Tale-2 Course Design and Instruction of Engineering Courses

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Lecture - 18
Summary Feedback

Greetings, welcome to module 2 unit 18 on Summary Feedback.

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In the last unit, we understood the design and use of project exit surveys; exit surveys for mini projects as well as the major main project; and mini projects both as independent courses as well as a part of regular course. So, we understood the design and use of exit surveys for all such project activities.

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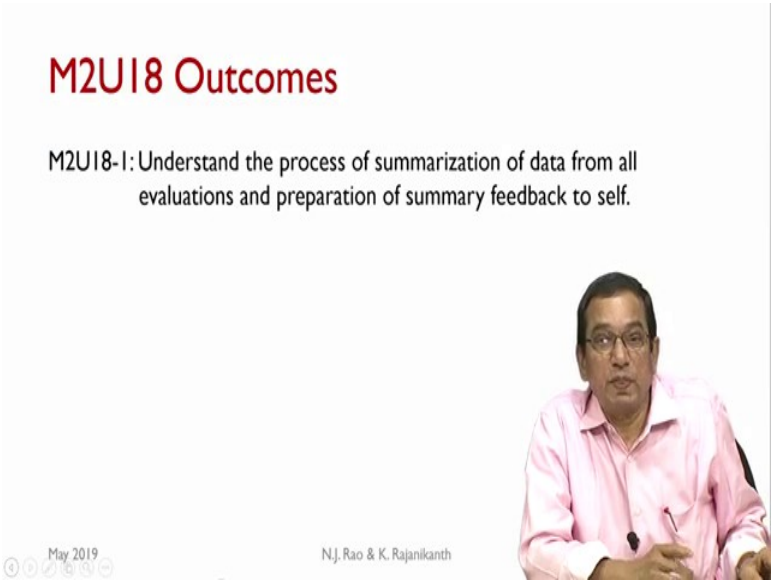

In this unit, we will look at the process of summarization of data from all evaluations and preparation of summary feedback to self. The outcome of this unit is "understand the process of summarization of data from all evaluations and preparation of summary feedback to self".

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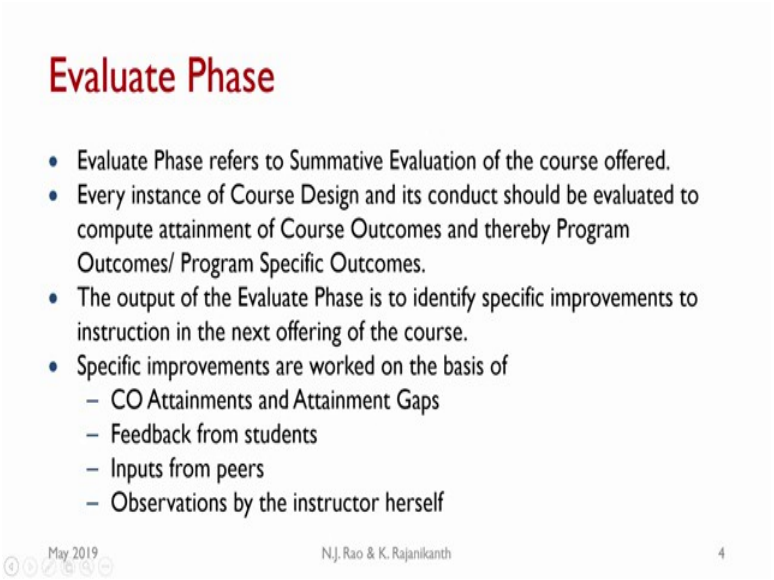

The evaluate phase of the ADDIE model refers to summative evaluation of the course offered. As we saw earlier also, after every phase of the ADDIE - after analysis phase, design phase, development phase, implement phase the outputs of that particular phase

are always pre reviewed to see if we need to revisit any of those activities. But there is a final evaluate phase which is summative in nature. So, this is the summative evaluation of the course offered.

Every instance of course design and its conduct should be evaluated to compute attainment of course outcomes and thereby program outcomes; program specific outcomes. Every instance is unique in some sense. So, the implementation of the course every time has unique features. So, we need to compute the attainment of COs and thereby POs and PSOs. The output of evaluate phase is to identify specific improvements to instruction in the next offering of the course.

Specific improvements are worked on the basis of CO attainments and attainment gaps (if any), feedback from students, inputs from peers (if it is available), observations by the instructor herself. As we noted, during implementation phase, after every instruction unit, the instructor must make some notes regarding that particular instruction unit's implementation. Based on all these observations by the instructor herself, we can plan specific improvements. We have different sources of getting the data for specific improvements, CO attainment gaps, feedback from students, input from peers and observation by the instructor herself.

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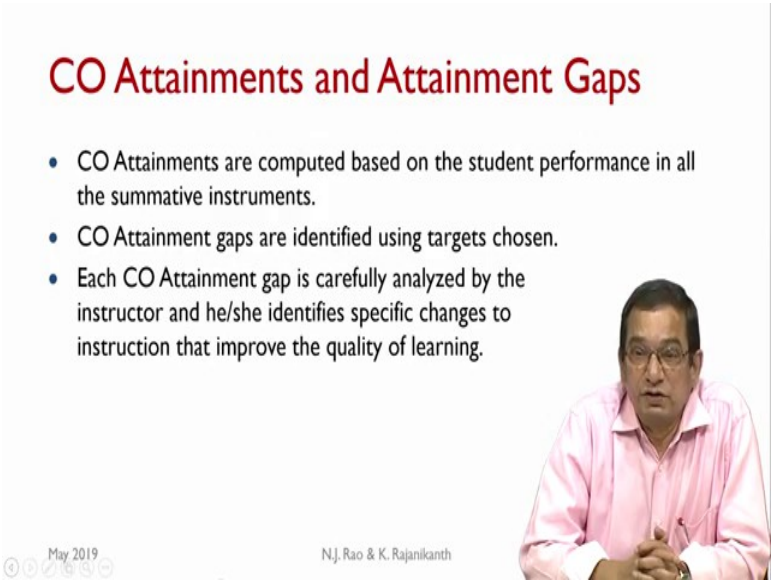

The CO attainments are computed, as we already saw, based on the student performance in all the summative instruments - internal assessment tests, quizzes, assignments,

semester and examinations. We also saw that it is possible to compute the attainment of CO in indirect way using the course exit surveys; then we can combine the attainment computed from indirect means with the attainment computed using direct means that is based on student performance, probably in the ratio 10:90 and that is how the total CO attainment can be computed.

Of course, computing the CO attachment through course exit surveys is optional; one could use it or one could use the exit survey only for planning the improvements in the implementation of the course next time. Then the CO attainment gaps are identified using the target chosen.

Each CO attainment gap is carefully analyzed by the instructor and then he or she must plan the specific changes to instruction that improve the quality of the learning. These improvement plans must be specific, they must include the time taken to introduce those activities, any additional resources which are required and if a cost is involved an approximate estimate of the cost - all these things must be included. The improvement plans must be quite specific; vague action plans which really do not mean much in terms of the practice are of not much help; specific changes to instruction that improve the quality of learning must be planed.

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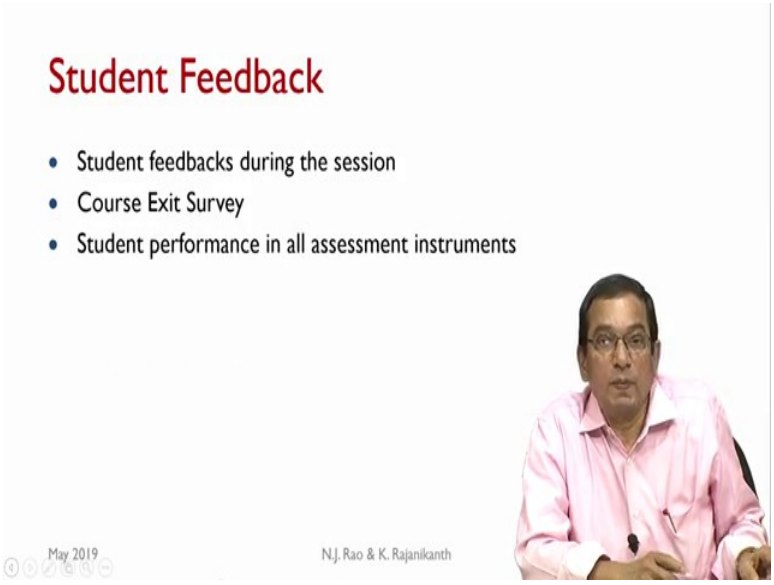

The student feedback is obtained during the session. We also saw that during the course exit survey we can get student feedback and student performance in all assessment

instruments itself constitutes useful feedback for us. What are the COs with regard to which the student performance is in general very satisfactory or satisfactory or below acceptable levels; which are all the COs where the students have certain bottlenecks towards learning. So, the student performance in all assessment instruments also becomes valuable feedback when we are planning the improvements.

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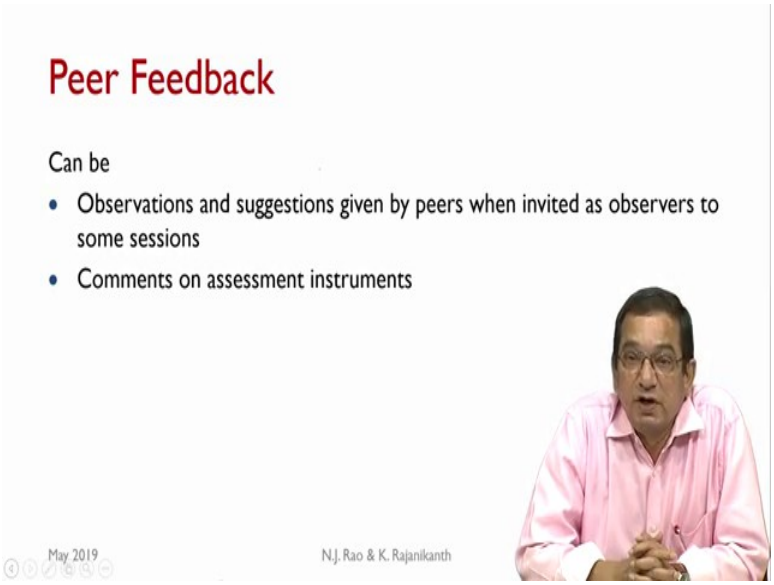

Peer feedback: It may or may not be available; it depends upon the practices in the department. It is primarily the observations and suggestions given by peers when invited as observers to some sessions. If such a mechanism exists, then the feedback given by the peers can be quite useful.

As discussed earlier, most of the institutes do have a quality assurance scheme whereby the internal assessment instruments go through a process of review by a small committee, to ensure that the language is unambiguous, technically the question is complete and correct, the COs are addressed properly, the time estimate is proper. From all these aspects the assessment instruments are reviewed and the feedback is recorded and it is made available to the instructor.

Comments on these assessment instruments give valuable feedback from the peers. So, the peer feedback can be both from the observers as well as comments on assessment instruments. Even situations where there is no such formal process of review of the

assessment instruments, the instructor can request her colleagues to give comments on the assessment instruments which could be very helpful.

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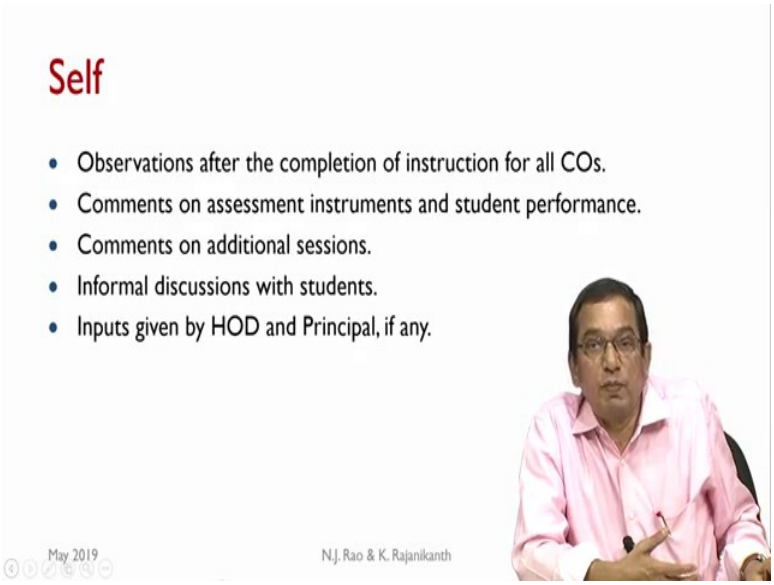

Self is another important source. We have seen that observations after the completion of instruction for all the COs, the instructor has to record (in fact, after every IU the instructor records her observations). The detailed observations given immediately after the completion of an IU would be very helpful. Comments on assessment instruments and student performance - the instructor herself can note down the performance of the students as well as the quality of the assessment instruments.

Comments on any additional sessions include - were they required and if so, why they were required; which parts of the instruction planning did not go as per the plan requiring additional sessions and why that happened? So, this kind of observations by the instructor should be noted down.

Then if it is possible, informal discussions with students would be very helpful; some kind of course - exit face to face discussions with the students. And of course, for this to happen, the students must have good rapport with faculty and if they are able to give such a feedback, that proves to be very valuable. In some institutes there is the mechanism whereby, the HOD may give certain feedback and even Principal may give some inputs based on whatever feedback she or he has received from the students. They all become additional sources of information to be used.

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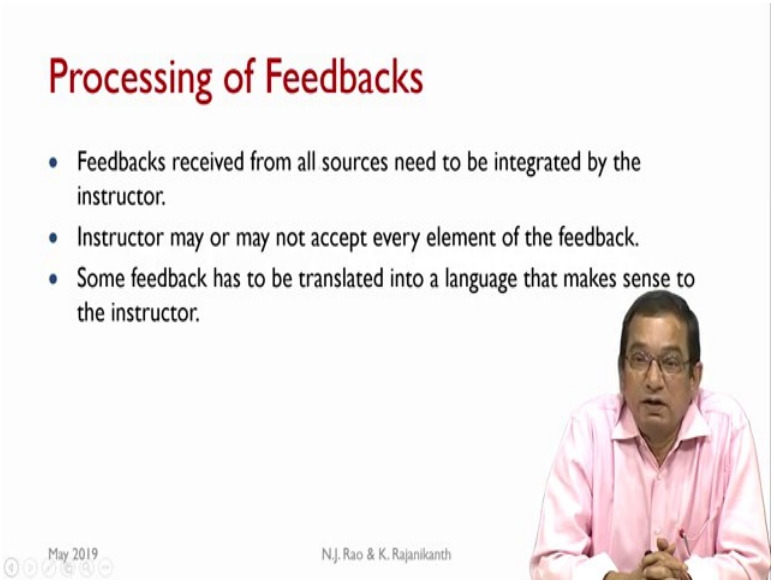

These feedbacks received from all the sources need to be integrated by the instructor. Instructor may or may not accept every element of the feedback; sometimes a feedback may not be really valid feedback, it may not be something with which the instructor agrees; it is quite possible. But we should look at the entire feedback and if some aspects of the feedback are not acceptable, we can write down our comments why it is not acceptable. But we must look at the feedback with an open mind, with the mind to improve the instruction.

Certain times the feedback maybe in terms which are vague or in terms which are given from the perspective of the students and we may have to translate that language into the language that makes sense to the instructor. We make it more clear, we make it unambiguous and we state it in a way in which we can use it further. So, some feedback has to be translated into a language that makes sense to the instructor.

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The consolidated data that we have, after rewording if necessary, can now be classified into four categories. The first category would be complements - what went right. What were the things which were ok with the course? Then - recommendations to the instruction to improve the instruction.

Teacher-student interactions: How did the instruction take place actually in the classroom? The classroom communication, concern for the well being of the students, good learning by the students, providing right levels of challenges, encouraging the students to ask questions - in general permitting greater interaction during the classroom sessions, supportive attitude to the students, supportive attitude to other activities of the students - all this come under teacher student interaction; feedback related to these aspects can be noted down.

Things that cannot be addressed and reasons thereof: Certain times the feedback indicates certain lacuna, but we have no mechanism to address that for a variety of reasons. For example, if it is a Tier II institute and if it is an issue related to certain aspect of the syllabus, then the instructor may not have an immediate way of remedying the situation.

There could be several other reasons - administrative, technical, many other reasons because of which right now the instructor is unable to address those issues. We can note down things that cannot be addressed and the reason thereof - why we are not able to

address that at this juncture. May be in future, some other time, we can address, but at this juncture we are not able to address that particular issue raised by the feedback. Such summarization enables the instructor to grow as a person and consequently leads to improvement in the quality of student learning. It is very essential that after every instance of the course implementation, the instructor must end up with such notes. These would become valuable records for improving the quality of student learning as well as they allow the instructor also to grow as a person. This is an important final activity at the end of the course delivery.

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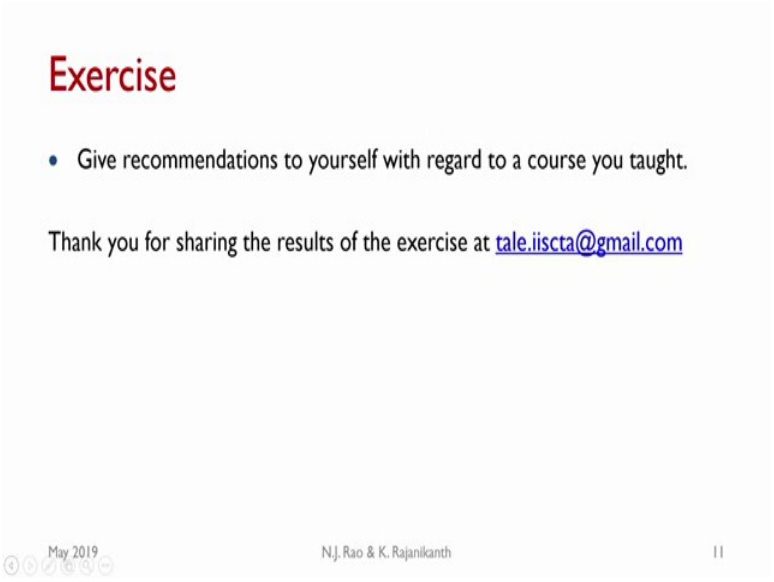

Exercise: Give recommendations to yourself with regard to a course you taught.

Thank you for sharing the result of the exercise at tale.iiscta@gmail.com.

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Now, that completes the last unit of module 2. So, let us quickly have a recap of the module 2; module 2 in retrospect.

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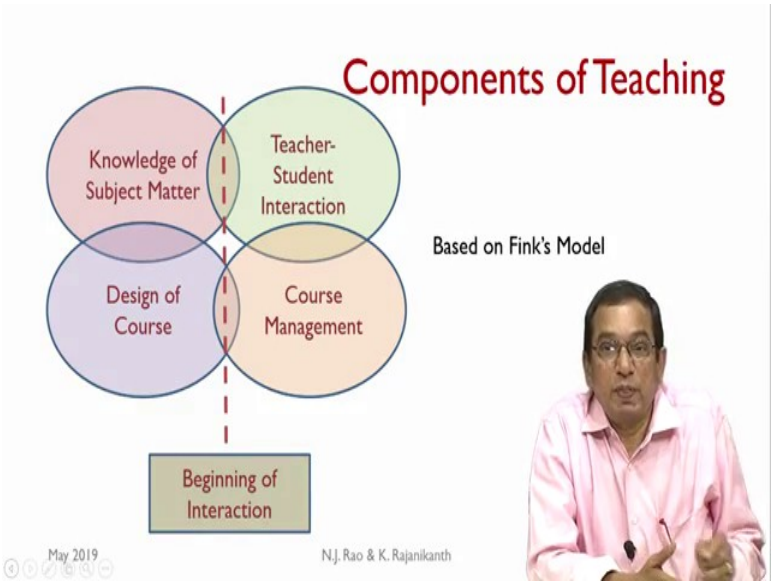

We saw the components of teaching based on Fink's model. There are four aspects. Knowledge of the subject matter, design of the course - these two happen at the beginning of the interaction. Once the course commences, we have teacher-student interaction and course management. So, these four aspects are the key aspects, key

components of teaching and of these, we were concerned with design of course, in this module.

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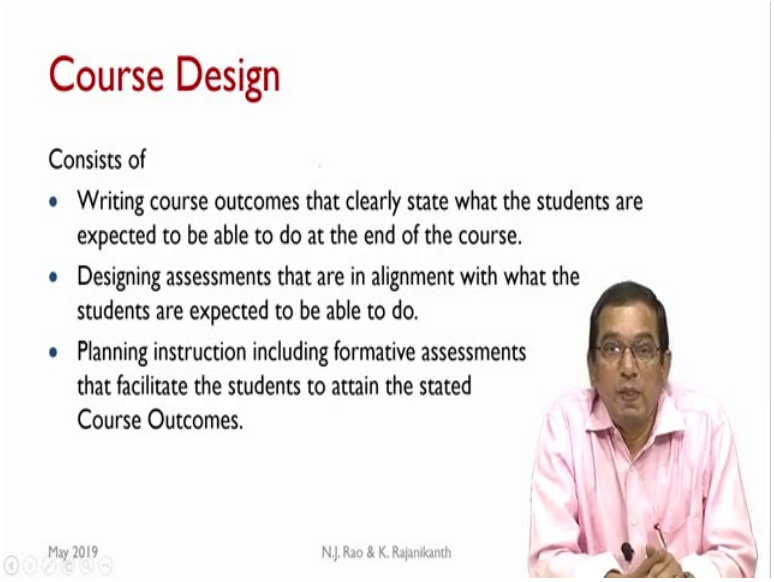

The course design, we saw, consists of writing course outcomes that clearly state "what the students are expected to be able to do (very important)" at the end of the course; designing assessments that are in alignment with what the students are expected to be able to do; planning instruction including formative assessments that facilitate the students to attain the stated course outcomes.

With every course, these are the three aspects: what is it that to want our students should be able to do - which are the course outcomes; how do we know to what extent they are able to do what they are expected to do - that is the assessment; and what do we do to help the students do what they are expected to do - what kind of instruction do we plan; the instruction including formative assessments, that facilitate the students to attain the stated course outcomes. So, instruction, assessment and COs and when all these three are aligned to each other, the quality of learning will be generally better. We need to look at all these issues in the course design.

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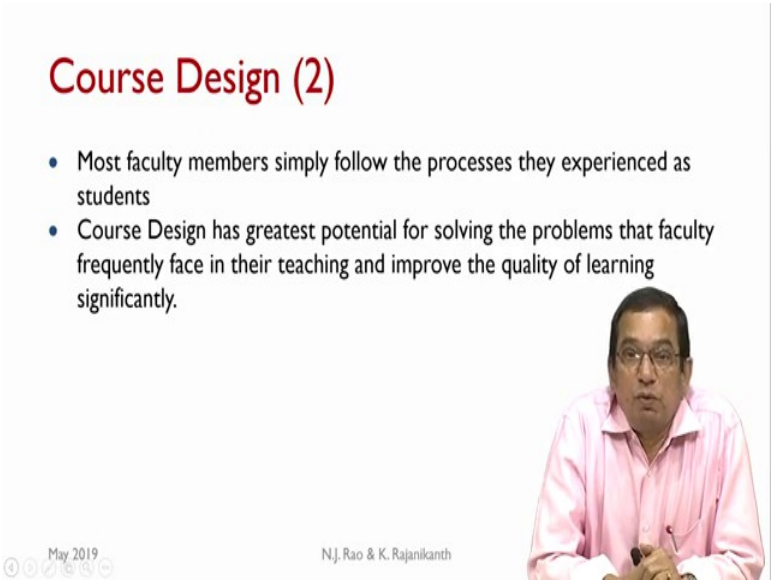

(Most of the faculty members probably follow the processes, they experienced as students). Course design as a formal activity probably is not done by many faculty, though some faculty do design the courses using a formal model. But it may not be that commonly practiced in many of the institutes. Course design has the greatest potential for solving the problems that faculty frequently face in their teaching and improve the quality of learning significantly.

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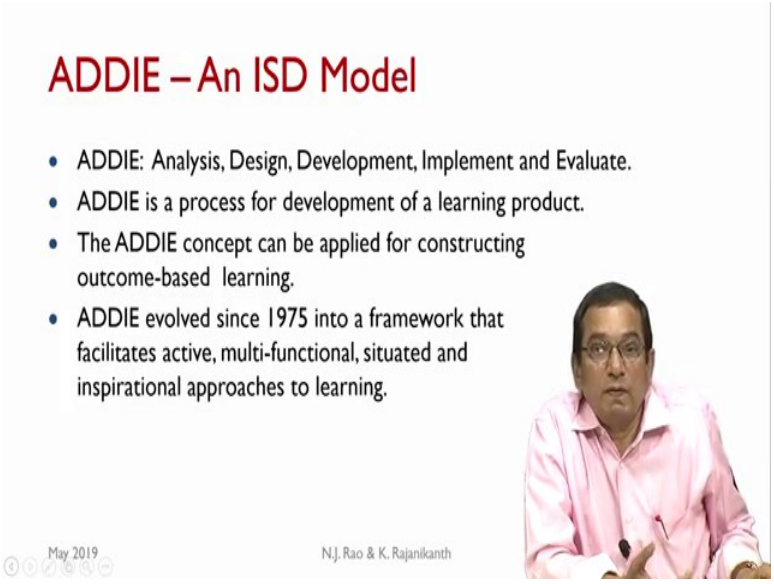

And we looked at the ADDIE model. There are several instructional system design models - we looked at one of the models - ADDIE. ADDIE stands for Analysis, Design, Development, Implement and Evaluate. This is a process for development of a learning product, not necessarily a specific engineering course, but any learning product. The ADDIE concept can be applied for constructing outcome based learning. ADDIE has evolved since 1975 into a framework that facilitates active, multi functional, situated and inspirational approaches to learning.

It is quite flexible. Unlike what some people think, ADDIE has feedbacks at every stage. After every phase, the outputs are reviewed and if necessary the activities are revisited. At the end there is a summative evaluate phase. So, ADDIE model is not a linear waterfall - like model. It is a model with feedbacks at multiple levels. Quite flexible and it has evolved into a framework that facilitates a very good approach to designing the learning.

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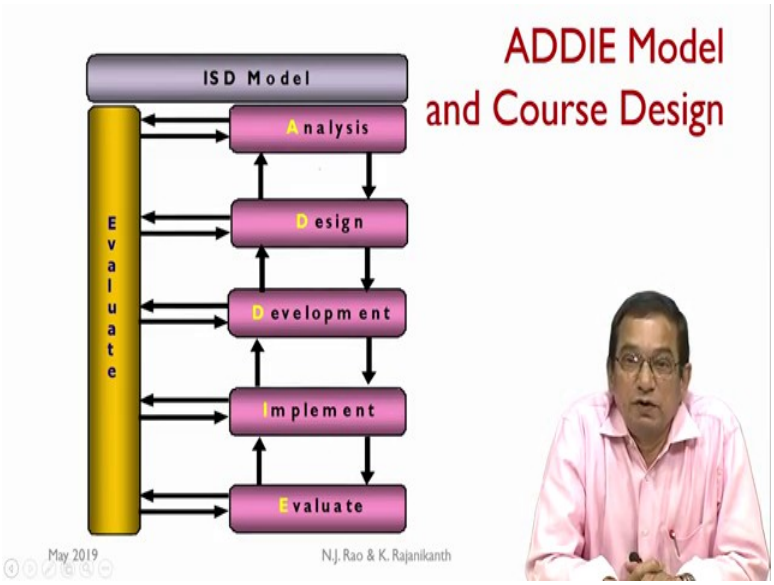

This is the ISD model that we have used - ADDIE model - analysis, design, develop, implement and evaluate. As we can see there are feedbacks at every stage. After every phase also there is evaluate, which is formative in nature. Then finally, there is a phase which is summative in nature - evaluate phase.

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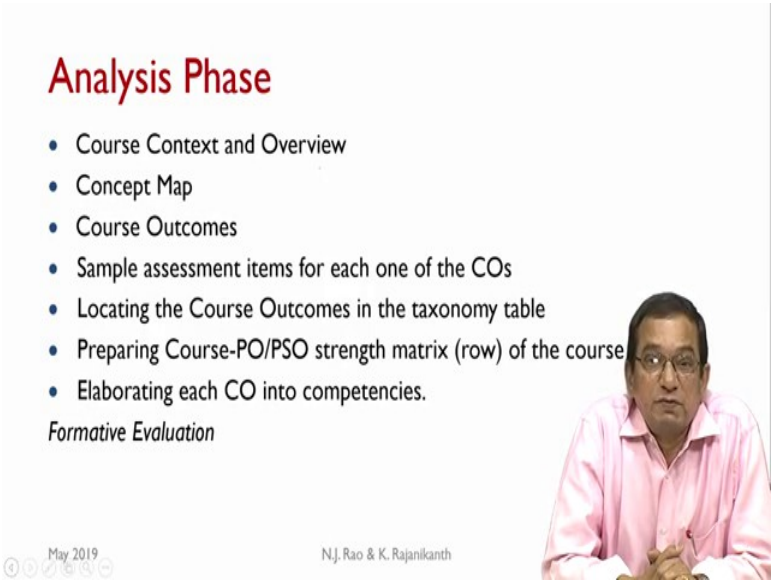

The analysis phase: Primarily it consists of the course context and an overview. We need to place the course in the curriculum and in the current context. We can develop the concept map - quite useful when you are looking at the course design. There are tools available by which the concept map can be constructed very easily (open source tools).

Course outcomes: It is very extremely important activity. Course outcomes which clearly specify what the student should be able to do at the end of the course and we looked at one of the possible taxonomies, quite popular taxonomy, “Revised Bloom’s Taxonomy”, “Bloom-Anderson-Vincenti Taxonomy” for writing the course outcomes. Sample assessment items for each one of the COs that helps us, if required, to refine the COs. When we try to create the assessment instruments, sometimes it is possible to see that the CO needs to be revisited. We must write sample assessment items for each one of the COs.

Locating the course outcomes in the taxonomy table: The cognitive process, the knowledge category - based on these - locate the CO in the taxonomy table. This helps us later when we create assessment instruments to place each assessment item also in the taxonomy table and see that the assessment is aligned to the COs.

We can also place the instructional activities in the taxonomy table and when there is a good alignment among COs, the assessment items and the instructional activities, the learning is bound to be better. Locating the course outcomes in the taxonomy table,

preparing mapping of course to PO/PSOs; COs to program outcomes and program specific outcomes and the strength of this mapping at the levels of 1 or 2 or 3 - low strength, moderate strength, high strength. Finally, course to PO PSO strength matrix, one row for the course, then when required elaborating each CO into competencies.

Sometimes the CO may be fairly complex in nature. Then it would be helpful to plan good instruction and good assessment to breakdown the CO into certain competencies - elaborating each CO into (maybe 4 or 5) competencies as required. Formative evaluation phase: the output of analysis phase needs to be reviewed, and if required these activities need to be revisited.

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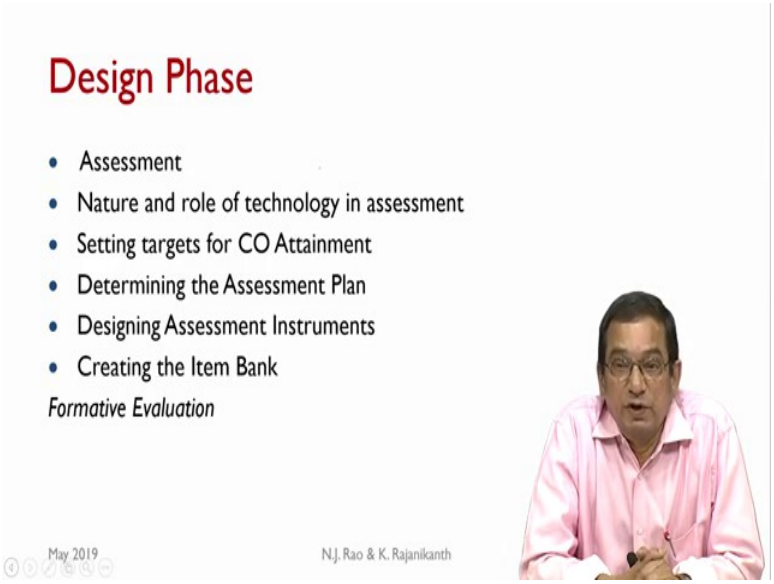

Design phase: The most important aspect of assessment; what is actually assessment, what is evaluation - we looked at it; then we looked at the nature and role of technology in assessment. The technology has a very strong bearing on the assessment, the way it is designed, implemented. Nature and role of technology in assessment; Setting target for CO attainment – very important aspects.

There is no recipe - algorithmic way of determining the targets for CO attainment - and what is reasonable can vary from institute to institute. The past experience of the institute needs to be taken into account. The COs must be realistic, but at the same time one cannot set targets which are too low. It is an activity which must be carried out with certain amount of group thinking and based on the past experience, targets have to be set

carefully. Because once we set the target; if we are not able to attain those target levels, reducing those target level should be an activity that is not to be encouraged. We must set initially the targets quite carefully - that is an activity of the design phase.

We must determine the assessment plan - this is an extremely important activity. Often the instructors, when they fail to determine the assessment plan, may end up with assessment instruments which are inadequate in terms of covering the COs, or inadequate in terms of their schedule. In general, the quality of assessment suffers if there is no proper plan.

The assessment plan must include which are all the assessment instruments that are to be created during that semester, how many internal tests, when they have to be scheduled, which are the COs to be covered by each test, at what cognitive level the assessment items must be there vis-a-vis the cognitive levels of the related COs, quizzes - how many quizzes, which COs should be addressed, at what cognitive levels, assignments; any other activities that are being thought of - they all must be planned ahead - up front.

So, how many, at what times, what are the COs to be covered, for how many marks, at what cognitive levels - all these must be planned up front. It looks like fairly tedious activity, but it is quite helpful. Once it is done, in the subsequent implementations of the course, this would not be that much of a burden. It may only mean some fine tuning based on the feedback. The assessment plan must be there.

If it is the tier one institute, we must have the assessment plan for the semester end examination also. Again there are multiple patterns for semester end examination. Depending upon the pattern that is being adopted in that institute, one must plan the semester end examination also. So, how the COs are to be distributed, how the marks are to be distributed, how the cognitive levels are to be addressed - all these things must be taken into account and this an extremely important activity to be carried out during the design phase.

Having done that, the actual assessment instruments according to that plan must also be designed. And this must be done up front so that we can have quality assessment instruments. So, it is necessary to design the assessment instruments also up front based on the assessment plan. Internal test papers, quiz papers, the assignment topics and in tier one institute even semester end examinations. And we may have to create multiple such

instruments because depending upon how the semester end examination is actually implemented; we may have to have three or four assessment instruments available, where the controller of examination picks up one at random. All these must be done upfront carefully and this creation of the assessment instrument gets facilitated to a great extent if we have a good item bank with items appropriately tagged.

Items tagged with course outcomes, cognitive levels, knowledge categories, difficulty levels, approximate time taken and sample answers to that. If we have a reasonably large item bank, then it becomes relatively simpler to design an assessment instrument when required. What would be the structure of the item bank and how do we create this item banks, what are the advantages, what are the challenges - that also we discussed and as usual the output of the design phase again must go through a formative evaluation and if required we must revisit all these activities.

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Development phase: Primarily we are looking at the delivery technologies. There is a huge choices available today compared to the earlier days which had only the conventional chalk and board approach. We have the smart board, electronic boards, learning management systems, a wide kind of technologies are available.

The technology chosen has an influence on the instruction and development of the instructional material and learning material. We looked at the instruction design very briefly. The next module is primarily on instruction, but here we looked at the instruction

design briefly. Then development of the instructional material, then identification, selection, preparation of the learning material - these are the issues which we looked at in the development phase. Output should go through a kind of formative evaluation and if required the activities must be revisited.

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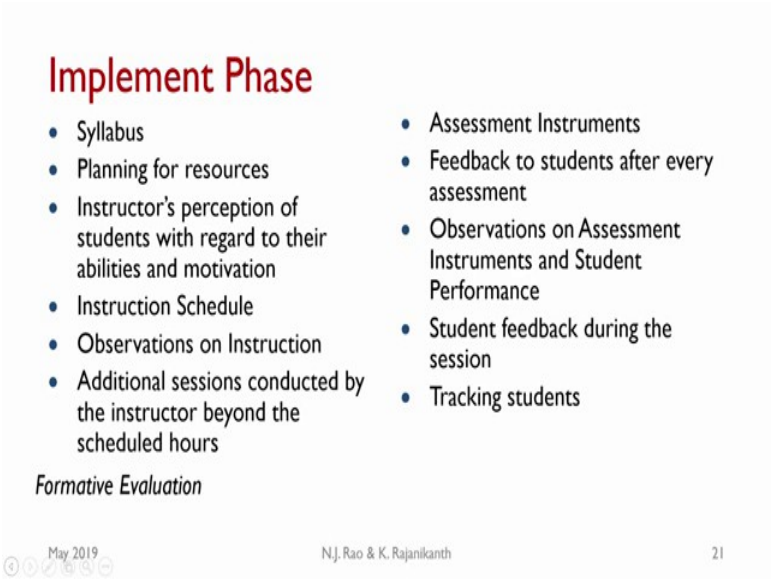

When we came to the implement phase, where actually all these things really are put into the final classroom practice. This has several aspects, several components, syllabus - the variety of items which are possible, planning for resources, instructor's perception of students with regard to their abilities, motivation, prerequisite knowledge - these are all very important because that has a bearing on how actually the instruction takes place.

Instructor's perception of students with regard to their abilities, prerequisite knowledge, motivation; all these come into the picture. Actual instruction schedule, observations on instruction - as we just now noted after every instructional unit we must have some observations recorded regarding how the instruction unit went - and all these issues. Then additional sessions if at all, conducted by the instructor beyond the scheduled hours; why they were required and what topics the additional session had taken up - that all can be recorded. Then assessment instruments, then feedback to students after every assessment. This is very important after every internal test, after every quiz, after the assignments are turned in and evaluated; feedback must be provided to be students.

Though these assessments are summative in nature, the feedback to the students is extremely important to promote quality learning. Feedback to the students after every assessment; then observations on assessment instruments and student performance; what is the quality of assessment instrument and then what is the student performance level; were there any specific items regarding which the student performance is below expected levels - that means, there are some bottlenecks to the understanding by the students or the abilities of the students, what are all those issues - they all must be recorded.

Observations on assessment instruments and the student performance: In particular, if there are certain competencies with respect to which uniformly the students' performances are below par, then we must make a note of that because it means that next time the course is offered; instructor must do something to promote better learning with respect to those competencies.

It is very important that the performance of the students is carefully examined and these observations are recorded. In student feedback during the session; mid course surveys or through informal surveys, that data is collected and that also must be recorded - that is extremely important again. There are ways of conducting the mid course surveys in such a way that we get valid and useful feedback from the students. Then of course, we must track the students. These are all the typical activities that take place during the implement phase.

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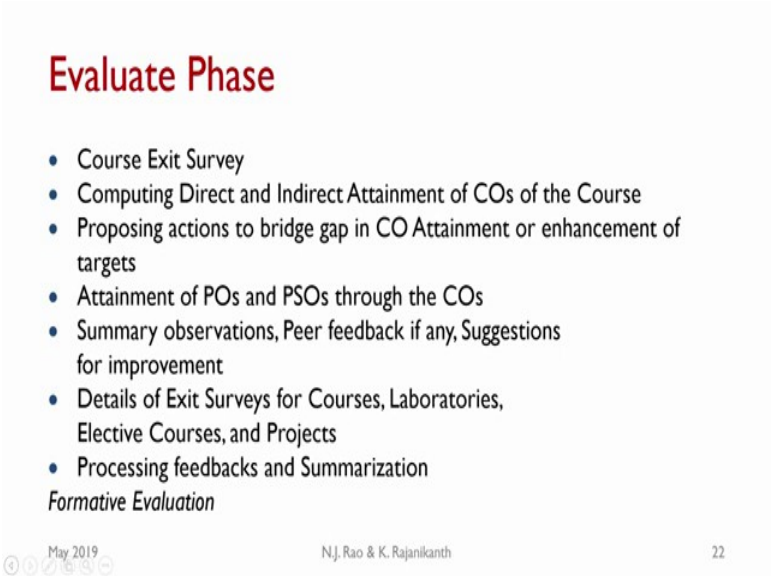

Evaluate phase: It was mentioned that the “evaluate” happens after every phase also, but that is formative in nature. This is summative and this is the final phase of the ADDIE model and this essentially has again several activities towards summative evaluation of how the course has taken place how the course was implemented.

There are course exit surveys, computing the direct and indirect attainment of COs of the course; proposing actions to bridge the gap in CO attainment or enhancement of the targets. We have set the targets during the design phase and computed the actual attainment. If the attained level is less than the target level, we need to plan improvement; if the attained level is equal to are more than the target level, then we have the choice - we can do an upward revision of the target; aim higher; or we can retain the same target level and see if we can repeat this attainment next time also. But we must record the observation of what we are doing with respect to the improvement if required or revision of the target, if we have achieved the target levels. This is an extremely important activity.

Through the attainment of the course outcomes, the POs and PSOs are attained. So, we must compute the attainment of POs and PSOs after computing the attainment of the COs. Then summary observations, peer feedback if any, suggestions for improvement - all these are also collected. We also looked at the details of the exit survey because broadly the exit survey nature remains same, but depending upon whether they are courses, or whether they are laboratory courses or laboratory components of a course or elective courses or mini projects or major projects, the details can vary. So, we looked at the exit surveys for courses in general which means predominantly core courses.

Then laboratories - both as components of core courses as well as independent laboratory courses,; then elective courses; then projects both mini and major projects - how to design the exit surveys for these activities. Then the final step - processing feedbacks and summarization and finally, making notes to oneself on ways of improving the course next time it is offered - we observed these.

But note that this also must go through again a formative evaluation. The documents that we have created in this phase also need to be really looked it again to see if any of these activities need to be revisited. For example, the design of the exit surveys or the way the

indirect attainment values are calculated - all these activities need to be revisited and that would complete the process of the evaluate phase.

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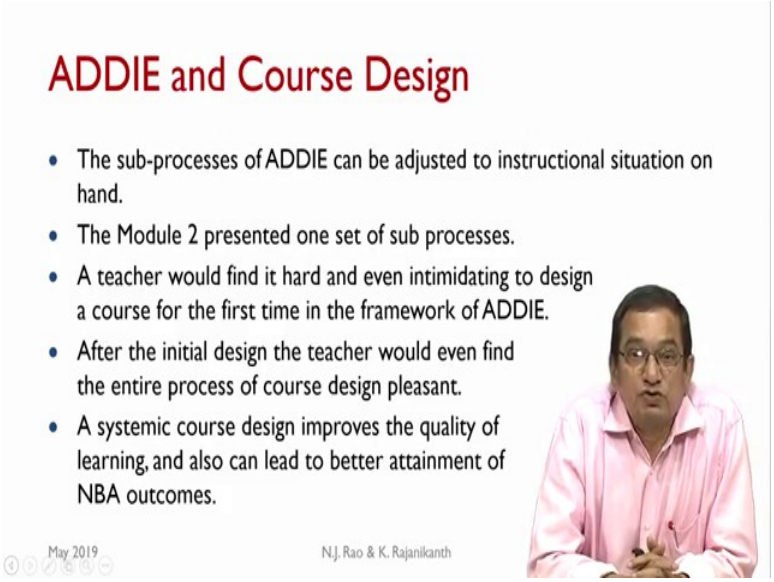

In summary, if we look at ADDIE and course design, the sub processes of ADDIE can be adjusted to instructional situation on hand. ADDIE is quite flexible. And module 2 presented one set of sub processes, but there is no finality to these processes; it can be adapted to suit the specific context. A teacher may find it hard and even intimidating to design a course for the first time in the framework of ADDIE. It looks like a very large number of activities need to be performed. But after the initial design, the teacher would even find the entire process of course design very pleasant, fruitful and it would lead to an instruction which is more satisfactory and it would lead to better student learning.

So, after the initial design, the teacher would even find the entire process of course design a pleasant activity. A systematic course design improves the quality of learning and also can lead to better attainment of NBA outcomes. Both at the course level - better attainment of course outcome and thereby better attainment of program outcomes and program specific outcomes. Thus it leads to better learning and better attainment of the NBA outcomes and it is very helpful to follow such a systematic process.

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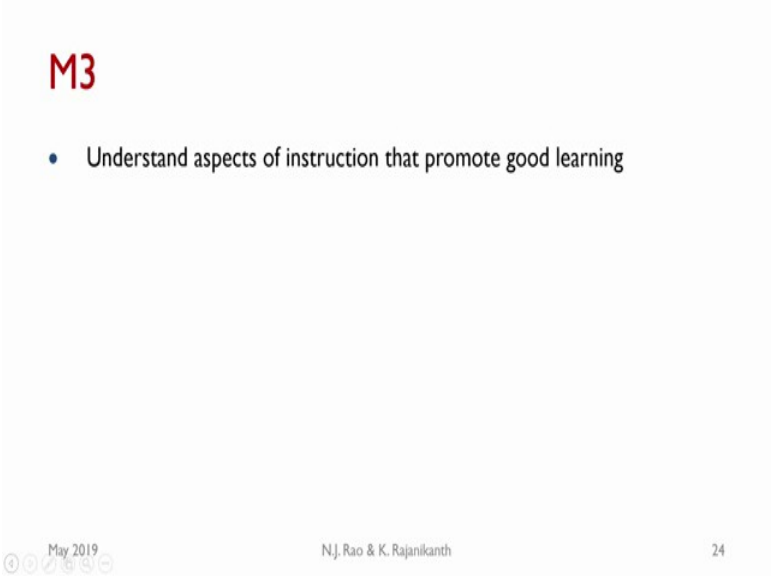

Module 3 is concerned with instruction. We look at the aspects of the instruction, what is instruction, what are the instructional components, what are the theoretical bases for such instructional approaches; different instructional approaches. Very broadly in that module, we will be concerned with instruction. Thank you and we come to the end of module 2.