Teaching and Learning in General Programs (TALG)
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Lecture – 08
Cognitive Levels

Greetings and welcome to unit 8 of module 1 of TALG.

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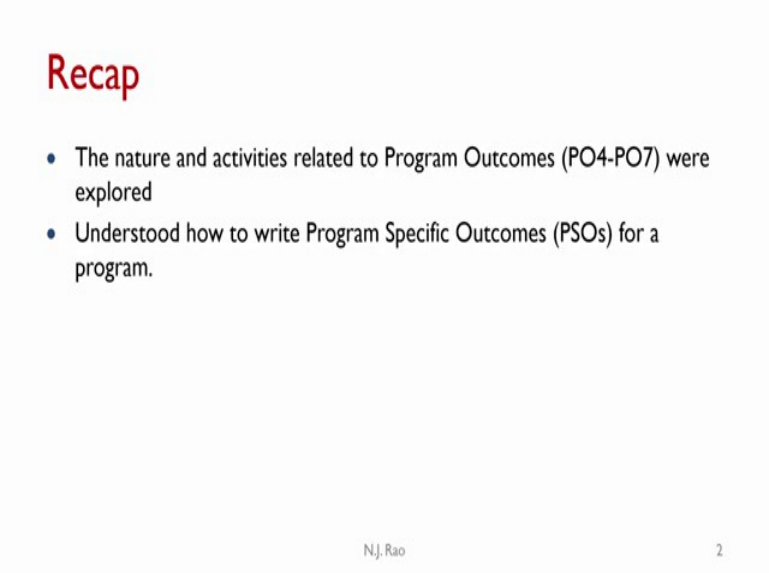

In earlier unit U-7 we looked at the nature of activities related to program outcomes PO4 to PO7 and also understood how to write program specific outcomes. We have now addressed outcomes are at two levels; one is a program level the other one is at specific program level.

Now, we need to look at course level that now requires a little more detail; we need to have a kind of a framework or a terminology using which we should be able to write outcomes that are at the course level.

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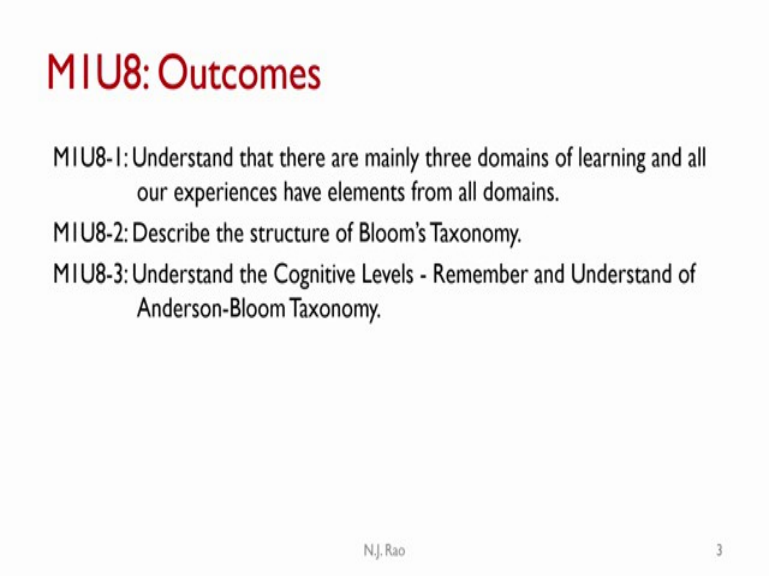

And to their extent this unit aims at understanding that there are mainly three domains of learning and all our experiences have elements from all domains, then we describe the structure of Bloom's Taxonomy; it is one particular taxonomy of learning outcomes. And, understand the cognitive levels especially 'remember' and 'understand' of Anderson-Bloom Taxonomy; these are the expected outcomes of this unit.

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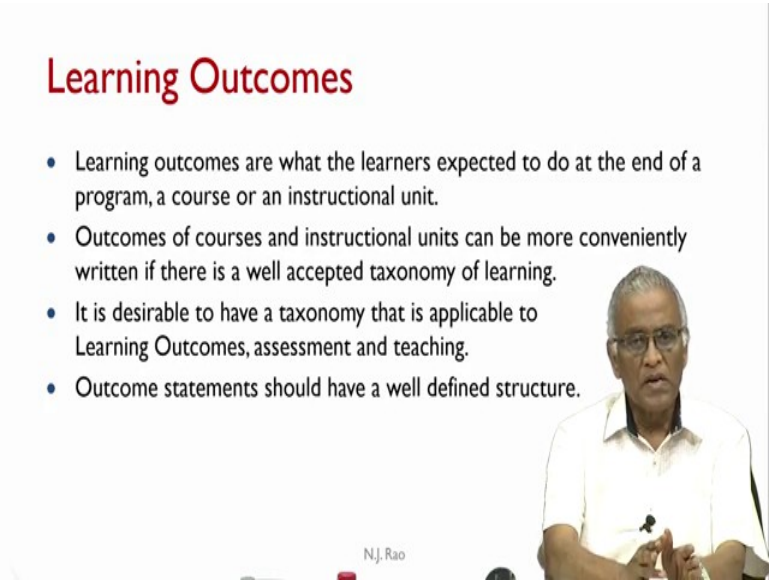

Learning outcomes; please remember it is a more generic word; it can apply at all levels. Learning outcomes are what the learners are expected to do at the end of a program or a

course or an instructional unit. In some institutions for all the three, people use the same - learning outcomes, whereas we are now trying to, at the program level we call them as program outcomes, program specific outcomes and course level we call them as course outcomes and at an instructional unit level we can use some other word like word ‘competency’. So, one can use different words to represent what the student should be able to do at different levels.

So, outcomes of courses and instructional unit can be more conveniently written if there is a well accepted taxonomy of learning instead of intuitively writing. When you do that different stakeholders; that means, different students or different stakeholders can have different understanding of what that statement is. If you follow a well accepted taxonomy, then it will be easy for all the students to understand it clearly.

The other one is in any course you not only write outcomes, you identify the outcomes; that means what the student should be able to do. But you also need to measure; whether the student has attained those outcomes through assessment. And, then the teacher will have to facilitate the students to attain these outcomes. So, all the 3-dimensions are equally important, that is the outcomes, assessment and teaching.

So, a taxonomy that is applicable at all levels, that is to write learning outcomes, assessment and teaching will be very desirable. And if they have well defined structure, it is convenient for all the activities related to teaching and learning. A commonly accepted structure of the statements will greatly help.

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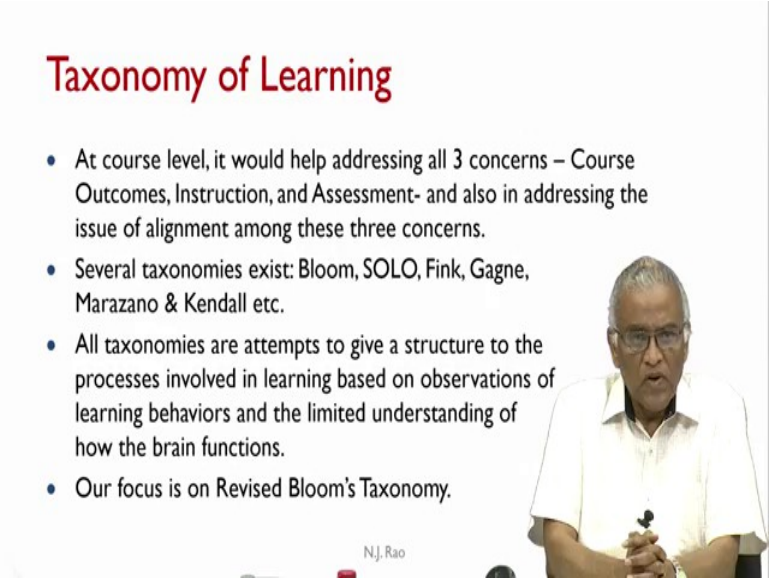

Now, that is where we come to taxonomy of learning. In any course again we repeat this. There are three concerns: one is course outcomes, the other is instruction and the third one is assessment. So, at all levels there should be an alignment between these three concerns and that is a reason why we need taxonomy. Now, taxonomy of learning, assessment and teaching is something people have been attempting for the past 60 – 70 years. So, to their extent it is well researched and yet we are not necessarily anywhere near the final conclusion and because several people have attempted, there is a whole bunch of taxonomies in the literature.

Like here Bloom's taxonomy, SOLO taxonomy, Fink's taxonomy, Gagne taxonomy, Marazano and Kendall these are some of the taxonomies that exist. Books have been written, people have practiced them. So, to their extent all of them are useful, acceptable to a certain level and you may have preferences for some of them. And, among all these, Bloom's taxonomy seems to be more popular in several countries including India.

You should remember all taxonomies are attempts to give a structure to the processes involved in learning. Based on observations of learning behaviors and the limited understanding how the brain functions, after all learning takes place in the brain and we have limited understanding how the brain functions. So, we are trying to somehow classify the functioning of the brain in one sense. To that extent any taxonomy as given now will have some limitations. We will talk about those limitations. So, to that extent

and no taxonomy is free of ambiguities, but because of that it should not be reason to reject any taxonomy.

Some teachers good teachers also, they refuse to accept any taxonomy at all because they think that it is like once you have a taxonomy you are somehow straitjacketing the whole teaching learning process. Anyway it is unfortunate to have such a strong feeling against using any taxonomy. Our focus here is revised Bloom's taxonomy. There are always issues where because of the nature of the activity involved. There will be ambiguities. So, one has to live with ambiguities when you are dealing with where the functioning of the you sre dependent on understanding the functioning of the brain.

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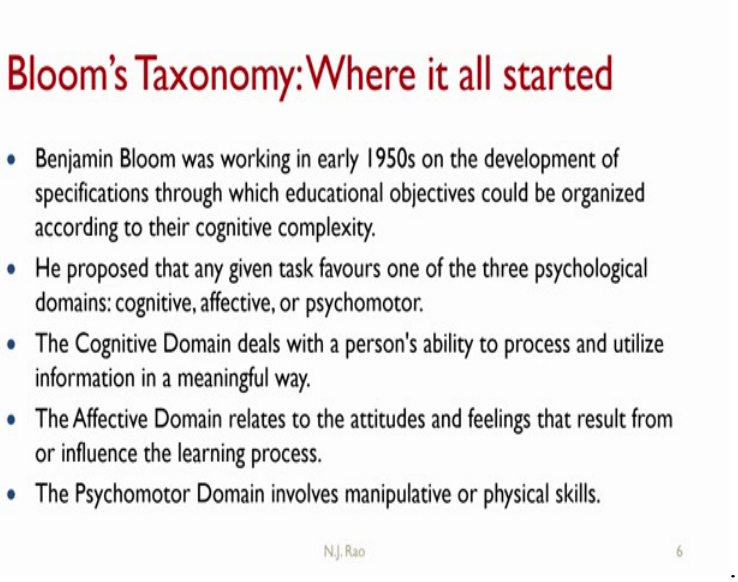

Of course, there were taxonomies prior to Bloom as well. As far as Bloom's taxonomy is concerned, Benjamin Bloom was working in early 1950s at the University of Chicago on the development of specifications through which educational objectives could be organized according to their cognitive complexity.

Note that we are talking of educational objectives and not learning outcomes. Actually both are the same but the word used at the time is educational objectives. He proposed that any given task favors one of the three psychological domains cognitive, affective, psychomotor. Just notice that any task favors one of the three; that means, you do not say it is exclusively focuses on one of the three. Generally, all our experiences, all the task that we perform, elements of all the three psychological domains are present.

The cognitive domain; here we are talking about three domains – cognitive, affective and psychomotor. Cognitive domain deals with the person's ability to process and utilize information in a meaningful way. That is what people seem to be understanding more now. Earlier the word used was intelligence; classifying intelligence meant we are looking at cognitive domain. And, the affective domain relates to the attitudes and feelings that result from or influence the learning process. And, the psychomotor domain involves manipulative or physical skills. These are the three domains that are involved in any activity that we perform.

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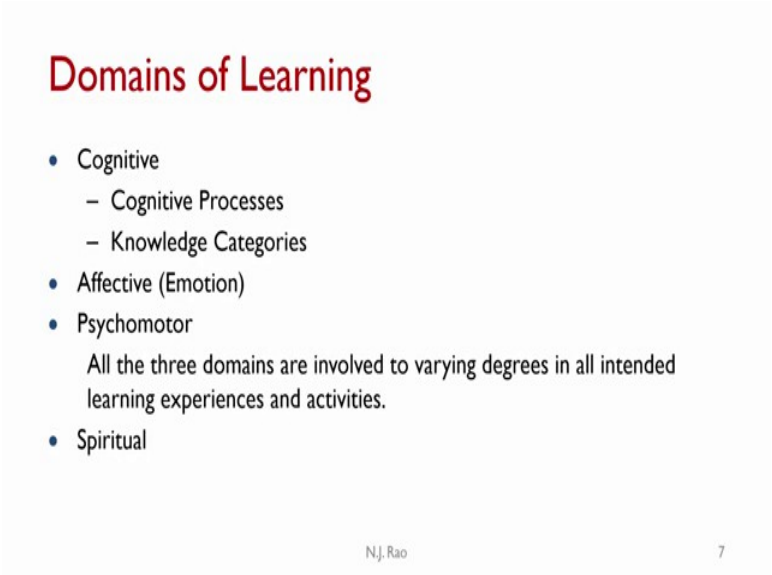

So, now summarizing that, the domains of learning, you have cognitive domain, but it is quickly realized that cognitive domain has two dimensions; one is called cognitive processes and the other one is called knowledge categories. You perform a cognitive activity that is cognitive process, one cognitive activity - simple cognitive activity is remembering, then what you are trying to remember? Some knowledge and that is the reason why you have two dimensions when you talk about cognitive domain.

Then you have affective domain which is linked with emotion and then the psychomotor domain. And, all the three domains are involved to varying degrees in all intended learning experiences and activities; if you want to complete this you can also add the spiritual domain to this as well. So, if one wants to extend you can add the spiritual domain, but we are not going to address that domain at all. We will look at these three

domains to varying degrees because we will focus mostly on cognitive domain and to a certain extent on affective and psychomotor domains.

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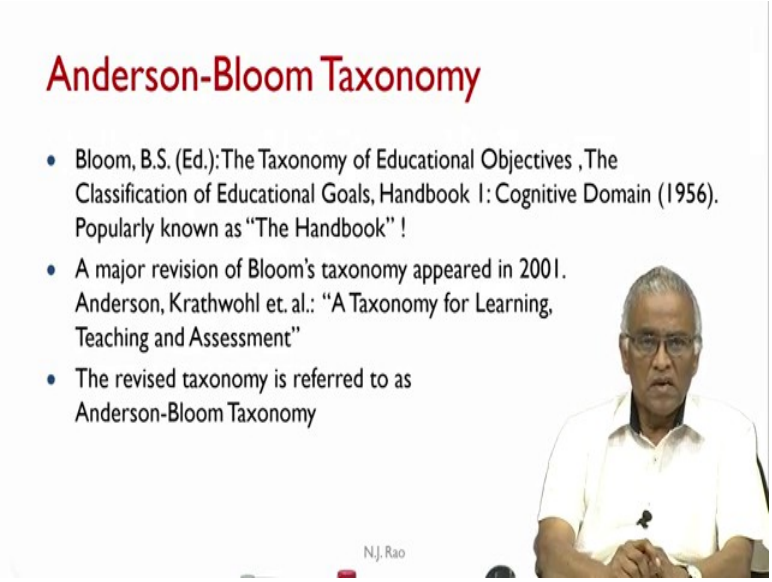

Now, the original Bloom's taxonomy was proposed; it is called Hand Book which came out in 1956 and it is now still popularly known as Handbook and incidentally this Handbook is available today at least on the internet freely. So, one can download and take a look at what was originally stated and this was in 1956. In around 2000, because people have been critiquing this for almost 40 years saying that this does not meet the particular requirement, these are the difficulties there facing and so on.

A major revision of Bloom's taxonomy appeared in year 2001 in the form of a book called Taxonomy for Learning, Teaching and Assessment, set of authors Anderson, Krathwohl and so on and this is called Anderson-Bloom taxonomy and, incidentally even this book is freely available on the internet. We suggest all teachers spend a significant amount of time, reading this particular book taxonomy for learning teaching and assessment. And, this revised taxonomy is now known as Anderson-Bloom taxonomy.

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Now, all experiences are integrated. Here are two examples where all the three domains are significantly present. If you look at it is the psychomotor domain dominant? Yes. Is the cognitive domain dominant? Certainly yes. Is the affective domain - is it dominantly present? Yes. So, these examples represent the highest levels of integration of all the three domains.

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Sometimes you have a dominantly cognitive experiences. These are representative examples I need not explain that.

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Or you can have dominantly affective experiences.

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And, you can also have dominantly psychomotor experiences; that means, if you look at that the skills involved psychomotor skills involved are the extreme versions and you can have in a particular experience at different points of time you have different domain dominating.

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For example if you are looking at an examination how the students spend time. So, the first one is dominantly cognitive and as you approach the end of the examination it could become very very psychomotor as well.

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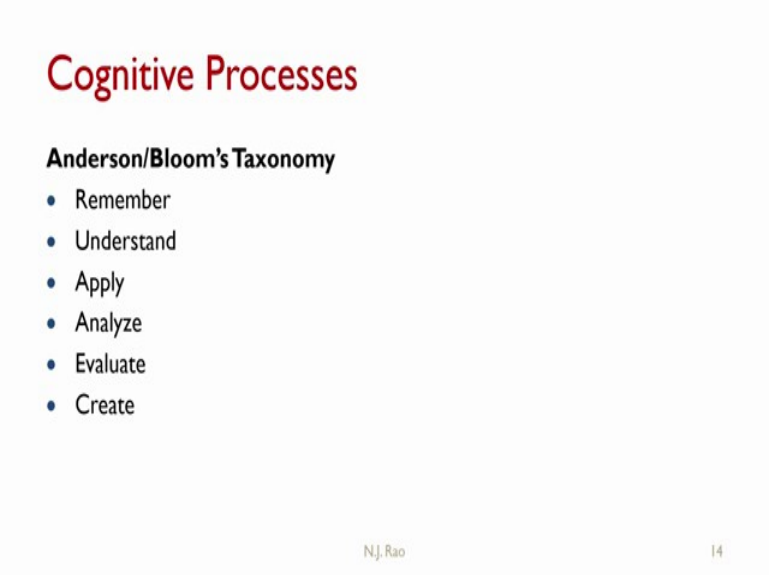

Now, coming to cognitive processes there are six cognitive processes that are identified. Anderson- Bloom's taxonomy says you have six cognitive processes: that are present. Remember, understand, apply, analyze, evaluate and create. And, basic feature of this is the cognitive levels are organized in hierarchical fashion; that means, understand activity

will also involve remember activity. Apply activity for example, will involve understand and remember activities. So, like that create activities the highest and it can or it may involve activities related to all the five cognitive process.

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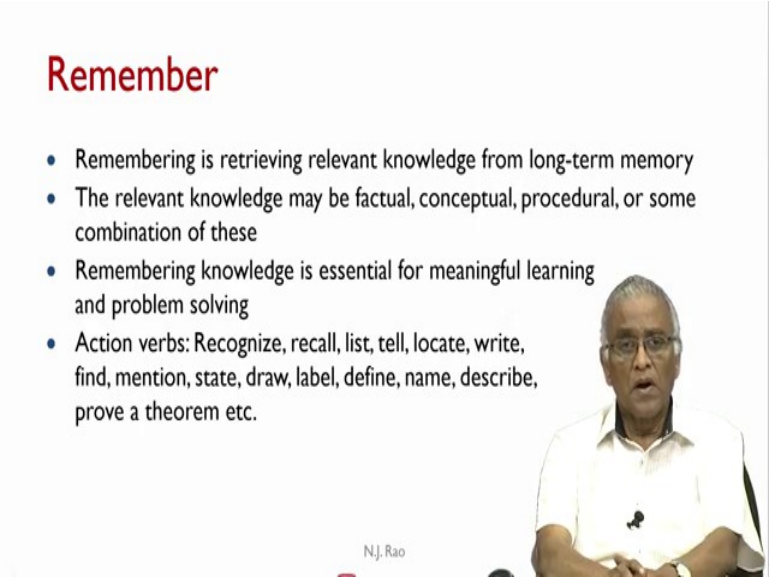

Now, we spend some time in looking at the remember and understand activities. Now, one more thing I should point out that when we are talking about this Anderson-Bloom's taxonomy the words that are used have very specific meaning given by this group; group of people who have provided this taxonomy. We may be using some of these words in our day to day in a commonsensical way we may be using that, but when it comes to using this taxonomy you have to understand these words in the way they have defined. So, that is the discipline that you need to follow when you are talking about Bloom's taxonomy.

Now, coming to remember it should be fairly easy to accept the meaning as well, as it is also we used in the same commonsensical manner. Remembering is retrieving relevant knowledge from a long term memory. It is now known that there is what is called temporary memory and a long term memory in the brain and this information that is being transferred to the long term memory part of the brain is retrieved; retrieved that is what we call remembering.

Now, the relevant knowledge can be just factual information or it could be conceptual information or procedural information or some combination of these. So, it can be any of

these things. For example, it can be conceptual say state such and such a theorem or give the proof of a theorem that is conceptual or let us say you ask how do you solve a given algebraic equation. You want the procedure is given to you, it is stored in your long term memory and you have to retrieve that particular information and present.

So, remembering knowledge is essential; obviously, unless you remember whole lot of things you cannot perform. Google cannot be consulted at every step. You need to have some amount of knowledge that can be recalled any time you want. So, remembering knowledge is very essential for meaningful learning and problem solving.

Now, how do you characterize this? Please note that remember is an activity. That activity can be characterized by many action verbs that represent. Like these action verbs recognize, recall, list, tell, locate, write, find, mention, state, draw, label, define, name, describe, even prove a theorem. These are only examples of that. For example, you may find some of these action verbs they may appear with respect to other cognitive processes as well, and that is what you have to accept because of our limited vocabulary that you have to work with.

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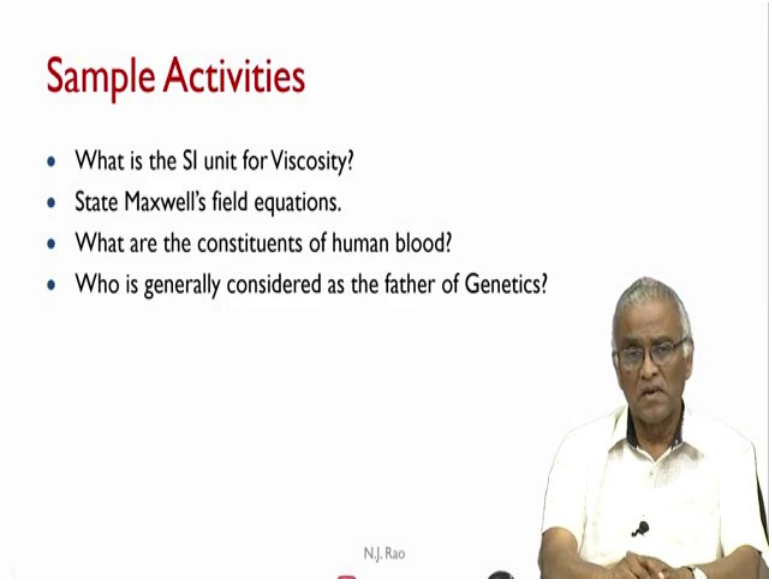

Let us look at some sample activities. If you ask what is the SI unit for viscosity? State Maxwell's field equations. What are the constituents of human blood? Who is generally considered as the father of Genetics? These are some samples of remember activity.

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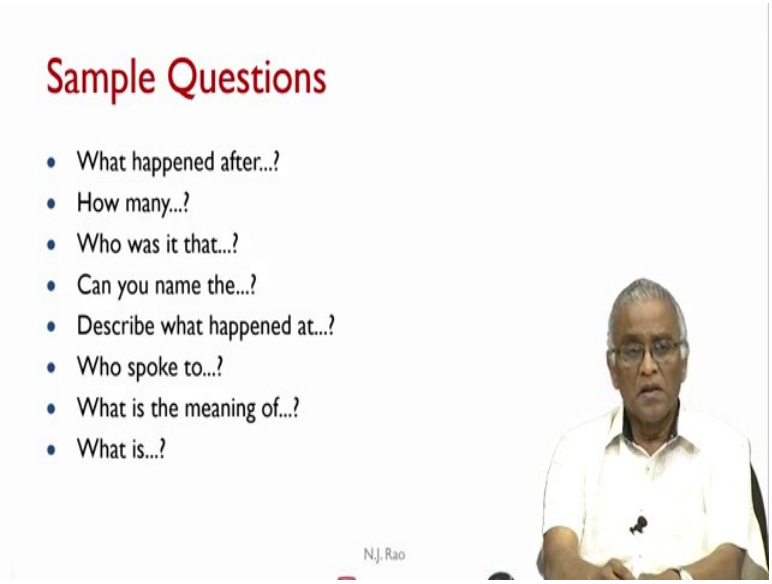

Now, we can also have some sample questions which are you give a common stem and then fill up the dots with respect to your particular course. What happened after…? How many…? Who was the…? Who was it that…? Can you name the…? Describe what happened at…? Who spoke to…? What is the meaning of…? What is…? So, these are sample stems you can say of the questions that you can ask whether the student has remembered or not.

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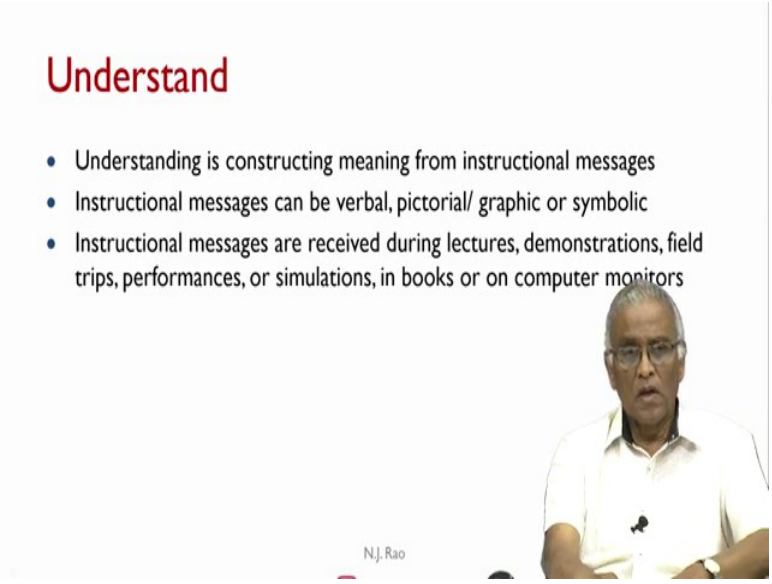

Now, come to one of the more difficult word Understand. The original word used by Bloom's group in 1956 was comprehension and they said word understand cannot be used at all, because understand represents internal changes in the brain and that is something that cannot be observed or measured. As we said any learning outcome that you talk about should be observable and measurable.

But, what happened is historically large number of faculty have objected to avoiding the word understand because, in a classroom it is very common for a teacher to raise the word asking the students whether they have understood something or not. It is almost a second nature to all teachers to use the word understand. So, finally, the Anderson-Bloom's group have accepted the word understand in place of comprehension.

Now, it is formally defined like this: Understanding is constructing meaning from instructional messages and instructional messages can be verbal, in the sense either a teacher can be speaking in some sentences or reading something in a book or it can be pictorial graphic or symbolic. Some set of equations you may write. That means, some message is presented to you, you are constructing meaning from that and this is a very very major activity that all students do in the process of learning.

And, the instructional messages are received during lectures, demonstrations, field trips, performances or simulations; in books or on computer monitors these days. So, 'understand' means constructing meaning from instructional messages.

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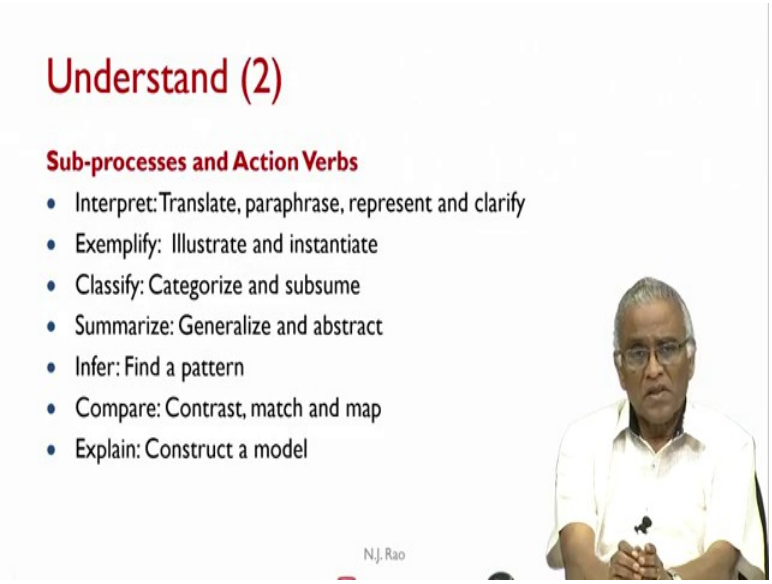

Now, there are seven sub-processes that are identified because ‘understand’ as many people take it as some internal change there is not observable. So, ‘understand’ is a word that is used as an umbrella word to represent these seven sub-processes. These are observable and measurable. So, whenever you are saying understand you are doing one of these seven activities.

Interpret – interpreting would mean translate, paraphrase, represent and clarify. Exemplify- either illustrate and instantiate given example of that kind of activity. Classify that is you categorize some of the objects that are given to you and that is classifying or categorizing and subsuming; you subsume something else into another category. Summarize – summarization is kind of generalizing or abstraction and infer- you are finding a pattern in something that is presented to you.

Compare, contrast, match and map you given two objects or two statements A and B and say you compare with respect to something and finally, explain; construct a model. Constructing a model in any form model can be a graphical model or a mathematical model or even a verbal model the explanation means you are constructing a model in that.

As a teacher you should spend lot more time in clearly understanding all the seven sub-process because quite a significant percentage of courses their outcomes dominantly come under understand and remember categories. Just because it is limited to understand and remember not looking at higher cognitive levels it does not mean that the course is inferior.

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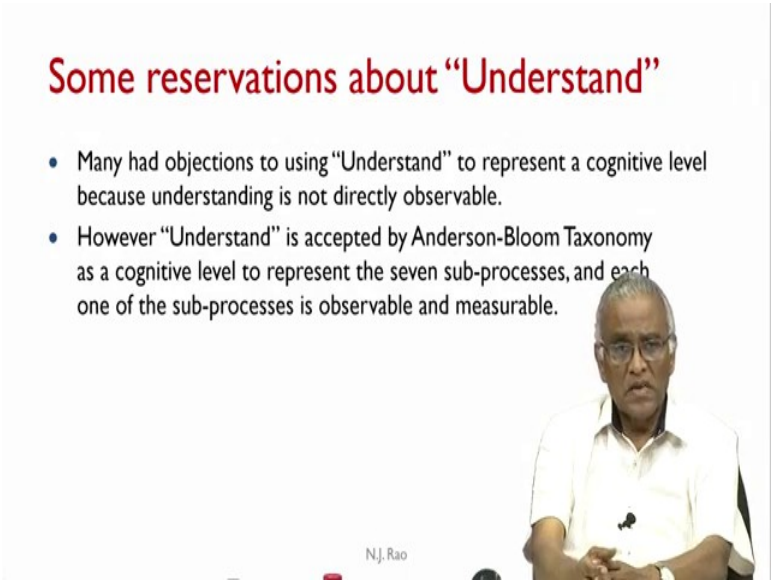

As I said people have reservations about the word understand because understanding is not directly observable that is a reason why understand is accepted by Anderson-Bloom taxonomy is a cognitive level to represent the seven sub-processes and each one of the sub-processes is observable and measurable. So, when I use the word understand it should always be used in the classroom in the context of what has been defined by these seven sub-processes in the Anderson-Bloom taxonomy.

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Some sample activities: identify the characteristics of Phylum Annelida with its classifications. Identify the feeling words in his or her narration after listening to an audio taped session of a client with social anxiety narrating his or her problem. Understand the principles of Genetic Modification of Crops. Explain the structure of DNA. Explain the Uncertainty Principle.

Differentiate between death imagery and nature imagery of Emily Dickinson poems. Compare the market policies of Alauddin Khilji and Muhammed-Bin-Tughlaq. These are activities that are taken from different subjects that one is likely to come across in undergraduate general programs. Of course, one can add endless number of such activities.

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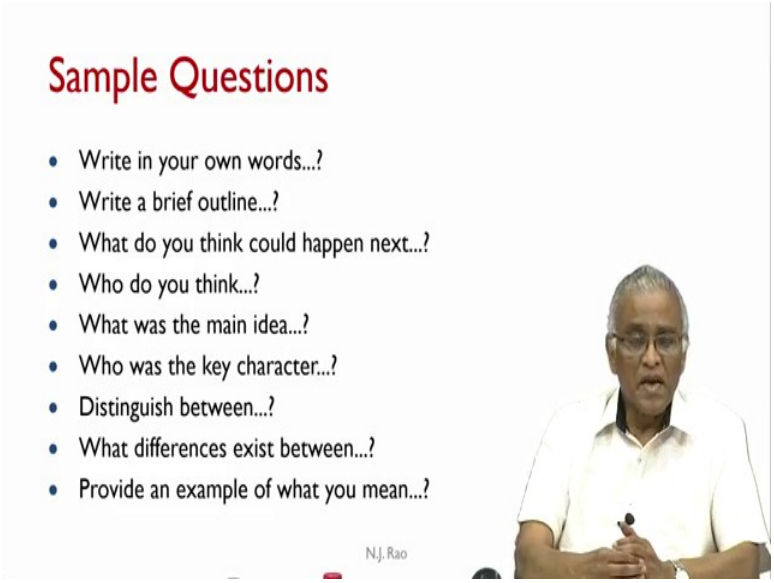

Now, sample questions which will give you stems and you can fill in that. Write in your own words…? Write a brief outline…? What do you think could happen next…? What do you think…? What was the main idea presented in some let us say some paragraph or some page or in a book or something like that. Who was the key character…? Distinguish between…? What differences exist between…? Provide an example of what you mean? These are some sample questions one can now write fill in the dots with respect to your subjects.

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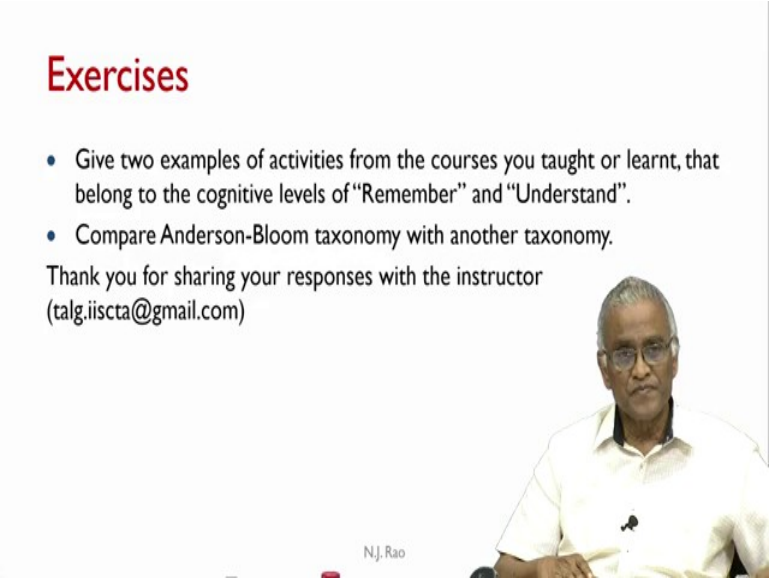

Now, we request you to do these exercises, give two examples of activities from the courses you taught or learnt that belong to the cognitive levels of remember and understand. Compare the Anderson-Bloom taxonomy with another taxonomy if you like because some people say 'why should I follow this?' Yes, there are other taxonomies and one can compare with that and say why do you prefer something in preference to the another that you can write down and we will be happy to share your responses.

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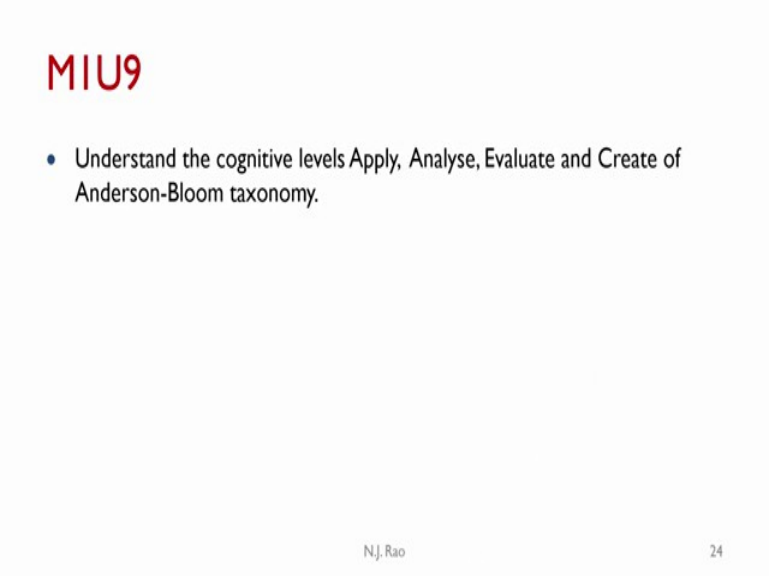

In the next unit we will look at the remaining four cognitive levels namely apply, analyze, evaluate, create of Anderson-Bloom taxonomy.

Thank you very much for listening.