

Psychology of Learning

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Lecture – 16

Thinking and Cognition

Hello viewers, welcome back to this NPTEL course on the psychology of learning. So, today we will start to discuss a new topic. A new topic about Thinking and Cognition. So, in the past, we have already discussed memory, learning, and different learning theories, etcetera. So, thinking is also a cognitive activity. Now, let us explore what is there in this domain of thinking and what does it mean.

So, the thing is cognition, as we have already discussed in the last previous classes, is the terminology that has been consensually selected, identified by the researchers as against as opposed to you know intelligence as a term. Intelligence was very criticised because of its different flaws, and different interpretations in different ways. So, cognition has been a more consensual, more overarching concept of defining the human cognitive ability, thinking process all the cognitive mental processes or mental processes. So, cognition is the term actually which refers to the all the mental processes involved in gaining knowledge, processing the information, remembering thing, comprehending thing all kinds of cognitive or mental activities.

So, the cognitive processes also includes thinking. Suppose when we are learning thinking is an internal mechanism. Thinking is involved in all kinds of cognitive activities. Suppose we are remembering something, we are learning something, we are performing something, we are doing something or we are solving some problems. In every activity of cognitive processes thinking is there. So, cognitive processes involve different types of thinking. So, it includes thinking, knowing, remembering, judging, problem solving, even comprehending, summarizing-all kinds of the mental activities.

So, there are different activities. So, these are the higher level functions of the brain. All these kinds of things: all active thinking, higher order thinking processes starting from learning to remembering to memorizing, to implementing to you know manipulating certain things. So, all these things these are the higher level of functions of the brain and it encompasses different cognitive components like the language, imagination, perception, planning. These are all the components and skills of this cognitive activity. And actually in psychology thinking is the process of consciously generating different kinds of ideas, manipulating different kinds of thoughts and ideas in the mind. So, thinking is an active process. It is inherent mechanism of human cognition, human brain etcetera which is engaged in different kinds activities of not only collecting the information, learning it, analyzing it, consciously creating manipulating these thoughts and ideas to get some new ideas and new concepts and schemas.

So, how important is thinking? Thinking is an action. It is a process which allows us to solve the problems, to learn new information, to understand the new concept, to process our

experiences to you know to get the new insight out of it. So, different kinds of for different kinds of cognitive activity thinking is a process is a mechanism you can say it is a mechanism. Thinking involves the entire process of learning remembering to organizing mentally, to understanding, to information even for communication, to negotiation, to analysis, to judgment, to all kinds of activity thinking it is a complete process of learning. So, it is inseparable you can say it is a mandatory, it is a compulsory, it is inseparable or it is you can say it is the prerequisite. Suppose as a human being we are going to learn something, construct something, demonstrate something, perform something thinking is the you know starting point it is the underlying mechanism.

So, primarily there are different types of thinking as per the requirement, as per the context, as per the difficulty level of the you know content different types of thinking are there, but primarily main types of thinking primary types of thinking as one is the creative thinking, divergent thinking, symbolic thinking, but there may be different subtypes of thinking under each domain. So, under each component. So, let us discuss what are these three types of thinking creative thinking, divergent thinking and the symbolic thinking.

So, creative thinking is that you know as the name implies we are innovating, we are creating, we are creating something new, something unique, something unconventional. So, that is the ability you know the ability to generate the innovative ideas unconventional, new, unique, original ideas that is the creative thinking.

And research says that yes of course, creativity is very much related to intelligence actually intelligence is a here we can say intelligence is it means that the individual must have some basic ability, basic grasping ability, basic level of intelligence, general intelligence to grasp to understand certain things. So, here creative thinking actually it is also related to intelligence like for example, if there is a debate on ongoing controversy about what is the degree of interrelationship between creativity and intelligence can creatively takes place without intelligence or can the people who are in highly intelligent be equally creative these are the controversy ongoing research is going on. But yes of course, the basic relationship is that creative thinking is higher order thinking and in order to get engaged in creative thinking or a person being capable of doing creative thinking of engaged in creative thinking creative thinking ability must be intelligent up to an at least average level up to a normal level. So, in order to create something new. So, intelligence you can say it is a prerequisite is the basic component basic requirement for being a being a creative person.

So, automatically creative thinking also involves intelligence basic intelligence. So, these two concepts are related, but to what extent what is the degree of relationship that varies from context to context. So, then another is the imagination when a creative thinking like you know the persons imagination and the environmental inputs he is getting the personal again personality also plays an important factor having the personalities traits specific personality traits being the being the reason of creative thinking abilities these things are also there. And so, these are creative thinking how the how creative thinking takes place having the person having some basic personality attributes basic intelligence and you know the environment also supports in terms of you know stimulating his or her imagination thinking abilities that is one type of thinking then a divergent thinking like divergent thinking divergent thinking that when we think of a solution multiple solution to a problem. For example, suppose brainstorming is best example brainstorming when we start thinking of the same problem in terms of multiple solution we stimulate everybody to think of many options many alternatives many solution possible solution that is a divergent thinking.

So, here we are seeking to the seeking the best solutions n number of solutions that multiple solutions to a question which is probably open ended question. So, once we think diversely and we are we have we have identified n number of solutions then after that then we try to assess evaluate which will be the most effective one. So, then actually divergent thinking in the initial stage and then later stage after having the multiple options and evaluating all these options when we come to the best solution most effective one most cost effective solution then we converge all our ideas into one. So, then we come to the convergent thinking. So, in creative it actually in creative thinking creativity both divergent and convergent thinking are required that is convergent thinking at least towards the end to converge all our ideas all our ideas to consolidate our thought process in particular or stop our self in a particular under a particular topic to finalize it or particular problem or solution to finalize the like that is why the creative people initially they are so curious they are so imaginative they are so that means, so that is the creative in the sense that whenever they go they always you know they try to find out identify the gap areas gap areas actually.

So, gap areas so they are very inquisitive they are very curious. So, that is the basic they have traits attributes are there they are very curious they are not not at all satisfied happy with the status quo. So, they always look for gap area some lacunae some you know some disadvantages some limitations always search for. So, but whenever suppose they have identified a gap area problem then they think of in multiple ways or they need to or we need to like suppose in order to solve a problem we need to diversify our thought that means, welcome the possible hypothesis possible solutions, but suppose you have n number of solution then we evaluate which one will be most effective will be cost effective most effective. So, after discussion of all kinds of things then we converge then convergent thinking takes place. So, both divergent thinking and convergent thinking you can say it can be a part of the creative thinking also.

Then symbolic thinking symbolic thinking is that it is like in the symbolic thinking actually we think in terms of some symbol some mental representation some image some pictures. So, best example is that when the children they play with their toys actually they try to replicate the you know replicate the real story real world whatever the whatever the mother does in at home they want to replay it in a imaginative play by you know by playing with the toys or toys and the toy play houses etcetera. So, that is symbolically they think they symbolically like they think that this toy is a toy is a her or his daughter this is the mother's role this is a this is the father this is the caretaker this is the this is the sibling these are the siblings in this way that is a imaginative place. So, symbolic thinking is that the when we create a kind of mental representations of the reality or particular events or particular people in mind or objects or our life experiences that is symbolic thinking.

And the characteristics of yes characteristic thinking in psychology is that people with strong thinking skill tend to have the several characteristics in common. Like suppose when we talk about the people who are creative thinkers who are very highly intelligent who are you know very you know you know high performers who are you know good narrators who are good orators who are good mentors. So, they have some when we compare a large number of people then we can we find out some of the common features common characteristics are there. So, then the thing is that so, here it involves an active. So, active imagination creative environment curious personality all these factors actually plays an important role in plays an important role.

So, active. So, the in order to very often adopt this symbolic thinking that definitely the

person must be a very active imaginator and for that matter also creative environment is also required. Curious personality the individuals tendency curious inquisitiveness is also very much required. So, the some of the personality attributes curiosity imagination creative environment stimulating environment and this environment these are important factors to make a person a very actively actively engaged or actively engaged in thinking process. So, yes of course, some other fields like the those who possess the either they are they are having some expertise expertise in their subject matter that is one factor or they are having inherent intrinsic motivation to learn certain things ok. So, in motivation one is the extrinsic motivation we are being motivated because of some external rewards incentives goals etcetera, but we are intrinsically we are motivated because it is our innate desire to do something to achieve something to perform something.

So, that is the intrinsic motivation. So, these two things these intrinsic motivation then you know to the you know achievement need achievement need to master or mastery need to have to possess the expertise in a particular field that also prompts us to develop the active thinking skills. So, now, here the concepts and prototypes are two important features of thinking concepts and the prototypes. So, you know when like in the mental imagery of the similar objects like for example, whenever the child grows up he formulates as per the Piaget theory he formulates you know different schemas. So, schemas that is ideas his own concept of different objects of animals of the pictures or the play materials etcetera.

So, that is the concepts that is the schema actually the schema is a mental category of similar subject it is a schema about the people about the events about the things and prototype is that it is a such a prototype is an example of it is a representative item of that concept. Suppose you have developed a concept of mountain suppose we have the concept of develop the concept of the mountain a mentally imaginary category of the mountain similar how many mountain grains are available etcetera etcetera. Then suppose and for as a prototype suppose out of all these mental images or the concept of mountain mountains then we take a pic of the prototype like Himalayan Himalayan mountains. So, that is the prototype. So, whatever new things we will we will encounter we will come across then we will try to map it against the prototype that that is Himalayan Himalayan mountains Himalayan mountains that is the range of mountains and Himalayan mountains.

So, Himalayan mountains here is our prototype and the other representative idol like that is the representative items of the concept of mountains that we have developed and whenever we come across the new such mountaineering mountains or range of mountains etcetera then automatically we compare it compare it with the our prototype. So, the basic example of these things is now for example, in the similar the child as the child grows of develop different kinds of concepts about people, dogs, doctors, police of different concepts etcetera and we compare the new information to against our prototype prototype we who is the ideal person like the child used to compare every outsider every stranger in comparison to his or her father because he thinks that he has been exposed to role model father and he thinks that his father is very loving father is perfect father is very disciplined father is very caring etcetera. So, whenever he comes across any new stranger male person in the home automatically starts the child starts comparing the person against the prototype that is his father ok. So, thinking in psychology also it is consciously generating and manipulating the thoughts and ideas in mind. So, that means, thinking as we grow up across over the ages in the over the across the developmental stage over maturity through higher learning exposure experiences etcetera.

So, thinking actually it helps us in consciously generating creating new ideas

manipulating the thoughts ideas starting from the you know concrete to abstract ideas very reflective thoughts different kinds of ideas thoughts etcetera we create it we generate it we manipulate the thoughts and then also we sometimes we recreate reconstruct sometimes through and this assimilation and accommodation is going on it is ongoing it is ongoing process either we make it find out some similarity with the other thing or else we think now it is something different we change it. So, in this process we create new concepts new ideas new thoughts in our mind and it is a lifelong process ongoing process. So, think so, now let us say thinking as a as an cognitive process thinking is very active thinking. So, these are the basic characteristics that we have discussed till now that is thinking what are the main different main types of thinking. So, thinking as a active cognitive process.

So, thinking is a cognitive process because it is very often it uses every everything from the long term memory to solution of the problem. So, when we are engaged in thinking means it covers everything maybe for small task our thinking span is very short maybe for if you are engaged in a big projects long term projects long or you know 5 year 10 year projects and etcetera. So, then the thinking will continue unless and until we complete the project unless and until we get the solution. So, it is it is a cognitive process it is a process that use of everything long term memory also it requires short term memory working memory it requires and different types of task it requires. So, it actually so, in psychology they define thinking in terms of you know in terms of linking cognitive thinking to a cognitive process ranging over n number of items concepts problems topics subjects etcetera.

And at the same time manipulating or handling or manipulating different mental representations of information. Suppose some of the information data has been given to us. And we are suppose we need to summarize we need to analyze we need to create something new out of this data or information. So, here we have to not only we grasp the underlying meaning of this information and data, but we have to assemble it analyze it synthesize it and create a new kind of new design or new piece of learning new piece of in a journals journalism topic writing write-up whatever. And the mental representation that is for example, the with the information type of information that we receive through our sense organs etcetera.

And the it we may we receive different types of data different types of information. So, we also form the different types of mental representation whether with related to language whether it related to words context maybe some visual images with regard to some structure some historical event. And so, the mental representation there is one depends on the type of stimulus type of information that we collect and that we are suppose to do what we are suppose to do in that information. So, thinking also transforms thinking also transform the particular representatives of information in a new different form. So, again thinking not just simply process the information it retains and it transforms changes it into different different state different you know shape different thing.

So, thinking also transforms a particular representation of information in a new format. So, like for example, when we are we are evaluating something we are critical evaluating and we try we are trying like the child does in the child would like he whatever toy will be giving to the child it will first try to explore the whole thing by dismantling the whole thing dismantling the breaking down the toys into different component. Then it then the child will explore which component which part is for what would be the possible causes reasons etcetera all kinds. So, we will try to explore the you know functions of different parts of that toy then we will try to again reassemble it ok. So, this is the this is the way we also learn.

So, thinking transforms not just assembles understand the whole thing, but try to that means, try to redesign it transform it into a completely new one primarily for example, in design learning. Design learning suppose you will be given to some given with some raw materials some scratches something like that, but you will be suppose when you will be asked you design particular kind of toy design kind of particular of you know you know some kind of structure infrastructure some kind of design some kind of you know design for machines design from design for automobiles design for housing. So, different kinds of design you try to find it. So, you will be given with some basic information or you can say the raw material then you will be asked to transform the whole thing or existing thing into a new pattern. Thinking is a symbolic process like mental through mental representation symbols like you know we have the sign language sign language is that no sign language this language these all kinds of sign language these are the symbols symbols.

So, we understand the meaning behind all these symbols. So, thinking is a symbolic process also and we try to represent the mental representation in in terms of some symbol with a say and symbols are not meaningless symbols are having some purpose some some meaning. So, you can say the signs symbols concepts ideas pictures etcetera. So, and primarily this kind of this symbolic process signs and symbols are primarily being used maximally being used in advertisement in marketing in you know journalism in mass media all these things. So, the systematic arousal of symbols helps in organizing the things.

Suppose in between some in between discussion there is a ongoing discussion suppose all of a sudden we get some some some symbol some signal sometimes we use it as a signal some systematic arousal of some symbols it helps again it start it gives a gives us some kind of information that kind of information or kind of stimulation that we have we need to reorganize our thinking that we need to be a lot either we need to be a lot we need to be change the topic we need to summarize it we need to make it more precise or we need to you know address something something new topic or address for a discussion welcome for give some space for the discussion or call out the session to be closed all kinds also. So, it starts it gives us a signal for organizing the thinking process. So, symbols symbols symbol symbol has many uses and the purposes. So, thinking again thinking is a higher mental process you know thinking means it is a process and it involves lot of cognitive activity lot of cognitive activity simply remembering the things to creating the new things ok.

So, it examines a thinking knowing. So, thinking involves all kinds of the higher mental processes like examining the thinking knowing the reasoning problems solving decision making planning generalizing all executing all you know you know for example, in corporates in the organizations in the in the in the different office government offices we need to come to the conclusion. So, before coming to the conclusion because suppose the events or situation the case is very especially the legal cases the legal cases. So, case is very complicated complicated in the sense that it has a long history some chronic factors some causal factors and many people are involved and the conflicts are the degree of conflict intensity of conflict is very high. So, in that situation how to come to the conclusion. So, here we need to exercise all kinds of active all kinds of brain exercises.

So, all kinds of brain activities it involves thinking even though it is of reasoning rational thinking problem solving you know even you can say you know even you can say expecting making assumptions anticipating then you know some kind of you know analyzing all. So, all kinds of cognitive activities takes place leading the process of thinking because

thinking is a flow it is a process it is a flow. So, it is only through thinking that we can yes, but whenever we process the information information encoding information receiving encoding registering in your registering encoding processing then retaining. So, all these information processing in the info memory model whatever information till from the moment we receive it from the external environment till we retain it in the in the long term memory and maybe that we are using and retrieving it in future all these things it requires it involves thinking thinking. So, thinking involves encoding the information is thinking processing in thinking scoring also involve thinking retrieving it analyzing utilizing all activities requires a thinking and thinking is a sub vocal talking yes for example, yes.

So, thinking as because during the thinking as we say that we also think we try to remember certain things in terms of images in terms of some musical tones in terms of some design in terms of different ways we what we try to consolidate our memory in the process of thinking. So, thinking is also sub vocal talking what is sub vocal talking? So, like whenever we are thinking that means, internally we are talking to our self. So, you we might have observed that few people they whenever they think they they they think it loudly loud thinking that means, they utter utter whatever they are thinking they actually speaking it out they are uttering it uttering it verbally. So, that is that is we can say though that means, self talking we say that self talking. So, that takes place usually many of us we do it self talking, but sub vocal even if that means, the child usually whenever the child plays it talks to himself talks to the you know play match or as well as self whenever he himself is playing with the toys as a self talking.

So, self talking means from time to time he is the child is playing the different role of the different characters and talking to himself. Similarly thinking is a sub vocal talking even if we do not utter it loudly, but still we are talking to ourselves. So, it is a sub vocal talking that is sub vocal talking that is the silent talking. So, that is that it is actually it actually depicts our inner voice. So, it involves implicit and inner voice mental images and all even as a result of some of the body changes biological changes like muscular involvement in even neuro neuro definitely neurochemical changes also takes place in brain nervous muscular muscular movements all things things also takes takes place.

So, that is way you know that is where the behaviorists is when that said that the thing psychology that means, learning is whatever it can be measurable it can be observable it can be replicable all these things. So, they could define thinking properly and they say that thinking is a sub vocal activities which can be measured through this measurement of the body changes ok. So, so, yes thinking also takes place in terms of mathematical symbols in terms of gestures in terms of you know varieties of expression like art art painting this is also a kind of representation of our ideas in the art form in the narrative. Similarly, writing the novel writing the stories writing the poems all these are expressions being manifested in different ways, but these are the result these have all these activities all these end products all these performances have been initiated by thinking process ok. So, thinking is a fulfilling thinking is fulfilling and need are the problem.

So, thinking begins the moment we learns even the moment the human being as an individual we starts about you know starts about conceptualizing our idea. So, since beginning like since early childhood whenever we are exposed to different kinds of environmental stimulus and the moment the child begins to think that means, and frame his first concept first concept initially from the since childhood whenever we start down the moment the child since birth after few months whenever the child begins to think actually that means, with the biological growth and

maturity only the child will be capable will be capable of thinking the moment it starts thinking means first concept probably it conceptualizes is the concept of mother or the caretaker mother or caretaker because then from the very beginning the child you know by collecting the information like the smell of the mother the touch of the mother all these sensory information when see a symbol see it assimilates it come then relates it to each other gradually slowly and steadily she first formulate the concept of mother or the caretaker mother. So, there onwards then starts of you know formulating new new new concept. So, it is a ongoing life long process it is a long long life long process and thinking also we also thinking also takes place as per our requirement as per our need as per as per our compulsion or you can say we are compelled to do certain compelled to act or think actively because of some because we are supposed to sort out some problems solve certain problems you know deliver certain things learn certain things fulfill certain criteria of you know examination classroom I think.

So, thinking is involved everywhere. So, now this is the things like it is always initiated by a problem and solution or an you can say problem or object or objective or the goal or whatever followed by certain necessary things thinking it involves involves different plans beliefs of preconceived ideas beliefs meanings experiences before taking any final decision thinking actually it involves also it is it requires some kind of planning to reach the goal some kind of mental planning some exercises some you know even even to remove the obstacles thinking is to understanding the nature of the problem analyzing the nature of the problem and thinking is also you know getting the idea suddenly all of a sudden getting the solution like that insightful learning that we are saying then thinking that just like the learning thinking also takes place all of a sudden we get the answer that is that is Archimedes ah moment. So, suddenly we got that means, the brain was still working on the same topic. So, learning and thinking we can say these are inseparable whenever we are engaged in learning we are thinking similar we are thinking. So, observational learning also suppose even in case of social learning observational learning when we are observing certain thing we are learning certain thing means our thinking is involved it is a inbuilt mechanism. So, that is thinking is of all activities all even reflecting on a past experience it is thinking everything thinking is a can it is a flow of experience it is a flow of activity.

So, elements of thoughts is the mental images yes mental images mental pictures of the past experiences of the present situation or suppose our imagination also we want to do certain things some mental pictures in mental images of the future that we visualize it even. So, images, these images can be of you know when we remember in terms of its nature like a visual imagery or maybe some something kinesthetic or auditory olfactory this kind of images can also be there. Suppose we have remembered some very good smell very good taste very good you know look clothing or some design. So, all these sensory experiences sensory information can also be also we can also be analyzed and conceptualized as the images. So, as you can say so, concepts are the mental representations of the class and objects.

So, when you form the concept, it represents certain group of things -mental representation of certain groups of things and prototypes We all know what prototype is. You can say, it is an example. It is a representative example of particular category, of particular concept. And when we formulate different concepts, it reduces not only the mental effort and saves the spaces in working memory but also reduces the cognitive load and it organize the whole learning task or the phenomena and makes it very simpler to remember it to learn it or to save it. So, concept actually is a more of organization of information, data and the learning material to make it more concise, precise, comprehensive and meaningful. And it becomes meaningful and it can be saved with lesser space in the working memory or long term memory and it is easy to work

out, it is easy to perform, it is easy to retrieve, it is easy to you know further use it and utilize it.

So, what are propositions? For example, thinking involves language, precepts, concepts. So, thinking which involves languages, precepts, symbols etcetera and give meaning to its thinking processes are called the propositions. Like we make some assumptions we make some propositions. So, proposition actually describes the mental manipulation of this cognitive skills like the how skillfully we manipulate the languages, how skillfully we manipulate the mental images, designs, ideas, thought processes and how we put it in a very meaningful pattern, meaningful format meaningful relation. We develop a meaningful relationship that is called the proposition. So, we can say through propositions, we develop different mental models (or you can say demo) or prototypes or the frameworks of constructing certain things or completing certain task or understanding the knowledge and organizing the knowledge by structuring it. So, proposition helps us in forming the mental models. These models are. you can say, the prototypes or the frameworks or organizational structures of putting the things, places and objects into different events and understand the whole world around us. So, there are strategic thinking models. You can go it into the depth there. What are the inputs? Similar to the information processing, inputs are there, outputs are there and there are practices in between. The processing practice is basically the effective use of certain practices and strategies. How can we make our thinking a very strategic thinking tool or component and use it in a very flexible way.

So, this is the strategic thinking model. So, now, I stop it here. Now in the next class we will continue with this topic. Thank you very much.