TALE - 2 Course Design and Instruction of Engineering Courses

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Lecture - 02
Course Design

Greetings and welcome to unit 2 of module 2 of TALE. This is related to the role of Course Design.

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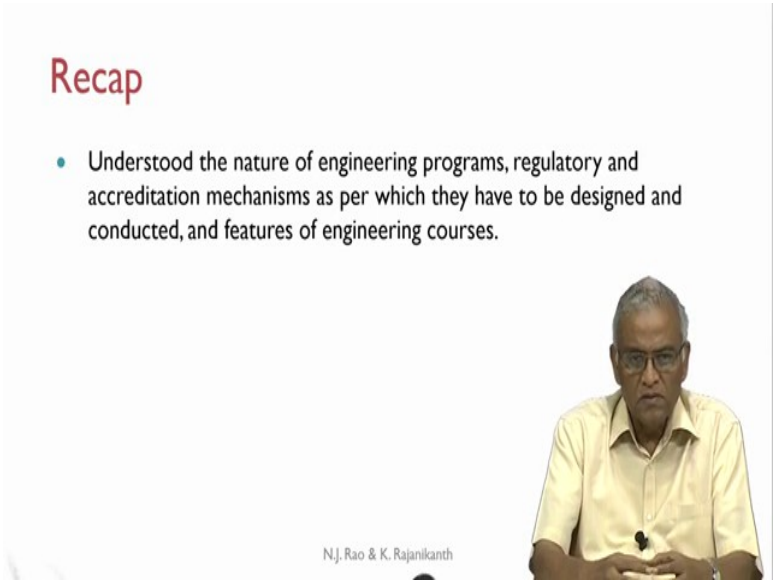

In the earlier unit that is unit 1 of module 2, we understood the nature of engineering programs, regulatory and accreditation mechanisms as per which they have to be designed and conducted, and the features of engineering courses. Why we keep insisting on all these constraints and all that? No course should be seen in isolation.

Somehow, we have been ending up with a situation where each course is looked at by a faculty member almost in isolation. Several courses together form a program, and through these courses we are required to attain certain outcomes. So, all the courses are playing a role, and there are lots of interrelationships, which will have to be respected. The entire program will have to be designed keeping these interrelations and interdependencies into account.

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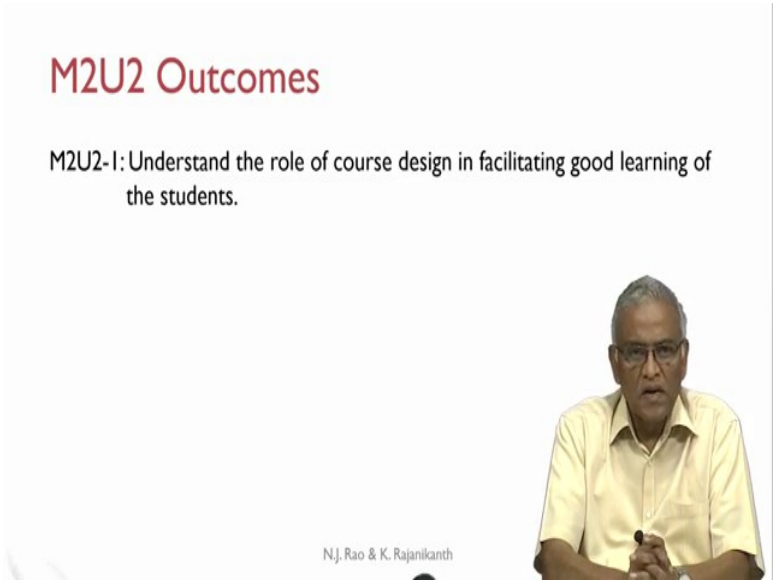

The main outcome of this unit 2 is to understand the role of a course, design it facilitating good learning by the students.

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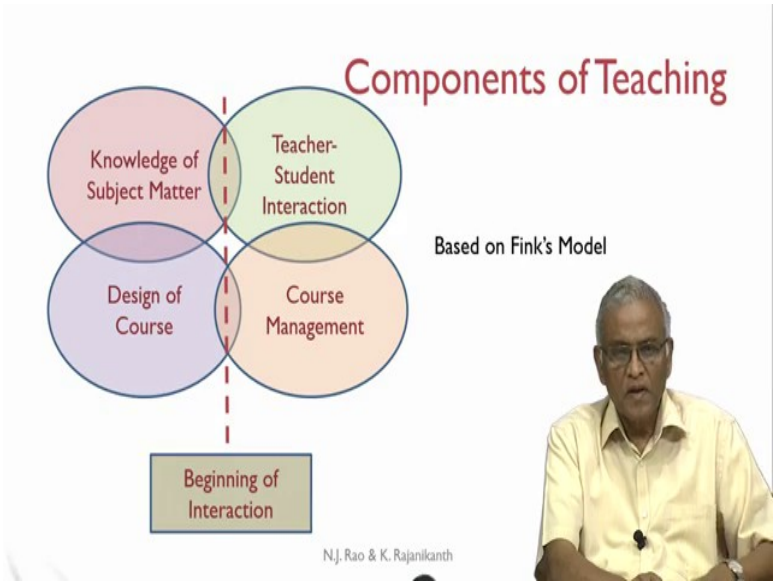

Now, let us look at components of teaching. This model is based on Fink's model, the reference will be provided to at a different place. Fink has suggested that there are four components of teaching, and we can see there is a line that demarcates the beginning of interaction in the classroom.

For example, knowledge of subject matter and design of the course are prior to the starting of the course. There is a bit of overlap, and when the course is actually in operation, teacher student interaction and course management are the components which become dominant during the conduct of the course. Prior to the beginning of the course the knowledge of subject matter and design of the course matter. So, broadly that is a model that has been given. Let us look at each one of these components.

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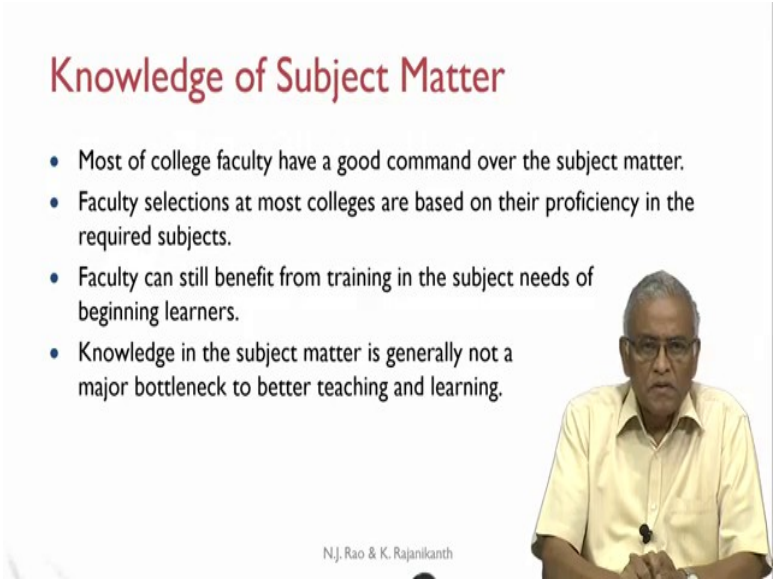

The prerequisite to offer a course, obviously, is the knowledge of subject matter. The teacher is expected to have good knowledge of the subject matter he is actually teaching, and most of the college faculty members have a good command over the subject matter. And if the subject matter is changing from time to time, we have a whole bunch of mechanisms available where faculty are encouraged to go and attend some short-term courses with the new knowledge that they need to have.

Faculty are selected at all the colleges, based on their proficiency in the required subjects, but they know the faculty can still benefit from training in the subject needs of beginning learners. One thing should be remembered, knowledge of subject matter is a prerequisite, but what the teacher is involved is in facilitating the students to learn.

How learning takes place that is not an area normally any new teacher knows. Maybe through experience he may understand something, but he is never formally trained in that. And especially the needs of beginning learners: when I start the course there are some prerequisite

concepts they have to master, what exactly they are and how do I prepare my students for my present course – these are things that all faculty can benefit.

Knowledge in the subject matter generally is not a major bottleneck to better teaching and learning. So, we will take it for granted, though from time to time even the subject matter needs to be upgraded for all the faculties, for which already well-organized programs are available. But we start with the assumption that the teacher has good knowledge of subject matter. These days, of course, you have Wikipedia and Google and any subject matter is readily accessible to the teacher.

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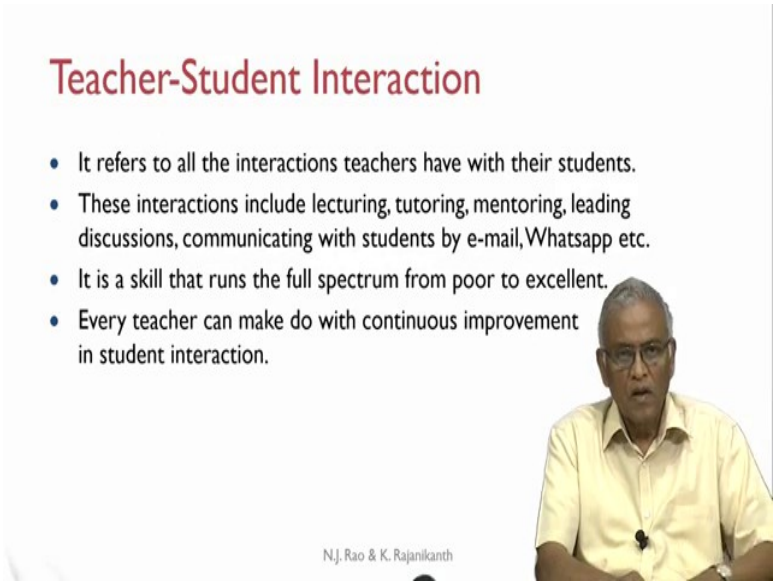

Now comes a very important aspect namely teacher-student interaction. It refers to all the interactions teachers have with the students. What are these interactions? These include lecturing, tutoring, mentoring, leading discussions, communicating with students by email, WhatsApp etcetera. So, there are a whole lot of interactions that take place, all of them refer to teacher-student interaction. And the funny thing is, if you look at all good, average or a low-end institutions, it is the skill that runs the full spectrum from poor to excellent.

Unfortunately, if somebody starts with a poor teacher-student interaction, somehow the teacher continues to stay at that level. But every teacher can make do with continuous improvement in student interaction. Even if he's close to retirement or any person for that matter life-long can continue to improve with regard to teacher-student interaction.

Once you accept that as a teacher, you will continue to learn or improve upon this teacher-student interaction. Teacher student interaction has a major role to play in keeping the students motivated, and so on. We are all familiar with this, but it has to be brought into focus, and we have to plan activities that enhance the teacher student interaction.

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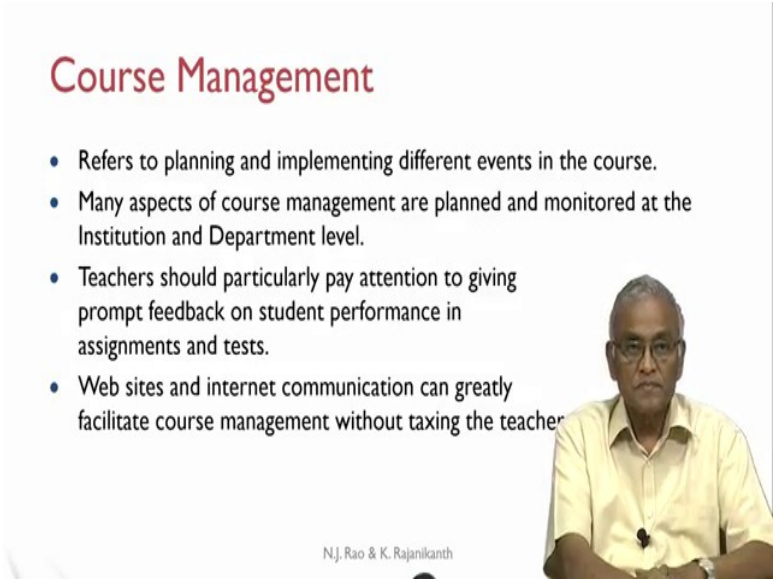

Course management: it refers to planning and implementing different events in the course. But many aspects of this are planned and monitored at the institution and department levels or sometimes even by the university. You have a schedule of normal academic activities, when should the course start, when should your lecture plan be made available, when to conduct tests, or when to give assignments, The entire process or all the events that take place right until the award of grade of a course, are all generally planned within the university framework or the institutional framework.

So, this is not a major issue, a few additional things teachers should particularly pay attention is to giving prompt feedback on student performance in the assignments and tests. If that is given in time, the final performance of the student is likely to improve significantly.

These days websites and internet communication can greatly facilitate course management without taxing the teacher. If you use some kind of learning management system like MOODLE, it is possible to facilitate course management much better. That means, you can send an assignment, send comments on student responses without individually writing emails or taking printouts. The internet or the learning management system can greatly facilitate

that. These days the Smartphone is also becoming integral part of a classroom interaction as well as course management.

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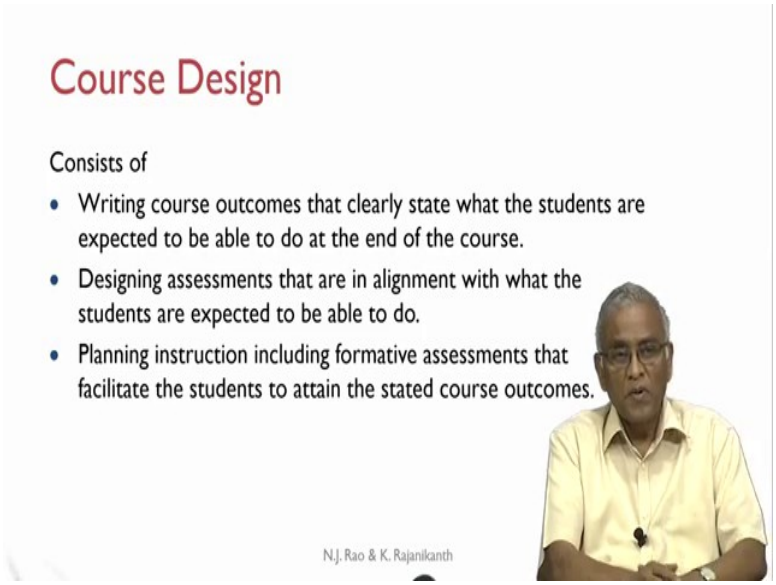

Course design: the last component - what does it consist of? It consists of writing course outcomes that clearly state what the students are expected to be able to do at the end of the course (this is dealt in Module 1 - how to write course outcomes).

Designing assessments that are in alignment with what the students are expected to be able to do. This assessment is a measure part of a course design, both formative assessment and summative assessment. Planning instruction including formative assessment that facilitates the students to attain the stated course outcomes is the next step. So, if you do it in advance before the starting the course (in the beginning of the semester) then it is course design.

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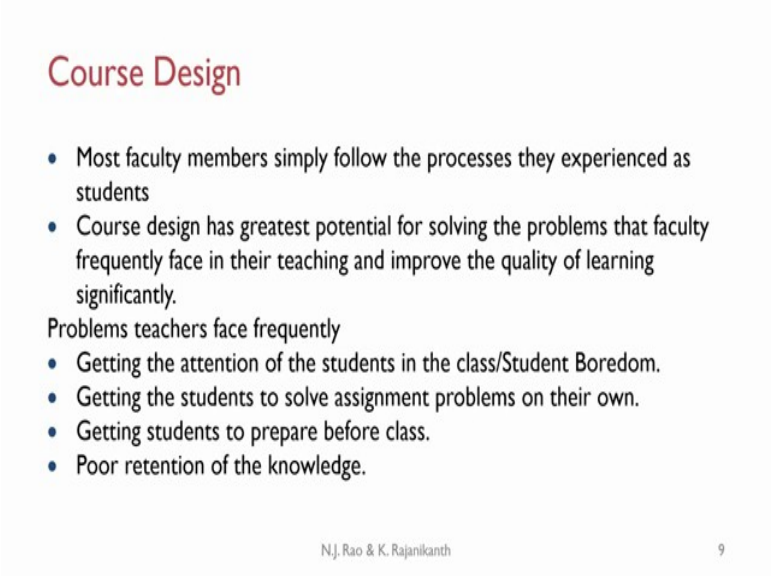

Now, coming to the current practices, most faculty members simply follow the process they experienced as students. So, what do you do? You do not particularly follow a process, but there is some implicit process you understand, and you start preparing your own personal course file. One course file of one teacher may significantly differ from the structure of the course file of the other faculty members. Most of the teachers do not follow any standard process.

It was observed through field surveys that the course design has the greatest potential for solving the problems that faculty frequently face in their teaching and improve the quality of learning significantly. Many times, even if you are not that very great with respect to your mastery of the content, or have some inherent limitations with regard to student teacher interaction, a good course design can overcome some of these limitations and still improve the quality of learning significantly.

We plead with you to follow some course design process. We are going to offer one process as a part of this module, but if you think that something different that needs to be done please go ahead but follow some well defined process. What are some problems teachers face frequently? The most important thing is getting the attention of the students in the class, that is when they come to the class, do they pay attention to what you are presenting in the class during the 50-55 minutes. You may put it in another way as student boredom. After some time, for whatever reason a student mentally drops out, in the sense he is physically there, but

is not anymore following what the teacher is saying. You are losing the attention of the student.

If I do not have the attention of the student whatever I do; however well I write on the board, whatever sentences that I use are of no consequence. Attention is the most important with regard to students. Another issue is getting the students to solve assignment problems on their own

Something has to be done, and you do not even know if you are capable of solving those problems, or you do not want to put the effort. To that extent I will just copy from my neighboring student. Every class works out its own dynamics, somebody solves and puts it on the WhatsApp, and then others copy from there to submit the assignment.

But the issue is not one of formal submission. The solving of assignment problems is one major way for learning the subject, and we should convince these students that they should spend time on this. That means, when I am solving the assignment problem, I am getting engaged with the knowledge concerned. The more and more I get engaged with the knowledge then only I will be able to learn better. So, unless I am convinced that I need to solve problems I will not put the required effort. This is one of the important issues, and the course design can address these issues to a significant degree.

Another major issue: many times if the students can prepare before coming to the class I can do in my class much better and I can start discussions. I can focus on solving the problems or address individual issues. I can do that provided I can persuade my students to study the material before coming to the class.

This can very rarely be done because the student comes to the class with the assumption that when the material going to be addressed anyway in the classroom, why should he spend time a prior to coming to the class. This is a an issue throughout the world, how to get the students prepare before the class. In some universities and in some programs they make it mandatory. Especially in law, they will assign plenty of reading, and nothing of what is to be read will be addressed in the classroom. You straight away start discussing the contents of that and if the students are not prepared they lose out in the final grade.

Yet another major issue is poor retention of the knowledge. While we seem to be understanding when the teacher explains, but after sometime because I am not using that

knowledge anywhere like, for example, I am not solving assignment problems and I am not practicing. When I am not using the knowledge or practicing; it will slowly start fading from the memory. So, there will poor retention of the knowledge.

These are some of the major problems the teachers face in course design. We will not say course design will solve all these problems, but it has a greatest potential to address these problems. If you do a systematic course design many of these problems can be addressed.

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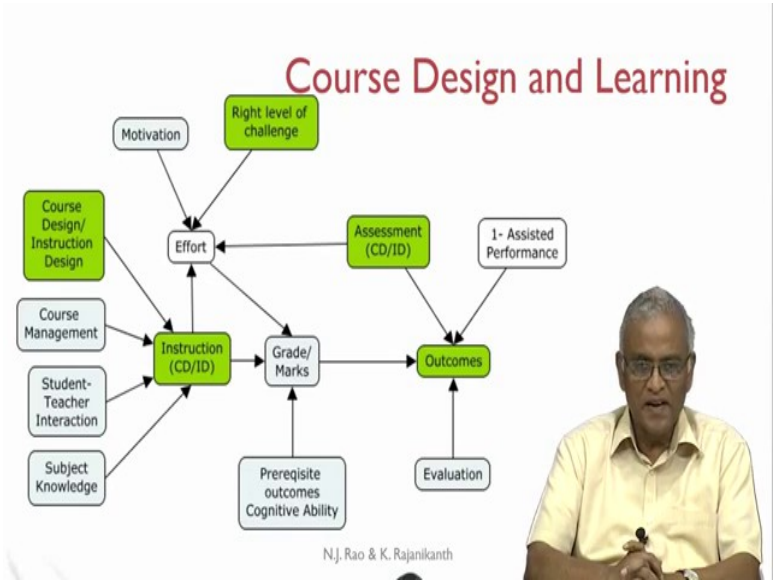

Let us look at this relationship diagram or interdependency diagram. There is no absoluteness about these relationships. If you can spend a little more time, look at these factors together in a different way, and can draw a slightly different diagram. Let us look at different issues.

Here if you look at the four components of a course: subject knowledge, student teacher interaction, course management, and course design. These four components may together be called course design or instruction design, and they lead to actual instruction. You conduct instruction, tests, examinations, and assignments before you give a grade.

We also consider the outcomes are better achieved if the students get more marks. The attainment is measured through the marks the student has scored at various points. But the grade or marks will represent the attainment of outcomes provided the assessment is right.

If I give a very cheap assignment; that means, predominantly related to remember, and very predictable questions (if assessment is poor), then grades really do not represent the

attainment of outcomes. If the student performance is not evaluated properly, two things can happen. I can be liberal in evaluation, for example, I just give out 5 of 5, even if he has written one-tenth of the answer correctly or I will give 4 out of 5, or sometimes I can be very strict in evaluation. Both ways the outcomes are affected. If I am strict then the grades will be lower. If I am liberal with the evaluation, I am giving more marks, but more marks does not mean that outcomes are better attained. Then there is another crazy thing, which still happens throughout the world - assisted performance. One assisted performance that all of us are familiar with: I create a small question bank. I give you 20 questions out of which 15 will be asked in the examination. That is in some sense assisted performance. I look the other way when people copy from each other or the instructor himself during the examination will come and give some assistance. “Oh you are doing it wrong, you made this wrong assumption” - something like some hints that you give while the student is writing the exam.

We called it (1 - assisted performance). If it is 1 assisted performance is totally absent, then the grades will represent the attainment of outcomes not otherwise. So, the outcomes are represented by grades only when assessment is right, there is no assisted performance. And now the grades and marks are decided by not only your instruction but also by the effort put in by the student. When does he put the effort? It depends on his perception of the assessment. and when the student feels there is a right level of challenge. If it is too difficult, he/she would not put the effort; if it is too easy, he/she would not the put the effort.

Sometimes in spite of all these, there are some subjects I am not interested whatever be the reason; I am not motivated. So, the teacher will have to spend some time to find out reasons for this disinterest. Unless you address this issue, the effort y the student will not be appropriate. This effort can lead to getting the appropriate grade or marks. It is also dependent on whether prerequisite outcomes of any of the course under consideration were attained or not. Does the student have all the knowledge of the prerequisites to a course.

All students do not have the same cognitive ability: some people require lot more effort to come to a conclusion and some people can come to a conclusion very fast. Whatever you call this ability - IQ or by any other label you want to give the cognitive ability. If I have higher IQ, I am likely to perform better.

Look at the things in green colour, they are all related to course design or instruction design. That is a relationship that a teacher should be familiar with.

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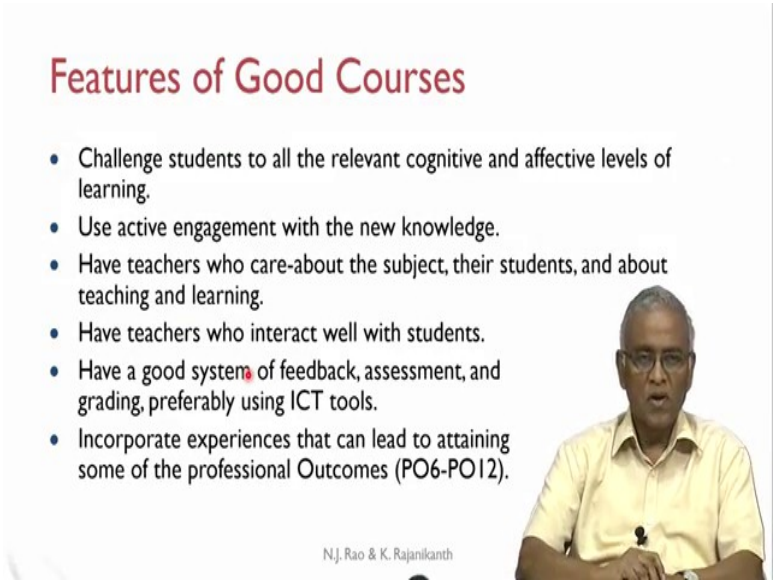

What are the features of good courses? Good courses challenge students to all the relevant cognitive and affective levels of learning. That means, you're really looking at all the relevant cognitive and affective levels. They use active engagement with the new knowledge. You plan exercises through course design in such a way that students are required to engage constantly with the new knowledge that is being imparted.

Good courses have teachers who are passionate or loves the subject, care for their students, and teaching and learning. Good teachers interact well with the students, have good systems of feedback, assessment and grading preferably using ICT tools.

Good courses incorporate experiences that can lead to attaining some of the outcomes PO6 to PO12, which are also called professional outcomes. Because the earlier era courses only focused on the technical content not on the professional outcomes related to communication, teamwork, continuous learning, impact of technology on society and so on. However, not every course will address all the professional outcomes. At least some of them need to be addressed by a course.

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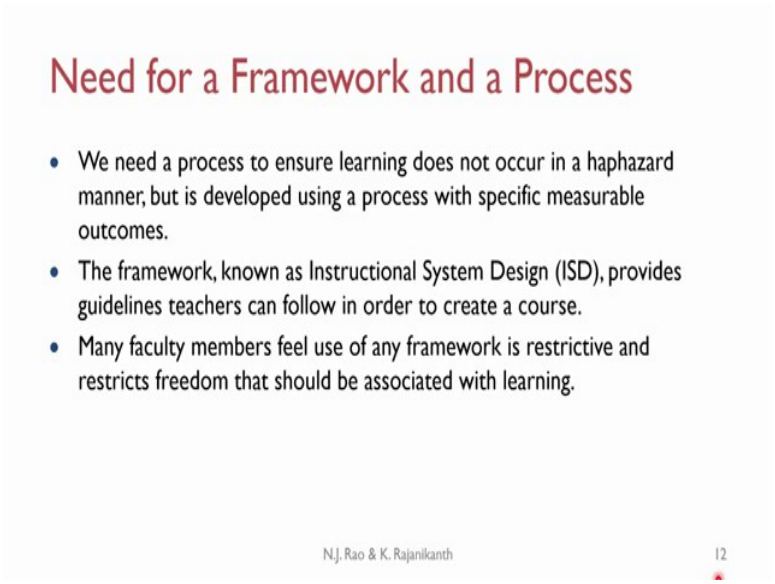

Need for a framework and a process: How do you address all these complicated relationships that we have identified? The framework is provided by NBA and AICTE. Curriculum identifies the relationships among courses. NBA stipulates that we need to achieve the stated program outcomes and program specific outcomes. How do we do all these? When I do it intuitively, I may not be a paying attention to all the details appropriately, that is why we require a framework and a process.

We need a process to ensure that learning does not occur in haphazard manner, but is developed using a process with specific measurable outcomes. Framework known as instructional system design (ISD) provides guidelines to teachers that can be followed in order to create a course.

These are only guidelines; it will not say you have to do it exactly in one particular way. It provides guidelines, but if you do not like one framework or one instructional design model, you choose something else and design your course according to that. But, unfortunately, many faculty members feel use of any framework is restrictive and restricts freedom that should be associated with learning. Any framework that one suggests, first reaction of many faculty is - no that is not education; education means total freedom that teacher and students need to have to explore. Sometimes it may look like an excuse, and sometimes it is a very strong belief that no framework should come near teaching and learning. Frameworks do not

actually restrict any of your academic decision making. By following a framework of your choice, you will be doing a much better job facilitating your students to learn.

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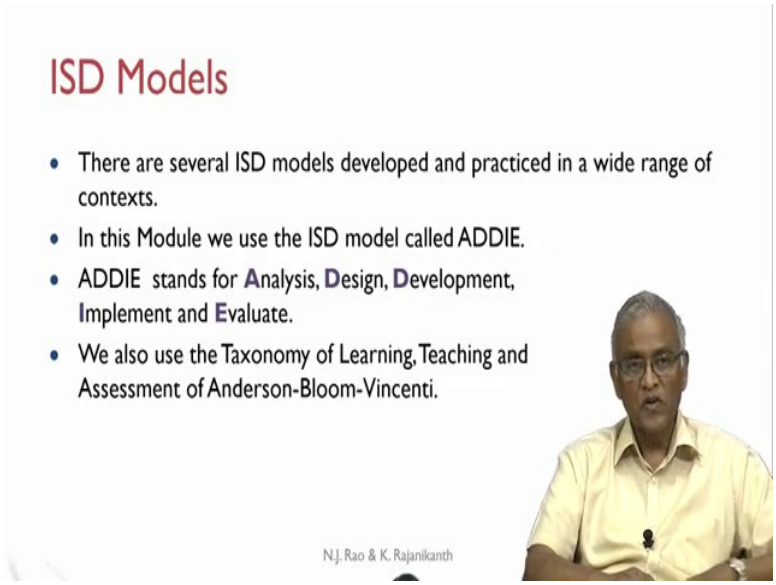

There are several ISD models developed and practiced in a wide range of contexts. In this module, we use the ISD model called ADDIE. ADDIE acronym stands for Analysis, Design, Development, Implement, and Evaluate and we also use the taxonomy of learning, teaching and assessment of Anderson-Bloom-Vincenti. So, our framework here in the module 2 is based on Anderson-Bloom-Vincenti taxonomy and ADDIE framework.

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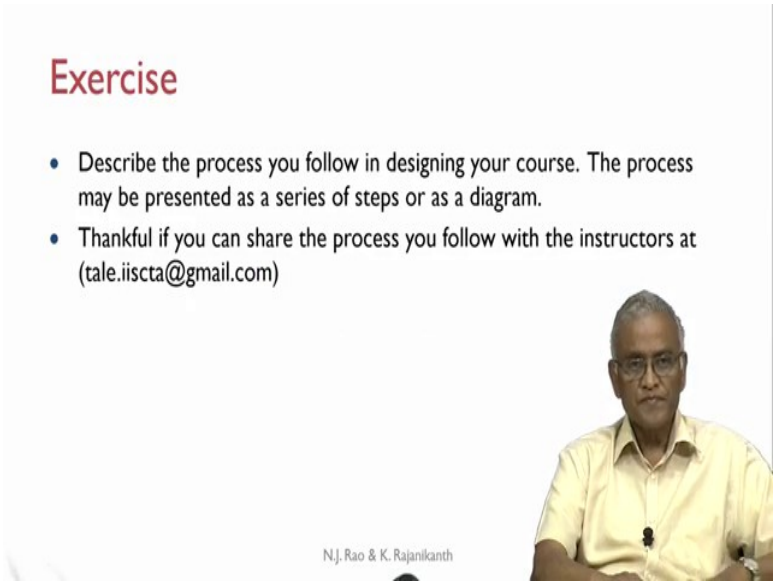

As an exercise we request you to describe the process you followed in designing your course. If you can capture them as a sequence of steps or in the form of a diagram, we would like to explore your option as well. There is no framework that needs to be followed by everyone. We will be thankful if you can share the process you followed with instructors at this particular email ID.

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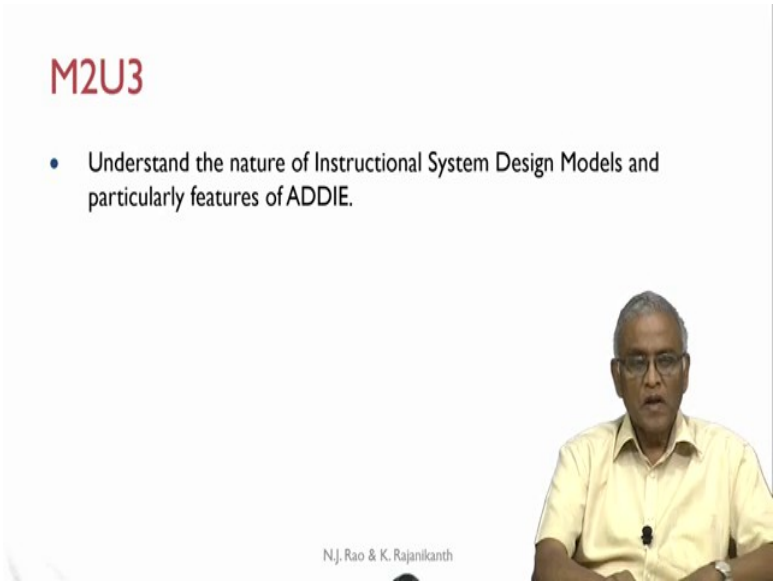

In the next unit; we will try to understand the nature of instructional system design models and particularly features of ADDIE.

Thank you very much for your attention.