Usability Engineering
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Module - 07
Lecture - 23
Cognitive Issues

Welcome to module 7, lecture number 23. In this module, we are going to discuss about the Cognitive Issues related to humans. It is important for us to understand these cognitive issues so, that while we design for our users; we can refer to these theories, we can refer to these limitations of human information processing, limit barriers of human information processing.

And thereby, we can ensure that whatever information systems or information presentation that we are designing as an interface for our customer; these interfaces can act as an enabling system to augment the capacity of our users in accomplishing their goals. It is therefore, important that we understand these issues related to the cognition and its processes in detail.

So, in this module, we will discuss about cognition, the related processes, cognitive loads, various theories, cognitive frameworks, models that would allow us to design a system more effectively for our customers and users.

So, let us begin.

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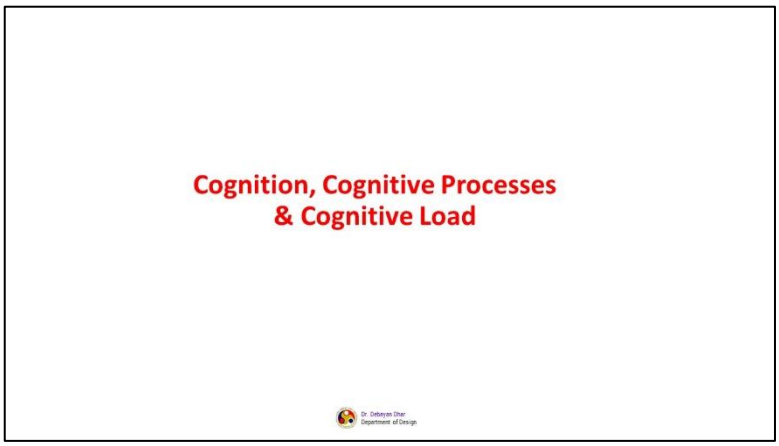

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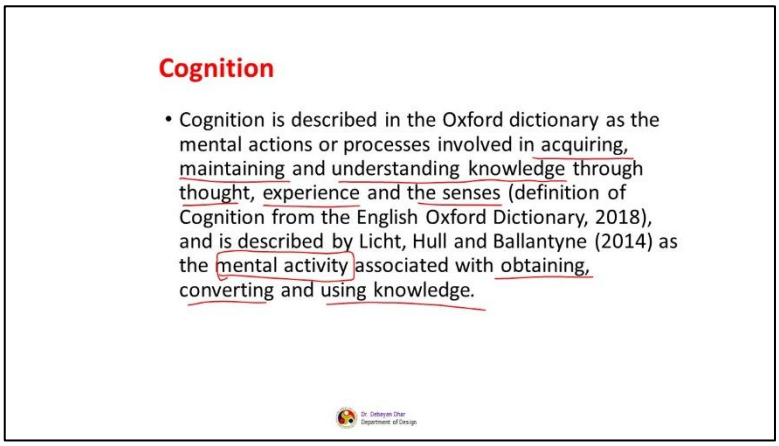

So, let us first start discussing about cognition. I am sure many of you have heard about this word, this is not something which is very difficult to comprehend.

Now, in the Oxford dictionary: cognition is described as mental actions or processes involved in acquiring, maintaining and understanding knowledge through thought, experience and senses. I would like to draw your attention here, while we discuss about cognition, please concentrate on the activities that we are discussing.

And the activities are acquiring, maintaining and understanding knowledge, through what? Through thought, experience and the senses. So, the processes that we are essentially talking about are the processes that helps us to acquire, acquire what? To acquire information, maintain and understanding knowledge. So, information is acquired, it is maintained, processed and then comprehended as a knowledge you know. And, these, all these processes are being carried out through thought, experience and the senses that we have in our body.

Now, this is what Oxford explains cognition as. It has also been described by Licht, Hull and Ballantyne in 2014 as mental activity associated with obtaining, converting and using knowledge. See the terminologies that Licht, Hull and Ballantyne has used mental activity. So, now we know that cognition means it is a mental activity and this activity is associated to obtain, convert and use knowledge right.

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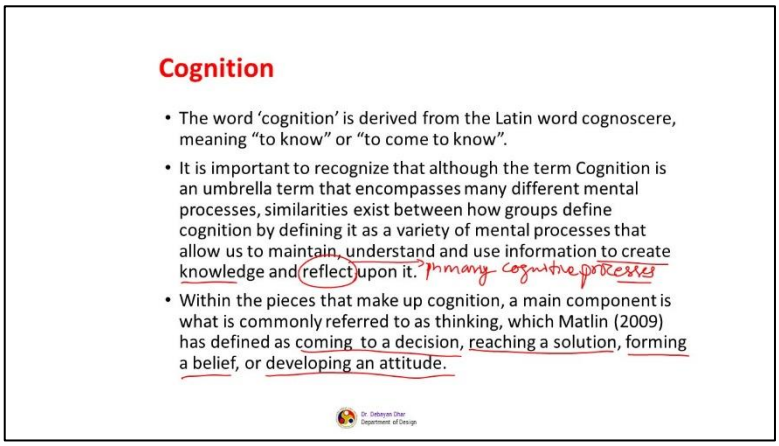

So, the word cognition has been derived from the Latin word cognoscere, meaning "to know" or "to come to know". It is important to recognize that although the term cognition is an umbrella term, it is used as a term that encompasses many activities and many different mental processes, similarities exist between how research groups define cognition by defining it as a variety of mental processes that allows us to maintain, understand and use information to create knowledge and reflect upon it.

So, creation of knowledge and its reflection is one of the primary activities of cognitive processes ok.

Now, within the pieces that make up cognition, a main component is what is commonly referred to as thinking. This is what we are referring to as the mental activities. The process of thinking, the act of thinking which was highlighted by Matlin in 2009 and he has defined as coming to a decision, reaching a solution, forming a belief, or developing an attitude.

See, the specific attributes of thinking have been defined by Matlin in 2009 as coming to a decision, reaching a solution, forming a belief, or developing an attitude. Now, can you relate why we are discussing cognition? After knowing these various ways of looking at these mental activities, I hope you can come close to the realization of the role of cognitive processes and cognition in the context of designing for our users.

Let us discuss this again, coming to a decision. See, decision making is an important activity in the process of designing; be it decision taken by the designers or decision taken by your customers or users by deciding which product to choose, how to navigate or how

to choose to navigate right. These are all decision making. Reaching a solution, forming a belief. See, belief is an important activity because it influences product adoption.

So, if the belief is influenced with negative thoughts or negative experiences then product adoption would be hampered. Similarly, it also influences what we term as developing an attitude. For example, there is product a and product b and because of the belief mechanisms, because of the attitude that has developed within me regarding product a which is negative in nature, I always prefer anything that is not a.

Now, as a designer it is important for us that we must take cognizance of the issues, the barriers, the frustrations; if you remember we discussed about frustrations in our last module. Frustrations, our pain points that affect the forming of this belief, this forming of this attitude which can influence product adoption.

If we understand this, if we are able to define the specific characters, the specific factors, variables or cues that influence this negatively, we probably will be in a in a position to address the issue and make a change that would ensure that the product that we are designing would be adopted and would be adopted with a higher degree of satisfaction right.

And it is therefore, important for us that we realize the role of cognition, the extent of cognitive processes that influences belief and attitude of our customers or users.

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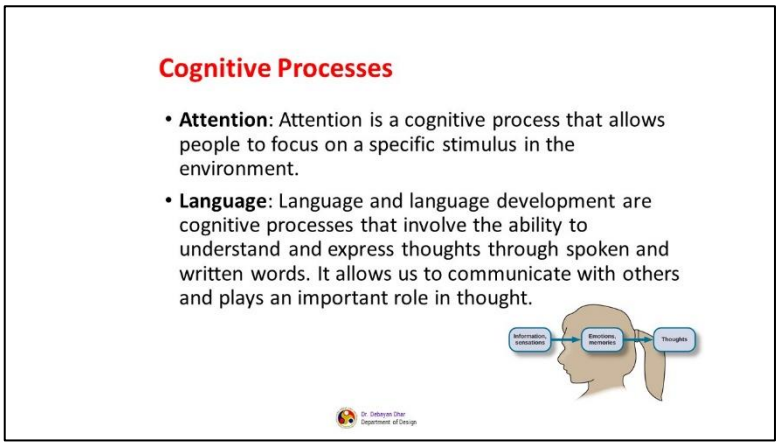

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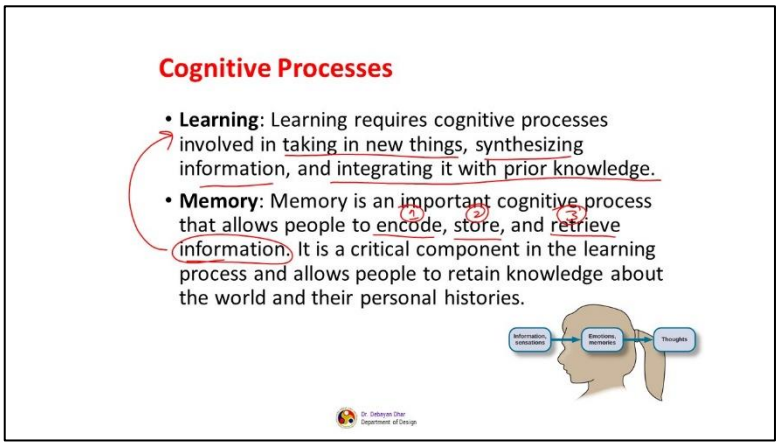

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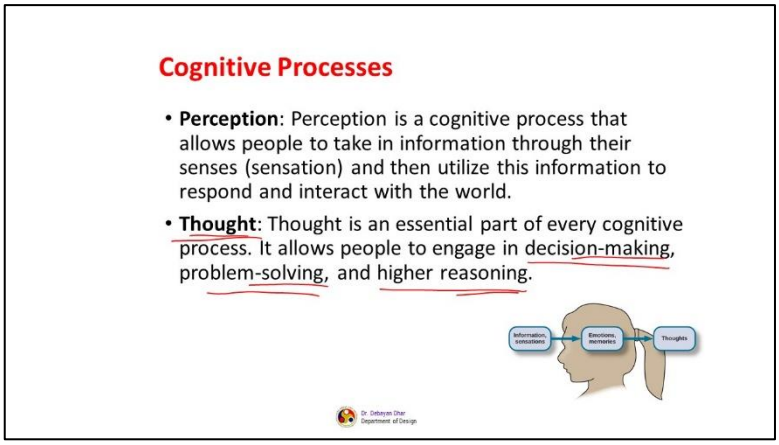

Now, having known about cognition, let us understand the processes that constitute cognitive processes. Attention, language, learning, memory, perception, thought, are few of the cognitive processes that we will be discussing now.

Attention is a cognitive process that allows people to focus on a specific stimulus in the environment. Language and language development are cognitive processes that involve the ability to understand and express thoughts through spoken and written words. It allows us to communicate with others and plays an important role in thought. Understand the situation; when we talk about attention. We are talking about the factors where or the design cues where our users are going to concentrate or the factors that are going to attract the attention of our users.

Now, if this engagement, the engagement where they are attentive to a particular design feature leads to extreme experiences and if it is negative then it will have an effect on the continuing of the usage of the product ok. So, therefore, it is important that we must realize how attentive the user is and which are the factors on which the attention is being influenced or the attention is being influenced by.

And, one of the techniques through which we understand this is by eye movement recorders. We understand where my users are focusing, where they are gazing, which are the instances that is influencing him and how his eyes is navigating from one design cue or one design variable to the other; because all these factors has an important role on the cognitive load that we are going to discuss later.

Similarly, language, language development is an act of cognitive processes because it is through acquisition of information and maintaining that information, processing them and creation of the knowledge that you learned language. And it therefore, and it then allows the person to communicate effectively with other. These are all part of cognitive processes.

Learning: learning is an important a major, major function of our cognitive processes. Learning requires cognitive processes involved in taking in new things, synthesizing information and integrating it with prior knowledge. See, the act is very clear here, you are taking in new things, synthesizing information and integrating with prior knowledge; then only learning happens.

So, learning does not happen in exclusion of prior knowledge, it happens in in a context where there are past experiences being recorded, being stored in your brain and new information is acquired.

These are analyzed, important chunks of information are extracted, pieces of information are extracted that is what we call a synthesis. Some amount of major pieces of information are grouped together, related with the past information that we have that is defined by our past experience or prior knowledge and thereby helping us to learn a new piece of information or it can be an activity.

So that means, design of particular activities, the way you design your activities, the way information is structured, presented and ordered can have a role. And, this role can influence the way information is acquired, processed and related with past experience. As

a designer it is therefore, important that you must focus on how your user would learn a new activity or a new situation, if he or she has to perform that through your product.

And, specifically we focus on learning when we are designing for novice customers or novice users. If you remember, in our past modules, we talked about the differentiation between a novice user, an intermediate user and an expert user.

Then comes memory; so, memory is an important cognitive process and it allows people to encode; see these are the functions to encode, store and retrieve information. So, first it is encoded, then it is stored and later it is retrieved and it is a critical component in the learning process; so, each one. So, memory has a very significant role in the learning process. It is a critical component in the learning process and allows people to retain knowledge about the world and their personal histories ok.

If you are interested to know how this encoding happens, you can take read papers or take detailed courses in cognitive science that would allow you to understand how this information are encode, stored and later retrieved if required, if situation demands. And, this significantly influences the learning process, the learning activity of your user.

The next cognitive process is perception. You would see that many a time we talk about we use this word perception; how do you perceive this situation, what do you perceive out of this instance, so on and so forth. So, perception is a cognitive process that allows people to take in information through their senses, we talk about the five senses.

So, these through these senses are the receptors through which your body extract information from your surroundings and then utilize this information to respond and interact to the world. So, sense making; this information has to be extracted from your senses and then sense making has to need to happen. You need to make sense of the information that has been extracted.

Unless and until sense making happens, comprehension of the situation happens, you would not be able to react to the stimuli or to the situation that is being demanded. So, response and interaction to the world depends on your ability to perceive the situation and this perception depends on the activities that we have discussed.

Thought: so thought is an essential part of every cognitive process. It allows people to engage in decision making. What we call as a thought is essentially an act of decision-making, problem-solving and higher reasoning.

So, now, all information has been acquired through senses, assimilated, synthesized, new pieces of information are formed, they are being related with our memory, past experiences, all this are happening perception happened. And, from all these things we now move on to a situation where we are able to take a decision and we are able to sense the situation in a way that we can solve a problem.

And so, problem solving is considered a higher reasoning skill which constitutes all these cognitive processes that we have discussed.

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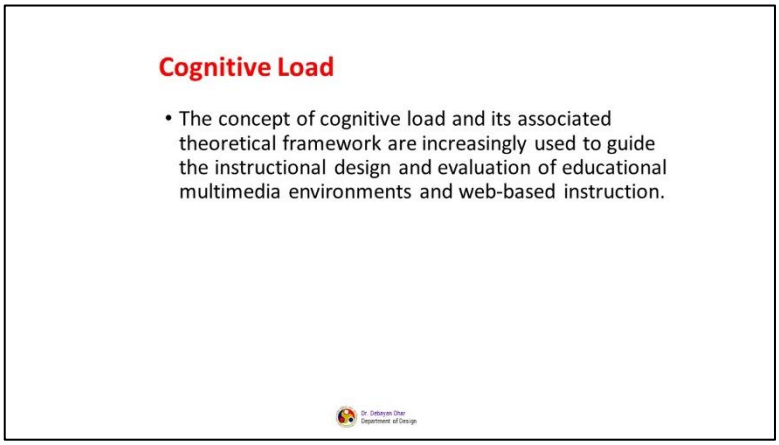

We would now discuss on cognitive load. You know every time you might have heard designers or people from psychological sciences talk about this term cognitive load.

So, the concept of cognitive load and its associated theoretical framework have been increasingly being used to guide the instructional design. So, design of instructional content; it is it actually started from those research activities related to instruction and evaluation of educational multimedia environments and web-based instructions.

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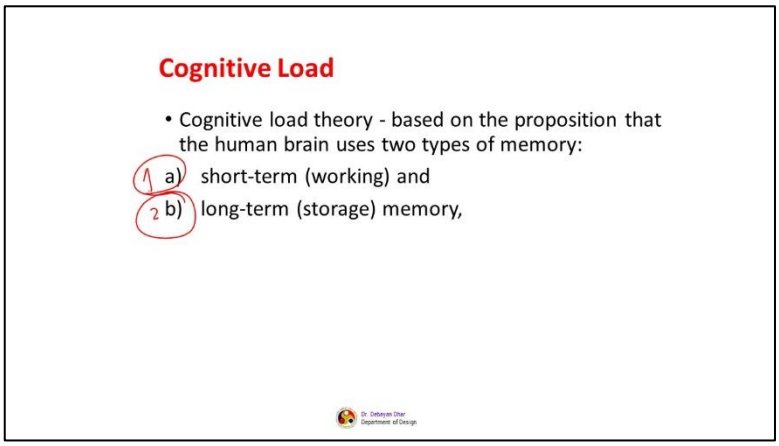

So, so we refer to the theory through which we understand about cognitive load as cognitive load theory which is based on the proposition that the human brain uses two types of memory and these are the short-term memory and the long-term memory. The short-term memory is often called as the working memory, while the long-term memory is often called as the storage memory. Let us understand details about short term and long-term memory.

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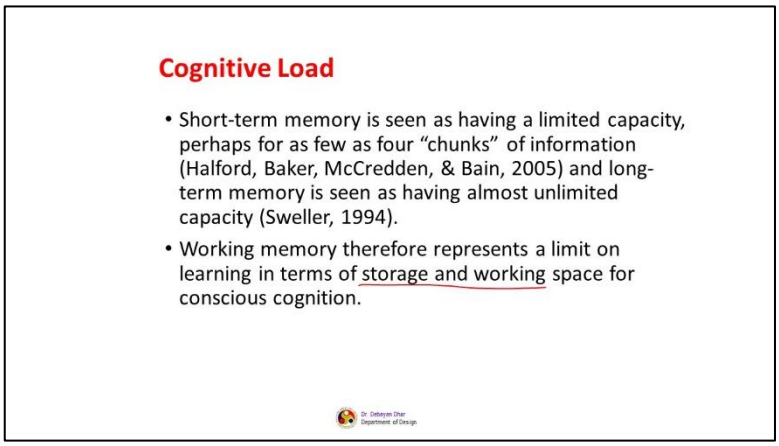

Now, short term memory is often seen as having a limited capacity. The word itself should tell you that it is short; that means, it has a limited capacity. And it has perhaps a few as four "chunks" of information according to Halford, Baker, McCredden and Bain in 2005. And, long term memory is seen as having almost unlimited capacity. So, your brain, the information processing system what we understand is that it has two segments to it. One

is the short term which has a very limited capacity, the other one is the long term which has almost unlimited capacity.

So, working memory therefore, working memory means we are referring to short term memory. So, working memory therefore, represents a limit on learning in terms of storage and working space. Because, its capacity is limited, limited to few chunks only, there is a limit to on learning if we are using the short-term memory or the working memory and for and that is specifically related to conscious cognition, current activities.

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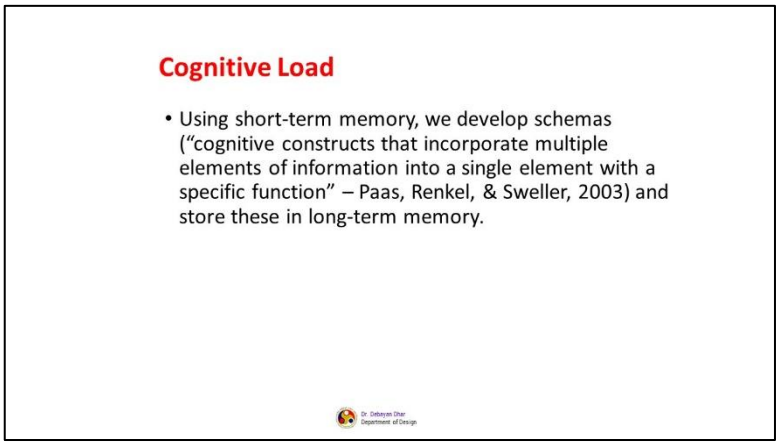

Now, short term memory, using short term memory what we do is we develop schemas; now this is important for us to understand. And what are schemas? Schemas are cognitive constructs that incorporate multiple elements of information into a single element with a specific function and these specific function constructs are defined by the person in terms of his past experience. So, these are in a meaningful way information are pieced together, are clubbed together which we call as schemas and these get stored in long term memory right.

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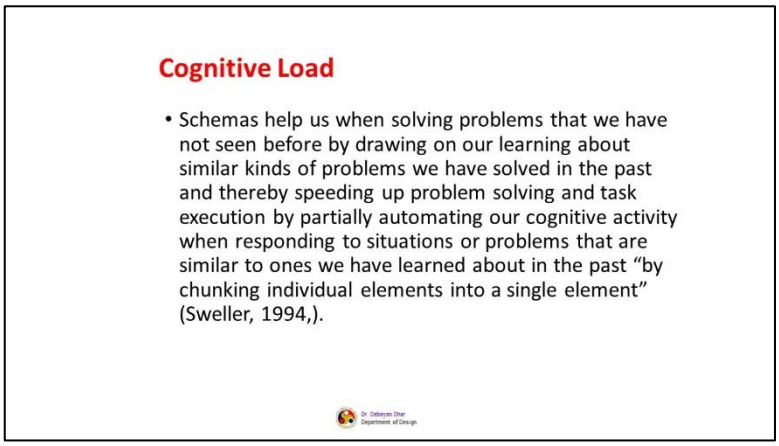

So, schemas that are formed that are formed in short term memory or the working memory get stored in the long-term memory for future retrieval.

So, schemes help us when solving problems that we have not seen before by drawing on our learning about similar kinds of problems we have solved in the past and thereby speeding up problem solving and task execution by partially automating our cognitive activity when responding to situations or problems that are similar to ones we have learned about in the past. And by chunking individual elements into single element and that is what Sweller has told in 1994.

So, the role of schemas as you can understand from what Sweller has said is that it speeds up the process of retrieval, recognition, of a new activity based on information that is stored that can represent past similar activities that the person has performed right.

So, whenever a new activity is given to your user, he can only make sense of that activity is schemas has been formed earlier about such similar activities and it helps him to speed up the activity which currently is in in front of him, that is the role of schemas. If these schemas are insufficiently formed then he may use different way of interacting the product or the activity and it might take longer for the person to finish the task, if the task is alien to him.

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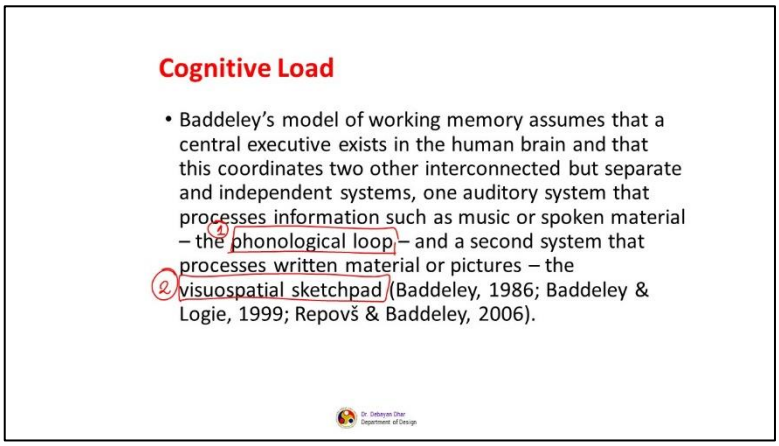

So, Baddeley in 1986 suggested a model of working memory and that assumes that a central executive exists in the human brain. So, Baddeley says that there is a central executive that exists in the human brain and that this coordinates two other interconnected, but separate and independent systems. And these systems are: one is the auditory system that processes information such as music, spoken material and this auditory system is called as the phonological loop.

So, the central the central executive system consists of two independent and separate systems and these are 1, the phonological loop and the second system that processes written material or pictures are called is called as the visuospatial sketchpad.

So, Baddeley proposed this structure in 1986 followed by his seminal works in 1990, 1999 and 2006, where he talks about the central executive system of the human brain which has two separate and independent uh systems and, these are the phonological loop and the visuospatial sketchpad.

Now, understand how these two are different. So, the phonological loop is something that is related with the auditory pieces of information. So, whatever you hear; it can be music, it can be spoken words are being extracted using the phonological loop system, while the visuospatial sketchpad are related to what you see and written; that means, pictures, texts that are written are being processed through that channel.

So, you have these two channels; the phonological loop and the visuospatial sketchpad. Now, you understand when an interface is presented in front of an user; you know that how the user is going to process the system. He is going to use his phonological loop to

extract the auditory pieces of information while his ability to see and the pictures and the texts and read through them will be used as the sensors or for the visuospatial sketchpad to extract the material or the pictures, the other part of the system.

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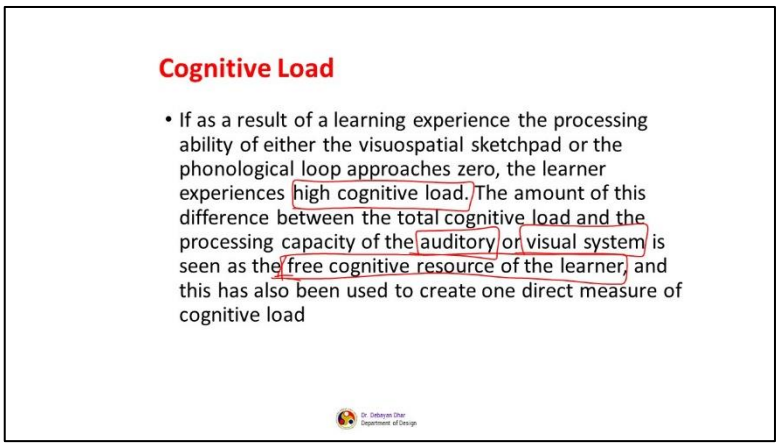

Now, we must understand how these two interact and help us to understand the situation. If as a result of a learning experience, the processing ability of either the visuospatial sketchpad or the phonological loop approaches zero. That means, say for example, while an activity is performed the amount of load, the amount of information that these systems are processing if these approaches to zero, the learner experiences higher cognitive load.

So, the channels are already loaded with huge information and if you are putting in more information there is a breakdown, there is a situation where the processes tend to become slower, his responses to the situation become slower, the person experiences higher cognitive load. And therefore, it affects his entire situation of completion of the activity.

So, the amount of this difference between the total cognitive load and the processing capacity of the auditory or the visual system. So, the phonological loop that we are referring to is part of the auditory system, while the visuospatial sketchpad that we have been referring to is part of the visual system of the central executive of the human brain that we are talking about.

So now, the amount of this difference between the total cognitive load and the processing capacity of the auditory or the visual system is seen as the free cognitive resource of the learner. Because, this is what would be utilized by the designers or the design of the system in order to process and help him complete his activity.

And this has also been used to create one direct measure of cognitive load. So, whenever experiments are conducted in order to understand how much a particular activity has cognitive load, this difference in these two factors; the high cognitive load and the processing capacity of the auditory and visual system is also being used as a direct measure of the cognitive load.

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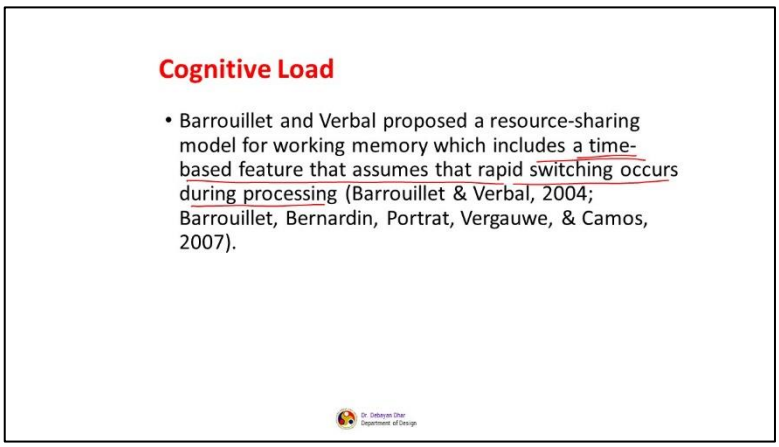

Now, Barrouillet and Verbal in 2004 proposed a resource sharing model for working memory. So, previously we talked about the Baddeley's model and now we are talking about the Barrouillet and Verbal's model which they proposed a resource sharing model of for working memory. So, working memory means we are focusing on the short-term memory and this includes a time-based feature.

So, for the first time we see a time-based feature that assumes that rapid switching occurs between occurs during the processes. So, switching of activities between these two uh the audio, visual systems happen during a processing, when the processing goes on and the user is performing an activity. And, this is time dependent, it is a time-based feature.

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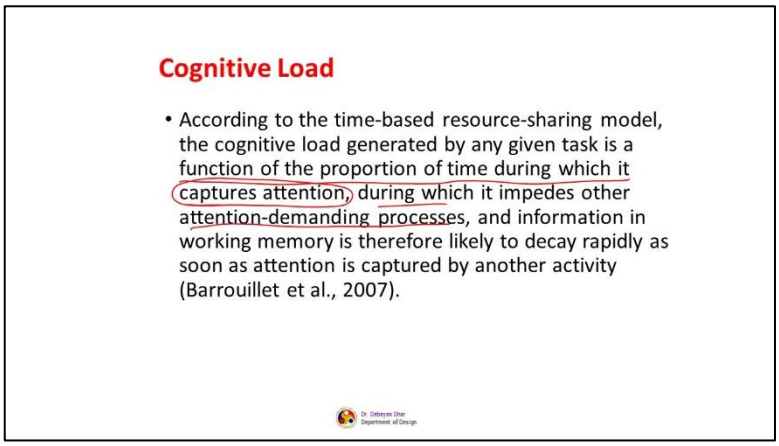

So, according to this time-based resource sharing model, the cognitive load generated by any given task is a function. So, it is a function of the proportion of time during which it captures attention. So, see you might think that why we are discussing these things in detail because, it is important for us to know the various activities through which attention is captured.

So, this time-based sharing that we are discussing is a function of the amount of time attention is captured. And therefore, it is important for the designers to ensure the design cues are being inserted engineered into the product in such a way that it captures attention, during which it impedes other attention demanding processes and information in working memory is therefore, likely to decay rapidly as soon as attention is captured by another activity.

Now, what does it tell you? It tells you about the activity that if you design an interface, if you design a structure which have multiple attention-based cues, cues which will attract attention from your users then it will also affect cognitive load. So, therefore, the design of the information structure, the information hierarchy, the cues, the factors through which you would like to attract attention of the of your users need to be designed in a way that it does not affect their cognitive load.

And how do you do it? The question is ok these are all theoretical aspects, how do we do it? You can do it, if you ensure a eye movement tracking recording study to ensure and to identify the features that that is that is ensuring the attention of your user, that would

highlight where your user is getting attentive, on which are the cues, on which feature the attention is being more in comparison to the other.

This would allow the designer to design the feature in a way which is optimized and would ensure higher effectiveness; lesser cognitive load improving the performance of the activity.

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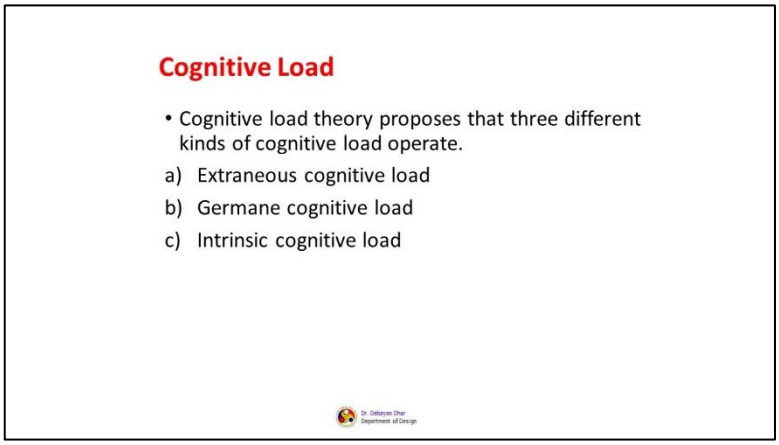

So, cognitive load theory that we have been discussing proposes that there are three different kinds of cognitive load that operate in an human brain. And, these three types of cognitive loads are extraneous cognitive load, germane cognitive load and intrinsic cognitive load.

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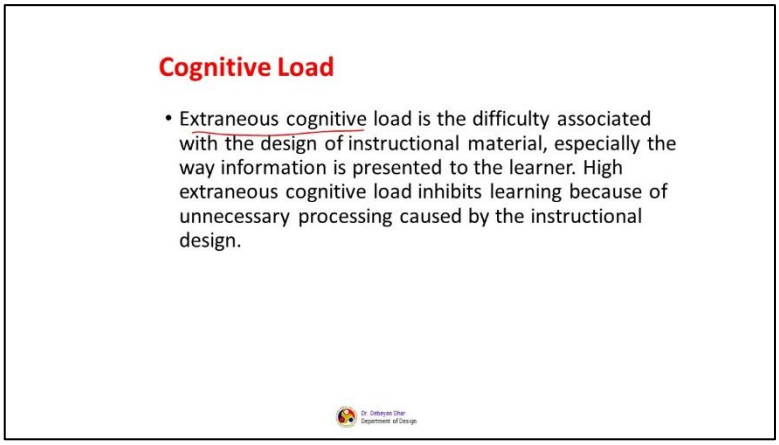

Let us see what are they. So, extraneous cognitive load is the difficulty associated with the design of instructional material, especially the way information is presented to the learner.

So, high extraneous cognitive load inhibits learning because of unnecessary processing caused by the instructional design.

So, see initially while discussing cognition and cognitive processes, we said that the entire concept of cognitive load and load theory has been based out of instructional design. So, therefore, it always talks about instructional content, but we can always visualize this cognitive load extraneous cognitive load from the perspective of the interface that we are designing or the product that we are going to design.

So, extraneous cognitive load which we are referring here is subjugated to what you are presenting in the screen. If there is too much information in the screen, if the information is cluttered in your screen; it will result in extraneous cognitive load. It will inhibit learning, it will ensure that the learning curve of the user is long, is high and that will reflect on his performance. And therefore, it is important that just an appropriate information needs to be presented to the user through the interface.

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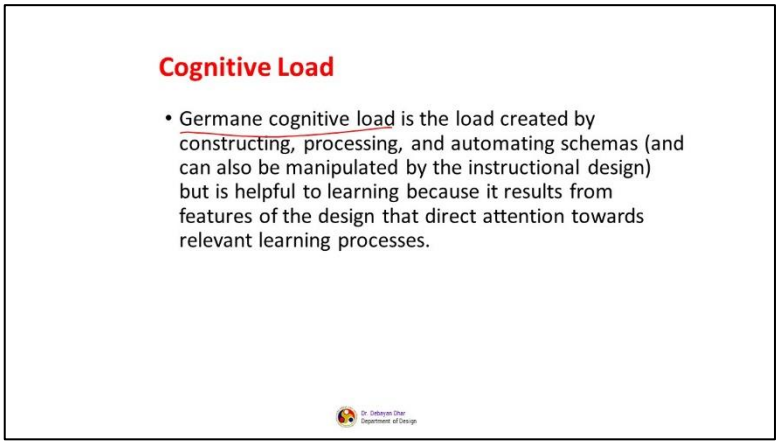

The next one is the germane cognitive load. So, the germane cognitive load is the load created by constructing, processing and automating schemas, and can also be manipulated by the instructional design. So, it is helpful to learning because it results from features of the design that direct attention towards relevant learning processes.

So, the focus of our design activity is to ensure that instead of extraneous work cognitive load, our designs should induce germane cognitive load; that means, that the activity of construction, processing and automating the schemas are being ensured. And, this would

lead to higher perception about the activity that you have planned through your interface or the product.

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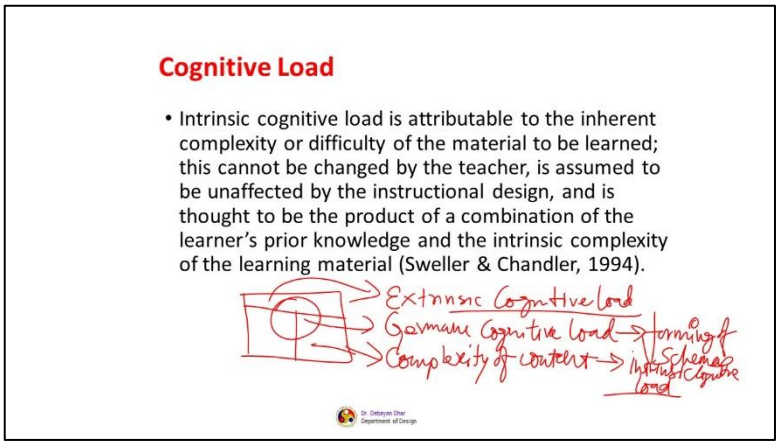

The third one is the intrinsic cognitive load. Now, intrinsic cognitive load is attributable to the inherent complexity or difficulty of the material to be learned and this cannot be changed by the teacher. It is assumed to be unaffected by the instructional design and is thought to be to be the product of a combination of the learner's prior knowledge and the intrinsic complexity of the learning material.

So, see out of the three cognitive loads that we have discussed that is the extraneous cognitive load, the germane cognitive load, the intrinsic cognitive load; the intrinsic cognitive load is something which is related to the intrinsic complexity of the content.

For example, this module we are discussing about cognitive load, while the germane cognitive load can be asserted to the way I am presenting the information to you, the way this slides are being presented, the way the entire narration of the lecture is going on. The germane cognitive load can be asserted to the way the discussion is also happening and your mental processes that are going on in order to form those schemas which attributes in learning.

But the intrinsic cognitive load is attributed to the complexity of the content in itself. So, content means in educational content you know there is a lecture on a particular subject. So, the complexity of that subject itself attributes this intrinsic load.

And this is irrespective of how the content is being delivered by the instructor or by the interface that these loads get generated. So, in many a time you would see, there are many subjects that say what are the prerequisite of this subject and if that prerequisite is not made, it will affect what? It will affect your intrinsic cognitive load because past experience, past information is not there that would support in reducing this intrinsic cognitive load that is related to the complexity of the content ok.

So, these are the three types of cognitive load that are associated to the activities that we are referring to. In short what we can understand, that as we design these interfaces the design of the interfaces is something that we should be careful of and this because this will attribute the extrinsic cognitive load. Now, the design of this will also ensure that the germane cognitive load is affected and this is a good one because, it helps in forming of schemas.

But, this content it is not the visual design or the visible content, the complexity of the content is what attributes the intrinsic cognitive load right. So, as designers we must be careful first of all to ensure that extrinsic cognitive load does not affect our product adoption and the activity of processing of information, while our user is performing an activity through our interface or through our product.

And we also very carefully design the act the act of navigation, the act of problem solving in such a way that it induces germane cognitive load so, the schemas are formed. And, these schemas would help him in the future for completing the activities effortlessly.

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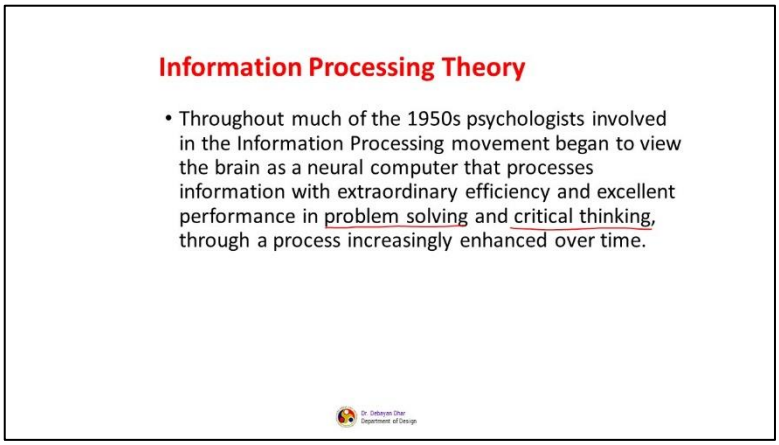

We will now discuss about information processing theory. Now, information processing theory throughout much of 1950s psychologists involved in the Information Processing movement, they began to view the brain as a neural computer.

A computer that has neural structure where each part is related to each part, it is a neural computer and that processes information with extraordinary efficiency and excellent performance in problem solving and critical thinking. See every time the focus is on problem solving and critical thinking, through a process increasingly enhanced over time. So, time is a major function here.

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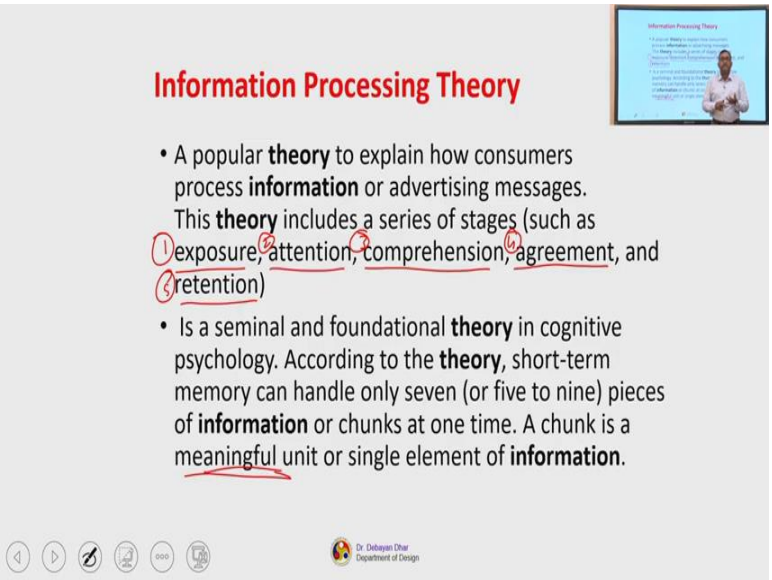

So, a popular theory was being contributed upon during that time to explain how consumers process information or advertising messages, whatever content is being delivered to them and this theory includes a series of stages such as. And these stages are what? Exposure, attention, comprehension, agreement and retention; look at these stages you know, this is not in hierarchy though exposure, attention, comprehension, agreement and retention.

It is a seminal and a foundational theory in cognitive psychology. According to the theory, short term memory can handle only 7, some people say 4 or 5 to 9 pieces of information. These pieces of information are called chunks ok, the one that we have referred to chunking, the activity of extracting these chunks. So, chunk is a meaningful unit, see the

words it is a meaningful unit and this meaning is being associated the by the person who is processing this.

It is a meaningful unit or a single element of information. Now, we cannot define what is signal uh what is signal, what is multiple or what is meaningful. This is being defined by the person who is processing this information. And therefore, for a chunk can be defined exclusively by the person who is using this information and creating those pieces of information.

The important aspect here is that this theory focuses on the activity of the processes like exposure. Now, exposure means what? Consider the situation that you have designed a product and the product is being given to a user that itself is called the exposure. So, a new product that is being exposed to the user to interact it or the user has accessed the product in order to accomplish a particular goal or a task; this is the first stage of exposure that is being happening. And, while this is happening the focus is to get his attention.

But, remember if the information presented in such a way that there are too many components in which the user is getting attentive, it will lead to cognitive load higher cognitive load. Because, remember the theory of phonological loop and the visuospatial sketchpad. The focus is to ensure that these are balanced. There are features which extracts or gets attention of your user, but then there should not be too many features that ensures that to if the users get too many attentive features, it would increase their cognitive load.

And, these design features can be from both these aspects; the visual systems or the audio channels, both these channels can have these features. Comprehension happens, comprehension means the act of assimilation of information synthesis being related to past experiences and then perception, the act of perception. And, once it is happening then agreement happens ok, there is this process of agreement whether you accept or you reject.

And based on this retention happens, stored into schemas for long term usage, stored as schemas for long term usage. So, the information processing theory focuses on these cognitive processes of exposure, attention, comprehension, agreement and retention.

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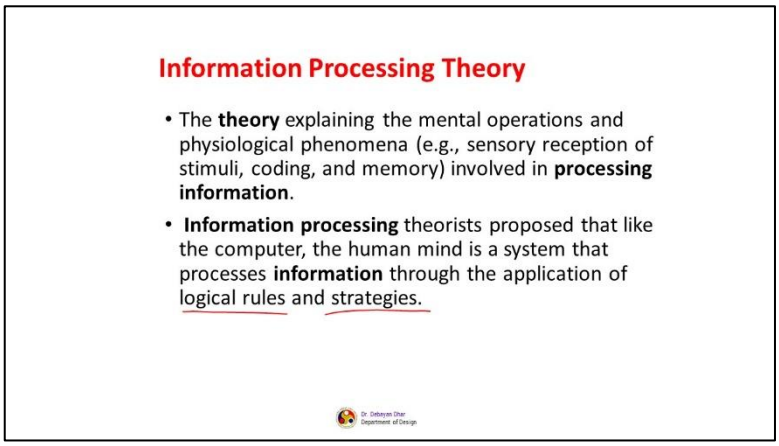

So, the theory explaining the mental operations and physiological phenomena. This information processing theory, it explains the mental operations and the physiological phenomena.

The sensory reception of stimuli coding and memory through the senses when the stimuli is presented through the senses, these various channels from the visual of the auditory channels these information are extracted, they are been coded, formed into schemas and stored into the long term memory for future retrieval. And, these are involved in the activity what we call as processing information. This is what we call as processing information.

Now, information processing theorists proposed that like the computer, the human mind is a system that processes information through the application of logical rules and strategies.

So, this activity that we are talking about, the activities of analyzing, synthesizing, extracting information through the channels and then relating with their past experiences, forming these schemas and then whether agreement happens or not, whether it is being stored as for long time for long time storage for future retrieval or not.

All these things happen because of some logical rules and strategies that are enshrined into the brain by that person. So, all this information processing is a function of the logical rules and strategies that are imbibed into the person internally.

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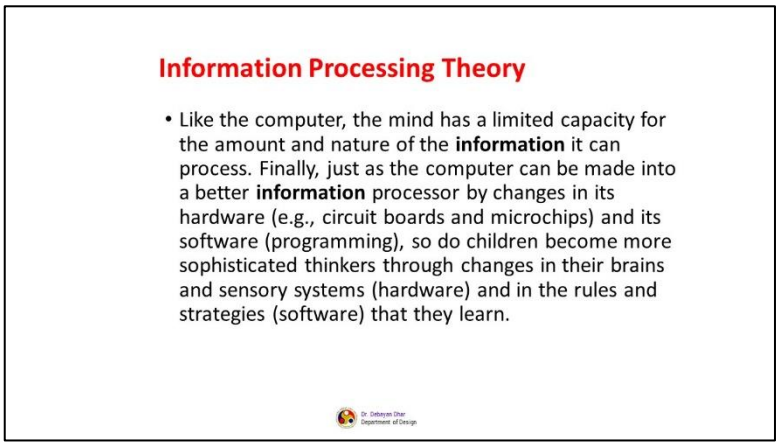

So, like the computer, the mind has a limited capacity for the amount for the amount and nature of information it can process. So, finally, just as the computer can be made into a better information processor by changing its hardware like circuit boards or microchips so on and so forth, its software programming can also be changed.

So do, you know it is therefore, being understood by the information processing theory. So, so do, we can have children become more sophisticated thinkers through changes in their brains and sensory systems which are the hardware and, in the rules, and strategies that they learn.

So, therefore, you would see many a time in schools there are multiple ways through which learning are being or the pedagogical activities are being designed. Multiple strategies are used that will ensure that the learning is affected, the learning is influenced and it is influenced to ensure to have a higher efficiency.

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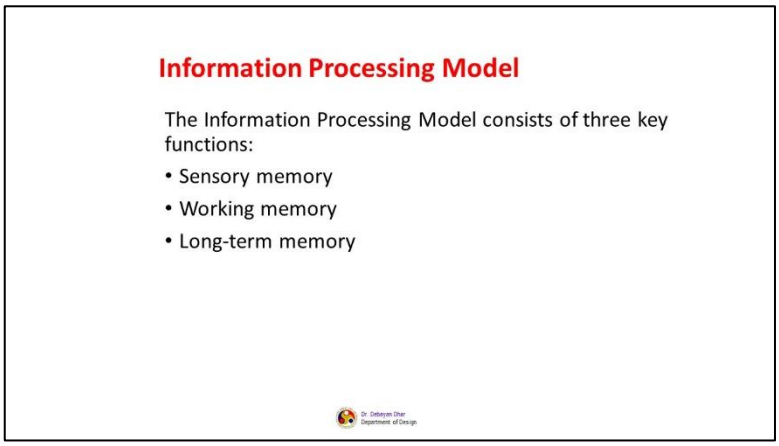

So, the information processing model consists of three key functions and these functions are the sensory memory, the working memory and the long term memory. So, the three key functions of the information processing model are the sensory memory, the working memory and the long term memory. Understand the working memory is a short term memory, this long term memory is the which has the ultimate capacity and it its capacity is actually unknown, infinity. It can store any amount of information.

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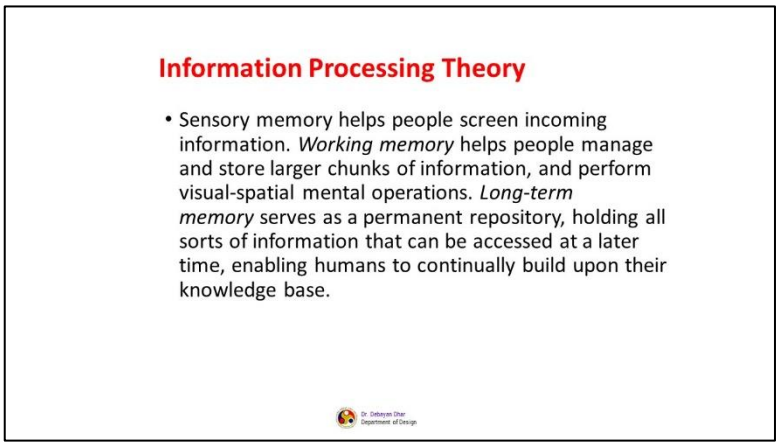

So, sensory memory helps people screen incoming information, its ability is to screen the in incoming information that we are collecting from this stimulus or the environment that is in which we are being exposed to. Working memory helps people manage and store larger chunks of information and perform visuospatial mental operations. Long term memory serves as a permanent repository, holding all sorts of information that can be accessed at a later time, enabling humans to continually build upon their knowledge base.

So, when we say that store larger chunks, it means larger chunks from the perspective of that theory that it can hold only 5 to 9 or 4 chunks of information which are being used to form schemas. And perform these visuospatial mental operations. Because, you remember we discussed that we have the central executive has two channels through which it can extract information; the auditory channel and the visual channel right.

It is only that these schemas get stored in the long-term memory which has infinite capacity. So, in terms of capacity the long-term memory has a infinite capacity, but the working memory does not have a infinite capacity, it is a small capacity. But, the long-term memory has an infinite capacity, while the working memory can process larger chunks of information, this chunks pieces can be more. And, these number of pieces can be defined by the person as I said.

The chunks are meaningful way of information that they are processing. So, it can be larger in nature, but the capacity to store to store this information is only a function of the long-term memory.

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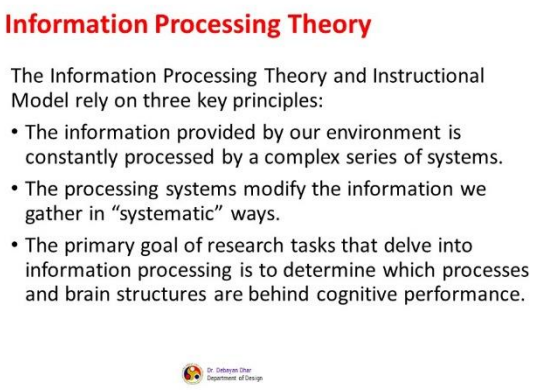

So, finally, what we understand from this is the information processing theory and instructional model rely on the three key principles. And, these are the information provided by our environment is constantly processed by a complex series of systems right. And, the processing systems modify the information we gather in systematic ways; logical rules, it is not random or without any following any rules. There are systematic and logical rules.

And, the primary goal of research tasks that delve into information processing is to determine which processes and brain structures are behind cognitive performance right. So, from cognitive load we are now talking about cognitive performance, because remember that the sole purpose of our design activity is to ensure that meaningful interactions are happening. By meaningful we mean interactions that aid the user in reaching their goal.

Many a time we understand that ok this product is new the user might feel, no no remember the user knows the goal. When you are going to a particular website to book a ticket, you are absolutely sure about your end your end goal and your end goal is that you want to book a ticket, a flight ticket. What you are using is just a medium, it just a product that would ensure that you book your tickets.

And, now this medium which is just a display of information for the user from the perspective of the interface, if it is not designed, keeping in view the information processing theory where we know the role of extraneous load, the role of germane load, the role of intrinsic load and also the role of the two channels of the central executive which are the phonological loop and the visuospatial sketchpad which is nothing, but the auditory channel and the visual channel. We would not be able to design an interface that aid these activities of the user to reach the goal.

And why this is important for us? Remember, this is a market driven economy, if your product does not support user to attain their goal effectively, efficiently, with less barriers, does not frustrate them because of these issues cognitive load is a major issue, because of which people get frustrated; you will lose this challenge. The challenge is to capture users in the market, as many users and to make them loyal customers.

You will lose this competition, your rivals, your competitors would ensure that they have a good onboarding experience and thereby they will have a loyal customer base, who would again come and use their system continuously. So, nothing happens during the interaction that are unsystematic in nature. The eye, the ways through which your user is processing the information happens in a very systematic and logical hierarchical way.

Ensure how much attentive features you need to provide in your interface, how many would be a noise. And, these understandings would lead you to design an effective interface for the requirement of your users.