NBA Accreditation and Teaching-Learning in Engineering (NATE)
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Lecture 05
Education, Teaching, Instruction and Assessment

Greetings and welcome to module 1, unit 5 of NATE, that is NBA Accreditation teaching and learning in Engineering.

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And here in the, last unit we tried to understand the nature of Self-Appraisal Report and the Centrality of Closing the Quality Loop at all levels of outcomes. As you can see we are looking at the entire process of teaching and learning within some framework and that framework is provided by two things one is NBA Accreditation the other is outcomes based education.

These are the two pillars you can say of to provide that provide a framework for looking at all aspects of engineering education. So, last in the last unit, we look at self-appraisal report and all the elements of that briefly mentioned and then we looked at what are this central features of that, one of the central feature of that is closing the quality loop at all levels. While we are going to look at all the criteria in great detail in the module 3 of this course, but the last unit just present today a brief picture of the nature of the self-appraisal report.

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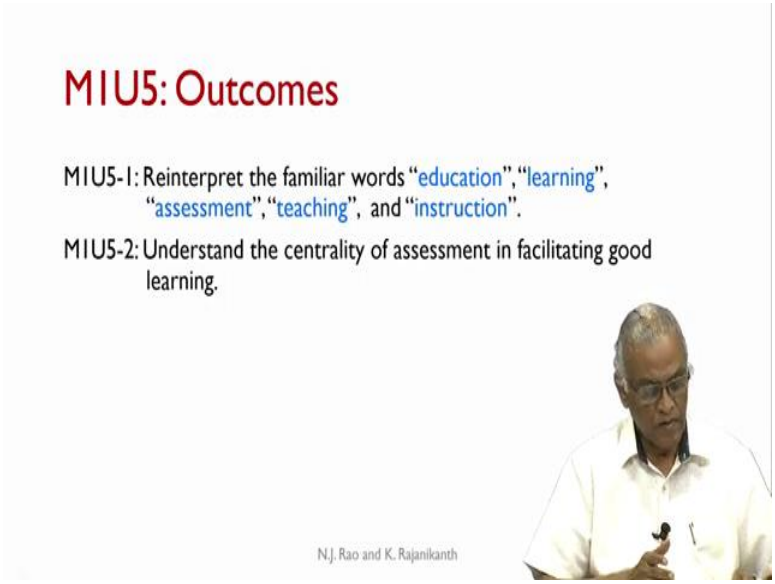

Now, coming to unit 5 the, it is a long title that we gave and the title is based on education, learning, assessment, teaching and instruction. And we use as a teacher or as teachers all of us use this words, unfortunately they are not used necessarily in the right kind of meaning or in right kind of context.

So, we felt that you reinterpret this words this are all familiar words all the words are known to everyone but yet they are not necessarily used in the right context and to give the right meaning and that is a reason why in this we try to we want you to reinterpret the familiar words education, learning, assessment, teaching and instruction. And also one minor thing which will alleging elaborate and later in module 2, understand the centrality of assessment in facilitating good learning.

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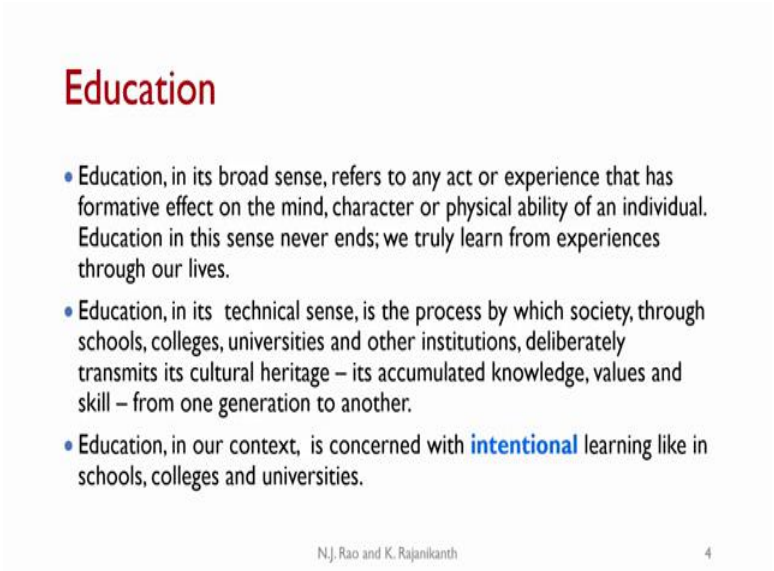

Now, we start with the word education it is not a new word everyone uses all the time. We in our conversation we use it readily, but in a formal sense if you want to define education refers to in its broadest sense any act or experience that has formative effect on the mind character or physical ability of an individual.

That is any kind of experience that has formative affect on the mind character and physical ability of an individual you can call it as education. So, in this broad sense the education never ends because all the time you are experiencing your interacting with the outside world to their extent.

Those experiences will have influence on your mind and character and sometimes physical abilities as well. So, in that sense we truly learn, from our experience through or lives. So, education happens all the time in our lives until our death. But here education and its technical sense now is the process in which society through schools, colleges and universities and other institution deliberately transmits its cultural heritage its accumulated knowledge values skills from one generation to the other.

And that is the reason why one, one generation to another that is a reason why this school education differs consider a blame from one country to the other, because each country will have to decide what, what is its culture, which part of its cultural heritage it wants to transmits to the next generation of people.

Education and the technical sense we are looking at what happens in schools, colleges and universities or similar institutions. So, in our context it is concerned with intentional learning like in schools, colleges and universities. So, when you enter a school or a college you their expected to learn something, that means there is a curriculum and there is something is already decided by some process and the student has to learn the things that have been already decided. So, to their extent, education is concerned with intentional learning like in schools, colleges and universities.

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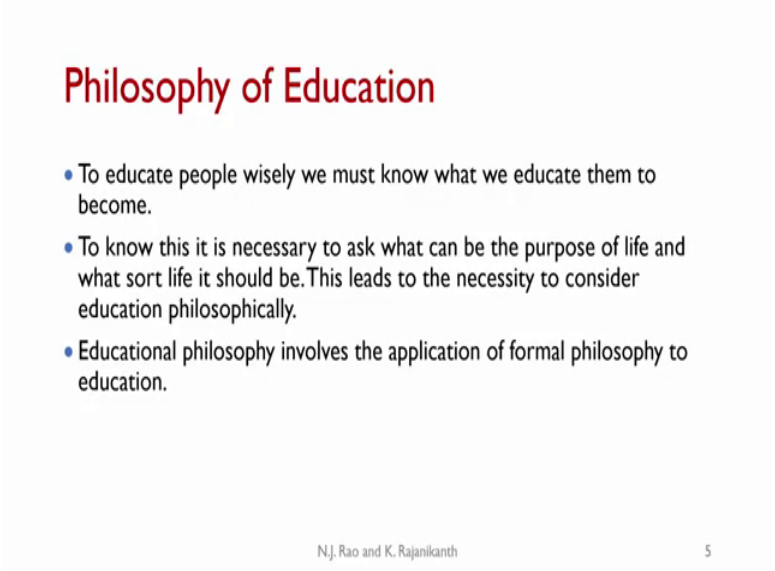

Now, we come to by why should we be concerned with the philosophy of education. So, somebody is deciding society and through some processes is deciding to educate its people, but to educate people wisely we must know what we educate them to become? For example coming to engineering, engineering education for example.

What kind of engineers do we want to produce? Is it something that you feel a group of people feel that they are what is that the student should learn or is there any framework within which you make that decision. So, to know what we educate them to become? It is necessary to ask what can be the purpose of life and what sort of life it should be. This leads to the necessity to consider education philosophically.

Again translating that into engineering what is the purpose of life of an engineer? And what sort of life it should be? So, then you have to define who is a good engineer which we made an attempt earlier in the first unit saying that, who is a good engineer? That our definition of good engineer again that definition will depend on the context.

Our context is at this point of time in India based on the current state of affairs or current states of the society, what are the desirable characteristic of a good engineer. At some level people have to agree to some common call it parameters or characteristics of the good engineer and that is the reason why, you require to consider education philosophically. So, essentially education philosophy involves the application of formal philosophy to education.

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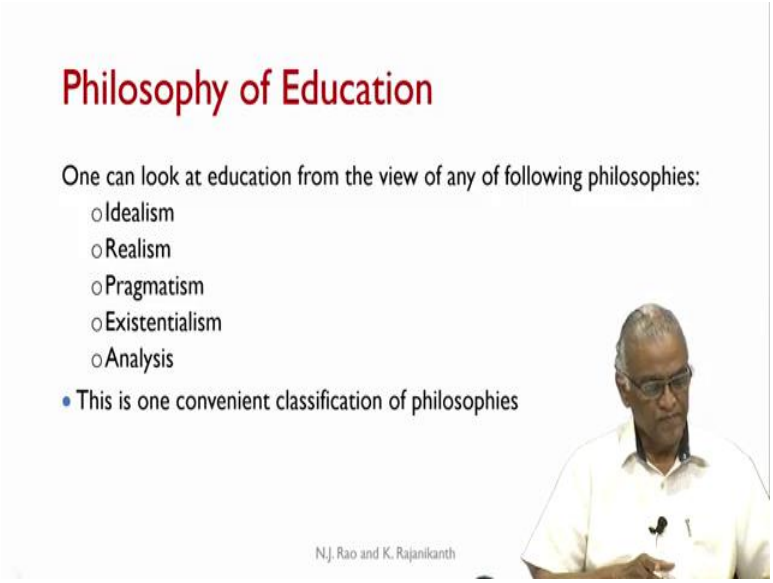

And then the moment we come to philosophy there is nothing like a single one or a possibly any two people exactly will agree with what philosophy of education is or for that matter what philosophy is and broadly we have the following schools of philosophy idealism, realism, pragmatism, existentialism and analysis.

Even people may not agree with this kind of classification, this is one convenient method of classifying philosophies. So, one should agree pick one from here what you consider is appropriate to this, for example at least at a higher education what we the philosophy of pragmatism is considered as a platform or basis for considering all a issues related to education. Let say at high higher level.

We will not go through trying to define or defend any of these decisions is only to bring it to the attention of the teachers that there are five, these five schools of philosophy and one can look at their programs through any of these philosophies, but that is the completely different those who are interested are welcome to explore this philosophies in relation to engineering.

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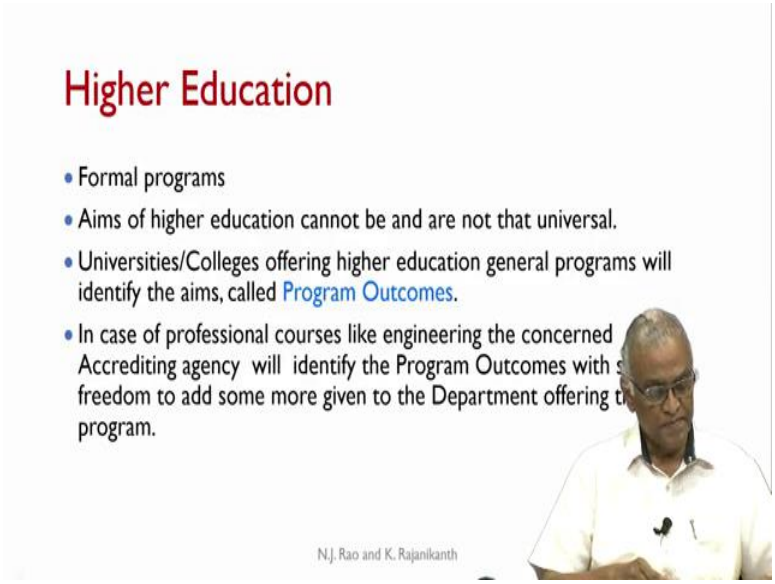

Now, coming to higher education. What are the characteristic of higher education, one is their formal programs that means somebody has a structure like in our case there are 4 years they are based on semester, semester system and there is a whole lot of things that it is a formal one. That means there is nothing like a total freedom at all levels between for both for teachers and students.

And unlike schools aims of higher education cannot be under not that universe, beyond large what happens in a country the aims of school education are broadly the same there is not too much of difference between one place to the other place, whereas at higher education it need not be, there is no need for it to be the aims of higher education to be universal that is one of the first characteristic of higher education.

Universities and colleges offering higher education general programs will identify the aims called program outcomes, that is if you are offering a course like BA in history or BA in sociology or a BSC in physics any of this general programs the this what we consider the outcomes of the program are decided by the university or sometimes even the college.

If it is autonomous college itself is required to identify in today's context the program outcomes, in case of professional courses like engineering the concern accrediting agency will identify the program outcomes, that means it is not left to the choice of the college or university, there is a national accrediting agency for example if you take architecture or medicine the so, called program outcomes are the entire professional course is designed and given by the accrediting agency.

Not only that, some amount of freedom is given to the department offering the program to add some more outcomes to this program outcomes, we call this additional outcomes as programs specific outcomes. So, what happens in the case of program outcomes, there the same across all disciplines, across all engineering programs. Whereas program specific outcomes are specific to a particular branch and that to their defined by the department.

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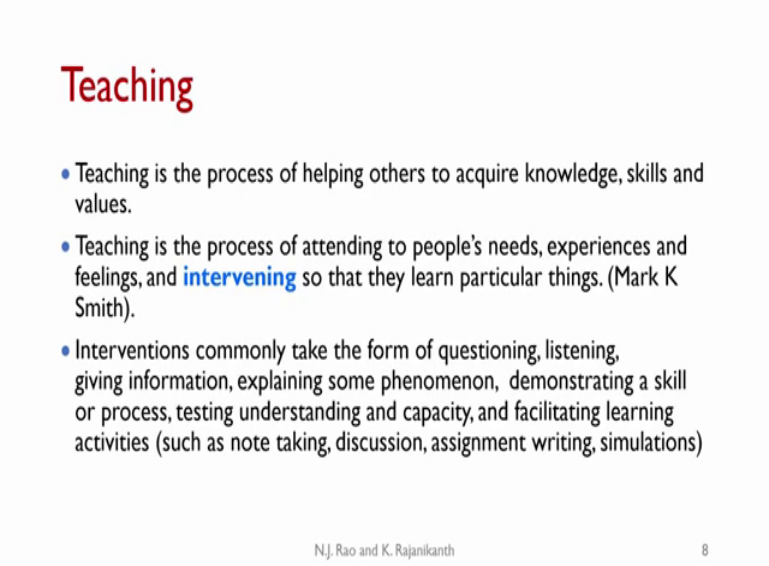

Now, we come to the process of teaching, so, we looked at education we look at higher what is a higher education program. Now, we look at the teaching. Teaching is a process of helping other to acquire knowledge, skills and values that is what the teacher does. How does it do? Teaching is a process of attending to people's needs experiences and feelings and intervenings so that they learn particular things.

These particular things are decided by the curriculum, what the student should learn are decided by the curriculum. So, teacher essentially does several things that means he mainly intervenes and who what are these interventions. Interventions commonly take the form of questioning, listening, giving information, explaining some phenomenon, demonstrating a skill or process testing understanding and capacity and facilitating learning activities, such as note taking, discussions, assignment writing, simulations and so on. So, the interventions take several forms and what kind of intervention is to be taken place is decided by the teacher. So, this is what teaching process is.

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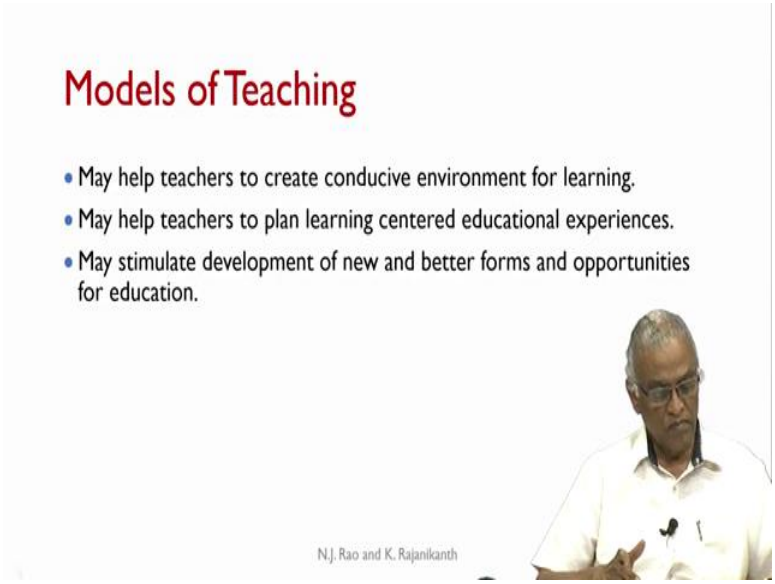

So, to their extent there are any number of models of teaching, there in fact there are there are several classes of models, there are large numbers of classes of models under each class we have several models again and essentially it applies to mainly school education. So, models of teaching may help teachers to create conducive environment for learning.

So, if I follow some model then I can plan my classroom teaching, according to that model rather than doing it arbitrarily and models of teaching may help teacher to plan learning centres a centred educational experiences, these also may simulate development of new and better forms of opportunities for education. A new teacher for example may identify the model of teaching that you would preferred to take preferred to follow, and then plan his teaching within that framework.

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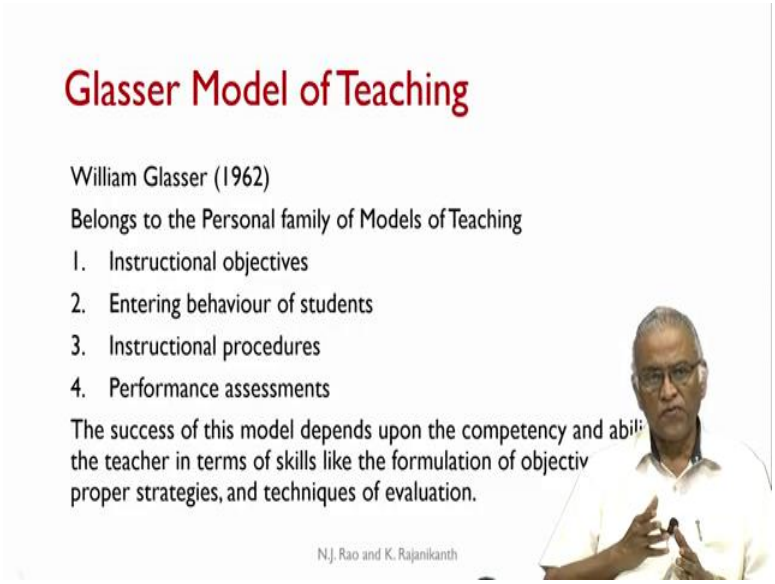

Now, this is one of the most popular model of teaching due to William Glasser which was provided in 1962, it belongs to the what is called personal family of models of teaching, we will not elaborate the features of this personal family and what are the features, the teacher should identity instructional objectives.

And the teacher should also know the entering behaviour of students that means what kind of students do you have? What abilities do they have? With what, what we call prior knowledge and skills they come in to your class. This is what the teacher will have to identify and then he follows certain preferred or selected instructional procedures and then he assesse the performance of the students, these are the four characteristic for teacher I think any teacher can readily relate to all these four.

But you should notice the success of this model depends upon the competency and ability of the teacher in terms of skills like the formulation of objectives, use of proper strategies and techniques of evaluations. So, this Glasser model of teaching is only is meaningful or will be successful corresponding to the competency and ability of the teacher. So, the teacher has a major role to play if you are following Glasser model of teaching.

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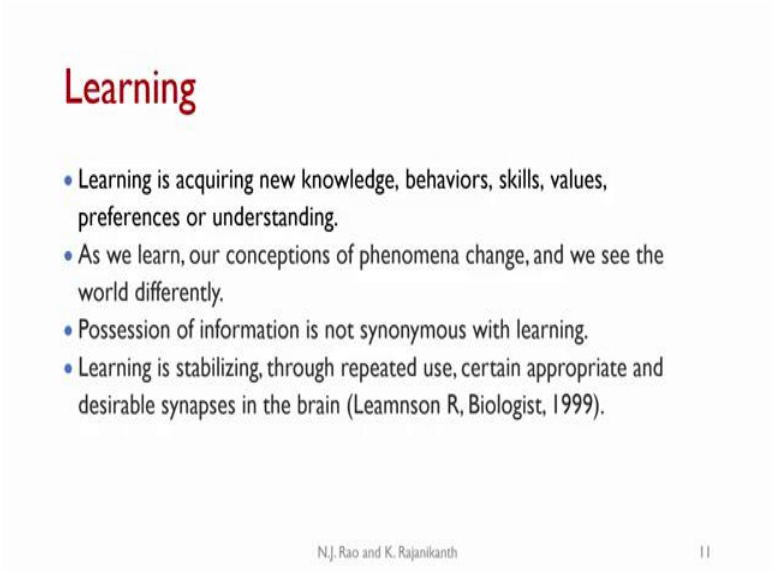

Now, we come to the other process namely the learning. So, here there are two actors always one is teacher the other are students. So, when teacher teaches the goal is to facilitate the students to learn. So, we must also understand what learning is? Learning is acquiring new knowledge, behaviour, skills, values, preferences or understanding.

If any if these things happen we are learning, as we learn our conceptions of phenomena change and we see the world differently. If we do not learn adequately then our view of the world may not change at all, it should be noted position of information is not synonymous with learning. If one rills out all kinds of facts and figures that is position of information or I would say data it is not synonymous with learning.

Now, if we want a biology's definition of learning, learning is stabilising through repeated dues certain appropriate and desirable synapsis in the brain, we will spend 1 unit on the kind of role our understanding the brain plays in learning that will do it at a later stage.

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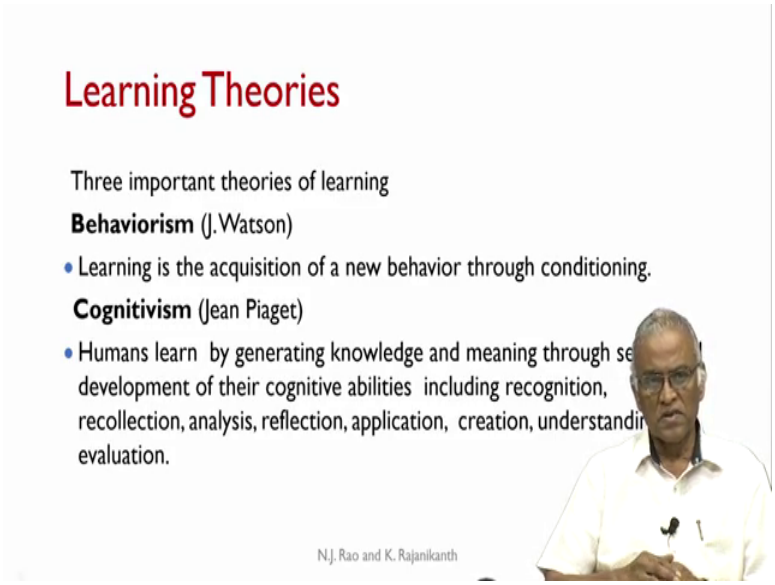

Now, we look at only 3 important theories of learning, there are many theories of learning will just confine ourselves to three which are these are the most dominant ones, in fact the whole learning theories first learning theory is behaviourism due to Watson. There behaviourism consider learning is a acquisition of a new behaviour through conditioning and behaviourism believed at when it was proposed in 1920s there was hardly any understanding proper understanding of the brain.

So, they made an assumption, brain is a black box the only thing that we can measure is what is it that your what are the stimuli that you are giving and what are the responses of the individual, these are the only things that are measurable the whole learning theory it will behaviourism is based on a stimulus and response.

And then what kind of sequence of stimuli will lead to what kind of say what kind of sequence of responses, under what conditions can I bring out desirable response from the individual. So, that is the kind of approach that was taken and quite a few of the practices of the schools and even at higher education level, they have been followed, they are based on the behaviourism.

For example, if you repeatedly practice your response to certain stimuli can be conditioned or can be improved. So, what happens one of the consequences of this you give practise problems. So, that issue, that particular method is the outcome of behaviourism. So, it is while it is super (())(21:59) by other but still that is it is not invalid but it does not completely behaviourism does not completely explain the behaviour of individuals.

Now, next is cognitivism, we are just or other heat proposed first and possibly tens of thousands of researchers have worked on this. Humans learn by generating knowledge and meaning through sequential development of their cognitive abilities, including recognition, recollection, analysis, reflection, application, creation, understating and evaluation.

So, we are going to focus much on the cognitive step approach to learning. For example, the cognitive processes focus on processing information, how do you process we have a given a long list and that is where we will be looking at our taxonomy of learning is dominantly based on cognitivism, we will look at that in the later units.

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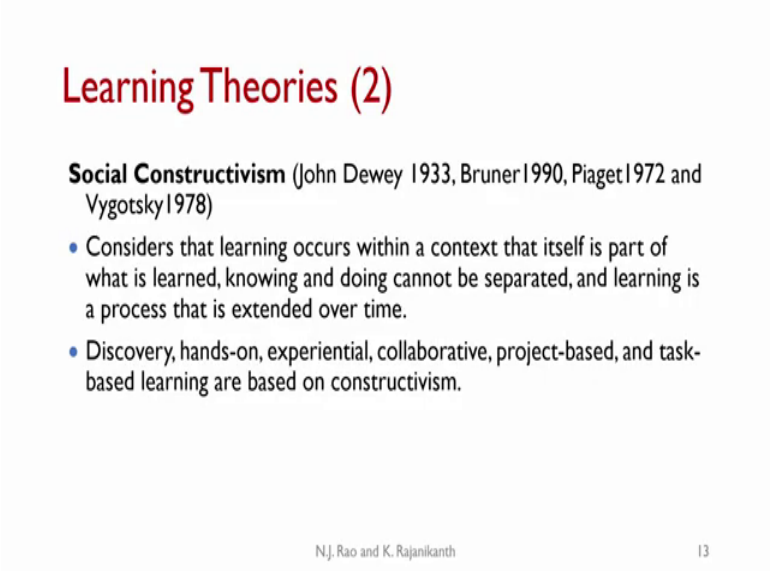

And the third one important one is called social constructivism, it is due to John Dewey, Bruner, Piaget and Vygotsky. It considers that learning occurs within a context that itself is a part of what is learned, though your teaching the same technical topic same subject in one well equipped classroom by an expert and in a good nice environment or the one that you are teaching in a very ill equipped, ill qualified faculty member the context are vastly different and whatever the students learn the impact of the context is also carried.

So, you cannot what do you call the context cannot be dissociated with the, with what you learned and to their extent knowing and doing cannot be separated and learning is a process that is extended over time. And we are just making very brief statements obviously we encourage teachers to explore this 3 learning theories a little bit.

I think every teacher should explore at least these 3 things beside many other theories that exist. One it should be remember learning is a process that is extended over time, is just does not happen in a very short period. That you explain and people seem to understand, seem to

you mean solve the problem immediately but it does not mean that you have learnt, it takes considerable time for that to be completely internalised and truly the learning is, you can say actually learning is actually happen it takes certain time.

And this is the one teacher should pay attention in the sense, a one of the mistakes that is done is that the curricular at many places are their overloaded. As a teacher you want your student to know all kinds of things and as soon as something is kind of addressed in the classroom you think that the learning has been facilitate, it does not happen as it takes considerable time specially the students with lesser cognitive abilities it will take lot of time to their extent the curriculum should be matched with the abilities of the student and the time required.

And the as a consequence of social constructivism some of the learning methods that they have come like discovery, hands on, experiential, collaborative, project based and task based learning are the consequence of social constructivism.

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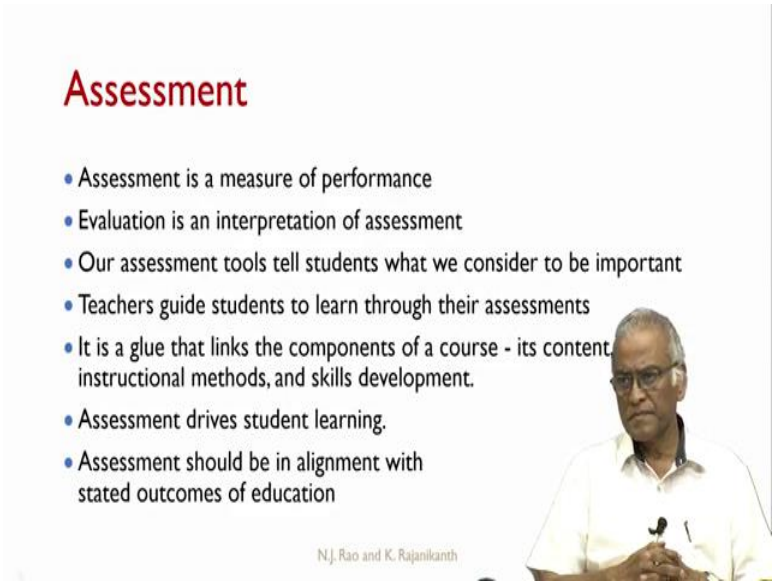

Now, we come to another very important aspect of teaching and learning, assessment. The formal definition of assessment it is a measure of performance, what do I measure to know that the student has learnt something and the another word the associated word is evaluation. Evaluation is an interpretation of assessment, if the student has performed let say conducted an experiment then evaluation is to determine how well he has performed or can I associate some grade or mark or some something with that to the with that performance.

So, assessment and evaluation are two different things unfortunately many times these two terms are used to synonymously that should not take place. And also we consider after we

think we taught well in the classroom, the teaching and learning has taken place and assessment are examination is a necessary evil. Actually we now presently look at the centrality of assessment in learning our assessment tools tells students what we consider to be important.

For example, if we consider some part of the subject is not important we may not ask any questions or not conduct a quiz in that. So, students will look at what kind of questions are being asked at various points, during a semester and they will accordingly prepare that means through your assessment tools you are communicating to the students, what you consider to be important.

For example, I cannot through my in my examinations are test I cannot ask superficial questions and expect the students to learned something meaningfully or deeply. So, assessment is the key, teachers guides students to learn through their assessments, you can even say that it is a glue that links the components of a course its content instructional methods and skills development and in fact you can even say assessment drives student learning.

I am sure you are all familiar with that always students prepare for the exams, and teacher in my opinion has no right to say that student should not worry about exams and they consider you should focus on learning and should not focus on examinations. If these two are different then it is a fault of the teacher rather than the student and learning well and performing well in that examination are an assessments they should be the same that should be the, that is the role of the assessment.

You should not your assessment should not create any issue related to performing an examinations and learning well should not be considered two different things. So, again to reinforce that we are once again saying assessment should be in alignment with stated outcomes of education.

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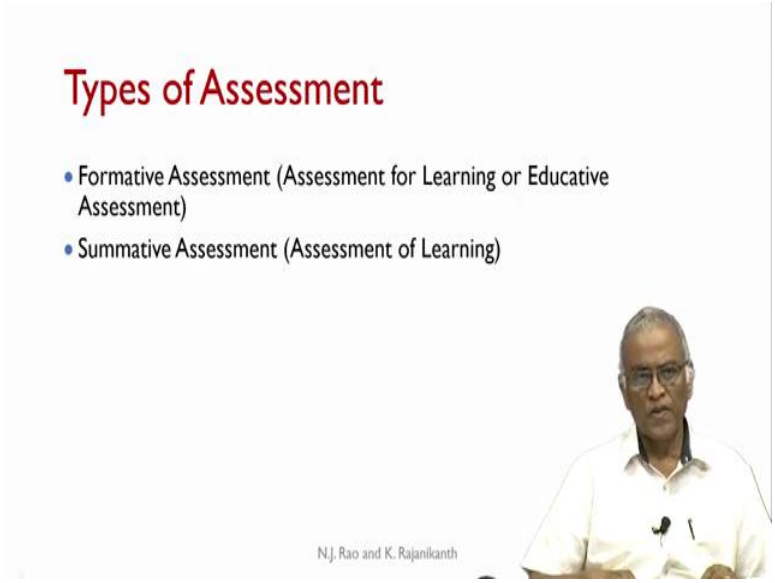

And there are two types of assessments formative assessment, assessment for learning or educative assessment means when I am asking when I am doing assessing formative assessment, I am trying to find out to what extent the student has learned and that will also provide me the basis for providing feedback and also to know where how the student to what extent they have learned.

That means in formative assessment, you are not trying to use the results for grading or giving marks for that. Whereas summative assessment that is assessment of learning to find out what is at the student has learned you conduct summative assessment. And I am sure that faculty are familiar with this two words formative assessment and summative assessment.

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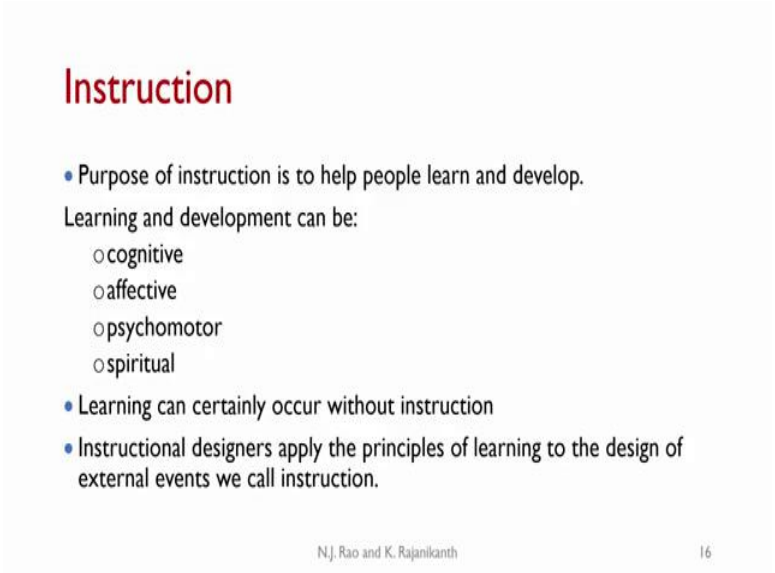

Now, we come to instruction is another word. For example, we may use teaching and instruction bit synonymously but instruction is slightly different, the purpose of instruction is to help people learn and develop very simple. But learning and development can be in any of the 4 domains cognitive, affective, psychomotor and spiritual.

Let say we keep the spiritual part a little aside because we do not even know how to formally define and how to do any body call prepare the student for it or there can be several controversies over that. So, we will mainly look at the learning and development a can be cognitive, affective and psychomotor. We will look at the affective and psychomotor domains a little later.

Learning can certainly occur without instruction, you do not require instruction at all like if you walk on the street by just observing what is happening or reacting to external situation you are learning something. So, learning can certainly occur without instruction but instructional designers apply the principal of learning to the design of external events we call instruction. That means they teach instructor plan some external events to facilitate learning these externals event are planed based on the principal some principals of learning, that is what the instructional designers do.

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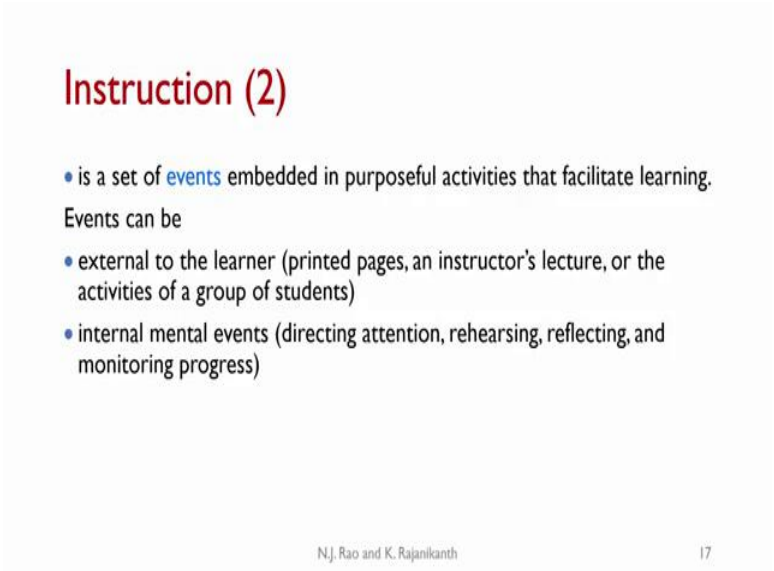

And instruction is a set of events embedded in purposeful activities that facilitate learning if you want a formal definition instruction. Events can be external to the learner like it could be printed page and instructors lecture or the activities of a group of students are conducting in a laboratory and so on.

Whereas internal mental events that is directing attention rehearsing, reflecting and monitoring progress these are internal mental events. So, the teacher will have to pay attention to both for him to do good instruction.

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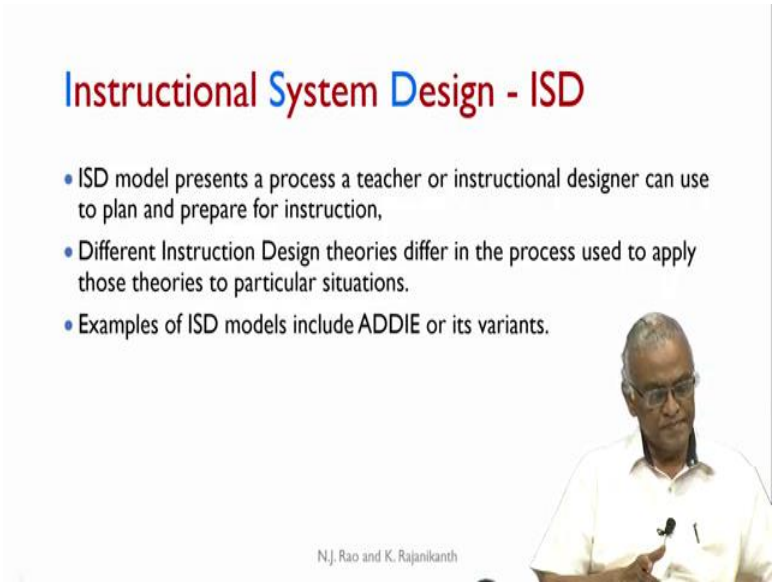

Now, there are what do you call Instructional System Design we call it ISD there are models for instructional system design and these models represent a process a teacher or instructional

designer can use to plan and prepare for instruction, there are many models. So, and there is nothing like this is a most superior model or this is a only way to do there is nothing like that.

But people may prefer a particular ISD model, different instruction design theories differ in the process used to apply those theories to particular situation. So, the process part can be different from one model to the other and the example that we are going to take is what is called ADDIE, ADDIE is a short name for analysis design development in implement and evaluate or there are several variants of the same. So, we are going to look at this particular instructional system design model namely ADDIE.

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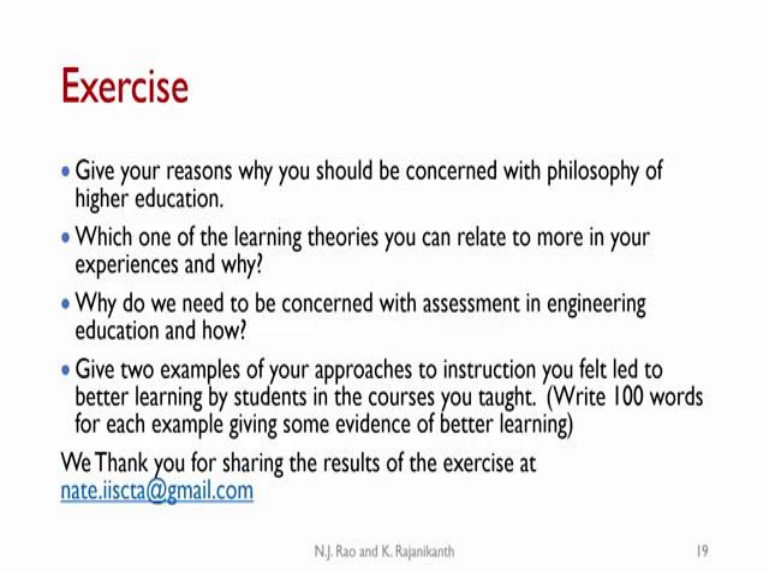

Now, as an exercise we would like you to give you a reason why you should be concern with philosophy of higher education, mainly to encourage it to read a little bit and say why you should really worry about philosophy of higher education. Which one of the learning theories you can relate to more in your experience and why?

We talked about three learning theories and you can explore more learning theories and if you preferred you can say which is the one you can relate better, why do you need to be concerned with assessment and engineering education and how. Give two examples of your approaches to instruction you felt let to better learning by students in the courses you taught.

Right handed words for each example, giving some evidence of better learning. This is we would like to learn from you if you are able to share your the result of your exercise, it will be great learning experience for us as teachers.

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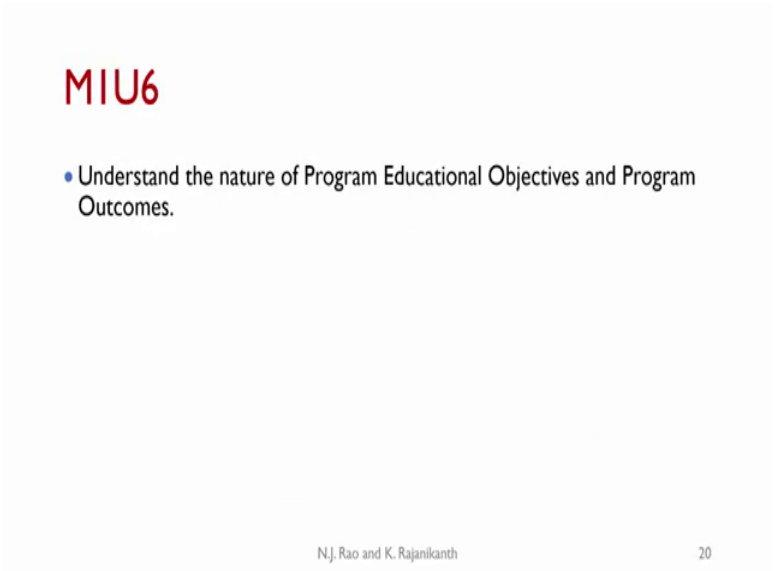

And in the next unit we try to understand the nature of program educational objectives and program outcomes, we talked about outcomes but these are all classified into four levels we will look at this two namely program educational objectives and program outcomes. Thank you for your attention.