NBA Accreditation and Teaching - Learning in Engineering (NATE)
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Lecture 36 – Instruction: An Overview

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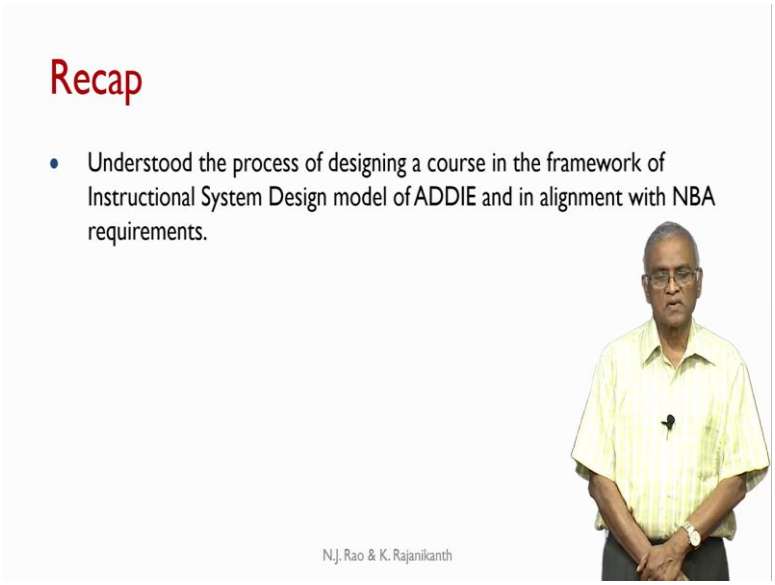

Greetings and welcome to NATE, module 2 unit 15 related to Instruction. In the earlier unit or in the earlier several units, we understood the designing of a course in the framework of instructional system design model of ADDIE and also in alignment with NBA requirements. So, having completed or having addressed the design of a course in an engineering program, we now move onto the next stage of, next stage namely, how do I instruct? How is the instruction conducted?

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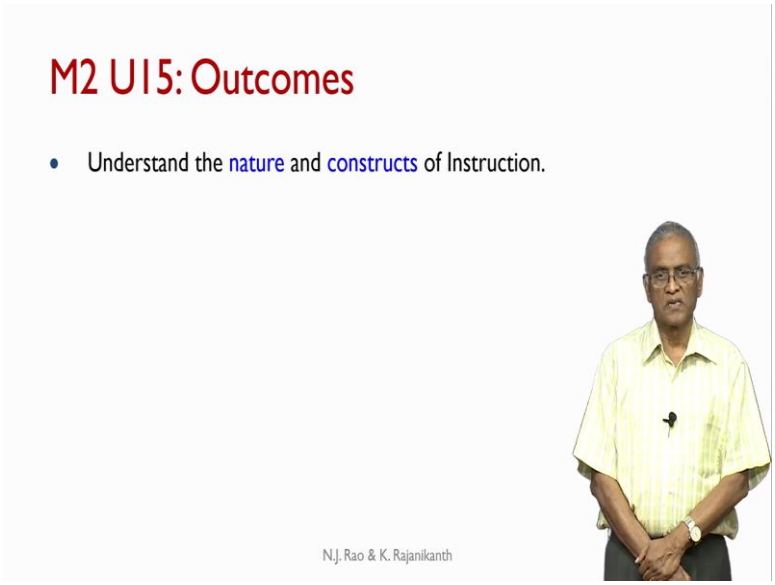

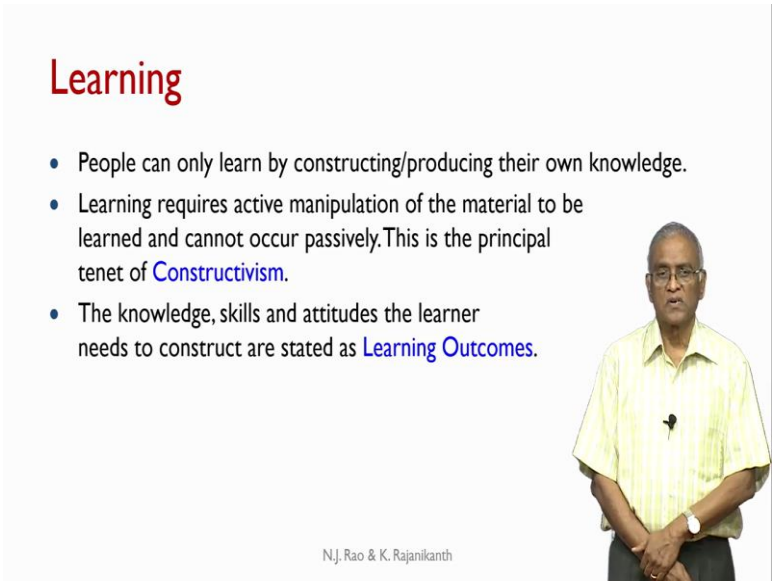

Now in this unit, we will try to understand the nature and constructs of instruction. Instruction is a very specific, you can say, technical word in the field of education and here as a teacher you are instructing or sometimes we call teacher also as instructor. Though some of the teachers may not like to be called as an instructor, they consider that is related to a lower level activity but instructor or instruction in the context of education is also practically synonyms with teacher.

Now coming to, before we go onto the instruction we once again have to take a relook at what learning is. People can learn only by constructing or producing their own knowledge. Actually, you can say learning is, if you have learnt, you are constructing or producing your own knowledge and if you have not produced your own knowledge then you have not learnt.

Otherwise, you are superficially remembering something and as long as you remember, you can reproduce that but beyond that you will forget about that.

So learning requires active manipulation of the material to be learned and cannot occur passively. Passively means by just listening or just by memorizing it cannot happen, learning cannot happen and this active manipulation of the material is the, is really the principal tenet of constructivism as we call it, that means you are constructing your own knowledge or producing your own knowledge.

The word knowledge production is coming to be accepted as the keyword in the area of education. Now the knowledge, skills and attitudes the learner need to, needs to construct are stated as learning outcomes. We have extensively dealt with the topic of learning outcomes and learning outcomes can come at various levels and how do we write them, how are they important, all that has been addressed in the module 1, mainly related to outcome based education.

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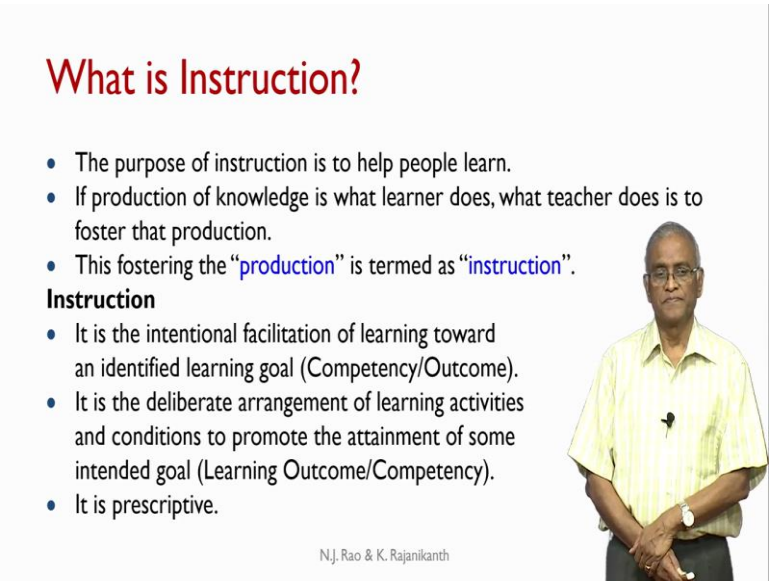

Now, let us formally define what instruction is. The purpose of instruction is to help people learn, simple. If production of knowledge is what the learner does, so the teacher's role is to foster that production. That means teacher role, teacher's role ought to be to foster the production of knowledge by the learner rather than merely transferring information to him, that is the teacher's role. And this fostering the production of knowledge is termed as instruction that is the process of instruction. Now instruction is international facilitation of learning towards an identified learning goal.

Learning goal will be either competency or an outcome. Outcome could be course outcome, program outcome or program specific outcome and so on. And also, instruction is a deliberate arrangement of learning activities and conditions to promote the attainment of some intended goal. So through an instruction what you are doing is, you are arranging learning activities and the conditions under which the learning activities are conducted are also manipulated, is also part of designing instruction.

And one thing, it should be remembered instruction is prescriptive, it is not as if there is only one way of doing things, it is not like proving a theorem, it is prescriptive. That means each teacher or each instructor is making a choice that if I do like this or if I arrange my learning activities in a particular way and if I organize the conditions I consider, that will promote the attainment of intended goal. So, each teacher does it in his own way, that is why it is prescriptive. That means you are taking internally stated or unstated a position that if I do like this, my students will learn better.

So that is why it is prescriptive and any prescriptive thing can only be probabilistically valid rather than absolutely, you cannot say, this is the only way to do.

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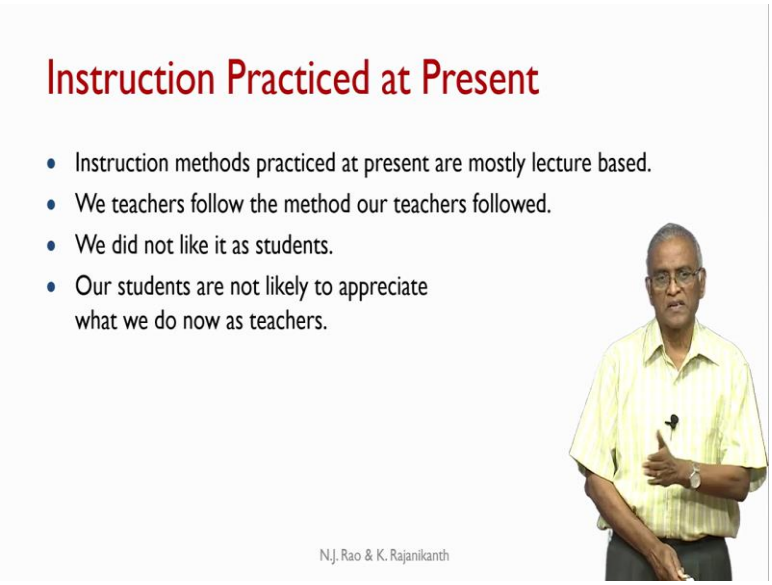

An instruction practiced at present if you look at, instruction methods practiced at present in practically all the institutions are mostly lecture based, why is it so? We, teachers follow the method our teachers followed. Right from our childhood we looked at teachers who are, how they are presenting in the classroom and we follow the same thing. And we can almost say we hardly liked our, hardly liked that process as students. Yes, there are some occasional

inspiring teachers but are good teachers but we hardly like this process, especially at higher education level.

So, we did not like these instruction methods as students. So our students are not likely to appreciate what we do now as teachers if you follow the same method, that is the reason why every teacher must explore a little bit about the theories and practices of instruction and there is a lot of literature that has been accumulated in this area, there are any number of books available even in instruction at higher education level.

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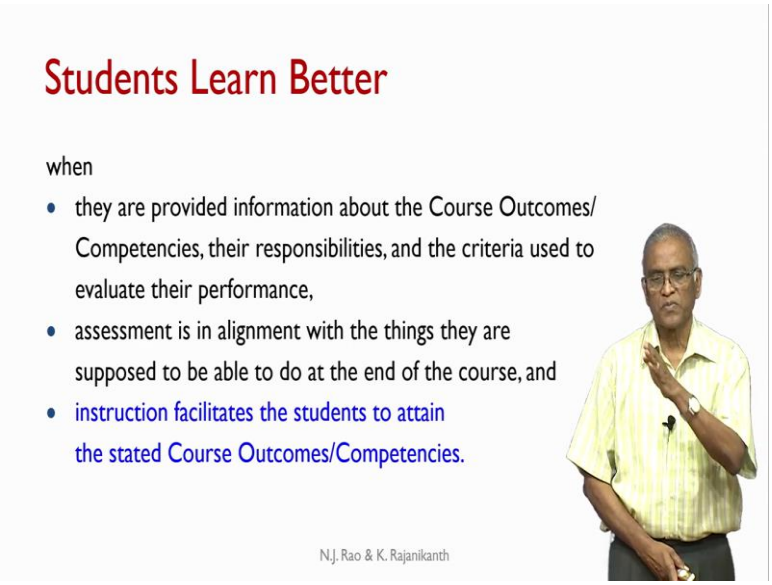

Now, this is a statement or these are the statements we have been stating earlier also, again let me repeat, students learn better when they are provided information about the course outcomes, competencies, their responsibilities and the criteria used to evaluate their performance. All this we have extensively addressed in course design. And in the outcome based education in the module 1, we also learnt how to write course outcomes and competencies.

For example, the responsibilities and the criteria used to evaluate the performance are all stated as a part of the syllabus. And assessment is in alignment with the things they are supposed to be able to do at the end of a course. This also we dealt with through using taxonomy table to decide the alignment and how do you design assessment which is in alignment with the course outcomes, all that has been dealt in both course design and in the module 1.

And instruction, the third one is instruction facilitates the students to attain the stated course outcomes and competencies. That means having written course outcomes or competencies instruction should be organized in such a way, you are taking the student towards that particular goal of attaining the outcome or competency.

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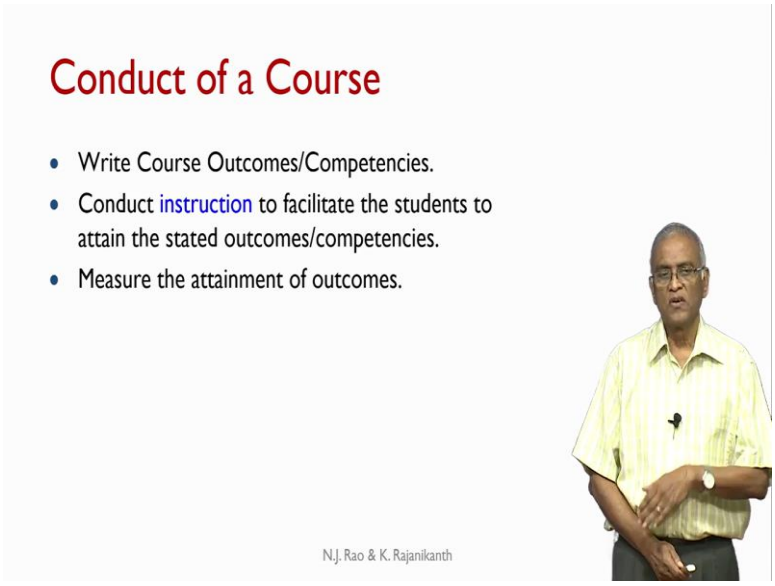

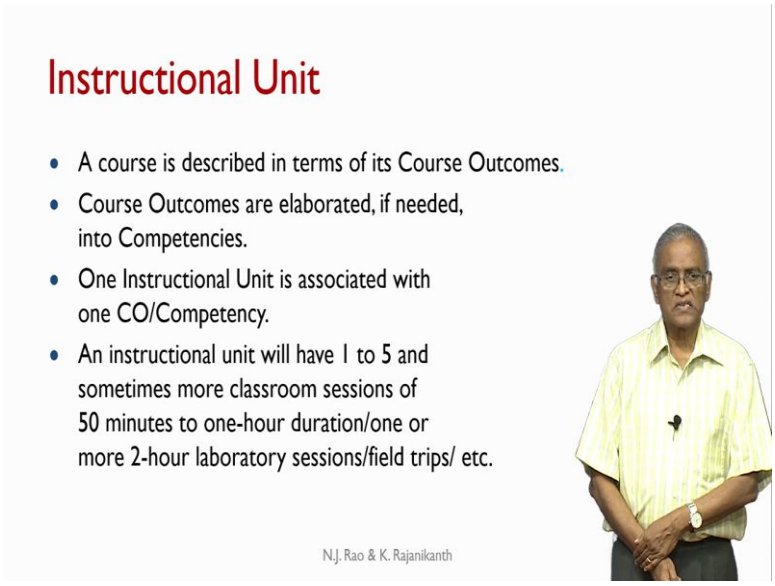

Now you look at how actual course is conducted. You first write course outcomes and competencies. Conduct instruction to facilitate the student to attain the stated outcomes or competencies and then measure the attainment of outcomes, that is a sequence in which you will do. When you design the course, you do 132 instead 123. Now, what is an instructional unit? That is, we consider that is the lowest level of learning unit, that means course is a fairly

large entity and course is described in terms of its course outcomes and course outcomes are further elaborated if needed into competencies.

One instructional unit is associated with one CO or competency. If CO does not have to be elaborated into competencies then CO itself will become one instructional unit. So an instructional unit will have 1 to 5 and sometimes more classroom sessions of 50 minutes to 1 hour duration or one or more 2 hour laboratory sessions, field trips etcetera. That is what an instructional unit will consist of.

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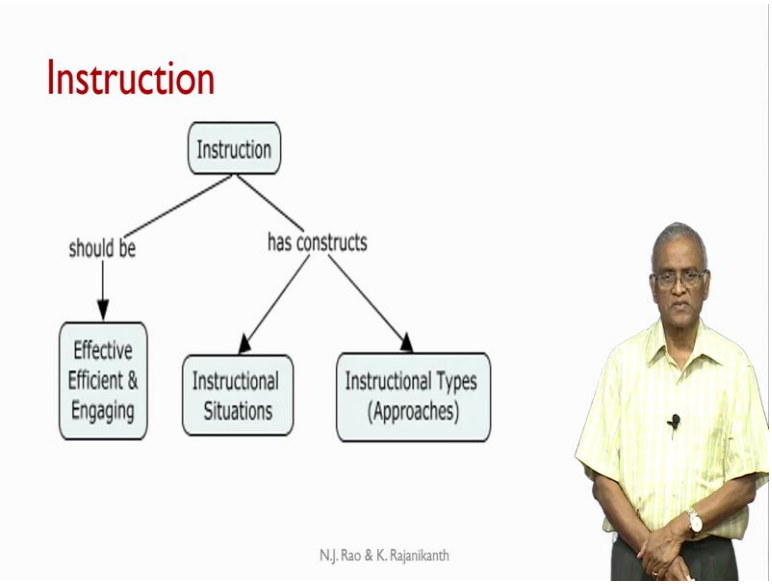

In such a case, now we now need to talk about instruction. There are so many variants because people have been acquiring tremendous amount of experience in teaching and learning processes, you have a whole range of subjects to be dealt with. All subjects are not dealt in the same way, there are so many classifications of instruction that exist in the literature. Now how do I capture all these variants? Here we provide you one way of classifying instruction. First of all, instruction it should satisfy or it should attain these goals irrespective of the actual methods that you would use.

Instruction should be effective, efficient and engaging. That is why we call it E3 instruction, we will presently come to that and elaborate on that and instruction has two constructs at the highest level. One is instructional situation, the other one is instructional types sometimes called instructional approaches. That is a first level of, top level of classification of instruction.

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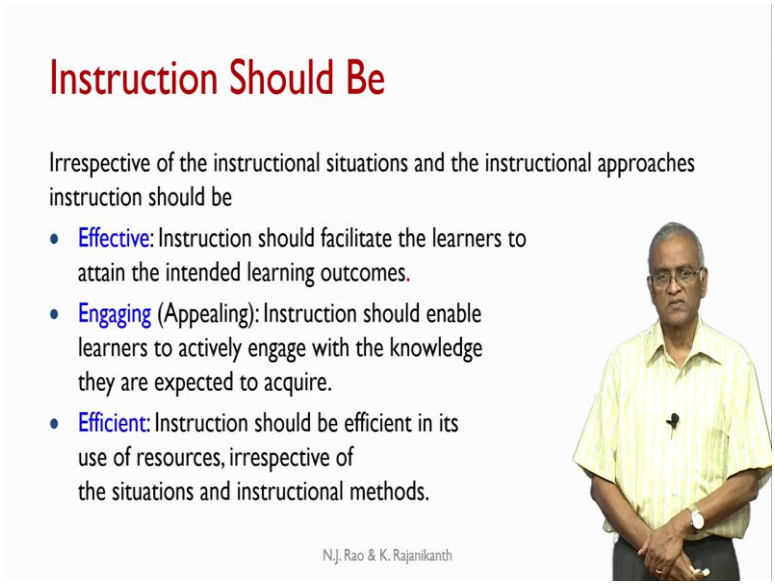

Now as we said, irrespective of the instructional situation and the instructional approach that has been taken, instruction should be effective, what do we mean by effective? Instruction should facilitate the learners to attain the intended learning outcomes. Eventually, whatever time that is allocated, within that time I should be able to attain the learning outcomes that I have stated already. If I have not been able to attain the outcomes then the your entire instruction is not effective and that kind of thing can happen if you have overloaded curriculum, if the number of things that you have to address somehow you are forced to address everything superficially to that extent the instruction will not be effective.

Then the next thing should be, it should be engaging or sometimes called appealing. That means the student should get engaged with the new knowledge they are required to acquire and it cannot be passive process. So instruction should enable learners to actively engage with the knowledge they are expected to acquire. If they are just sitting down in a classroom and listening for 50-55 minute lecture and then the teacher expects them to do their own reading at home, that is not a very engaging or appealing way of instruction.

And the third one is efficiency. Instruction should be efficient, it means it should be efficient in its use of resources irrespective of the situations and instructional methods. So you have to choose your instructional method and manipulate the situation in such a way that it is efficient. That means within the given time, within the resources that are available to you, you have to make it effective, that is you should achieve your goal and these are the 3 major objectives of, or goals of instruction: effective, engaging and efficient.

That is why we also call it E3 instruction. What happens is when you want really achieve the goal of effective and engaging, you may find it may not necessarily be efficient the way you have chosen but the challenge is always to achieve all the three goals, that is a challenge to the teacher.

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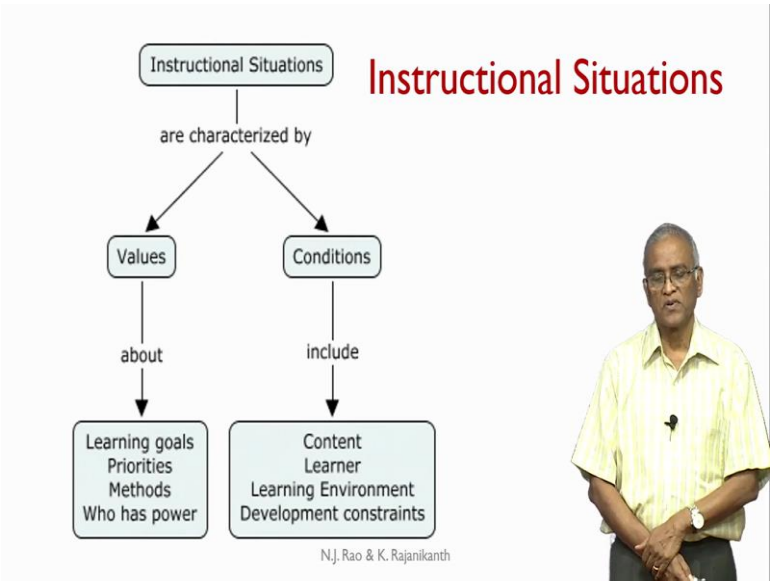

Now we come to, as we said the first one is instructional situation. Instructional situations are characterized by two again; values and conditions. Values are about learning goals, priorities, methods and who has the power. The values are decided by the person who has the power over the teaching learning processes and the other one is conditions, these include content, the kind of subjects that you are doing and also, it is controlled by the learners, the quality of the learners that you have, their motivations and so on, and the learning environment actually this becomes the very crucial.

If the learning environment is not right for the kind of content and the kind of learners you have, the instruction will be ineffective. And also, you have what are called development constraints, we will presently, see all these elements. These will be applicable irrespective of the type of program you are in, the type of subjects that you have and so on.

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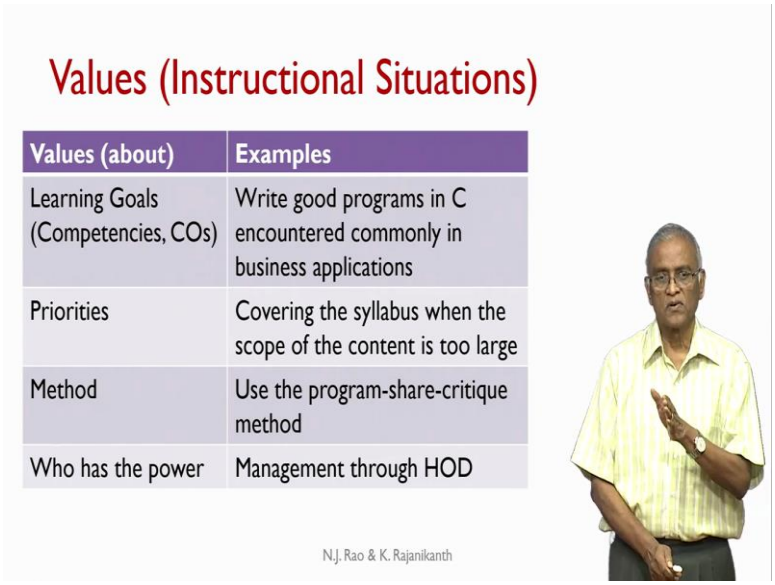

Now, let us take an example of the values. In the instructional situations, what are the values about learning goals? Learning goals for us are nothing but competencies or course outcomes. For an example, the goal of a particular course is to write good programs in C encountered commonly in business applications, that is my learning goal. So depending on the subject, you can alter that particular goal.

Then what are the priorities for us, for the teacher covering the syllabus when the scope of the content is too large, that is a priority. When the syllabus is too large or the number of topics to be addressed is too large then covering the syllabus when the scope of the content is too large becomes the priority. How do I do it in the given time? Then the method that I use for example, I want to use a method to address this particular, to attain this learning goal, use the program-share-critique method, of course, I can use other methods. I can just describe a few programs that we write on the board or present it as a set of slides and ask them to do but here the person has chosen the method of using the program-share-and-critique.

That is each person writes the program and shares let us say with the neighbor and gets critiqued by the neighbor, that is the method some people use. And who has the power over all this things? Generally, in private institutions or in, even otherwise right now 95 percent of the institutions in the country are privately conducted. So the person who has the power over the entire instruction is management through head of the department, that is how it works right now.

And for example, management put some restrictions or goals, they are transferred to the head of the department and head of the department has to make sure that the teacher follow, kind of fulfills those constraints.

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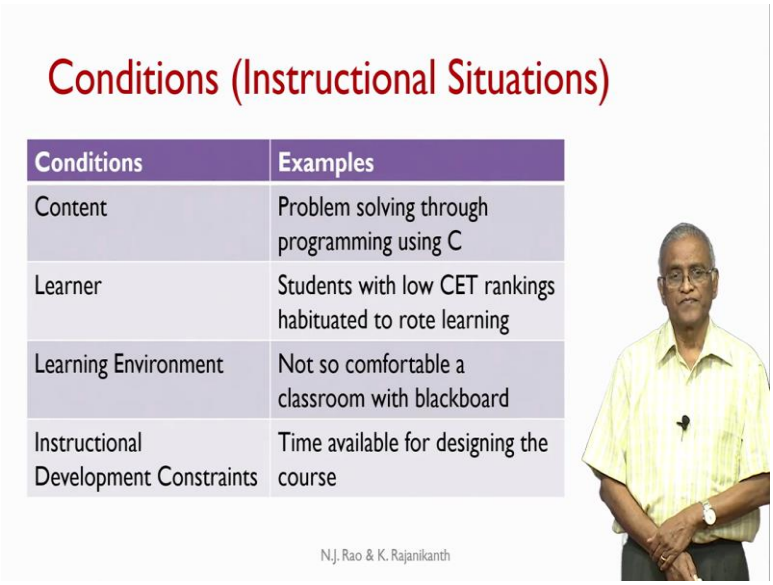

Now let us look at the conditions. You talk about content, learner, learning environment, instructional development constraints. This is what we have written, again content is problem solving through programming using C, that is a title of a course. You have to solve problems through programming using C. Then the learners, let us say in a particular institution or in a particular branch you have students with low CET rankings habituated to rote learning, that is the kind of learners that you have. No point in complaining about it because that is a type of students that come to you, you have to deal with them.

And the learning environment if it happens to be not so comfortable a classroom with a blackboard, all the teacher has access, is classroom with a blackboard and you have to write on the blackboard and sometimes instructional development constraints can be, for example, a teacher with very short notice is asked to teach a course which he has not taught earlier, it happens. So here the development constraint is time available for designing the course, so obviously, this constraint will affect the quality of instruction. So we looked at instructional situation has values and conditions.

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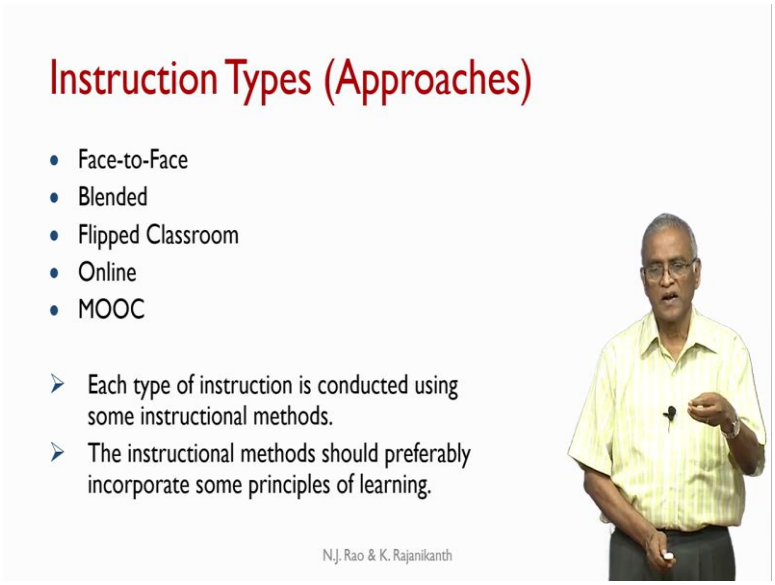

And now we talk about instruction types or they are called approaches. Right now I am presenting you about five of them, you can add more maybe. One is face-to-face, which is the most dominant one, the teacher is working or doing instruction face-to-face in a classroom or otherwise. You can have blended learning that is the part of the instruction takes place on the Internet, not directly face-to-face but part of the instruction takes place face-to-face, that is blended learning.

Then flipped classroom, that is what normally happens in the classroom of transferring information now happens outside and what happens outside the classroom like solving problems, doing assignments get shifted to the face-to-face classroom, that is flipped classroom. You can have online course, in online you are not directly interacting except through some limited amount of online interaction. Otherwise there is no face-to-face interaction. But generally, online instruction is restricted to within a particular college and between a group of students and a teacher.

Whereas MOOC, now the students can be any part of the world and the teacher has a good course, a teacher may have to deal with thousands of students. So how do you take care of good learning takes place is a different challenge with regard to the MOOC. And you require for both online and MOOC courses, you require the appropriate technologies accessible. And again, each instruction, each type of instruction you follow your own choice of instructional methods, there is no universality about it and the instructional methods should preferably incorporate some principles of learning. We will presently come to that, that is you expect,

you accept certain principles of learning and then use them as the framework or use them as a basis for actually designing your own instruction.

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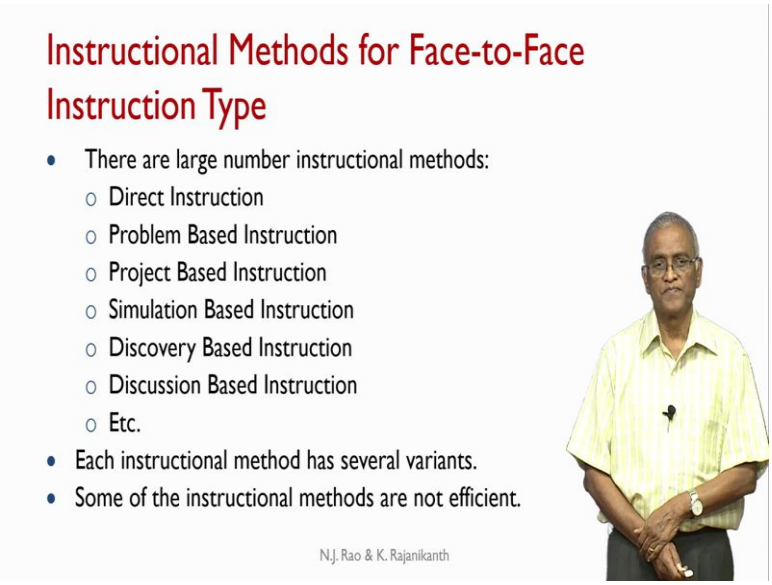

Now, we will mainly confine ourselves to face-to-face instruction type in this particular course. We will not be talking about though this course is being conducted as a MOOC but this, what we are going to present is mainly face-to-face instruction type. Even in this, there are a large number of instructional methods now; direct instruction, you have problem based instruction, project based instruction, simulation based instruction, discovery based instruction, discussion based instruction, etcetera.

There are fairly large number and again, each instruction method has several variants in that. If you take problem based instruction, I may be able to do in several different ways depending on the kind of subject that I have or my own preferences and in some of them while they are effective and engaging, they may not be very efficient. That has to be kept in mind when you say something is wonderful and then you want to adapt that into your classroom.

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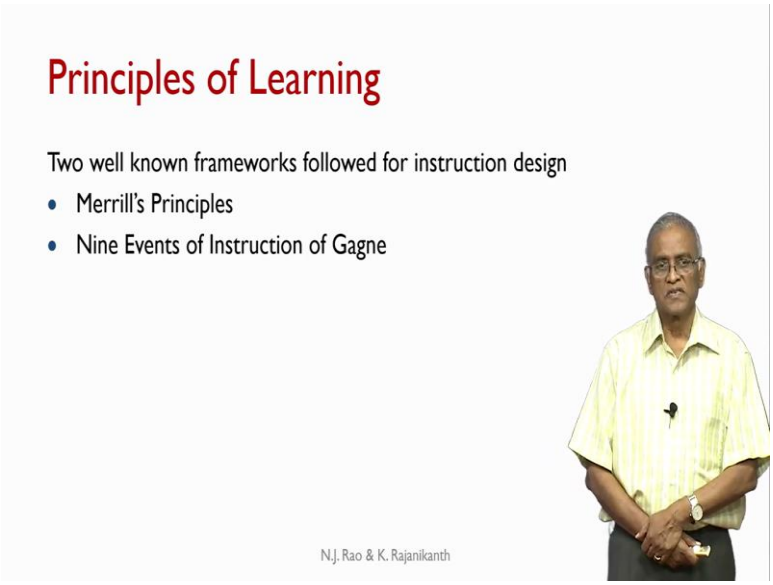

Now, principles of learning, we are only presenting two sets of principles. Two well-known frameworks followed for instruction design are Merrill's principle and another one which has been in the, which is ranging around for quite some time called Nine Events of Instruction of Gagne. We will talk about them more in detail later.

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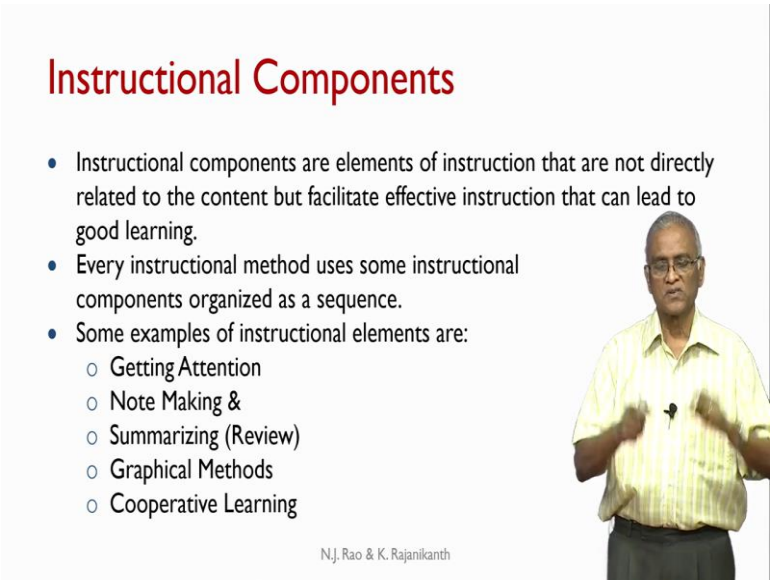

And then you have what are called Instructional Components. Instructional components are elements of instruction that are not directly related to the content but facilitate effective instruction that can lead to good learning. These are subject independent but like every any instructional method that you take, it uses some instructional components organized in a certain sequence. For example, we will again deal with this instructional components also in

detail. Some samples of, or examples of instructional elements are getting attention is one instructional element, how do I get the attention of the students let us say at the beginning of the class, that is irrespective of the subject.

For example, you talk about note making. We ask the students to write a few sentences of what they have understood or what their comments are, summarizing which is similar or reviewing whatever they have learnt over a period of time. You use graphical method say draw a table or draw a graph, draw a picture, you use that. It is instructional component and it can be used in any of the courses depending on the, of course the nature of the topic that you are dealing with.

For example, cooperative learning is another instructional method. There are many more, we will look at them, at least some of them in detail in a later unit. So, an instructional method that you choose will pick for each instructional unit, which is nothing but a competency or a CO. A certain combination of this instructional elements and pieces it together and that becomes the instructional method.

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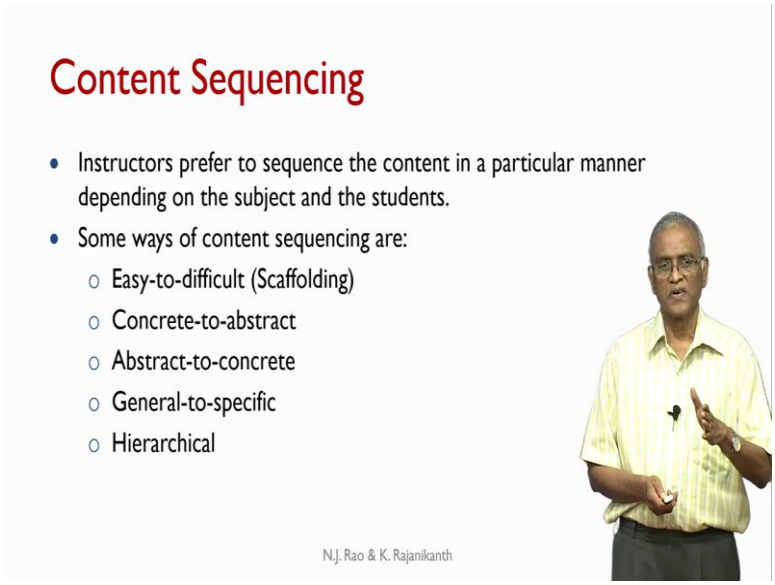

Now there is also another aspect of instruction. Instructors prefer to sequence the content in a particular manner depending on the subject and the students. Let us look at like this when you have really bright students, they do not have to be given lot of detail, they can make something at the very abstract level and then ask them to directly solve specific problems and that method cannot be applied to a different class of students. So you have different ways of content sequencing, easy-to-difficult, you start with simple problems, make them solve, make

them absorb that and then start going to the next level and so on. You move from easy to difficult problems, that is called scaffolding. And concrete-to-abstract, you solve some concrete problems and then abstract them and generalize them in terms of like convert them into some theorems or certain abstract structures.

Or the other way, just now as I mentioned abstract-to-concrete or general-to-specific, it could be hierarchical, so there are several methods of content sequencing which the teacher can choose depending on the kind of instructional situation that you have.

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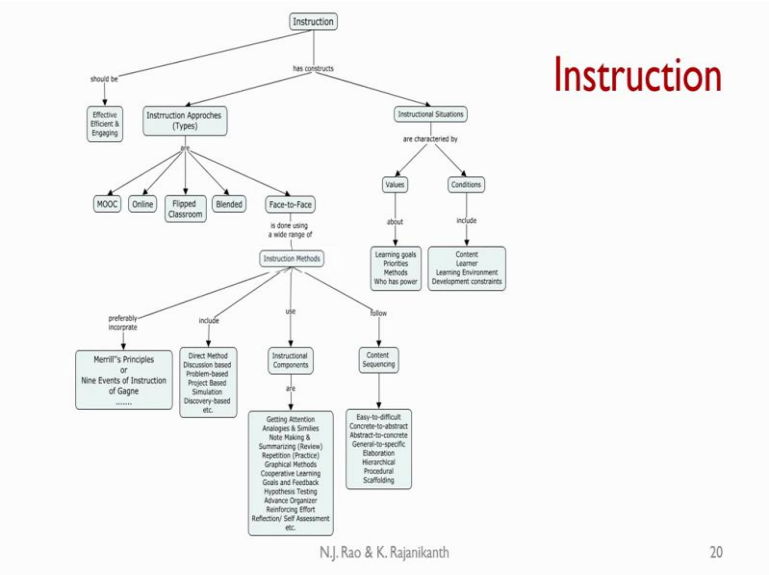

Now all this can be captured, of course the here the instruction should be E3 and has constructs, instructional approaches, these are the five that we talked about and this face-to-face one can use several instructional methods and those are the one and they, for example, they primarily incorporate one of these, follow one of these learning principles and then you have several methods here and then you have instructional components and then you have content sequencing. These are all the, this is how one can classify the instructional method and instructional approach, so we are confirming ourselves only to this part, we are not looking at these four.

And coming to instructional situation, we have already looked at values and conditions and we have elaborated on that. Mind you, the instructional situation has really the most dominant effect on the quality of learning as of now. Because whatever teacher or students complain, first they are mainly are related to instructional situation.

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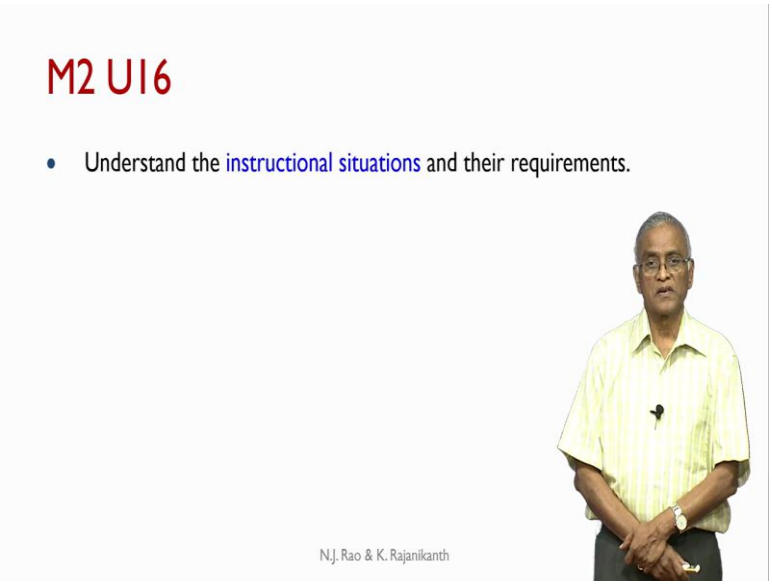

And in the next unit, we, that is why we try to understand the instructional situations and their requirements. Thank you very much.