NBA Accreditation and Teaching - Learning in Engineering (NATE)
Professor N. J. Rao
Department of Electronics System Engineering
Indian Institute of Science, Bengaluru
Lecture 27 - M2 U6: Technology for Assessment; Setting Targets

Greetings and welcome to NATE, module 2 unit 6 on Technology for Assessment and Setting Targets, which is part of design phase.

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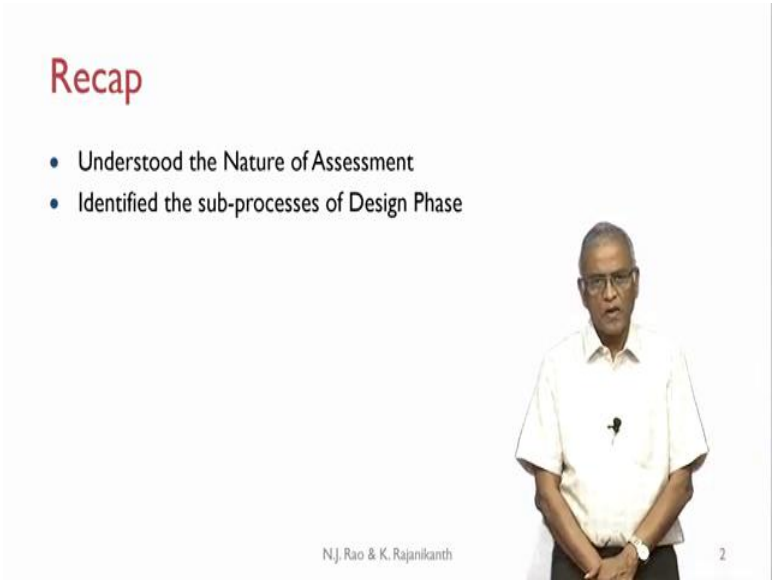

In the previous unit, we understood the nature of assessment as we have been repeatedly saying, assessment really drives learning. So designing correct assessment is the key to improve the quality of learning. And we also identified the sub-processes of design phase.

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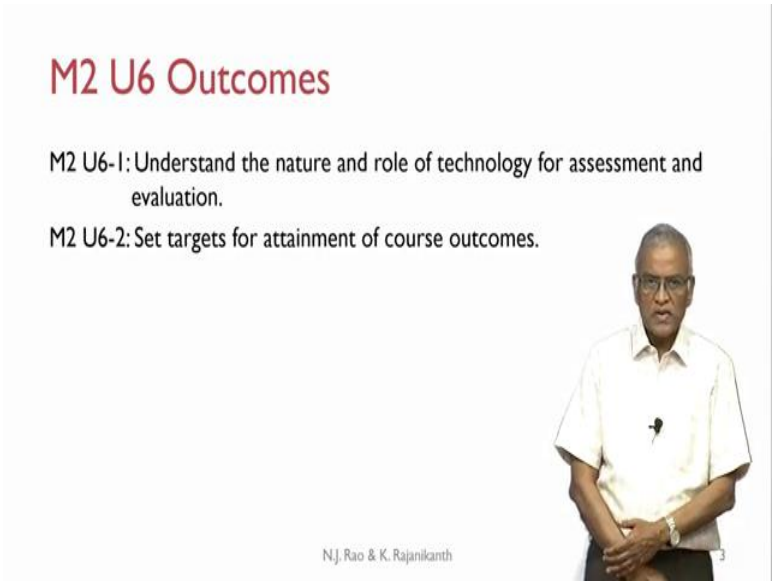

We will now continue with the first two sub-processes of design phase, which are to understand the nature and role of technology for assessment and evaluation. The choice of technology will determine the kind of assessments that you can design or want to design because technologies do not exist for every type of assessment.

So, depending on the technologies available to the teacher or available at the institution, you need to work on the design of assessments and similarly, evaluation also, which is associated with assessment will also require its own technologies. And the next stage is design of assessment is also based on how you have set the targets for the attainment of course outcomes which we have considered in great detail in module one.

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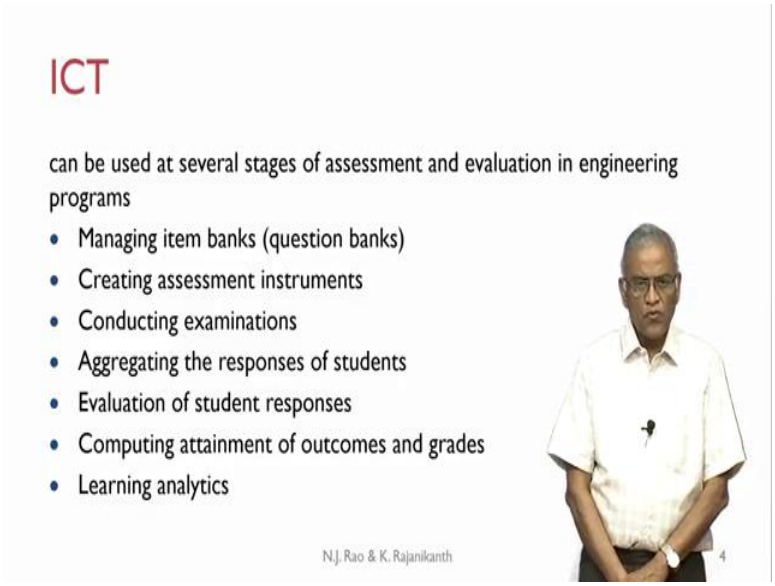

Now, you can use Information and Communication Technologies at several stages of assessment and evaluation not only engineering programs for that matter any other program. The, this is one classification of the activities and for which ICT tools can be identified. First thing is managing item banks. We are only looking at activities that come under design phase, not as a part of instruction, the ICT tools for instruction are very different, which we will explore in the module 3.

Now, the area where ICT tools can be considered are management of item banks are sometimes known as question banks, creating assessment instruments that can I design from the item bank a set of assessment instruments or question papers as you can call or technologies that are used in conducting examinations and also aggregating the responses of students which is a very peculiar requirement in Indian context. That is, for especially

affiliated colleges where students write the same examination at multiple places and the responses of the students have to be collected and sent to a centralized place.

And also evaluation of student responses, computing attainment of outcomes and grades. And these days what are called learning analytics. So, these are all the areas related to assessment that the information and communication technologies can be used. Let us consider each one of them one by one.

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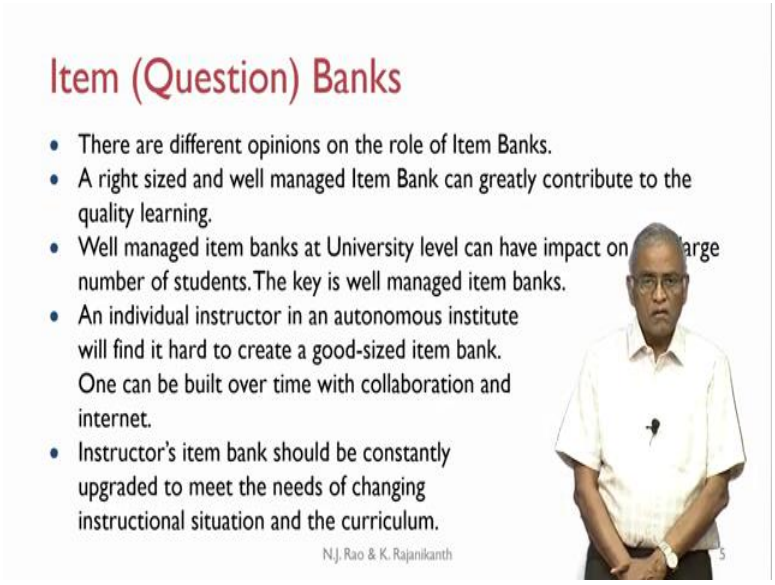

Now, item or question banks everybody is familiar with this concept, but different people have different opinions. Some people consider, you are only providing a method to students to mock the answers for a large number of questions and reproduce them or sometimes also what happens they for variety of reasons, either the teacher or the institution or the sometimes university start shrinking the size of the question bank.

That means you have 50 questions out of which 20 will be asked in the exam, which completely destroys the purpose of assessment. Some people feel if you have item banks created a priori then it is possible to design good quality questions, properly designed distributed over several cognitive levels, as well as course outcomes and so on. And one can design a very balanced examination paper or an assessment instrument and he can also create assessment (instru) multiple versions of assessment instrument which are all of the same quality.

So, I, we take the position that item bank properly designed can have a great impact on the quality of learning in any institution. So, we say a right sized and well managed item bank

can greatly contribute to the quality of learning. So, the key words are right sized and well managed. So, let us look at a well managed item bank at the university level can have impact on very large number of students.

If you are adopting the item bank approach at the university level, it can because there are large number of colleges involved and it will impact on the quality of learning of large number of students. That is easily stated but the key is well managed item banks, when you have to create item banks for about 400 and odd and maybe sometimes 600 courses in a centralized place, the processes the people involved are the way you review. These can become extremely complicated and in that process, there it may be difficult to assure the quality of item banks.

So, what do we mean by a well managed item bank? For example, you can seek contributions from different teachers and sometimes even from students to contribute items to the bank. It need, it need not be designed by one person and in fact should not be designed only by one person and when they come from multiple sources, the quality of the item may sometimes will become questionable.

First of all, the language itself may not be appropriate, there may not be adequate clarity about the question or there can be significant variation in the difficulty levels and sometimes even technically technical incorrectness also can creep in. So, what happens before an item is accepted into the bank, there has to be a review committee that will check out all these things before it is actually incorporated into the bank.

So and to do this, to review all these items for a few hundred courses is not going to be very easy. That is one that is why in a centralized way, while it is desirable, it may be very difficult to actually implement and still produce a good quality item bank. And right sized would mean what? How many questions should you have in the item bank for it to be meaningful? Yes, we, we say a starting number will be about thousand, at least thousand you can start then only it can be meaningful. And also the question should have a large an adequate numerics in them.

So, when you have new questions that demand numerics, then every time you ask the same question, I can change the numerics. I can change some numbers, so, the students cannot mug the answers for those questions. So, these are the features that have to be incorporated in designing a good a question bank.

On top of that, you should also keep the question bank or item bank dynamic. What does it mean? Every year, you kind of archive 10 percent of the questions, I am saying arbitrarily 10 percent could be 15 percent. And bringing new questions, the same 15 percent question new questions can be brought into the bank. So to that extent, your, the yearly change in the item bank can be as much as 20 to 30 percent, which is a good one.

And the items that are archived can be brought back into the item bank maybe after a few years. As I said, these are all nice things to say, but very difficult to manage on a large scale. But an individual teacher, it is possible for him to maintain the quality and right kind of item bank but even then it involves a lot of work.

So, an individual instructor in an autonomous institute, he will find it hard to create a good sized item bank. But it can be built over a time with collaboration and with the help of Internet and you can also collaborate with others. Like you can ask your students to suggest some questions, you can borrow from your colleagues, from other institutes, and so on.

So, but an individual instructor can build a good sized item bank as per his requirements as per the requirements of the course that he is dealing with. It is much more viable to deal with an instructor, individual instructor level, than at the university level which you will involve hundreds of courses and hundreds of people and the processes will have to be monitored and so on.

So, at the instructor site of a bank should also be constantly upgraded to meet the needs of changing instructional situation and the curriculum. So, it has to be dynamic and it can be made dynamic with it at the individual faculty member level, but it will be a lot more difficult to create at the university level.

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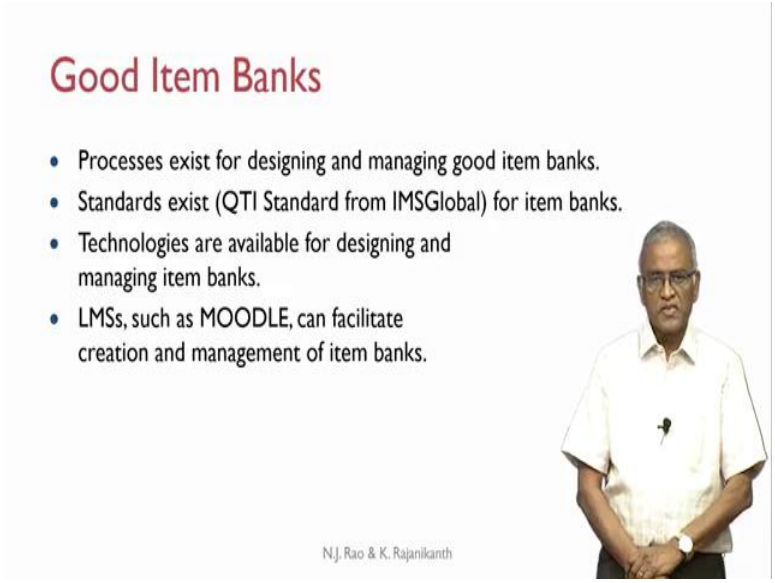

And processes do exist for designing and managing good item banks. This issue has been addressed by organizations like IMS Global and they have defined what is called QTI standard, QTI is question test item standard for item banks. So, if one wants to design an item bank, it is good to borrow the standard from IMS global which is available on their site and it is free and any software that you want to develop for managing all the processes related to the item bank, they can be designed based on the standards made available by IMS global. So, technologies are available and different companies have developed technologies as per the standard.

So, either you can go to them or if you have people in your institute, who are interested and capable of developing such technology, they can also be used. For example, LMSs that is learning management systems such as MOODLE, can facilitate creation and management of item banks. The while they provide you the tools, the process of creating that means how do you tag the questions and how do you review the questions, how do you archive some questions every year, how do you bring in the new questions, all these processes will have to be set up by the individual instructor.

So, an item bank idea is worthwhile to be pursued. And we strongly recommend those instructors who are who really believe in that to do it, but once you create an item bank, a life becomes easier for the instructor to set up whether a class test, another paper, second paper, third paper or the final semester and exams and all that can be created very easily and all of them are the right kind of quality, that is the advantage of having item banks and the technology for that.

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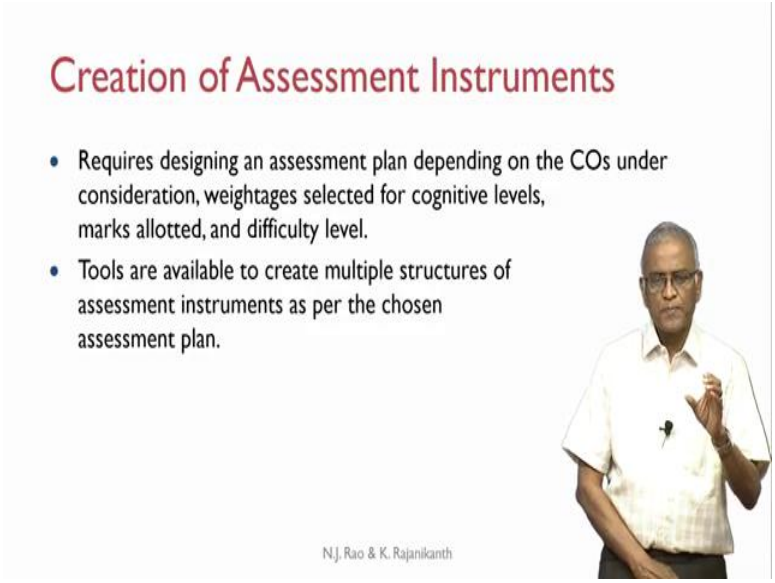

Next is I have the item bank, alright. But I have to create an assessment instrument, I have to produce a test paper or an exam paper and exam paper has certain structure and there dealing if it is a class test, it is only dealing with a subset of the course outcomes. And when you want to create an assessment plan, depending on the COs under consideration, for example, some CO maybe at remember level or it could be at understand level and I need to have some two questions of two marks under understand from CO1.

Let us say I have a requirement like that. So, I should create such plan assessment plan with proper weightage to for selected cognitive levels, marks allotted and also paying attention to the difficulty level of the question. So all this can be, I will not say automated, can be structured in a proper way. So you create a plan first. And according to the plan, you create the assessment instruments.

Now, tools are available to create multiple structures of assessment instruments as per the chosen assessment plan. For example, I want to give weightage, let us say, out of 20 marks 5 marks for understand question, questions belonging to CO2. Now, I can create multiple structures that is the weightage for different questions can be modified and yet it is broadly as per the assessment plan. So, tools are available for creating such options. So, any structure that you can take once I select my structure, then I this structure I use as a basis for actually creating the assessment instrument.

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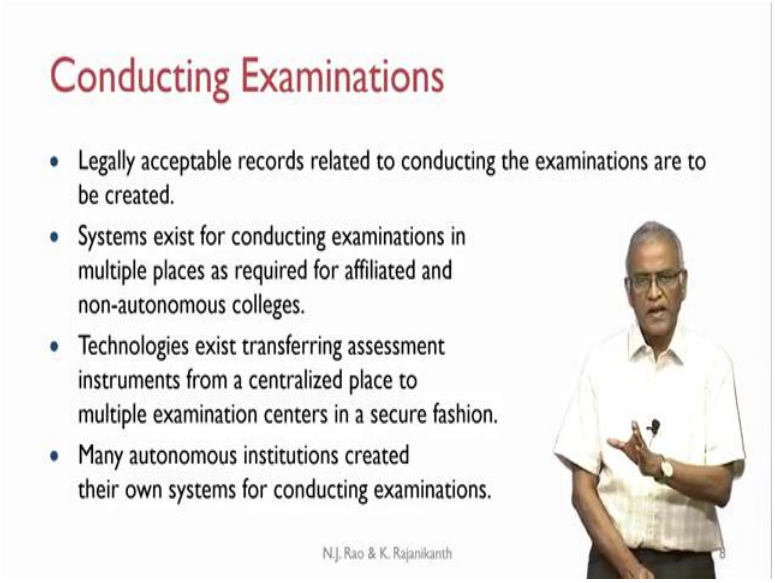

Now, conducting the examinations has certain legal aspects to that, because there are several legal records that need to be created when you are conducting the exam with regard to who is present, who is not present, why is he not present. The whole day that will have to be properly kept track of. Sometimes you do have legal case, cases related to these conducting the examinations.

And systems exist for conducting examinations in multiple places as required for affiliated and non-autonomous colleges. Because the whole country has been dealing with mostly non autonomous colleges affiliated to universities, over a long period of time, people have tried different things and slowly kind of settled down in that.

So we do have systems that take care of conducting the examination, some of some aspects of that are done by ICT tools, some are done manually. So systems do exist for conducting examinations in multiple places and also you have to when you are conducting the exam from a centralized place, you have to transfer the assessment instrument or your question paper in a secure way to the examination center.

Sometimes you have to give enough time after sending it for adequate copies to be made from that. So for this also, both technologies exist, and where systems also exist to create adequate copies of assessment instruments at multiple places. And many autonomous institutions because they have to deal with only their college, they have created their own systems for conducting examinations. Some of them are partly ICT based, some of them are manual systems.

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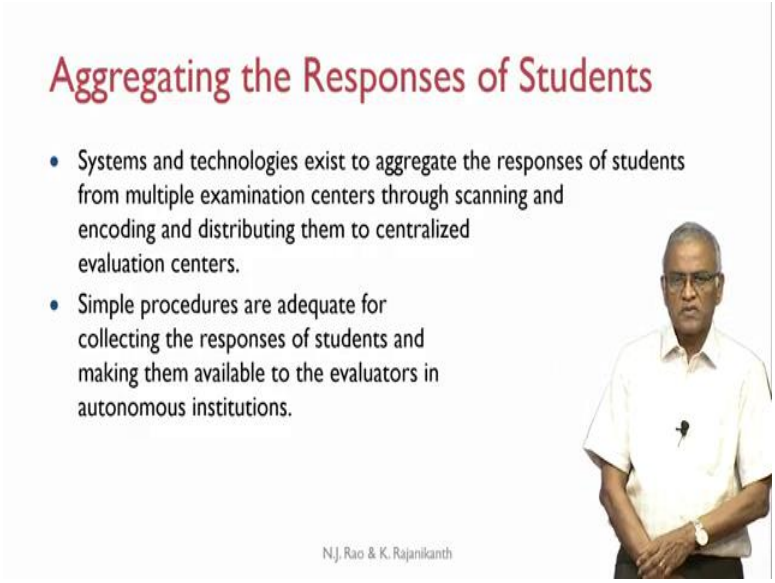

Now, you have another issue, because of the affiliated college you have to aggregate the responses of students, student has written on pieces of paper his responses, they have to be collected and properly what do you call tagged and coded and transferred to a centralized place. Such a system does not exist anywhere in the world. But we do have solutions for that to aggregate the responses of students from multiple examination centers, through scanning and encoding and distributing them to centralized evaluation centers.

There will be several centralized evaluation centers. Whereas you require elaborate systems for a university for an autonomous institutions, simple procedures that are adequate for collecting the responses of students and making them available to the evaluators in autonomous institution, for example, in an autonomous institution, I can conduct the objective type of questions using an LMS.

So, the student will respond on his Internet device and whereas written exam written papers, written responses the teacher himself can collect or you can have for multiple choice questions, you have several optical readers and calculators and so on, they do exist and these technologies continuously change and it depends on the access and availability of these tools to the instructor.

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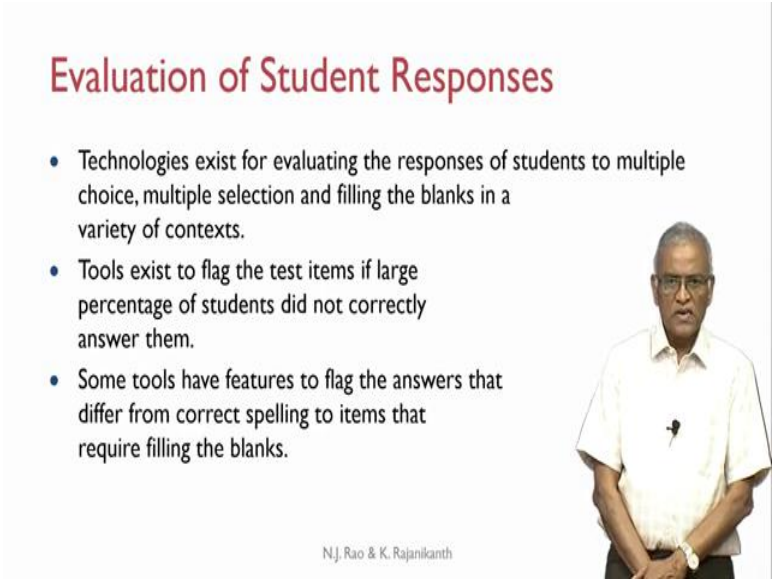

Now, the next stage after collecting the responses at one place, evaluation of student responses. Technologies exist for evaluating the responses of students to multiple choice multiple selection and filling the blanks in a variety of contexts. NPTEL is a major example of that and also NPTEL type of systems do have tools to flag the test items. If large percentage of students did not correctly answer them, they flag them.

So to bring it to the attention of the evaluator, to say whether there is any issue with that, whether one has to accept a smaller percentage of students responding to them, or correctly responding to them, or anything else to be done, they will only flag and bring it to the attention of evaluators.

Similarly, they have tools that have features to flag the answers that differ from the correct spelling to items that require filling in the blanks. For example, if you give a question to fill in the blanks, somebody will have to use some word, but the spelling used is slightly different from the correct one. In that case, they will flag and ask the instructor whether it can be whether you would like to give marks or not give marks. So flagging such things is very convenient.

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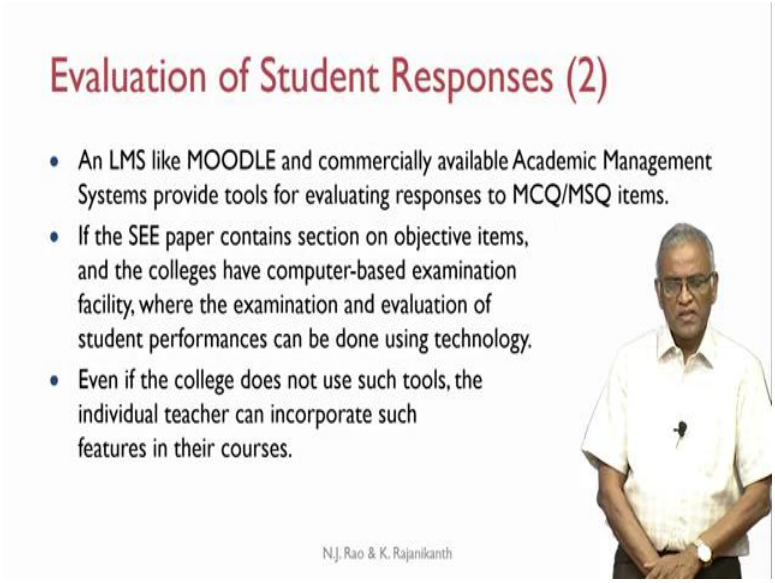

And an LMS like MOODLE, and commercially available academic management systems provide tools for evaluating the responses to MCQ and MSQ items that we have already stated. So, even one teacher wants to when the college does not have really these tools if a teacher is interested, MOODLE being an open source, it can be set up on his own computer and he can still use that tool to evaluate responses to MCQ and MSQ items.

And if the semester and exam paper contains section on objective items and the colleges have computer based examination facility, where examination and evaluation of student performances can be done using technology, which is being used. So, it can be used also in the context of semester and exam papers.

Even the college does not use such tools as we said, the individual teacher can incorporate such features in their courses, is a good for a teacher to try this to make, make it not only convenient for himself or herself, but also to improve the quality of assessment and quality of learning in the process.

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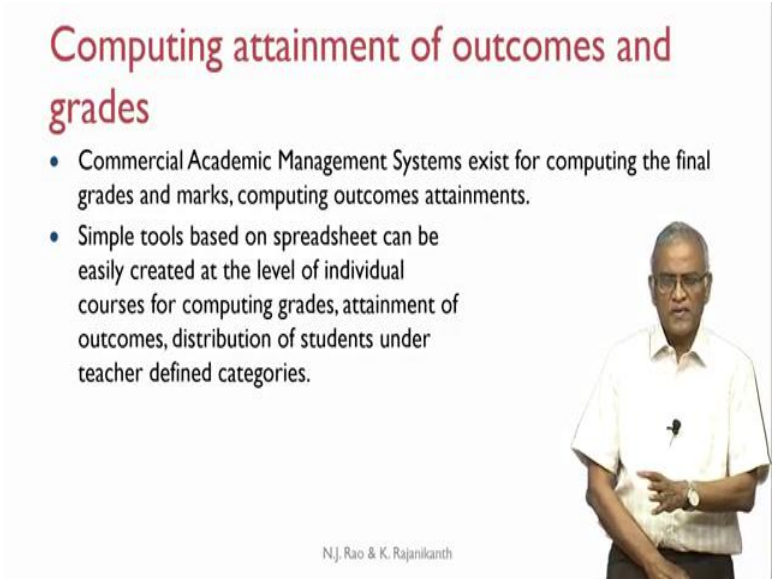

Now computing attainment of outcomes and grades because that is also part of assessment and evaluation. Commercial academic management systems exist for computing the final grades and marks and computing given outcome attainment of outcomes. But if you do not, the college does not have such Commercial AMS then simple tools based on spreadsheet can be easily created at the level of individual courses for computing grades, attainment of outcomes, distribution of students under teacher defined category.

So, we would strongly suggest every teacher should master using the spreadsheet for a variety of activities related to teaching and learning. It makes his or her life very easy if you feel comfortable using a spreadsheet.

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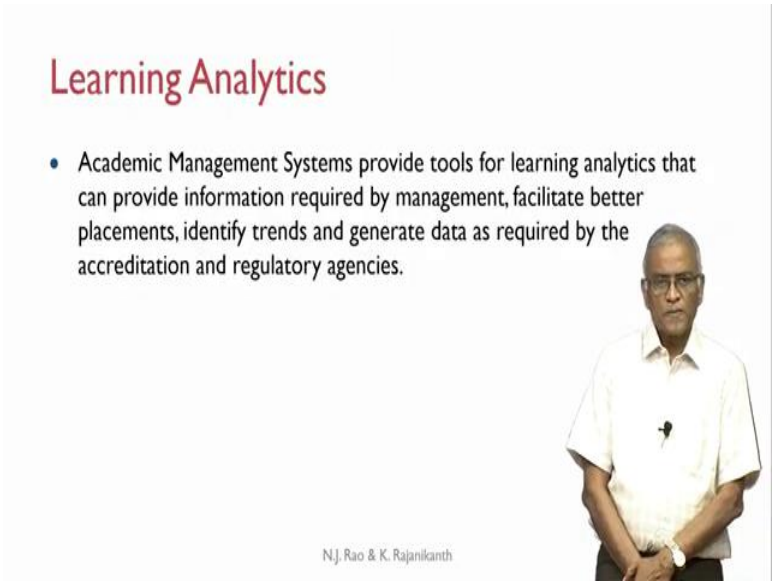

Now these days, learning analytics you are trying to get some information out from the way the students have performed in different courses at different in different semesters, different years and so on, across disciplines or across degree or across let us say engineering programs. And the kind of information you seek may differ from one situation to the other. But learning analytics can provide information required first, by the management, for management to understand what is happening instead of waiting until some crisis that comes, one can process the information that is already available based on the performance of the students and can be presented in a format that management can deal with or understand.

It can also facilitate better placements, if you have good analytics. There are some colleges which have tried to use these analytics to improve the placements. And you can also identify trends and generate data as required by the accreditation and regulatory agencies. So, it is learning analytics is slowly becoming quite popular with some of the institutions.

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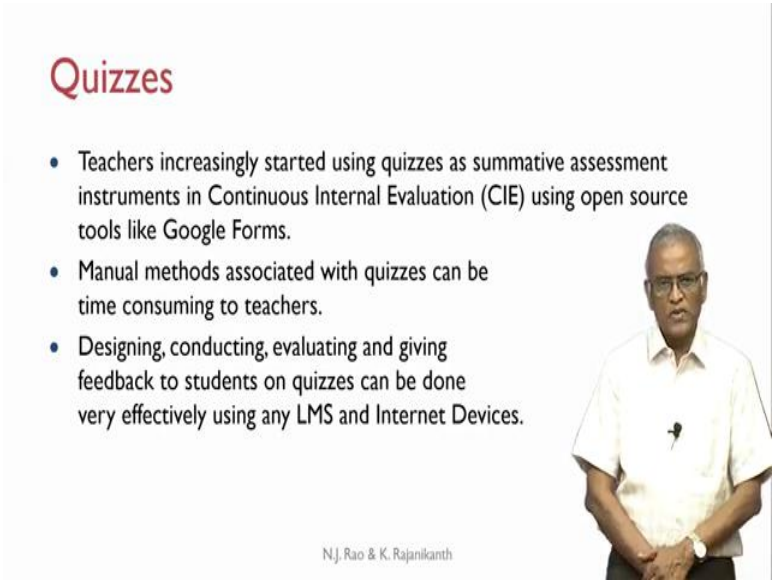

Now we come to a kind of a specific thing, quiz if you talk about, quizzes are normally used for as a part of formative assessment. Sometimes they are also getting used as a part of summative assessment. That means you give some marks and give some weightage to that and add it to the final for computing the final grade. And this is where you can use open source tools like Google Forms to conduct a quiz, that means given a series of questions, maybe five or six and ask the student to kind of give you the multiple choice or even sometimes fill in the blanks.

And if you use the Google Form, the responses can be processed or evaluated and you can already get even graphic form the results how the classes perform. So it can be used both for summative and formative assessments and you can save on the time the teacher has to spend, if he has to do it manually. Then if he has to look at each response manually and tick it and integrate them, and then give feedback it is very time consuming. Because it is time consuming, people may not use the quizzes as an effective tool for teaching and learning.

So you can use tools like Google Forms to take care of that. Designing, conducting, evaluating and giving feedback to students on quizzes can be done very effectively using any LMS and of course, the other prerequisite is students having Internet devices. Of course, the most common one is student is likely to have these days is a smartphone. So LMS and smartphones can be linked and if you have that, quizzes can be easily conducted. But the issue comes if all students do not have Internet devices, at the point where you are conducting a quiz, then you will have issues.

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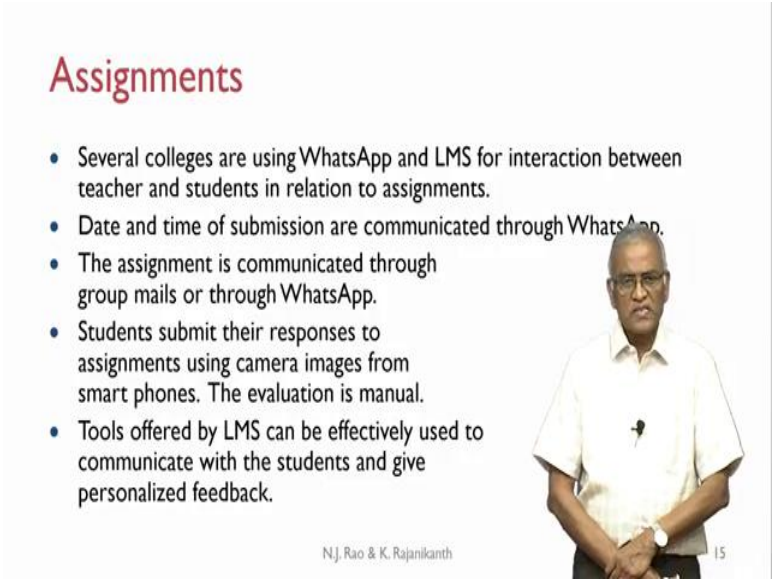

Then similarly, assignments several colleges are using WhatsApp and LMS for interaction between teacher and the students in relation to assignments. So you can put the assignment on LMS or you can write and you can write on a piece of paper or type something, and then take a image of that and send it through WhatsApp to the student groups. You can do that.

And date and time of submission are communicated through WhatsApp. So you do not have to announce in the class, you can do it offline. The assignment is communicated through group mails or through WhatsApp, group mail would mean as a part of LMS. Students

submit their responses to assignments using camera images from smartphones but of course, the evaluation is manual.

If it is an assignment, obviously, the evaluation is manual, we have do not have technologies as yet for evaluating the performance of students to questions that require either short or long answers or very elaborate steps are involved, we do not have technologies as yet for that. And you can say the final barrier now, with regard to teaching and learning is to develop evaluation, automated evaluation mechanisms for different subjects.

But if you have solved it for one subject, it does not mean those tools are applicable to some other subject. So, each subject has its own requirement. And that is why the problem will have to be solved at subject level and let us say, in a given subject, you have changed the content, you add an extra and drop some.

And once again you have to take a look at with respect to the new material how to design automatic evaluation system. That, that is going to take considerable time and these tools are not going to be that easily available in near future. And tools offered by LMS can effectively be used to communicate with the students and give personalized feedback.

So, we strongly urge that all teachers get themselves familiar with the open source tool, like MOODLE, there are a few others but we are more familiar with MOODLE that is why we keep saying that try to use the MOODLE.

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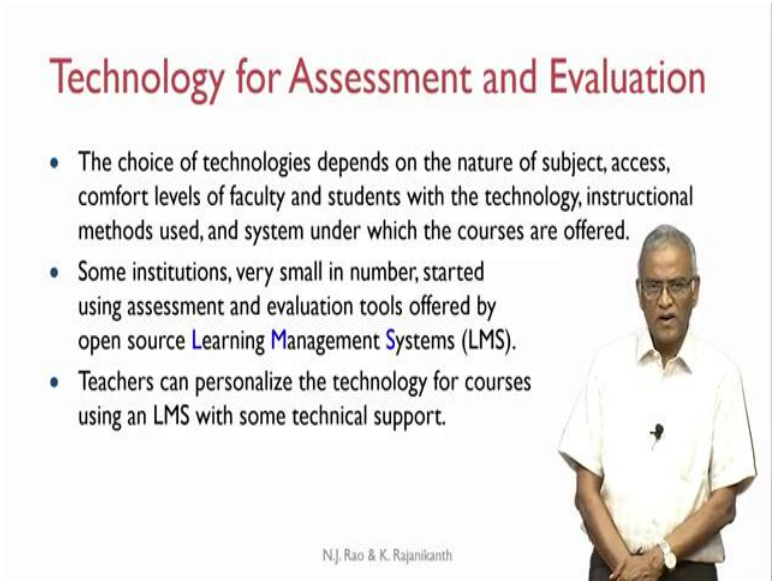

So the choice of technologies depends on the nature of the subject access, comfort levels of faculty and students with technology, instructional methods used and system under which the courses are offered. As you can see a whole lot of factors determine that, that is the reason why it is may not be that very easy to legislate which tools to be used.

So, initially, individual teachers who feel comfortable in using such tools should start with and kind of slowly spread across to other courses in a department. Some institutions very small in number started using assessment and evaluation tools offered by open source LMS like MOODLE.

Teacher can personalize the technology for courses using LMS with some technical support. Because everyone may not be very comfortable in trying to write several PHP programs as design special, what do you call them? Small modules that can be integrated into the, into the LMS tool itself.

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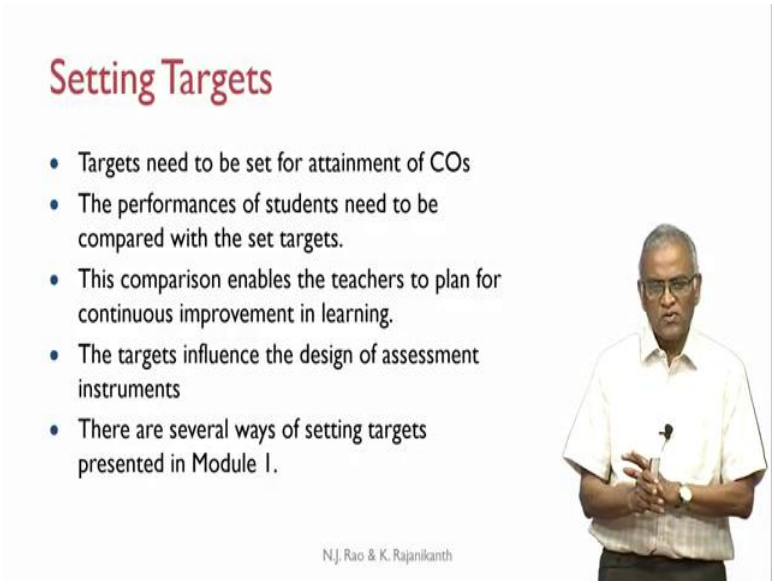

Now that is about technology and assessment and evaluation. So, a teacher will have to make a decision where exactly he is going to use the technology whether, he can afford to use it, whether he is familiar with it, whether he believes in using that. All those decisions have to be made and based on that, you can proceed with the rest of the design process, design phase processes.

Now, one small step which you have already considered in detail in Module 1 is setting the targets for attainment of Cos. What you do? You set a target, what it is we have already dealt

in detail in module 1, so the performance of students need to be compared with the set targets. This comparison enables the teachers to plan for continuous improvement in learning.

And the targets influence the design of assessment instruments also, if I have set a target depending on my understanding of my own students, I have to now decide what kind of items do I incorporate in my assessment instruments, the difficulty level, cognitive levels, what percentage of questions do I put under a specific cognitive level, all that will be influenced by your perception of the students' abilities with regard to the set targets. And there, as we indicated in Module 1, there are several ways of setting targets presented in module 1.

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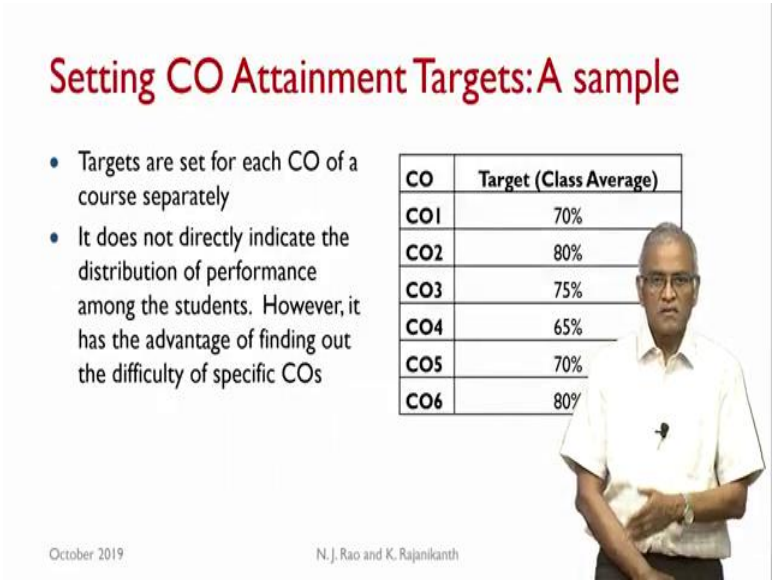

And here is one sample which we have been recommending. So, targets are set for each CO of a course separately, the way we have shown in the table and it does not directly indicate the distribution of performance among students. Because you are only computing the class averages. However, it has the advantage of finding out the difficulty of a specific CO. If you feel comfortable with tools available to you, you can make this setting the targets a little more complicated to meet your requirements.

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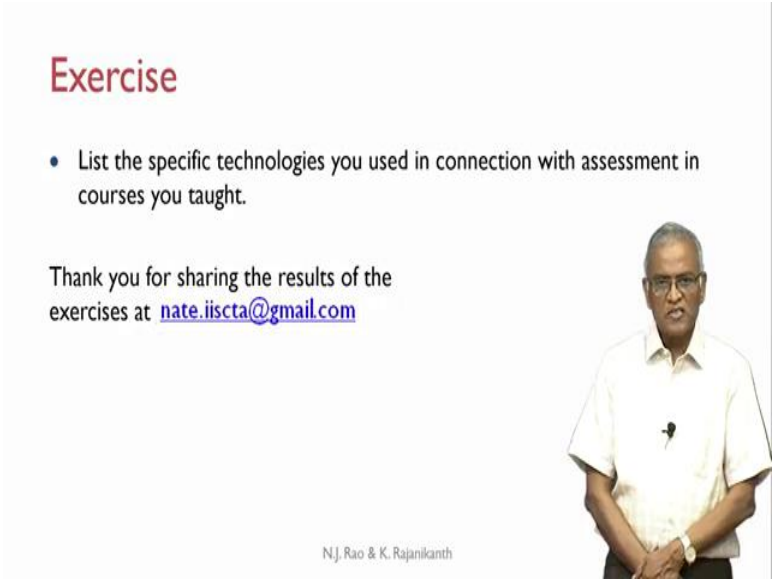

Now, we request you to kind of list the specific technologies you used in connection with the assessment in courses that you taught, what all technologies that you have used? Please make a list of that and share it with us at this particular email id.

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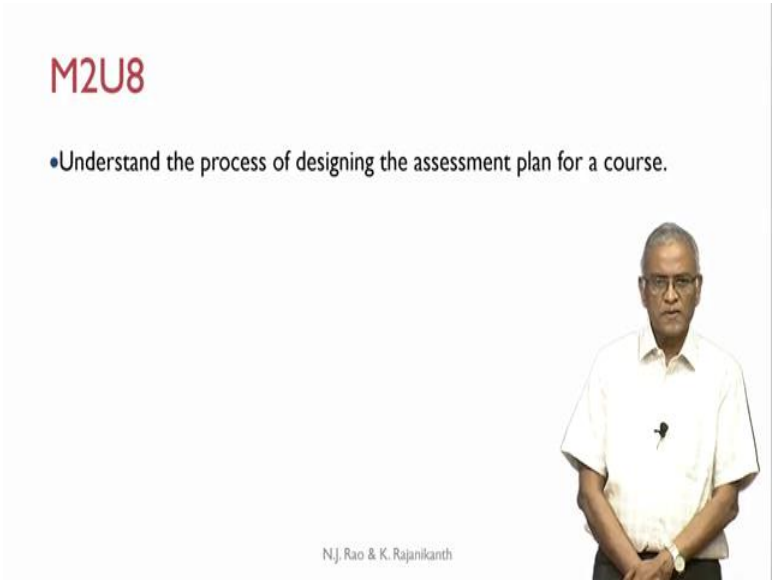

And in the next unit, we try to understand the process of designing assessment plan for a course. Thank you very much for your attention.