developmental research away from its traditional concerns with social and emotional development and toward cognitive development."

Over the course of his research career, Piaget published over 50 books and 500 papers, almost all of which can be found in the Jean Piaget Archives. He served as professor and director of several institutes at the University of Geneva, the University of Lausanne, and the Sorbonne.

After many years of observation, Piaget concluded that intellectual development is the result of the interaction of hereditary and environmental factors. As the child develops and constantly interacts with the world around him, knowledge is invented and reinvented. Piaget's concept of these developmental stages caused a reevaluation of older ideas of the child, of learning, and of education. If the development of certain thought processes was on a genetically determined timetable, simple reinforcement was not sufficient to teach concepts; the child's mental development would have to be at the proper stage to assimilate those concepts. Thus, the teacher became not a transmitter of knowledge but a guide to the child's own discovery of the world.

My learning from the work of Jean Piaget is that, while working with children as a teacher, I should focus more on how I will be helpful to a child to offer him/her the maximum learning opportunities. I feel that not only a child but every new learner goes through all these processes of acquiring knowledge and invent certain findings for himself.

Credit & Reference: Information compiled from the book "Theories of childhood" written by Carol Moorey and from various internet sites.